

Update 17th January – Melbourne Bird Vet Clinic – Dr. Colin Walker AgriBio and Intervet meetings

Yesterday was a day of meetings. In the afternoon I met with Dr Grant Rawlin and Dr Christina McCowan at AgriBio. Essentially the meeting was to bring me up to speed with all the various diagnostic endeavours that are proceeding at AgriBio and AAHL regarding Reovirus. A trial is being set in place to see what effect (if any) the virus has on chickens. There are also plans to investigate whether the virus can be carried by other species of bird that may in turn pass the virus to pigeons. The virus cultures have generated good amounts of virus (not an easy thing) for further testing, such as electron microscopy and gene sequencing. This work is not only being done by AgriBio but is being repeated by AAHL and the University of Melbourne to back up the first set of results. AgriBio staff are well aware of the need for urgency in this diagnostic work and are proceeding as quickly as possible. The sequencing will take a bit longer with results now expected next week. They will be forwarded to me as soon as they are available.

Later in the day, I had a phone hook up with Dr Tom Grimes of Intervet. In order to spend the short period waiting for the Reo sequencing results productively, we are preparing to begin the vaccine sequence comparison as soon as the results are available. We are informing the experts at Intervet now so that they are expecting the sequencing results and are able to make their recommendations on likely cross-immunity as quickly as possible. On Friday I am having a combined hook up with Dr Tom Grimes and Robin Anderson, both of Intervet. Robin is Poultry National Sales Manager. I have been advised that gene sequencing comparisons usually take 2 to 3 days. If it appears that cross-immunity is likely from one of the overseas vaccines, it will then be a matter of getting our import approval submissions to the APVMA and Biosecurity Risk Assessment as quickly as possible. I have already spoken at length to both of these departments and will fly to Canberra once the submissions have been made in an effort to expedite their processing.

As explained in previous posts, if it appears that the available overseas vaccines are unlikely to offer any cross-immunity, then a vaccine will need to be made here. I have made enquiries with 5 companies that may be able to do this work for us. For now though, it is a matter of waiting for the sequencing results and completing the comparisons with the vaccines as promptly as is practicable.

Viruses all the same

To date, all completed testing done at AgriBio and AAHL in Victoria has confirmed that the disease that affected pigeons in WA in May/June and in the eastern states since December is the same.

WA Report

The Department of Agriculture and Food Western Australia (DAFWA) has advised that their report on the pigeon disease outbreak that occurred in Western Australia in May has passed to the next regulatory level for approval prior to release! They are unable to give a time when the report will be available. However with Victoria essentially having diagnosed the cause of the disease and with all results indicating that the disease in WA, NSW, SA and Victoria is the same, this report has probably become irrelevant to the diagnostic and disease management processes. Some fanciers will be surprised to learn that this report is still not available, with some suggesting that the delay in diagnosis and failure to close the WA border contributed to the spread of the disease to the rest of the country. The cause for the delay is unclear.

Reo Virus overseas and its implications for Australia

I have had some correspondence from two of my European veterinary colleagues, Dr Pascal Lanneau from Belgium and Dr Dennis Rubbenstroth from Germany. They have advised that they have information on Reovirus infection in 2 unrelated pigeon flocks suffering from disease.

In the first case

- Reoviruses from pigeons were isolated mainly from juvenile birds suffering from diarrhea (McFerran, 1976).
 - Serological tests suggested a wide distribution in racing pigeon flocks in Germany (Heffels, 1981).
 - The authors sequenced an isolate from a racing pigeon flock with mortality of juvenile birds.
 - The virus was isolated in cell culture and sequenced.
 - There is apparently only minimal cross-reactivity with chicken reoviruses.
 - The sequence belonged to an independent clade (taxonomic group). The next relative originated from a sea lion (70% amino acid identity). (I have no information which segment(s) was/were tested.)
- In this case it was unknown, whether Reoviruses in pigeons were species-specific or the result of spill-over infection from other species (e.g. poultry).

In the second case

- a Reovirus was suspected in a squab with diarrhea, which originated from a flock with losses of juvenile birds. A virus was isolated in cell culture and provisionally identified as Reovirus by electron microscopy.

