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Avian influenza surveillance report: July-December 2022

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Introduction

Routine surveillance for avian influenza (AI) in South Africa is necessary to assist with detection of highly pathogenic (HP) strains, i.e. H5Nx or H7Nx, that can cause serious economic losses in poultry and are the most likely strains to lead to human influenza pandemics. These characteristics also make surveillance important for export certification of poultry products.

Biannual surveillance in backyard chickens, commercial poultry and ostriches is prescribed by Appendix 9 (Notifiable Avian Influenza (NAI) Surveillance), of the HPNAI contingency plan of 2009.

Bird serum is screened with an influenza A enzyme-linked immunosorbent assay (ELISA). Positive ELISA tests are followed by haemagglutination inhibition (HI) tests to screen for H5, H6 and H7 antibodies.

A farm where serology results in a positive ELISA test should be retested as soon as possible. Further serum samples are taken and also tracheal swabs for detection of viral RNA via polymerase chain reaction (PCR). Samples that are PCR positive for avian influenza RNA must then be screened further for H5 and H7 RNA, using more specific PCR tests. RNA sequencing is required to determine other (non-H5 and –H7) subtypes and to provide further information on the exact strain involved. For more details on the surveillance strategy, please read the introduction to the June 2020 Epidemiology Report.

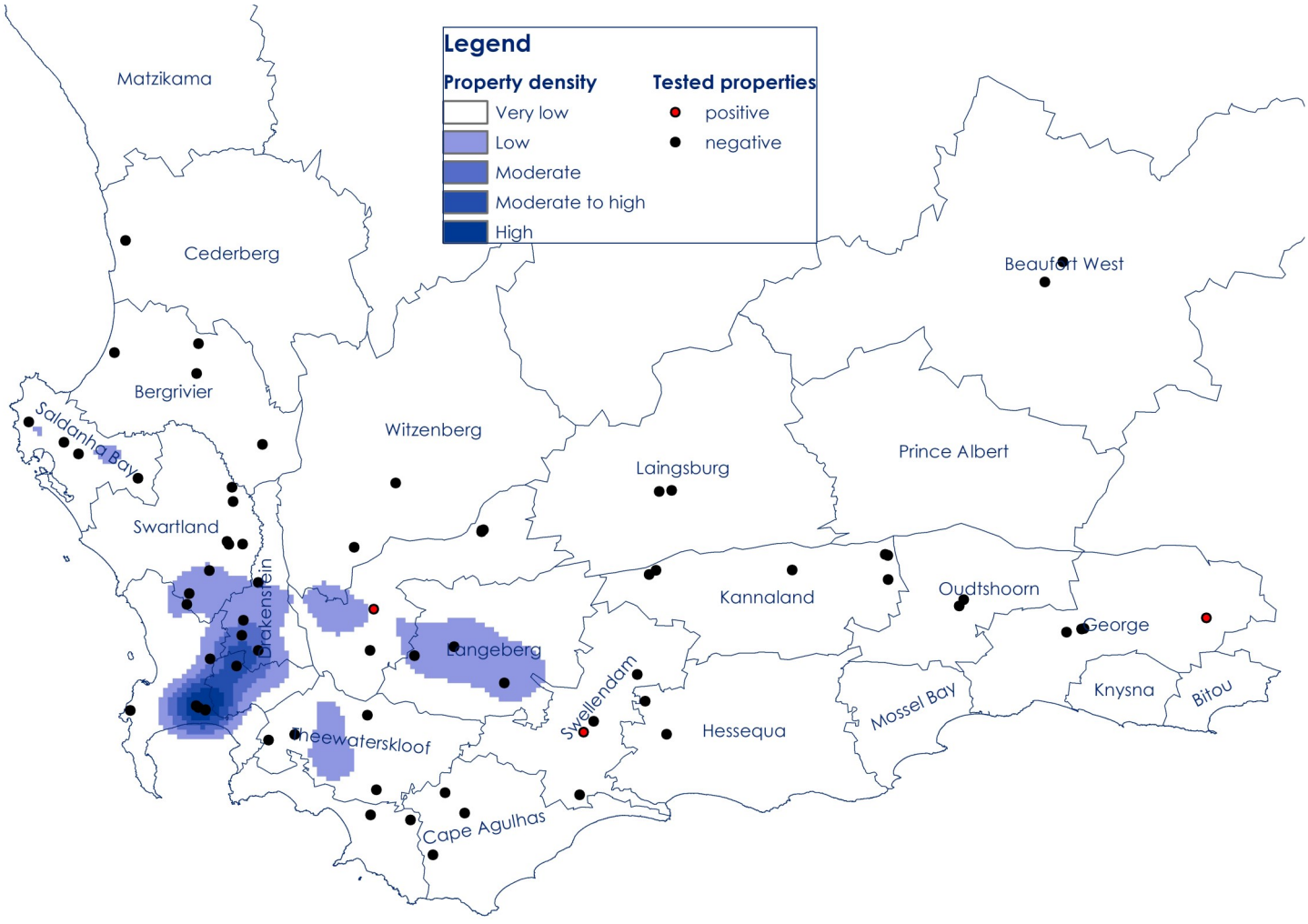

Figure 1: Avian influenza surveillance on properties with backyard chickens in the Western Cape, June-December 2022

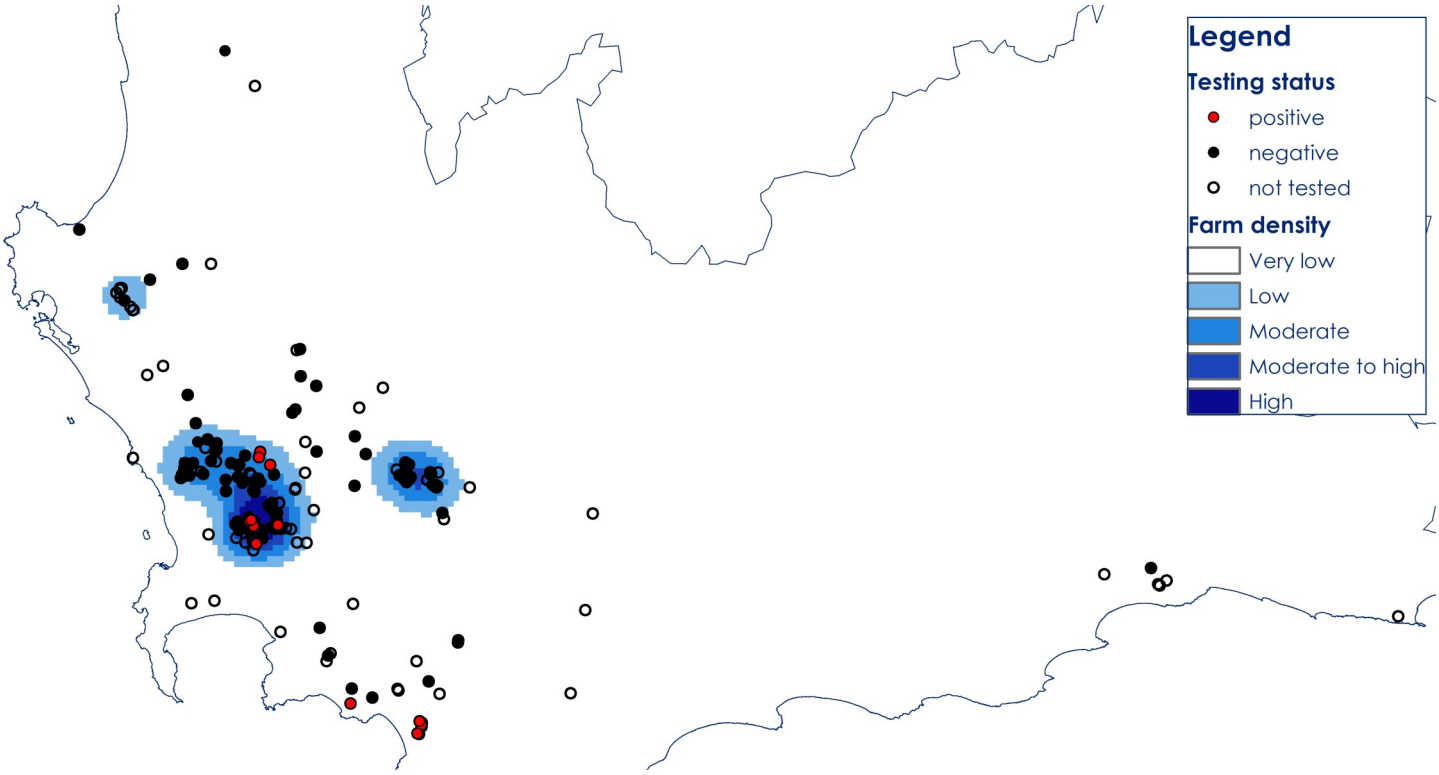

Figure 2: Avian influenza surveillance coverage in commercial poultry in the Western Cape, June-December 2022.

