

# Case study: Newcastle disease Virus outbreak in a large private avian collection

Muller, M.G. and R.Raghav

## **Summary**

*In a large private avian collection which lacked quarantine and hygiene protocols, a high mortality rate in newly imported Arabian Partridges (*Alectoris melancocephala*) without any obvious disease symptoms had to be investigated. The first examination did not show any significant results apart from weak, tired birds with mild neurological signs. The post mortem results were insignificant and the blood results showed anemia and *Hemoproteus* sp. Infection. Newcastle Disease Virus was suspected, however, the first tests showed negative results. After four days, another clinically sick partridge was tested strongly positive for NDV. The NDV spread to other birds in the collection like partridges and francolins. Due to the owner's request, an eradication of all clinically sick birds was performed and all other 60.000 birds in the collection were vaccinated against NDV to create a buffer zone. After the mass vaccination the outbreak got under control. Nevertheless, this kind of vaccination can create latent carriers. A transmission of the disease among migrating birds is crucial posing problems not only for this collection, but other bird collections in the Middle-East. The prevention for such contagious diseases can not be stressed enough, especially through the presence of quarantine for newly imported and sick birds, hygiene protocols and veterinary supervision of collections.*

## **1. Introduction**

Newcastle disease virus (NDV), caused by a Paramyxovirus, is a well-known and feared avian disease all over the world. Two of three large panzootic outbreaks originated in the Middle East region: an outbreak in fowl in the late 1960s and in pigeons between the late 1970s and mid-1980s (Alexander, 1990, Alexander 1997). From the Middle East, the disease spread rapidly all over the world. NDV can be transmitted by moving live birds like feral birds, pigeons, poultry and exotic birds, other animals, humans, equipment, poultry products. Moreover, air, water, contaminated poultry feed and vaccines can be other sources of infection (Alexander 1997). In respect of the infection with wild birds, the feature of "wild birds" with inapparent signs of NDV is well-known to be a sign of NDV (Whiteman and Bickford, 1989). In this case study 251 out of 400 newly imported Arabian Partridges *Alectoris melancocephala* had died suddenly without obvious reason. Due to this unusually high mortality rate an investigation for possible reasons was undertaken. At the initial stage of the investigation a problem of a only small group of birds was expected as the extent and number of birds in this collection was not fully known.

## **2. Material and Methods**

### **Material**

Originally a group of 400 partridges was examined. Then the investigations were expanded to 138 Grey Francolins and 7 Black Francolins. All birds had been newly imported and been kept in an open cage surrounded by a net. None of the birds had undergone quarantine and other falcons were kept in a cage approx. 50 meters away.

## Methods

From the partridges, the following examinations were undertaken:

- ◆ Physical examination
- ◆ Blood hematology and biochemistry
- ◆ Parasitology of crop and fecal
- ◆ Serology for NDV and Avian Influenza via Elisa tests
- ◆ Microbiology of fecal samples
- ◆ Post mortem examination of dead birds

## 3. Results

### Day 1

The physical examination of the partridges revealed the following disease symptoms:

- ◆ Depression
- ◆ Anorexia
- ◆ Loss of appetite
- ◆ Fluffy feathers
- ◆ Moving away from the other partridges in separate areas
- ◆ Sitting in corners
- ◆ Mild neurological symptoms: head tilting, head shaking

The blood hematology showed in 5 cases Hemoproteus sp. infection as well as anemia, high white blood cell counts (indicative for an infection) and low total protein and albumin levels. The post mortem examination of six partridges did not show any significant changes and the parasitology and microbiology did not show any relevant results. The Elisa tests for NDV, Avian Influenza virus, Avian Pneumo virus, Infectious Bronchitis Virus and Avian Reovirus were negative.

### Day 4

The Elisa test for NDV was strongly positive the case of one sick partridge of the same group which showed obvious disease symptoms. This result was even matching with the previous negative results as the Elisa test is only positive 4-14 days after infection. A further test of a reference laboratory with Hemagglutination methods showed the same results.

### Spreading of NDV

Further investigations among other bird species in the collection showed clinically apparent pigeons with CNS symptoms. One of those pigeons tested had a strongly positive NDV results in the Elisa test. The clinically sick birds were immediately killed and all other birds became part of the mass vaccination program. Also infected were Grey Francolins *Francolinus pondicerianus* and Black Francolins *Francolinus francolinus* with visible disease signs and mortality.