This is obviously a very different pattern of disease from what we are seeing in Australia. Dr Rubbenstroth feels (like me) that the virus we are currently dealing with has probably originated in Australia after a genetic shift in a Reo virus already present altered that virus's ability to cause disease. This raises further questions for Australian fanciers. If this virus has originated here, it has the potential, in theory, to infect the world's

pigeons. There may be some hesitation by some overseas countries to accept for import pigeons coming from Australia, including those being entered in 'one loft' races. I have been advised that the Victorian authorities have an obligation to advise the Australian national authorities, who in turn have an international obligation to notify other countries of a potential animal health threat.

AgriBio assisting fanciers to get an accurate diagnosis.

AgriBio has advised that they are once again prepared to back up Victorian veterinarians by covering the cost of diagnostic work on suspect Reo birds. Fanciers who suspect that their birds may be infected are strongly advised to contact their veterinarian and seek an accurate diagnosis. Not every bird that becomes unwell in Victoria over the next few months will have Reo virus and fanciers should not assume that their birds have the disease based simply on the symptoms that they are showing. Fanciers should take an unwell live bird to their veterinarian, who will be able to collect the samples necessary for diagnosis and forward these to AgriBio. There will be charges from your local veterinarian but all costs directly associated with diagnostic testing will be covered by AgriBio. This is a generous offer and is an example of a government body working directly with fanciers to help solve a problem. Fanciers should avail themselves of this service.

Update Wednesday 11th Jan, 2017 Melbourne Bird Vet Clinic – Dr. Colin Walker

Progress. Some technical stuff

I have had contact with Dr Christina McCowan at Agribio today. Christina is guiding the gene sequencing process. She advises that the sequencing is taking a bit longer than envisaged and will not be completed until early next week. This is still very quick. We were hoping that the results would be available this week but there are constraints on this process. She has also advised that the embryos from virus isolation are showing positive changes that are consistent with viral, possibly Reo viral disease. She will look at them histologically and Agribio will examine the fluids in various ways, mainly molecular. She is also expecting more electron microscopy (EM) from AAHL within the next week.

Agribio is sending some tissues to Prof Amir Noormohammadi at the University of Melbourne so that he can run the chicken Reo PCR that his department has developed on Victorian samples. The positive results reported earlier were done on WA pigeon samples

Crossroads

The next week is a pivotal one for the Australian pigeon community. The sequencing results and then their comparison with the available vaccines will determine whether we will be applying to import a vaccine or need to make one in Victoria. The 2 authorities who need to OK the import of a vaccine are the APVMA and Biosecurity Risk assessment. I have spoken to both the APVMA and Biosecurity. The APVMA indicated that, with a critical national need (as here), they could issue an import permit in 1-3 months. Biosecurity will take longer; they estimate 3-6 months to issue their permits. If the sequencing indicates likely cross immunity and the permit application process proceeds smoothly, then this would mean the entire country can race and show this year even if this means for some organisations starting their season a bit later or running a compressed or shorter season. To make a vaccine would take 18 months so this means potentially no competition. I have been advised that it is important that the decision makers are made aware of a critical national need. To this end, I will endeavour to set up meetings with Australia's Chief Veterinary Officer in Canberra (as we did with the PMV) outbreak and also the Minister, Mr Barnaby Joyce. I have contacted both Zoetis and Intervet and arranged to forward the sequencing results as soon as they are available to their experts so they can evaluate the potential for cross immunity from their chicken vaccines to pigeons.

USA

As many fanciers are aware, there are reports from the USA about a mystery disease killing large numbers of pigeons there. Some Australian fanciers have been concerned that it may be the same disease as in Australia. I have contacted a number of my US veterinary colleagues and have been advised that a number of these cases have been diagnosed as PMV. Other cases are still being investigated. I will make veterinary results available as I receive them

New cases

Since Monday eleven new lofts have either been confirmed or are under strong suspicion of having the disease. One is in Dandenong. The rest are all in Melbourne's north west. Of these, three are non- racing lofts