Backyard chickens

Backyard chickens on 78 properties were sampled. Between one and eight properties were tested per local municipality and 20/25 local municipalities were represented (Fig. 1). The provincial target is 90 properties and sampling in the Matzikama, Mossel Bay, Knysna and Bitou municipalities was lacking. However, the majority of the deficit (9 properties) comes from the City of Cape Town. This has the highest density of properties with backyard chickens so the deficit should be addressed in future.

Three properties in the Breede Valley, Swellendam and George municipalities had positive serology results (ELISA positive only, HI-negative), though none of these had any history of disease. Two were followed up with further serology and PCR testing. Neither tested PCR positive and one was seronegative on retesting. The other still had positive ELISA tests on the retest, but no HI reactions.

Commercial poultry

Nine poultry companies performed serum sampling for AIV serology on 106 farms, comprising 140 sites. All of the seven largest companies (operating three or more farms) performed sampling, with an average of 72% of farms per company tested at least once. Maximum testing proportion was 98% and minimum 27%, by a company that only tests their export-approved farms. Farms tested comprise at least half of those in the Western Cape and provide good coverage of the densely populated poultry area (Fig. 2).

60/140 (43%) of tested sites were tested once in the 6-month period, as is required by the NAI surveillance protocol. 21% were tested twice, 30% were tested three, four or five times, and eight sites (6%) were tested six times (every month).

Only two companies reported positive results, one of which has only one farm. No positive H5 or H7 haemagglutination inhibition (HI) tests were reported, and therefore no evidence of potential highly pathogenic viruses was detected.

Twelve farms tested seropositive; four on more than one occasion. Nine farms underwent follow-up testing, though three farms with repeat positive results were followed up only once. The only non-negative PCR test was a suspect result for AIV, but the birds were seronegative at the next sampling.

Two farms had HI tests indicating possible previous infection with an H6 AIV. One farm had 2/40 samples H6- positive (titres of >1:16 on both the H6N2 and H6N8 antigens), but no follow-up testing was done. The other farm had 1/40 samples H6 positive but was sero- and PCR negative on two rounds of follow-up testing.

Commercial Ostriches

The Western Cape had 281 registered ostrich compartments in the period of interest. However, 20 are hatcheries, 59 contained only breeder ostriches (exempt from serological surveillance), 35 were empty (and 13 of these were then de-registered) and three had only small chicks (exempt from sampling). This left 164 compartments with birds suitable for testing.

161 ostrich farms (72% of populated properties) were tested between July and December 2022. Of the three not tested, one had been tested in June and was tested again in January 2023.

Twenty-three farms tested seropositive for avian influenza (14% of those tested) from July to November. There was a

peak in September, when avian influenza antibodies were detected on eight farms, and between two and four tested positive in the other months. Seven of the farms are located east of Oudtshoorn and four in the Heidelberg area, with smaller numbers in six other areas (Fig 3).

One of these farms had been seropositive since 2021 and three tested negative on follow-up tests, leaving 19 positive (12% of tested). Two that were negative on follow-up testing had AIV-positive PCR tests on the first round of follow-up testing but were PCR- and seronegative on the second round.

For eight seropositive farms, HI tests did not indicate a serotype (no positive reactions on paired antigens). One of these farms tested AIV positive on PCR tests but the virus could not be typed further.

Three had HI tests with paired positive reactions on both H6 antigens, though two had other low titre reactions that made interpretation more uncertain. Two of three tested positive on the AIV PCR test but could not be typed further (H5 and H7 PCR tests were negative).

