H7 Low Pathogenic Avian Influenza in Oudtshoorn

Marna Sinclair

H7N1 avian influenza was detected on an export registered ostrich farm (Ref #116) just east of Oudtshoorn during the second half of March. The initial positive results were obtained from routine 28 day post-movement serum samples taken, as per requirement, from ostriches that were kept in a post-movement isolation camp. 11/30 sera tested positive on ELISA, and the HI assay showed 4 were positive against H7N1 (titres ranging between 1:32 and 1:64, with 2 sera below positive threshold) and 5 were positive against H7N7 (titres ranging between 1:16 – 1:256). Follow up serology and PCR showed N1 to be the likely N type for the virus.

TRACING AND OUTBREAK INVESTIGATION

TRACE BACK procedures showed that there were four inputs of birds onto the farm within the month of March 2013. Day old chicks from the hatchery just outside the compartment (belonging to the same owner) and older chicks (7 weeks to 4 months of age) from two sources: a chick-raising compartment across the road which is also owned by the same owner (n=937 chicks in 2 movements) and a chick-raising facility in Grootbrakrivier (n=140 in a single movement). The ostriches that initially tested positive in the post-movement isolation camp originated from Grootbrakrivier. This property was retested as part of the follow-up investigation and yielded negative results.

TRACE FORWARD showed that the only movement off #116 in the previous 3 months prior to the AI detection was to the chick-raising facility across the road owned by the same farmer. This occurred late in March 2013 and is a potential source of infection for the raising facility which subsequently tested positive.

FOLLOW-UP SAMPLING included both serum samples and tracheal swabs taken from all epidemiological groups on the positive farm. The results showed that the infection had spread throughout the whole farm, irrespective of biosecurity protocols maintained between the different groups. In total 50% of all sera tested positive on ELISA, with the following breakdown between groups: 37/60 (62%) in the chick group; 29/60 (48%) in the slaughter bird group; 30/60 (50%) in the first post-movement isolation group (from the chick-raising unit across the road) and 24/60 (40%) in the second post-movement isolation group (from the chick-raising unit in Grootbrakrivier).

Faecal samples that were taken from chicks on #116 showed consistent viral shedding on consecutive days. Further samples were taken in an attempt to determine the possible period of viral shedding in the faeces of infected birds, but no results are available yet.

The only wild birds regularly seen amongst the ostriches were hundreds of pigeons and sparrows. Several of these birds were sacrificed as part of the outbreak investigation. None of the organ pool samples yielded positive results on PCR, but AIV was detected on a pool taken via swabbing the feet of pigeons. This result indicated that pigeons (or other columbiformes or passerines) could have acted as mechanical vectors in the spread of an avian influenza infection and it probably played the biggest role in the local spread of infection on this property.

Surveillance in other wild bird species (African sacred ibis and hadeda amongst others.) present in the area yielded negative results.

The chick raising facility across the road was also tested extensively as part of the trace-back procedure. All the chicks in this unit fell within the 7 week – 5 month age group and 60 serum samples and tracheal swabs were collected. Organ samples from chicks that died were sent for PCR and virus isolation. On serology, 27/60 sera (45%) tested positive on ELISA and the infection clearly
spread throughout the whole facility. Matrix gene was detected on one swab pool and H7 was confirmed. PCR tests also confirmed H7 avian influenza on an organ pool and virus was successfully isolated from this sample.

There are several links between this chick raising facility and the original positive farm, including management, the movement of chicks and the presence of pigeons. Although strict biosecurity measures were maintained between the two compartments, the viral load, the nature of contact and the presence of the pigeons probably overcame these measures.

Follow-up sampling is continuing, and all tracheal swabs from the initial property have since tested negative, although the second positive facility has still yielded positive PCR’s. Unfortunately not all results are available yet.

The source of the infection could not be determined, but it is possible that the virus was introduced by Africa sacred ibis feeding amongst a specific group of ostriches (see Fig. 1 on the previous page). This group (originating from Grootbrakrivier) was unfamiliar with a feedlot system and was therefore kept on a lucerne pasture for their post-movement period, where they likely had contact with sacred ibis amongst other wild birds.