Correct PMV dose

There has been a suggestion that the dose for PMV vaccine is too high and that the vaccine in its adjuvant (i.e. its carrier or base) predisposes the birds to illness and infertility. A dose of 0.25 ml has been suggested. The recommended dose of both Poulvac and Neucovac killed La Sota vaccines in Australia is 0.5 ml twice, 4 weeks apart. The dose of 0.5 ml was proposed by the Consultative Committee for Emergency Animal Disease (CCEAD). It was also the dose used during the 18-month vaccine trial that was conducted in 2013. One of the principal aims of the 18-month PMV vaccine trial that was conducted in 2013 was to ensure that the suggested vaccine protocol did the pigeons no harm. No harm could be demonstrated. The test results passed the rigorous standards of the APVMA enabling Pfizer/Zoetis to register the vaccine for use in pigeons. The trial was also published in the prestigious peer-reviewed Australian Veterinary Journal. These ultimate authorities were happy with the conclusions that the suggested protocol was not harmful to pigeons and conferred strong immunity. The killed La Sota-based vaccine used in Australia is used in many countries around the world including the UK and USA. It has been suggested that the dose of 0.5 ml is not the manufacturer's recommendation. I emailed today Mr Phil Lehrbach who is in charge of Zoetis' (the vaccine's manufacturer) product distribution for Australasia and SE Asia. He advised that the dose is 0.5 ml. There are other brands of La Sota vaccine available in the world where the recommendation is that a different volume be injected. Unlike some other drugs, the vaccine volume is not based on weight but the level of activity of the vaccine. This means that a stronger vaccine may require a lower injection volume. People and particularly media who advise a different, particularly lower dose rate must be prepared to accept responsibility for pigeons catching PMV because fanciers followed their advice and gave a different dose that failed to develop protective immunity in their birds. They should also be prepared to back up such opinions with published peer-reviewed scientific data (as with the recommended dose) rather than just someone's theory. Fanciers should give PMV vaccine at a dose of 0.5 ml twice, 4 weeks apart, and should be confident that the vaccine is not harming their birds.

Melbourne Bird Vet Clinic – Dr. Colin Walker
Update Friday 6th Jan

I spoke to Dr Christina McCowan at AgriBio today. She believes they are still on track to have the gene sequencing completed by the end of next week. This is great work. As explained earlier this will give a good indication as to whether the Reo chicken vaccines are likely to also be protective for pigeons. The sequencing work will also give an indication whether the pigeon Reo virus is likely to, in fact, infect chickens. It may also allude to the origins of the virus.

Professor Amir Noormohammadi at the University of Melbourne has produced a chicken Reo virus PCR test. PCR tests are very specific and check for matching sequences of DNA in a sample. The chicken Reo PCR test was today run on 4 pigeon livers from confirmed Reo cases.. All 4 tests were positive. The chicken Reo PCR registered a positive result even though only pigeon Reo was present. This may indicate that there are significant similarities between the 2 viruses. This test will also be useful in diagnosing Reo virus in suspect pigeons. Amir's gene sequencing is also proceeding well. Fanciers should be aware that there are many very capable vets and pathologists giving their skills and time to give us the answers on Reo virus.

Previous veterinary work has indicated that only a full genotyping of the Sigma C gene on the Reo genome will give an indication of antigenic relatedness.

Because it is a significant indicator of likely cross immunity both AgriBio and the University of Melbourne are focusing on this particularly important sequence area

Today we have had cases confirmed through our clinic at Eltham, Lysterfield and Whittlesea. Another loft is under suspicion in the Dandenong ranges

Source : Melbournebirdvet.com Dr. Colin Walker

05/01/2017

Drug Company and regulatory body meetings

I have spoken today to vaccine supply companies and also the relevant government bodies involved with biosecurity risk assessment and the issuing of vaccine import permits. The time frames that they have suggested make racing a possibility this year (but only just). Over the next 10 days the pigeon Reo sequencing results should be completed. The experts in this area will then assess and compare these results with the available Reo chicken vaccines to see if there is likely to be any cross immunity. If this is the case then permit applications will be prepared. This is a big job and there is a cost involved that the pigeon fraternity will need to cover. The permit applications will then be submitted. If successful, a vaccine will then be able to be imported. I feel that fanciers should continue (at least for the time being) to manage their lofts as if racing was going to proceed. There are however a number of significant hurdles to cross. The most significant of these is that there may be little or no cross immunity. In this case, a vaccine will need to be made here and, after speaking to several vaccine manufacturing companies, this may take up to 18 months. I must say that the biosecurity and APVMA (Australian Pesticide and Veterinary Medicine) representatives as well as the pharmaceutical people that I have spoken to today have all been most informative and helpful. Australian fanciers can be assured that these people are doing what they can to assist us

Other issues today

The University of Melbourne is working on a Reo virus PCR diagnostic test. This test checks for Reo DNA in samples such as droppings. This will make it quicker, easier and cheaper to diagnose suspect Reo birds.