Eight ostrich farms had HI reactions indicating possible clade 2.3.4.4 H5 virus involvement. The majority (five) of these farms tested positive in September. Most (five) are located close to Oudtshoorn and one each in the Langkloof and Mossel Bay area. PCR testing detected fragments of H5, H6, N1 and N2 virus on one farm south of Oudtshoorn, which was reported to the WOAH as part of the HPAI H5N1 outbreak. This was the only H5 seropositive farm where any PCR typing was successful. AIV was detected via PCR on another six of these farms, but the H5 PCR tests were negative. Next generation sequencing was performed at the University of Pretoria on one of these PCR-positive samples from the Langkloof and a partial sequence of an African H5N1 virus-associated PB1 gene was detected. Only one farm had entirely negative PCR tests.

The relatively high proportion (52%) of seropositive farms where AIV was detected was encouraging, but the lack of virus typing was puzzling. Possible causes will be investigated.

A further two farms were never seropositive but tested AIV PCR positive once (H5 and H7 negative) and were both PCR and seronegative on follow-up. The farms were tested with PCR initially because they were near another positive farm.

A last farm had chick mortalities and inconclusive AI PCR results on organ samples. Follow-up tests on the farm were negative and it was discovered that the organ samples had been transported with those from another farm that was AIV positive. Cross-contamination between samples during transport is suspected.

Because breeder ostriches are not included in routine AI surveillance, the presence of breeders on sampled farms was assessed as a possible risk factor for AI infection. Of the seropositive farms, only 6/23 had breeder ostriches present. Additionally, 6 of 68 (9%) of farms with breeders tested positive whereas 17/93 (18%) of farms without breeders tested positive. This provides some reassurance that breeders do not appear to be associated with increased risk of avian influenza exposure.

