Pigeons, PMV and Politics

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IDENTIFICATION OF THE DISEASE

In Victoria in late August 2011 a pigeon paramyxovirus 1 (PPMV1) outbreak was diagnosed in several pigeon lofts in Melbourne and Shepparton after the owners contacted either their local veterinarian or the Victorian Department of Primary Industry (VDPI). Infected birds were dyspnoeic, polyuric, polydipsic, and lethargic. Mortalities in most lofts ranged from 60-90% but in some lofts were 100%.

For me, the PPMV1 outbreak began on Saturday evening, 27th of August, when I returned a client's out-of-hours phone call, which turned out to be significant. The pigeons he examined in a subsequent consultation the next morning turned out to be the first with PPMV1 to be presented to a veterinarian in this country. The eventual confirmed diagnosis, along with those over the next two weeks, resulted in the closure of a State border, racing stopping mid-season, disunity within and between various pigeon racing organisations, and substantially alter the pigeon landscape in Australia, possibly forever.

On that Saturday evening, I was at the clinic routinely medicating unwell birds hospitalised in the clinic. Four out-of-hours messages had been left on the clinic's phone recording during Saturday afternoon. While there, I returned the calls. One sounded urgent. The pigeon fancier on the end of the line explained that every day some of his birds were dying. Rather than wait until Monday, I arranged to meet him at the clinic on Sunday morning about 9 am. The next morning he arrived with four birds. They were of mixed Middle Eastern breeds. Two appeared normal, and two definitely sick. The latter two were quiet, fluffed up, with one having trouble breathing. When the bird was picked up, it promptly died! The owner thought that the problem was due to the birds' feed and said that he thought that the other birds would all die. The live birds were admitted to the clinic for preliminary testing, while the dead one was left for autopsy and histopathology. Routine microscopic examination of a crop aspirate revealed no abnormalities; however, examination of the droppings showed large numbers of roundworm eggs and coccidia eggs. The birds were also on a low-protein diet containing a high percentage of wheat and sorghum, and concern was raised about the level of hygiene in the home loft, since the basket the birds were presented in contained an accumulation of droppings. It was possible that all this, perhaps combined with a secondary infection, was sufficient to cause the problems being seen. The live birds were wormed, treated for coccidia, and also started on a broad-spectrum antibiotic (mention). They were then placed in a heated cage and fed a protein-rich grain mix. It was expected that the birds would recover, since, after all, two appeared clinically normal. Autopsy of the bird that had died, showed very inflamed lungs. During the autopsy, all relevant tissue

samples were collected to be forwarded to an avian pathologist for examination on Monday morning. On Sunday evening, I returned to the clinic to again medicate the hospitalised birds. The condition of the admitted pigeons was unaltered. On Monday morning, however, one had died. Throughout Tuesday, the two remaining birds became short of breath, developed a thirst, and started producing profuse watery droppings. Both died Tuesday night, despite being hospitalised and treated for all the identified problems. I then started to think that we might be dealing with one of the more severe pigeon viruses such as circovirus, herpes virus or adenovirus. Paramyxovirus was not a consideration as this virus did not occur in Australia. Speaking to the birds' owner, he explained that 120 of his 130 birds at home were now dead. On Wednesday, I telephoned the pathologist to make sure the samples had been received and requested the results to be communicated as rapidly as possible.

On Thursday morning (1st September), a pigeon client arrived with some unwell Persian High Flyer pigeons. These are an unusual breed of fancy pigeon that originated in the Middle East. This fancier was experiencing high mortality in his birds. In fact, 29 of 50 had died in the previous few days and the birds he presented were showing similar clinical signs to the birds seen on the previous Sunday. In these birds, however, microscopic examination of crop flushes and faecal smears revealed no abnormalities. As there were no dead birds available for further testing and these initial routine tests were normal, it was decided to admit these birds, commence antibiotic treatment, and only do further testing if the birds failed to improve. The next morning, one was dead and the second had developed a severe thirst, delayed crop emptying leading to a large fluid-filled crop and profuse watery droppings. The bird that had died was autopsied. It had a large trichomonad nodule in one of its liver lobes. Again, during autopsy, all tissue samples were collected and forwarded to an avian pathologist for examination.

On Friday morning (2nd September), the VDPI rang the clinic to discuss a disease outbreak in pigeons in Shepparton, a country town approximately 200 km north-west of Melbourne. It was explained that in a loft of Persian High Flyers (the same uncommon breed), a mortality of greater than 90% had been experienced, with the birds showing clinical signs of shortness of breath and wet droppings prior to death. The similarities to the two cases that we were investigating were far greater than any coincidence. The caller advised that the VDPI had identified a type 1 paramyxovirus in pigeons in the Shepparton loft as the likely cause. This virus was subsequently named Pigeon Paramyxovirus Type 1 (PPMV)

Cloacal swabs for PPMV1 PCR testing were collected immediately from the live and dead birds belonging to these two owners. The VDPI collected these swabs that afternoon and the results were available on Saturday afternoon. Both were positive for PPMV1. In the meantime, on the Friday afternoon, another fancier arrived, again with Middle Eastern-breed pigeons. He was also experiencing high mortality in his birds. These birds were also having trouble breathing and were producing profuse watery droppings. In addition, they had lost their sense of balance and coordination and had a decreased awareness of their surroundings. Along with other tests, a cloacal swab for PPMV1 DNA testing was also collected from these birds. Their cloacal swabs confirmed a positive PPMV1 result. The pigeon landscape in Australia had drastically changed. On the Thursday, PPMV1 in pigeons was an exotic disease and did not occur in Australia. Now, only 48 hours later, we seemed to have a mini outbreak with four known cases, three of which had been to our clinic.

During the following week, approximately ten further lofts were diagnosed (three through our clinic) as being infected.