There has been reference on the internet to a toxic bacteria bowel /liver syndrome. DAFWA (Dept of Agriculture and Forestry WA) has advised that histopathology done on birds that had died of the disease did not show erosive inflammation of the bowel wall or virus present there. Also the bacteria in the bowel, when cultured, were all identified as just normal bacteria. The proposed condition is not supported by the results.

I have had contact with avian vets in South Africa, USA and western Europe . All have advised that strains of Reo virus occur in pigeons there but that these are regarded as an incidental finding and are not thought to be associated with disease. To date, the strain of Reo virus causing disease in Australia seems to be an exclusively Australian problem.

Apparently, clusters of, as yet unconfirmed, cases have occurred in lofts around Kyabram and (Victor Harbour) Port Augusta. In these lofts, the birds have been confined. This raises the possibility that ,as with PMV, Reo can be carried asymptotomatically by non-target bird species, i.e. that other species of bird can carry and transmit this strain of Reo virus to pigeons without becoming unwell themselves.

It is still not known whether this strain of Reo virus is capable of infecting chickens

**Update 24th January 2017 - Melbourne Bird Vet – Dr. Colin Walker
Sequencing Completed.**

The last few days have been a time of phone calls, emails and meetings with AgriBio staff, interstate DPI reps, vaccine manufacturers and drug companies. On Friday AgriBio completed the sequencing of the virus responsible for the current disease outbreak in pigeons. The virus is a member of the Reo family of viruses (the Reoviridae) but is actually a Group A Rota virus. The Reo family of virus is divided into about 30 genera (a type of group). The Rota viruses are one of these groups. The Reo virus that affects chickens belongs to another group called the Orthoreo viruses. Even though both types are in the same family, because they are in different groups it is very unlikely that there will be any cross immunity between the two. (Nevertheless this will be thoroughly investigated.)

Consequently a chicken Reo vaccine is unlikely to be effective in protecting pigeons against a Rota virus disease. It was hoped that the chicken and pigeon Reo types would be more similar and that a chicken vaccine could be used to immunise pigeons. Frustratingly it now looks as if this is not the case. If it was the case however, then because these vaccines are not available in Australia appropriate import permits would need to be obtained from the relevant government bodies. As discussed earlier this is involved and would take several months.

The big advantage with the problem being diagnosed as a Rota virus is that there are Rota virus vaccines already available in Australia. They are made for use in calves. It may be that vaccinating pigeons with a calf Rota vaccine will protect them. To many pigeon fanciers this is going to seem really bizarre. I can remember that some fanciers were reluctant to use a “chook “ vaccine to protect their pigeons against PMV. Which species the virus actually causes disease in however is pretty irrelevant. Of much more importance is the genetic overlap between two viruses. The more antigens that are shared between viruses then the more likely cross immunity is to develop between the viruses even if those viruses naturally infect different species. It may surprise many fanciers to learn that horses are immunised against Hendra virus with a modified canary pox virus! So I don't know which sounds more unusual, vaccinating horses with a canary vaccine or pigeons with a calf vaccine. Some will remember that in an earlier post I mentioned that one Reo virus that infects pigeons is closely related to a Reo virus that infects sea lions. It is important not to become distracted by which species the virus naturally infects

but rather consider how similar the viruses actually are. Some species of Rota virus that infect cattle are 96% the same as Rota viruses that infect pigeons.

Having said all that though, the Rota viruses that infect cattle belong to the subgroup H while this Rota is a G and because of this some of the experts that I have spoken to have suggested that even though cross immunity is a possibility it is not a strong one. I have asked two large pharmaceutical companies which supply calf Rota vaccine in Australia to forward the sequences to me. AgriBio will compare these and make an assessment on potential cross immunity.

And so at least for the short term the pathway to immunising the Australian pigeon flock has been redirected. We are now moving away from evaluating chicken Reo based vaccines to evaluating cattle Rota vaccines for potential cross immunity. Any suggestion for virus use would be based on the degree of antigen overlap and the potential for immunity to develop and as such would only be a recommendation. A trial would need to be conducted to confirm this.