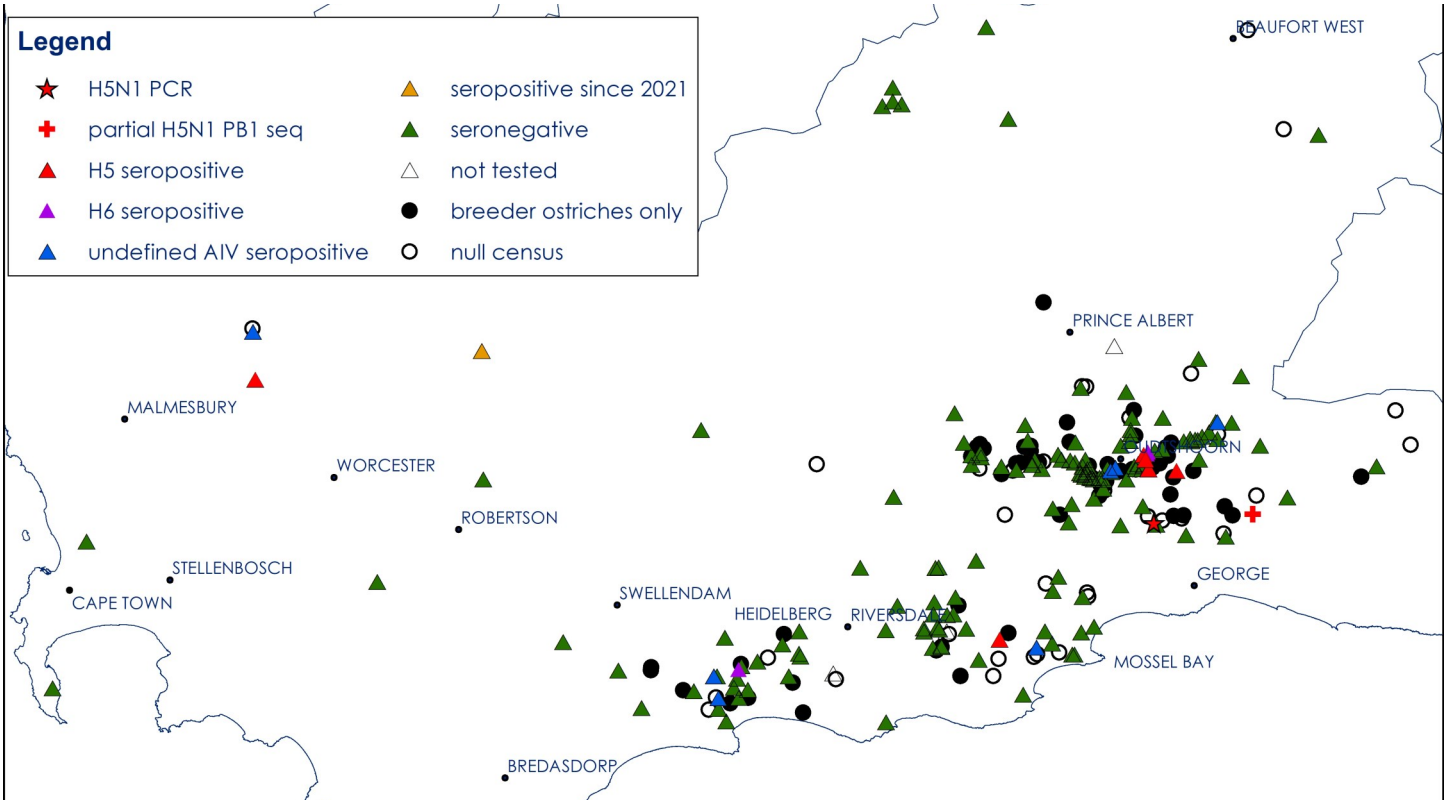

Figure 3: Avian influenza surveillance in commercial ostriches in the Western Cape, June-December 2022. All registered ostrich farms are shown. Farms with ostriches suitable for testing are shown with triangles and those without testable birds with circles.

Outbreak events

A **horse** in the **Plettenberg Bay** area tested positive for **African horse sickness** (AHS) after showing swelling of the supraorbital fossae, laboured breathing and fever. As a result, movements from the George state vet area into the AHS control zones were temporarily suspended. Clinical surveillance was conducted surrounding the case and in horses that moved from the area.

Deaths of wild **Cape hares** were seen on a farm near **Malmesbury**. A carcass was collected and a necropsy conducted. Widespread haemorrhaging was seen (Fig. 4), leading to a diagnosis of **rabbit haemorrhagic disease**.

Highly pathogenic **H5 avian influenza** virus was detected in a wild **kelp gull** and **common tern** in **Cape Town**.

Two **ostrich** farms in the **Heidelberg** area tested **avian influenza** seropositive in March. Follow-up serology and PCR testing found no evidence of highly pathogenic virus so the cause is concluded to be an undefined low pathogenicity avian influenza virus.

Virulent **Newcastle disease** was diagnosed near **Malmesbury** after a farmer found approximately 30 dead wild **guinea fowl** on his property.

After sheep were seen itching during shearing on a farm near **Beaufort West**, **sheep scab** was diagnosed. The sheep were treated twice under official supervision.

An increased incidence of **bluetongue** was seen in **sheep**. Outbreaks were diagnosed clinically in the **Vanrhynsdorp**, **Piketberg** and **Prince Albert** areas. Unconfirmed reports also came from the **Beaufort West** area.

A **sheep** farm near **Riversdale** was placed under quarantine after **Johne's disease** was diagnosed on histopathology of the intestinal tissue.

A **pig** carcass from a farm near **Gouda** was condemned at the abattoir after signs of **erysipelas** were seen.

A **cow** with typical lesions of **lumpy skin disease** was seen near **Malmesbury**.

***Salmonella* Enteritidis** was cultured from boot swabs and dead-in-shell **chicks** on two farms in the **Malmesbury** area.

In **George**, a pyrexic **horse** tested positive for **West Nile** virus.

Orf was reported in a group of **rams** on a farm near **Riviersonderend**.

Mortalities of **wild birds** were reported from a waste water treatment facility in the **Mossel Bay** area. Upon inspection, several birds with signs of paralysis were seen. There were no obvious findings from a necropsy on a moribund duck, and samples taken were negative for avian influenza and Newcastle disease. Based on the history and clinical signs, a diagnosis of **botulism** was made.

Red lice were seen on **sheep** in auction pens near **Gouda**.

An unusual number of **mortalities** of young, apparently healthy **Cape fur seals** occurred in the **Mossel Bay** area. Some neurological signs were reported in affected animals, and brain congestion and haemorrhage was seen on post-mortem. Samples were taken to test for controlled diseases, but were negative for avian influenza, rabies and *Brucella*.

Figure 4: **Haemorrhages seen in the carcass of a wild hare near Malmesbury** (Photo: J. Chapman)

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