As news of the outbreak spread throughout the pigeon community and then the media, the environment in the clinic changed from busy but organised to one of controlled chaos. We had calls from the media, members of the public, VDPI representatives, disinfectant suppliers, lawyers worried about compensation if birds were culled, vaccine suppliers, other veterinarians, interstate and Victorian Government departments and, of course, many pigeon fanciers. There were radio, newspaper and television interviews, both for Australia and overseas. One American interviewer working for World News told me not to be nervous as the interview was going out to 100 million viewers. This did not help. All of this was on top of the normal case load and day-to-day running of the clinic. Overall, it was a very, very busy time.

One thing that had become apparent fairly quickly on talking to fanciers whose pigeons had the disease was that they had been to or purchased birds from a particular pet shop. This pet shop, located in Melbourne's north-west, provides a service to pigeon fanciers who have excess birds. Fanciers can take their spare birds to this pet shop, which has extensive lofts. Here they can be housed and made available for sale to other fanciers. During the week after Sunday 28th August, a significant number of pigeons had started to die in the pet shop. The owner thought he had an outbreak of circovirus on his hands. This shop continued to trade and some birds were returned to their owners. In hindsight, this was unfortunate as subsequent tests by the VDPI showed the problem not to be circovirus but PPMV1. In this way, the virus was inadvertently spread.

VICTORIAN PIGEON INDUSTRY

In Victoria, most pigeon fanciers can be divided into one of three groups:

1. **Racing pigeon fanciers**

   Racing pigeons are sleek beautiful creatures that have been selectively bred for nearly two centuries. Today's birds can return from 1,300 km or more, often at speeds in excess of 90 km/h. Approximately 8,000 people actively race pigeons in Australia. Most fanciers belong to larger federations (groups of clubs) that are found in the capital cities but most larger rural cities and towns have one, two or more clubs, typically each containing 10-25 members. In Victoria, racing is centered in Melbourne. Melbourne contains four federations representing approximately 600 members, while throughout rural Victoria large clubs are found in Geelong, Ballarat, Bendigo, Shepperton and Gippsland. Breeding occurs in August until February in a dedicated breeding loft. Young birds are weaned at four weeks of age into a purpose-built separate racing loft. Once settled, they are flown around the loft under control on a daily basis. As they mature and become fit, they are taken further and further distances from the loft. Through a combination of instinct, genetics and training, they learn to return quickly and reliably. A race program of 21 races is conducted from July until November. The races gradually increase in length as the season progresses. Short races at the start of the season are approximately 160 km, while at the end of the season the birds are returning from southern Queensland back to Melbourne, a distance of over 1,200 km. Several races are also conducted each year across Bass Strait from Tasmania. Birds are transported to the release point in purpose-built transporters. Upon release, each flies to its home loft, typically at an average speed of about 90 km/h. This means that, in a 600-km race, it takes the birds about 7 hours to return. The birds that return the fastest to their lofts win. Racing pigeons have significant financial value with average birds worth approximately $300 each and champions over $10,000. In 2009, one bird sold for $123,000 in Sydney.

2. **Fancy (exhibition) pigeon keepers**

Fancy pigeons have been selectively bred by man, literally for millennia. Some of today's breeds were known to exist over 2,000 years ago, while some of their ancestors are depicted in images associated with the Egyptian pyramids from 5,000 years ago. Today's fancy pigeons occur in a wide variety of colours, shapes and forms, with several hundred breeds of fancy pigeon occurring in Victoria. Fancy pigeons are bred to conform to published breed standards and are usually (but not always) confined to their lofts. Shows are held throughout the various Australian States, where breeders of these birds pen their birds to be judged. The winners are those that are presented in good condition and best conform to the breed standard. The principal show of the year is 'The National Show', which is conducted by the Australian National Pigeon Association (ANPA), which is the national governing body for exhibition pigeons. This show normally attracts an entry of 3-4,000 birds and rotates through the various capital cities. The national show in 2011 was conducted in Perth, Western Australia, while the national show for 2012 was scheduled to be run in Ipswich, Queensland.

3. **Pet pigeon fanciers**

These people do not belong to any formal organisation and do not show or race their birds. They enjoy keeping their pigeons as pets and typically keep smaller numbers, often 10-30 birds in a small loft in their backyard.

INITIAL CONTROL

With the initial diagnosis, the Victorian DPI adopted a policy of identification and quarantine of infected properties. Infected properties were promptly visited by departmental veterinary teams, who advised owners on quarantine and hygiene procedures. The DPI was extremely active in monitoring the disease and maintained a regularly updated website, which, together with email newsletters, kept both veterinarians and fanciers up to date with the progress of the disease and its control.

Several options were available to limit the spread of the disease once it had gained entry. These included:

1. Identification and quarantine of infected properties;
2. Education - educating pigeon fanciers about the virus and its potential means of spread so these could be avoided;
3. Limitations on bird movement - the extent of these could vary from total bird confinement, to just loft flying, or to no training or racing;
4. Vaccination; and
5. Depopulation of infected properties - never really discussed as an option although some avian veterinarians pushed very strongly for this.

The DPI very quickly and efficiently (in my opinion) looked after the first two options on this list but made only suggestions about options 3 and 4, preferring to leave final decisions here to pigeon keepers themselves. The DPI suggested that the use of PMV poultry vaccines could confer some immunity to pigeons but the exact extent of this immunity and the safety of the vaccines were unclear. They suggested fanciers discuss vaccine use with their veterinarian. The DPI also stated that the less bird contact the better and it would therefore be best that racing and shows be suspended.