What the pigeon community in Australia must realise however, is that if it does turn out that there will be no cross immunity from a calf Rota vaccine that we will then have exhausted our options of using an available vaccine. There are no chicken, turkey or pigeon Rota virus vaccines available anywhere in the world. To immunise our birds we would need to make our own vaccine.

Making a vaccine.

To this end, I have made some tentative enquiries with seven vaccine manufacturing companies. The big question that every fancier wants answered is how long this will take. The answer is probably about 12 months but it could be as long as 18 months. It is unlikely to be longer than this.

The vaccine development would essentially occur in two stages:

1. Research.

Here the specifications of the vaccine and the way to make it would be developed. A potential way that a vaccine could be made would be, for example, to genetically modify an E coli and insert the Rota antigens that are required. Rota's are hard to grow while E coli's grow readily. In this way, larger amounts of antigens could be generated for vaccine manufacture. This stage would cost probably in the range of \$100,000 – 200,000. This is a lot, however two of the labs that I have spoken to can apply for Australian Research Council (ARC) Linkage grants. This is a federally funded research grant that is a source of funds for research in

which the industry (in this case, the pigeon sport) that benefits contributes to it. In this way, a research organisation links with an industry partner. These have to be applied for and it is competitive. Usually, the government funding will match the industry funding at a ratio of 2 to 1.

2. **Manufacture**

Information is supplied to the manufacturer, who will make the vaccine. This typically would not involve the pigeon community with any cost. The cost of the vaccine would be set by the manufacturer to offset the cost of vaccine manufacture and incorporate a profit.

With the classic enteric rota viruses, the mothers are vaccinated to protect their offspring. Because this virus affects the liver, it is likely to have what is called a viremic stage (where the virus is in the blood). This means that an autogenous vaccine should protect the youngsters. Laboratory tests will indicate when the best time to vaccinate will be.

Are we going to race?

Obviously, I am not the one to make this decision, but, at the moment unless a calf Rota vaccine is deemed to be likely to confer cross-immunity, it will not be possible to immunise the birds before the normal start of racing. It will be up to each individual organisation to make its own decision. The Australian National Racing Pigeon Board may choose to issue advice but the final decision will rest with each organisation. If the virus behaves the same way that it did in Western Australia, and there is no reason to suggest that it will behave any differently, then it will be readily spread through race units and kill on average 15-40% of birds in previously uninfected lofts. If this occurred in a widespread way on the eastern seaboard, we would be looking at the loss of between 250,000-400,000 pigeons.

Get a diagnosis

Over the last few days, there have been many phone calls either from fanciers saying they have the disease or from other fanciers saying they know someone with the disease. Without a diagnosis, all that can be said is that fanciers have birds with symptoms that are suggestive of the problem. To not get an accurate diagnosis is, in my opinion, to put it simply, just crazy. Fanciers are strongly urged to take advantage of the supported diagnosis currently offered by Agribio and discussed in an earlier update. Getting a diagnosis has many advantages for the fancier, the most obvious one being that he gets an accurate diagnosis. He may have something else that may be treatable. Getting

a diagnosis also has advantages for the pigeon fraternity. If cases are not presented, how can the distribution and pattern of disease ever be evaluated.

Sydney

I was advised by Dr Amanda Lee of NSW DPI that the first case of Rota in the Sydney metropolitan area was confirmed yesterday. Other lofts are under suspicion.

Technical Stuff.

1, This is a new Rota virus to science and this is early days in our understanding of it. It has not been recorded anywhere else in the world. It is made up of several parts. There are similarities to a fox rotavirus but it has also similarities to a rotavirus from the spotted dove (*Streptopelia* sp) that is a common inhabitant of Australian gardens. There are also some duck components. The current thought is that it evolved here in Australia after a pre- existent Rota virus changed slightly. This change altered the type of disease the virus could cause and the species it could infect.

2, Rota viruses typically cause an enteritis (inflammation of the bowel) and low mortality rates. This virus primarily causes a hepatitis (inflammation of the liver) and has a high mortality rate. We are therefore dealing with something that is very novel, although a Rota virus in mice causes a similar disease.

3, Rota viruses are very tough in the environment. It is likely that this virus would survive for at least several months in a contaminated environment such as a loft. It is unlikely though that it would survive longer than 6 months.