CONTROL AND REPORTING

The reporting of the incident was done via a standard SR1 form to DAFF who further reported it to the OIE.

All ostrich farms within 3 kilometres of the affected properties were identified and were quarantined along with the affected properties. Only one farm in this 3 km radius had ostriches present on it (only breeder birds) and it was sampled for virus detection using PCR on tracheal swabs, with negative results. To increase the sampling frame and the certainty that the virus had not spread, another 5 high risk properties within approximately 5 km from the affected properties were sampled using both serology and PCR on tracheal swabs. These 5 properties were selected based on proximity to the positive properties, the presence of younger more susceptible birds (not only breeders), and the date of last routine testing. Fortunately all these properties tested negative affording more surety that this was a pin-point introduction of virus maintained on the property aided by good biosecurity and quick initial response.

Both infected properties will remain under quarantine until depopulated by slaughtering out the market ready and PCR negative ostriches over a period of time, or alternatively until that point in time when no PCR positives are detected and serology has stabilised, i.e. no increase in titres or sero-prevalence on subsequent testing.

CLINICAL SIGNS

There were no clinical signs on either of the two properties that could directly be linked to avian influenza infection. However, the younger chicks did display an unusual amount of rectal prolapse and other gastro-intestinal problems over the months prior to the outbreak. The stocking density in the chick raising facilities were fairly high and the stress associated with this as well as cold, wet weather prior to the outbreak probably added to decreased immunity and increased susceptibility to disease. The gastro-intestinal problems lead to an increase in mortality in this age group and post mortem examinations (mostly performed by the farm managers) showed septic intestines (aided by the ingestion of foreign objects common in stressed chicks) and liver damage in some, but no respiratory involvement. Weekly mortality seldom exceeded 5% on both properties, but it did increase to approximately 20% and 13% in the younger and older chicks respectively on the initial positive property (#116 - graph not shown) during the last week of March.

PRELIMINARY CONCLUSIONS

Although not confirmed it is plausible that the virus was introduced via African sacred ibis to the group of ostriches kept on a lucerne pasture at that point in time when these wild birds were active in the vicinity. Low pathogenic H7N1 with the same amino acid sequence was previously detected in sacred ibis in the Western Cape Province. The rapid spread of virus throughout the farm can be explained by the presence of a large number of pigeons amongst all ostriches on the property, although this does not exclude the involvement of additional factors like other means of mechanical transmission, high stocking density and favourable climatic conditions.

The current low ostrich density in the immediate vicinity as well as good biosecurity helped to limit the spread of the virus in the surrounding farming area.
A brief review of H7 AI events in the Province

Figures 3 and 4 on this page give a brief overview as to the H7 avian influenza events in ostriches over the past year. The graph (Fig. 3) shows the number of farms affected per month during this period. A total of 13 properties have been affected with the majority of cases occurring during winter 2012. The top panel of the graph shows those farms where positive PCR on tracheal swabs was detected. Of these LPAI H7 AI was confirmed in 3 farms by RNA sequencing, the most recent being the case described in the main article of this report. All 13 farms had positive serology against H7 AI within the predominate N type being type 1. The only farm which showed a possible alternate N type was the farm in the Touws River district (the far western case in Fig. 4) where N7 was detected. This farm did however have very low seroprevalences on both ELISA and HI testing and the farm never tested PCR positive so our confidence was low that this was in fact a different H7 AI virus responsible.

The spatial extent of the positive farms has shown a wide-spread pattern within the Province (Fig. 4) with cases occurring in the Southern Cape, the Klein Karroo Valley (with a cluster near De Rust) and more sporadically in the greater Karoo region. At times the farms infected have been associated with each other, the case described in this article being a good example of that.

The most recent H7 outbreak generated significantly more media attention as a result of the current Chinese H7N9 avian influenza outbreak which has also affected humans. Based on what cases have occurred in the Province over the past year it is clear that H7 incursions into the ostrich population have occurred sporadically throughout the year and the recent case is linked to the circulating virus which is thought to be associated with our wild bird and water fowl populations.