However, rather than be a 'big brother' with a legislative stick, they offered this as guidance and left the final decision about restrictions on bird movement and vaccination use to the people directly involved - the pigeon keepers. I thought this was a good approach. Vaccine use and bird movement very quickly became hot topics amongst pigeon fanciers. As the outbreak had occurred in the middle of the Victorian racing season, some fanciers were keen to resume racing. They vaccinated their birds with a view to resume racing in four weeks. This outraged other fanciers, who said that the best thing was to totally confine all birds. They were angered by the suggestion that birds should be loft-flown, let alone trained or raced. Some fanciers had extreme views, one mentioning that he would rather kill his birds than vaccinate them. Another finished off an email 'yours in our once great sport'. He explained that his father and he had raced pigeons and that his son was now showing an interest but he doubted if he would encourage his son to follow this interest. Some fanciers used gossip with other fanciers as their only source of information, while others who had no experience or training in disease control became overnight experts in vaccine use and viruses generally. Some of these were very keen to disseminate information through various platforms such as internet forums. Some fanciers were selfish, short sighted, critical of others and wanted to do just what suited them. Fanciers disagreed, federations disagreed, and a coordinated plan failed to evolve.

Often fanciers were polarised into pro-vaccination or pro-confinement camps. Many fanciers, however, adopted an in-between approach, seeing the advantages and disadvantages of both control options.

After several weeks, the DPI upgraded their advice in consultation with pigeon organisations to totally ban all activities where pigeons from different lofts mix, such as races, shows and sales. Loft flying was still permitted. Whether or not to vaccinate remained a topic of debate among fanciers.

In November an executive body, headed by Mr Stephen Kearsey was formed by the Victorian pigeon industry to deal with the PMV outbreak. Since that time, the response from the pigeon industry has been more coordinated, enabling effective liaison with the VDPI, the Australian Pesticides and Veterinary Medicine Authority (APVMA), the Australian Quarantine and Inspection Service (AQIS), vaccine companies, Scolexia, veterinarians and others.

COMMENCEMENT OF THE BAN ON PIGEON MOVEMENT AND ITS EFFECT ON PIGEON RACING

The Victorian racing season consists of 21 races conducted over 17 weeks from mid-July until early November. The ban came into effect six weeks into the program. Suddenly, in one week in August, the training programs of approximately 100,000 Victorian racing pigeons in full work were stopped. Fees paid to federations for a complete season's racing were returned to members, race convoyers made claims to federations (successfully) for loss of income and broken contracts, visits to avian veterinarians to monitor health declined, competitive birds, who had been in training for six months or more, whose level of fitness, health, and motivation had been important and were destined to travel out of the State to race perhaps half a dozen times or more before the end of the year, were, for the most part, simply confined to their lofts.

An atmosphere descended over the Victorian pigeon industry of 'where to now?' In the two weeks following the initial diagnosis on 1st September, 26 infected properties were identified. In the next three weeks (15th September – 7th October), a further 15 properties were identified.

Some stories of outbreaks were quite heart-wrenching and I think that some fanciers' still-balanced approach in the face of the ongoing deaths of their birds showed their individual strength of character, if nothing else. It must have been incredibly distressing for fanciers with infected lofts to go down to their loft each morning and find more birds dead on the floor. One well-known Australian Tumbler (a breed of exhibition pigeon) breeder in Melbourne whose birds were diagnosed with the disease had earlier received an ANPA Master Breeder award. His birds were regarded as world class with some being exported to other breeders around the world. Three weeks after the diagnosis of the disease in his loft, he had two hens left, from his original 40 pairs. His life's work was gone and an irreplaceable genetic pool was gone forever.

ERADICATION?

By 10th January 2012, PPMV1 had been diagnosed in 62 fanciers' lofts throughout Melbourne and Victoria and also in 43 discreet feral populations of pigeons. On average, infections were being diagnosed in three to four new localities each week. The second week in January saw the single largest number of infections (11) diagnosed in a week. This was eclipsed the very next week with 15 new diagnoses. In February, the virus was identified in three Collared Sparrow Hawks, which had presumably become infected by feeding on pigeons, where it caused severe clinical disease and death, and an asymptomatic *Streptopelia* spp. dove. There exists the strong possibility that the virus could be carried asymptomatically or cause clinical disease in any of Australia's 21 native pigeons and doves, in particular the one indigenous columbid specie, the White Headed pigeon, *Columbia leucomelia*.

By mid-February, few people still believed that the virus could be eradicated. By this time, the virus had been identified in over 70 fanciers' lofts and also in over 70 discreet populations of feral pigeons. Feral pigeons are a species that is incredibly widespread and mobile. In overseas outbreaks, in particular Canada, the diagnosis of the disease in feral pigeons did not correlate well with the spread of the virus. PPMV1 had been identified in feral pigeons only months after the first case in a fancier's loft, by which time literally hundreds of fanciers' lofts were infected. The fact that so many feral populations had been identified as infected suggested that the virus was well and truly entrenched. Also, identifying the virus in a *Streptopelia* spp. dove was a concern. In other overseas outbreaks, native and introduced dove and pigeon species had been implicated as asymptomatic carriers of the disease. Other factors thought to also enhance the spread of the virus or make eradication difficult if not impossible included:

1. mixing of birds from different lofts, even in the absence of racing, through simple loft training;
2. failure of some fanciers with infected lofts to notify the DPI and, consequently, these lofts evading quarantine;
3. difficulty in enforcing the quarantine of infected properties;
4. persistence of the virus in a contaminated environment for up to 60 days; and
5. shedding of the virus by recovered but asymptomatic birds. In Europe, this had been demonstrated to occur for up to eight weeks.

These facts, together with a large naïve population with significant emotional and financial value, were a recipe for a potential disease disaster.

VACCINATION

By early 2012, the focus started to shift away from eradication to protecting Victoria's pigeons through vaccination. An earlier vaccine trial had been conducted in November 2011, sponsored by the VDPI and conducted by the Melbourne Bird Veterinary Clinic. Here, pigeons were bled, serology performed to confirm the birds were PPMV1-negative, and divided into three groups. One group was a control, the second group was inoculated with NDV4 (a modified live chicken-origin PPMV1 vaccine) and the third was inoculated with 0.25-ml La Sota (a killed chicken-origin PPMV1 vaccine). All birds were bled 19 days later. HI levels using Australian-strain pigeon PPMV1 as an antigen were insufficient to protect the birds.

