

## **Update from Dr Colin Walker**

**Update 24<sup>th</sup> January 2017**

### **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 virus 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.