Fig. 3

Bovine Papilloma outbreak in Mosselbay
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The animal health technician in Mosselbay was approached by the local Farmer Support and Development (FSD) official for help after she noticed a large number of warts on cattle that formed part of a new FSD project. These cattle were adopted into the project by the small farmers and assistance and advice was not sought by the farmers involved prior to their purchase. The AHT went to investigate and found a herd of 29 animals consisting of 5 Friesian type cattle and 24 Bonsmara-cross breeds. Two dairy heifers were severely infected and another approximately 7 (the rest of the dairy heifers and some of the younger beef cattle) had very few and small lesions.

The worst affected dairy heifers were approximately 2 years old. They showed a typical papilloma pattern where the warts were mainly concentrated on the head and neck areas. According to the history obtained the beef cattle had been in the herd for a period of 2-3 years, while the dairy cattle, obtained from a local dairy farmer, were new arrivals in November 2012. Apparently the dairy cattle had warts when they were bought and could therefore be obtained at a reduced cost. Approximately 6 months after the arrival of the infected cattle only a few of the younger beef animals have developed lesions (very few and small warts). Considering that the average incubation period of the virus according to literature is 3-4 months, the beef cattle
Figure 5: Disease outbreaks in the Western Cape Province identified during April 2013

Legend (Outbreaks in bold, follow up transparent):
- Avian Influenza
- Low Pathogenic Other
- Bovine Tuberculosis
- Johne's Disease (Paratuberculosis)
- Lumpy Skin Disease
- Other Pastureulosis
- Rabies
- Routine Vaccination Events - All diseases
- Other farm visits by officials

Reported animal diseases for April 2013 Western Cape Province

Map produced by Animal Disease Control Department of Agriculture REPUBLIC OF SOUTH AFRICA.
seemed to have been more resistant to the virus. The seemingly better immunity of the beef cattle might in part be due to insufficient colostrum intake in the dairy animals, which is often the case in dairy calves intended for sale. All cattle on the property were in poor condition, mostly due to lack of proper nutrition.

**FOLLOW UP CONTROL MEASURES**

Samples were collected from the warts and send to the Beaufort West laboratory for the production of an autogenous vaccine. All 29 cattle were subsequently vaccinated and the warts were treated with sulphur by FSD.

A follow-up investigation 6 weeks post vaccination did show local reaction on some of the vaccination sites. These were more visible in the beef cattle. One of the severely affected heifers died with what was thought to be as a result of a concomitant heartwater infection. The other severely affected heifer had also not responded to the vaccination and in fact the warts were bigger and also infected by blowfly larva. It was recommended that this animal be removed from the herd as she is a continuous source of virus to the others in the herd and to any new arrivals.

**Other Outbreak Events**

- Another case of **Johne’s disease** was diagnosed in the Malmesbury district using histopathology and ZN staining of samples taken post mortem from a clinically affected 2 year old ewe. On post mortem ascites, hydropericardium and hydrothorax were noted as well as severely enlarged mesenteric lymph nodes. The farmer has been losing approximately 10 sheep per year with a clinical picture consistent with Johne’s disease. The farm does border on know positive farms and the only introduction onto the farm has been rams from Johne’s negative farms.

- A confirmed **Rabies** case was diagnosed in a Bat-eared fox in the Malmesbury district. The fox was found by a farmer wandering through his cattle herd during the day showing no signs of fear. Rabies has occurred on this property (and a neighbouring property) before in the same species. Domestic dogs on the property were re-vaccinated by the private veterinarian involved.

- An unvaccinated herd of cattle in the Grabouw informal settlement were diagnosed with **lumpy skin disease**. A total of 8 of the herd of 60 cattle died since the start of clinical disease with a further 25 animals showing clinical signs when the AHT (Werner Gouws) became involved in the case.

- Another **blue tongue case** in sheep was logged in the Vanrhynsdorp area.

- **Redwater** was confirmed by a private veterinarian in the Caledon district.

- A 20% mortality as a result of **pasteurellosis** was detected in a flock of angora goats in the Murraysburg region. This occurred after significantly higher than normal rainfall occurred on the property over a 3 day period.