The vaccine trials commenced in early October and were not completed until early November when the final (disappointing) blood test results came back. While the vaccine trials were proceeding, further cases of PPMV1 continued to be diagnosed on a regular basis and it was apparent that the disease was becoming more established. With the chicken PPMV1 vaccines available in Australia being shown not to be able to protect Australia's pigeons when used this way, attention then focused on gaining access to the proven vaccines available in the UK and US.

Pfizer makes '*Columbovac*', a PPMV1 vaccine that is registered for use in pigeons in the EU. It is regarded as safe, effective and has been widely used for many years. Pfizer held a sufficient volume of 'Columbovac' in Europe to meet Australia's needs and also had their EU registration dossier complete and up to date. They would submit this to the Australian authorities with a view to registering '*Columbovac*' for use in Australia. Their aim was to have this done by the end of 2011.
With the aim of expediting the registration of an overseas vaccine for use in Australia, a series of phone calls were made between Stephen Kearsey, President of the Victorian Homing Association (VHA), John Shore (VHA Vice-President) and myself. It was decided that a meeting should be held at the VHA headquarters where representatives of the APVMA, AQIS, VDPI and the various federations should meet to discuss making a vaccine available. To this end, on Thursday 17th of November, Dr John Owusu of the APVMA (having flown down from Canberra), Dr Sam Hamilton (Federal Department of Agriculture, Fisheries and Forestry, from Canberra and assistant to the Commonwealth Chief Veterinary Officer), two representatives from the VDPI, the president and secretary of the four racing federations in Melbourne (VHA, Western Pigeon Federation, Victorian Pigeon Union and the Greater Melbourne Pigeon Federation), the secretary of the ANPA and I met at the VHA headquarters in Melbourne.

This was an extremely useful meeting. Not only did the government bodies develop an understanding of the pigeon industry's need and the urgency of the situation but also the representatives of the federation learnt what was required to make the vaccine available. On the following Monday (21st November), an open meeting was held at the VHA rooms to which all members were invited. About half of the federation's members attended. Stephen Kearsey, John Shore and I summarised the situation to members and answered their questions. On Tuesday (29th November) of the following week, Stephen Kearsey and I met with the Victorian Chief Veterinary Officer, Dr Andrew Cameron, at his offices just north of Melbourne. Dr Cameron explained that, with several further locations being identified as infected each week, a huge vulnerable pigeon population, no effective vaccine available, the extremely high morbidity and mortality rate associated with the disease and the disease being identified in feral pigeons, Victoria 'wants and needs' an effective vaccine. Dr Cameron explained that he would write to both the APVMA and AQIS, explaining the situation, and urge them to prioritise the vaccine registration process so that an effective vaccine could be made available as quickly as

possible.

By the end of the year, Pfizer had submitted their registration application to both APVMA and AQIS, Dr Cameron had written to the APVMA asking that this and any other application received be prioritised, and John Owusu had acknowledged receipt of the application and the request to give it priority and had agreed to do this. It was a good example of various government bodies, pigeon organisations and private business working together to achieve an objective. The normal time to register a vaccine in Australia is 15-18 months. Indications were that, depending on AQIS, this registration approval would be completed in the comparatively short time of four to five months.

While these meetings and activities were proceeding, a second vaccine company MSD was also indicating its desire to submit a registration application for its pigeon PPMV1 vaccine, 'Nobivac'. This vaccine is also registered in the EU, where it is widely used. This application was submitted in mid 2012. Full evaluation is anticipated to take approximately 15 months.

Throughout January, the Consultative Committee for Emergency Animal Disease (CCEAD) reviewed available literature and made a submission to the DPI that 0.5 ml La Sota given twice at a 4 week interval would be likely to confer protective immunity in pigeons 4 weeks after the second inoculation. This vaccine is available in Australia. The CCEAD's advice was passed on to the Victorian executive body by Dr Andrew Cameron during a meeting at the Victorian Homing Association headquarters in Melbourne in March. Victorian pigeon keepers were quick to adopt this advice and in the following weeks over a third of a million pigeons were vaccinated with La Sota vaccine throughout Victoria. In the meantime the APVMA had concluded its assessment of 'Columbovac' by mid-January and deemed it safe and efficacious. However, because of the availability of La Sota vaccine already in Australia and a perceived biosecurity risk by AQIS of importing an overseas vaccine, this application was declined.

A SECOND VACCINE TRIAL

A second vaccine trial to evaluate the effectiveness of the protocol prepared by the CCEAD was developed by Dr Peter Scott of Scolexia, implemented by the Melbourne Bird Veterinary Clinic and sponsored by the Victorian pigeon industry. This second vaccine trial commenced on the 27th of March 2012.

The full protocol is included as Appendix 1. Basically 60 pigeons of mixed ages, breeds and sexes were moved into two vacant pigeon lofts. All birds were bled. A HI test using NDV as the antigen and chicken red blood cells, a HI test using NDV as the antigen and pigeon red blood cells, and an NDV ELISA test was done on each sample to check for earlier PMV exposure. The test results indicated no earlier exposure. Blood was also stored for subsequent HI testing at the Australian Animal Health Laboratory (AAHL), using pigeon PPMV1 as the antigen.

All birds were randomly assigned to three groups. One group was a control, the second received V4 vaccine and then La Sta vaccine four weeks later, and the third received an initial La Sota vaccine and a second La Sota vaccine four weeks later. All birds were bled four weeks after the first inoculation and again four weeks after the second inoculation. HI values four weeks after the first inoculation indicated that only one of the birds in the V4 group were likely to be immune against pigeon PPMV1 compared to 65% of the La Sota birds, based on the HI readings when using NDV as the antigen. HI values four weeks after the second inoculation indicated that 100% of birds in both groups would be

unlikely to develop disease if challenged with pigeon PMV, again based on their HI response when using NDV as the antigen. The average HI titre was higher, however, in the birds that received two La Sota inoculations. All control birds returned zero HI titres throughout the entire trial. Again, samples of blood from all birds at each bleed were stored for subsequent HI testing at AAHL using pigeon PPMV1 as the antigen.

At the completion of the trials, a HI using pigeon PPMV1 as the antigen was done on all stored blood samples. In the results from the third bleed (25/5/12), when pigeon PPMV1 was used as the antigen, six of the V4-La Sota group and 16 of the La Sota-La Sota group demonstrated HI levels regarded as high enough to prevent the development of disease if exposed to pigeon PPMV1. The full results from the blood samples collected four weeks after the first and second inoculation are attached as Appendix 2.

It is worth noting that all birds remained clinically normal during the trial. In fact, all birds gained an average of 15% body weight, possibly through being confined and having free access to food. The birds were hopper-fed Australian Pigeon Company Pigeon Maintenance pellets and G9 pigeon grit. No local vaccine reactions occurred. Because the birds had been randomly assigned to the groups, mature cocks and hens were in each group. These paired up, experienced normal fertility and raised and weaned clinically normal robust young during the trial. There was no readily discernible difference in the immunity formed based on age, sex or breed.

The results of the trial were consistent with the CCEAD advice. These results are likely to be used by Australian vaccine companies to extend the registration of La Sota vaccine from chickens only to include pigeons. The Victorian pigeon industry is continuing to fund the trial with the trial birds being bled every two months. Continued monitoring of HI levels is expected to indicate a time at which a booster would be appropriate. Similar testing in Europe has indicated that annual boosters are required to maintain protective immunity.

VACCINATION - JUST VICTORIAN PIGEONS OR NOT?

As the disease continues to be regularly diagnosed in Victoria, Victorian fanciers should all consider inoculating their birds. As to whether or not use of the vaccine should be encouraged in States other than Victoria is debatable. No fancier wants to be the first case diagnosed interstate through not vaccinating his birds, but is it really worthwhile having hundreds of fanciers spending hundreds of dollars vaccinating thousands of pigeons against a disease that doesn't occur there?

Based on the manufacturer's claims in chickens and the level of immunity formed in pigeons in the EU, it is thought that the proposed vaccine protocol will confer sufficient immunity to prevent vaccinated pigeons showing signs of PPMV1 infection, but will not prevent them, if exposed to the virus, from carrying and excreting it for several weeks. In this way, inoculated pigeons can mask the spread of the virus. The principal aim of non-Victorian DPIs is to prevent the introduction of the virus to their States. For this reason, it is likely that vaccinated Victorian pigeons will still not be allowed to race out of the State unless the disease is diagnosed in other States. This is also the reason why, if South Australian, New South Wales and Tasmanian pigeons are vaccinated, they are still unlikely to be allowed to race into Victoria. Such birds could be exposed to the virus in Victoria and carry the virus home without showing any clinical signs. For the same reasons, Victorian exhibition pigeons are unlikely to be allowed to be shown interstate and the birds from other States are unlikely to be shown in Victoria.

Most advice from Victorian veterinarians is that Victorian fanciers should definitely vaccinate but interstate fliers should not necessarily unless the disease is diagnosed in their State. Racing federations and fancy clubs, of course, may make recommendations or indeed rulings to their members but many people that keep pigeons in Australia do not formally race or exhibit their birds and as such do not belong to any organisation. This means that, in many circumstances, the decision to vaccinate or not will be an individual one. Fanciers will need to consult with their veterinarian, take their club's advice and consider what risk they are prepared to take.

REVIEW OF CONTROL MEASURES

Was the program to eradicate PPMV1 in pigeons successful? The short answer is 'No'. Was the program successful in containing the outbreak and preventing PPMV1 becoming established and widespread? Probably the control measures have slowed the rate of spread but again the simple answer is 'No'. One could argue that the millions of dollars and thousands of man-hours spent on the programs aiming to control this disease have been wasted. The disease is now well and truly established, with the virus being identified in over 150 different locations throughout Victoria as of the end of March 2012. Just why this has happened is open to debate. One could argue that, although the VDPI staff on the ground have done a great job, the basic control plan was flawed from the start, or perhaps the whole process was doomed to failure from the beginning, having as its objective an almost impossible aim. After all, in all other countries where pigeon PPMV1 has been diagnosed, it has not been eradicated. A university academic who is also an avian veterinarian with experience of several PPMV1 outbreaks in pigeons overseas suggested, right at the start that the control measures were far too conservative. He advocated that birds on infected properties should all be culled. One should remember that there have been several outbreaks of Newcastle disease (which is caused by a similar PPMV1) in chickens in Australia. All of these have been successfully eradicated. Others suggested that unsupervised quarantine was not really quarantine at all - simply relying on the quarantined fanciers' honesty to comply. Also, some have suggested that lofts were released from quarantine too early when the environment could still have been contaminated. To some observers, watching the weekly DPI postings on their website and monitoring the slowly rising number of infected locations has been like watching a slow train wreck reaching an inevitable conclusion - the disease becoming endemic.

The DPI program has, however, achieved other objectives. The progress of the disease has been well monitored, the pigeon community has been kept fully informed of the situation, affected fanciers have been well supported, fewer pigeons have become sick and died because of the control measures, vaccine advice has been given and trials have been conducted, the effect of the virus on chickens has been investigated and pigeon fanciers have been educated about PPMV1. The DPI has been fully prepared, and indeed willing, to liaise with the pigeon community from the start, taking advice on the potential ways the virus could be spread and suggestions on bans on pigeon movement. One can imagine the various responses from the pigeon community if the decision had been made to not only quarantine infected premises but also cull the birds on these premises. I think the majority of pigeon fanciers, given the circumstances, have been impressed by the job done by the DPI.

SITUATION WITH CHICKENS

Chickens have been deliberately exposed to the virus in Victoria by the VDPI. This testing showed that chickens could become infected with the virus but did not show clinical signs. When these infected chickens were subsequently mixed with further chickens at a second location, they were able to pass

the virus onto some of these birds in the second group. After several weeks, all chickens cleared the virus and at no time showed clinical signs. From a pigeon fancier's point of view, this meant that chickens could also be a source of infection to their birds.

THE FUTURE

PPMV1 is now regarded by many as established in Victoria and has the potential to spread Australia-wide. It is, however, unlikely to have any significant effect on the owners of pet pigeons. They simply need to ensure that vaccination of their birds against PPMV1 becomes incorporated in their normal health management program, along with other basic health procedures like vaccination against pigeon pox and routine parasite control measures.

On the other hand, PPMV1 has a potentially devastating effect on both the racing and showing industries. Certainly, these birds can be inoculated and protected but the difficulty comes in that, as mentioned earlier, although the level of immunity conferred by vaccination is sufficient to prevent the development of clinical disease, it is thought to be insufficient to prevent vaccinated birds from being infected by the virus, being asymptomatic carriers for 2-3 weeks, and excreting the virus during this time. Unless PPMV1 is diagnosed in other States, this means that it is unlikely pigeons can be raced out of Victoria.

Two-thirds of races are from distances greater than can be achieved from releases within Victoria. For many fanciers, the real allure of the sport is to race from the longer distances. Repeated, short races from within Victoria have little appeal, not allowing the birds to demonstrate their real capabilities. Certainly, birds going interstate can be tested for PPMV1 (usually by a cloacal PCR for PPMV1) but, as most races have between 5000 and 10,000 birds entered and it is important that birds arrive promptly at the release point from their lofts so as not to compromise their ability to return, this is almost impossible and impractical.

Similarly, the exhibitors of fancy birds are restricted to Victorian shows only and excluded from national competition, something which makes this activity much less attractive, particularly to the larger, more successful studs. As a high-ranking government official said in a recent meeting, 'It would just be simpler if the disease spread interstate'. It is hard to believe that, given the passage of time, this will not occur.

The disease is also likely to negatively impact on Victorian studs and fanciers who sell pigeons interstate. Current regulations require that all birds are tested for PMV using a cloacal PMV PCR prior to leaving Victoria. This currently costs $300 for the first five birds (a single pooled sample) and $40 for each five after that, significantly adding to the purchase price of the birds.

For Victorian fanciers now, however, it will simply be a matter of inoculating the birds each year, as do all other pigeon fanciers around the world (except for a few small areas like New Zealand). Perhaps Victorian fanciers should consider themselves lucky to have escaped the disease for as long as they have. What happens in the future is essentially dependent on whether PMV spreads to the other states or not.

Appendix 1

PROTOCOL

EFFICACY AND SAFETY OF POULTRY NEWCASTLE DISEASE VACCINES IN PIGEONS

TRIAL NUMBER: SCX-12-02

Title: Evaluation of the efficacy and safety of poultry Newcastle Disease vaccines when used (off-label) in pigeons.

Purpose: To provide information for veterinarians to allow an informed decision for the 'off-label' use of both live and killed Newcastle disease (ND) vaccines currently registered for use in poultry in Australia

Key Personnel: Principal Investigators: Dr Peter Scott, Scolexia Pty Ltd
Dr Colin Walker, Melbourne Bird Veterinary Clinic

Testing Facility: 1 George St, Scoresby, Victoria 3179

Proposed Start and Finish Dates: To be determined (March, April 2012)

Test System: Racing pigeons

Experimental Material: Poulvac® Newcastle V4 (Pfizer Animal Health a division of Pfizer Australia Pty Ltd)
Poulvac® Newcastle iK vaccine (inactivated) (Pfizer Animal Health division of Pfizer Australia Pty Ltd)

Justification of the Test System:
Pigeons are essential to demonstrate efficacy and safety in the intended vaccine recipients.

Test System Description:

All birds for the trial must be tested negative for antibodies to Avian Paramyxovirus 1 APMV1 (preferably from a known APMV-1-free area). All birds will be assessed as fit and healthy prior to inclusion in the study.

Test System ID: The pigeons will already be individually identified with leg bands. The weight and age of each bird will also be recorded on form 1.

Housing: Each treatment group (or at least each group vaccinated with live NDV vaccine) will be housed in an individual pen in the loft facility.

Experimental Design:

Group	Treatment	Animals/Group
T1	Controls	20
T2	Poulvac® V4 (live), followed by Poulvac® iK (inactivated) booster 4 weeks later	20
T3	Poulvac® iK (inactivated), followed by Poulvac® iK (inactivated) booster 4 weeks later	20
Total		60

Hypothesis:

H_0: Group (T2 or T3) NDV titre = Group NDV titre
H_1: Group (T2 or T3) NDV titre > Group NDV titre

And:

H_0: Group (T2 or T3) NDV titre < 2^3
H_1: Group (T2 or T3) NDV titre $\geq$ 2^3

Allocation:
The birds will be ranked on weight and allocated to one of the three groups randomly as set out in allocation form 8.

DOSE AND ROUTE OF ADMINISTRATION:

Treatment group T1 will receive no vaccinations.
Treatment group T2 will initially receive Poulvac® Newcastle V4 (live virus vaccine) given by eye drop. One drop of reconstituted vaccine will be dispensed into the birds eye using a dropper bottle and teat, allowing the drop to fall onto the eye and spread over the surface of the eye. Treatment group T3 will initially be injected subcutaneously with 0.5 mL of Poulvac® Newcastle iK vaccine (inactivated). After 28 days groups T2 and T3 will be injected subcutaneously with 0.5 mL of Poulvac® Newcastle iK vaccine (inactivated). Treatments will be recorded on form 3.
The 0.5 mL dose of Poulvac® Newcastle iK vaccine contains at least $10^{7.8}$ EID_{50} Newcastle Disease Virus La Sota strain prior to inactivation. This compares to the pigeon vaccine Colombovac® PMV which contains a minimum antigen dose of $10^{7.9}$ EID_{50} (La Sota strain) prior to inactivation.
Each drop of Poulvac® Newcastle V4 contains Newcastle Disease V4 strain virus $10^{6.0}$ EID_{50} when used with Poulvac Eyedrop Diluent and eyedropper teat.

PROCEDURES:
Identification
Tag numbers and bird details will be recorded on form 1 (Bird details).
Treatment
Treatments will be as described in the dose and route of administration section. Treatments will be recorded on form 3.

Monitoring
Birds will be monitored for normal behavioural activity including drinking and feeding. The birds will be monitored for depression, inappetence and any other abnormal signs. Monitoring will be recorded on the monitoring form (form 2). Abnormal behaviour or clinical signs will invoke a veterinary examination and the veterinarians report will be recorded on form 7. Animals removed from the study will be recorded on form 5.

Blood sampling
Blood will be collected by venipuncture of the jugular vein using a small 27 gauge needle removing between 0.5 and 1.25 ml from each bird. Sample Collection (form 4) will be used to record blood sampling.

Autopsy
Autopsy will only be carried out in the event of unexpected illness and following clinical examination and on the decision of the attending veterinarian. Autopsy findings will be recorded on form 6.

Serology
Blood samples from treated birds will be transported to Ace Laboratories (Gildea Lane, East Bendigo) for the following test procedures:
Haemagglutination Inhibition (HI) test for Newcastle Disease Virus antibody using NDV V4 as the antigen with chicken red cells
HI test for Newcastle Disease Virus V4 antibody using NDV V4 as the antigen with pigeon red cells
BioChek ELISA for Newcastle Disease Virus antibody
A subsample from each bird will be forwarded to the Australian Animal Health Laboratory (AAHL) (Port Arlington Rd, East Geelong) for the following test:
HI test for Newcastle Disease virus antibodies using APMV-1/pigeon/Shepparton/2011 as the antigen and using chicken red cells
At least 2.5 mL of blood will be required to provide red cells for the pigeon cell based HI test. This should be taken from three tested negative (NDV HI) birds (1 mL per bird) and will be placed in sodium citrate collection tubes at the time of bleeding the test birds.

DATA RECORDING

All data generated during the conduct of a study shall be recorded directly, promptly, and legibly in black ink on approved, printed forms or in a bound laboratory notebook. Use of pencil for data generation is strictly not allowed.

All data entries shall be dated on the day of entry and signed or initialed by the person making the observation and/or recording the data. Should more than one person make the observation and/or record the data, entries should be properly attributable to each person.

If a mistake occurs during the actual collection or post-collection period, the mistake should be corrected by a single strike-through, so as not to obscure the original entry, and the correct data recorded. The change to the raw data must be initialed and dated at the time of the change by the person making the change, and the reason for the change shall be stated. Use of white-out or erasures for data changes is strictly not allowed.

DATA COLLECTION:
Origin and description of the birds
Allocations
Age and weights
Dose volumes and treatment types and date
General health observations
Autopsy observations
Serology

RECORDS TO BE MAINTAINED:
As for data collection
Protocol
Animal receipt and disposition
Protocol amendments and deviations

DISPOSITION OF ANIMALS:
The birds will remain in their loft and will continue under their normal husbandry regime.

STATISTICS:
Log transformed mean NDV HI titres from groups T02 and T03 will each be compared to mean titres from group T01 using a student's t-test assuming unequal variance. HI values of 0 will be assigned the value of 0.1 for log transformation. The null hypothesis will stand if the probability (P) is greater than 0.05. The alternate hypothesis will be demonstrated if $P \leq 0.05$.

Timetable:

Day -7	Bleed all birds from flock to ascertain that the flock is negative for NDV and Pigeon Paramyxovirus antibodies. Send bloods to Ace Laboratories.
Day 1	Record bird numbers and descriptions, allocate to treatment group and monitor bird's health and behaviour. If healthy treat group T2 with Poulvac® Newcastle V4
Day 1-14	Monitor hourly after treatment for 2 hours, then 4 hours after treatment and then twice daily for abnormal health or behaviour using the monitoring check sheet.
Day 15-28	Monitor daily for abnormal health or behaviour using the monitoring check sheet. Record any clinical signs and/or mortality.
Day 28	Bleed all birds from each treatment group for HI and ELISA testing as detailed under serology. Bleed 3 non-trial birds for red cells for HI testing with species specific HI
Day 28	Vaccinate groups T02 and T03 with killed NDV vaccine.
Day 29-56	Monitor daily for abnormal health or behaviour using the monitoring check sheet. Record any clinical signs and/or mortality.
Day 56	Bleed all birds from each treatment group for HI and ELISA testing for as detailed under serology. Bleed 3 non-trial birds for red cells for HI testing with species

APPROVAL:

By signature, the undersigned have discussed, understood and agreed to the above described protocol. If any future changes are necessary in the protocol, they will be made by protocol amendments signed by the principal investigator and trial monitor.

Principal Investigator.....
Dr Peter C Scott

Date.....

Principal Investigator.....
Dr Colin Walker

Date.....

Appendix 2

Bleed 1/5/12 V4

Lab. No.	Tag No.	NDV HI-CRBC	NDV HI-PRBC	NDV ELISA	PPMV HI-V
		Log 2	Log 2	Titre	Log 2
1	2333	0	0	1	0
2	683	2	1	1	0
3	18014	2	1	10	0
4	18604	1	0	228	0
5	333	2	1	1	0
6	1133	0	0	1	0
7	21684	2	2	1	0
8	1637	2	1	10	0
9	30944	2	1	93	0
10	30923	0	1	1	0
11	19863	0	2	1	0
12	3216	0	0	20	0
13	222	0	0	1	0
14	3208	3	4	1	0
15	3213	1	2	1	0
16	3225	2	1	1	0
17	19516	1	1	10	0
18	24985	0	0	1	0
19	27503	0	0	1	0
20	30950	0	0	53	0
Mean Flock Titre		1	0.9	22	0
% CV		103	113	245	
Positive		>3	>3	>1159	>3
Low Positive Negative		<3	<3	<1158	<3

CV = Coefficient of Variance
standard deviation of a group of values divided by their mean. Often that ratio is multiplied by 100 to express the coefficient of variation as a percent (abbreviated %CV).

Bleed 1/5/2012 La Sota

Lab. No.	Tag No.	NDV HI-CRBC	NDV HI-PRBC	NDV ELISA	PPMV HI-V
		Log 2	**Log 2**	**Titre**	**Log 2**
1	1087	0	0	195	0
2	111	5	3	2636	4
3	3248	2	1	10	0
4	30921	5	3	464	0
5	6419	4	3	83	0
6	3260	4	3	238	0
7	3218	4	3	83	0
8	33509	1	2	1	0
9	30911	1	2	93	0
10	20558	4	1	103	0
11	10976	4	3	1	0
12	30700	5	3	73	0
13	1301	0	0	1	0
14	9461	0	0	10	0
15	17105	4	4	63	0
16	12389	6	4	10	0
17	17825	7	5	1642	0
18	3446	6	5	536	0
19	3224	5	5	146	0
20	29186	0	0	185	0
Mean Flock Titre		3.4	2.5	329	0
% CV		68	68	200	447
Positive		>3	>3	>1159	>3
Low Positive Negative		<3	<3	<1158	<3

Bleed 1/5/12 Control

Lab. No.	Tag No.	NDV HI-CRBC	NDV HI-PRBC	NDV ELISA	PPMV HI-V
		Log 2	Log 2	Titre	Log 2
1	11153	0	0	1	0
2	17814	0	0	1	0
3	3266	0	0	1	0
4	19527	0	0	1	0
5	1063	0	0	10	0
6	30917	0	0	1	0
7	14778	0	0	1	0
8	30922	0	0	1	0
9	17898	0	0	1	0
10	32451	0	0	1	0
11	6497	0	0	1	0
12	30947	0	0	1	0
13	9474	0	0	1	0
14	27389	0	0	53	0
15	466	0	0	1	0
16	465	0	0	1	0
17	29463	0	0	103	0
18	21541	0	0	1	0
19	3219	0	0	1	0
20	5100	0	0	1	0
Mean Flock Titre		0	0	9	0
% CV				273	
Positive		>3	>3	>1159	>3
Low Positive Negative		<3	<3	<1158	<3

Bleed 29/5/12 V4 x La Sota

Lab. No.	Tag No.	NDV HI-CRBC	NDV HI-PRBC	NDV ELISA	PPMV HI-V
		Log 2	Log 2	Titre	Log 2
1	18604	8	8	321	0
2	18014	7	10	394	0
3	3213	7	5	73	0
4	3225	7	8	232	0
5	683	7	6	123	4
6	24985	6	6	36	0
7	1133	7	8	298	0
8	1637	8	7	103	0
9	3208	8	7	123	4
10	21684	8	8	474	4
11	222	5	5	1	0
12	30950	7	8	341	0
13	19516	7	8	1	0
14	3216	8	8	202	4
15	30944	8	9	371	5
16	333	8	9	219	4
17	19863	4	4	341	0
18	2333	5	5	73	0
19	27503	5	8	421	0
20	30923	5	5	60	0
Mean Flock Titre		6.8	7.1	210	1.3
% CV		19	23	72	158
Positive		>3	>3	>1159	>3
Low Positive Negative		<3	<3	<1158	<3

Bleed 29/5/12 La Sota x La Sota

Lab. No.	Tag No.	NDV HI-CRBC	NDV HI-PRBC	NDV ELISA	PPMV HI-V
		Log 2	Log 2	Titre	Log 2
1	1301	8	5	341	4
2	20558	7	7	974	5
3	1087	7	7	719	3
4	9461	7	8	632	4
5	6419	7	7	719	4
6	17105	6	7	159	2
7	30921	7	9	821	2
8	29186	7	8	474	5
9	12389	8	9	791	5
10	3260	8	10	748	6
11	3248	8	8	262	0
12	3229	8	9	844	4
13	17825	9	6	6123	4
14	3446	7	10	1921	3
15	30911	6	8	219	3
16	33509	7	6	1	0
17	30700	7	8	1	5
18	111	7	8	619	4
19	10976	7	8	146	4
20	3218	7	8	189	4
Mean Flock Titre		7.3	7.8	835	3.6
% CV		10	16	158	44
Positive		>3	>3	>1159	>3
Low Positive Negative		<3	<3	<1158	<3

Bleed 29/5/12 Control

Lab. No.	Tag No.	NDV HI-CRBC	NDV HI-PRBC	NDV ELISA	PPMV HI-V
		Log 2	Log 2	Titre	Log 2
1	21541	0	2	1	0
2	9474	0	2	1	0
3	466	0	2	1	0
4	17814	0	2	1	0
5	27389	0	2	1	0
6	30922	0	2	212	0
7	5100	0	2	1	0
8	1063	0	2	1	0
9	465	0	2	1	0
10	3219	0	2	1	0
11	19527	0	2	1	0
12	29463	0	2	7	0
13	3266	0	2	1	0
14	11153	0	2	1	0
15	30917	0	2	1	0
16	6497	0	2	1	0
17	90947	0	2	1	0
18	17898	0	2	1	0
19	32451	0	2	1	0
20	14778	0	2	1	0
Mean Flock Titre		0	2	12	0
% CV				387	
Positive		>3	>3	>1159	>3
Low Positive Negative		<3	<3	<1158	<3