### Further action

The advice was to immediately slaughter all infected bird groups and the birds living in close contact to the diseased ones to prevent the spreading of this contagious disease to the other 60,000 birds of the collection. Afterwards all other birds were vaccinated. The owner preferred to slaughter only those birds with clinical symptoms and to vaccinate all other birds.

### Mass vaccination

All birds in the directly surrounding cages had been manually vaccinated on an individual basis using injectable vaccine Newcavac™ (dose rate of 0.25ml sc) or Talovac™ ( 0.5ml sc) in the neck region. A mass vaccination using vaccine in drinking water (Hipraviar™) (appropriate dilution depending on the number of birds in a group) was given for all the other captive and free-living birds of the collection. Booster doses of the vaccines were given three weeks later.

### Protocols

A temporary quarantine station had been established which was replaced by a fixed one. Quarantine protocols for newly imported birds as well as sick birds had been put in place. The hygiene protocols were established for the different cages and birds houses and the staff had been trained especially in hygiene matters and disease prevention.

## **4. Discussion**

Numerous private avian and other collections exist throughout the Middle-East with multiple animal species and diverse varieties of birds, but often neither with any effective and accurate quarantine and hygiene protocols in place nor any veterinary supervision of those collections. In addition, as it was the case in this incident, the close proximity of captive and free-living birds with common sources of food and water enhances the risk of disease causation and spread. Free-ranging water-fowl, Pittidae, Psittaciformes, some Passeriformes and Strigiformes are generally considered to be common reservoirs of NDV (Gerlach, 1994). Therefore the problem of disease transmission between feral birds and birds in a collection has to be regarded as an extremely important one for all Middle-East countries. Furthermore this general problem of disease outbreak control as well as prevention in connection with animal stock management is not restricted to birds only, but applies to mammals also. These problems as well as neglect, lack of proper information or belated reaction are putting large collections and the surrounding and migrating wild animals at risk.

In the case presented, the rapid spreading of NDV from individual birds to other bird species might be the result of lack of proper hygiene, free interaction of bird-keepers among different species and groups, free interaction between captive and free-living birds in the collection at feeding and watering points as well as the possible presence of disease carriers due to absence of a strict slaughter policy. This observation would be in conformity with the reasons for diseases spread previously stated (Alexander, 1990).

Although the approach chosen of mass vaccination of all birds in the collection including those having contact to the diseased birds is certainly not the usual approach of mass slaughtering and eradication, it was necessary in the case of this NDV outbreak. Due to the large number of birds involved, the idea of the prophylactic vaccination was to use a “ring vaccination” around outbreaks in order to create a buffer zone (Alexander, 1997). In the present case, this approach was successfully performed as there have not been any reports about new infections so far. The spreading of the NDV virus got under control. This vaccination protocol was expected to give up to 9 months of immunity (Gerlach, 1994). However, it has to be taken into account that this kind of mass vaccination may lead to the creation of virus latent carriers. Therefore further outbreaks of NDV can not be ruled out due to constant shedding of the virus (Gerlach, 1994).

In this context, the preventive measures for NDV can not be stressed enough. They do include a separate quarantine facility and quarantine protocol under the supervision of a veterinarian. Moreover, hygiene protocols need not only to be established but also to be closely followed permanently. These protocols have to be implemented accurately and all staff members need to be trained accordingly. The collection needs to be monitored very closely for incidences of further sick birds.

## **5. Conclusion**

Newcastle Disease Virus outbreaks are very common in the Middle-Eastern region. Although the outbreak of NDV in this private bird collection was successfully controlled, incidences like this lead to concerns about the general vulnerability of avian collections in this region and elsewhere. This needs to be seen under the special impact on wild birds especially in their breeding or migration areas. Those migrating birds can result in a massive disease spread leading to panzootic outbreaks again. The major emphasis has to be laid on routine vaccination of all birds in a collection, quarantine for newly imported birds as well as quarantine and hygiene protocols. Nevertheless, the factor “human being” has to be regarded as one of the most important one for spreading the disease. Uneducated and untrained staff who do not know anything about any hygiene guidelines can unwillingly contaminate vast areas. Therefore the investment in their training is definitely the most economical way and a big help in combating disease outbreaks of all kinds in this region. The key in successful disease prevention are the proper hygienic measure combined with the installation of quarantine facilities and veterinary medical control.

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## **Author’s contact:**

Dr. Margit Gabriele Muller MRCVS, Abu Dhabi Falcon Hospital/Environmental Research and Wildlife Development Agency (ERWDA), P.O.Box 45553, Abu Dhabi, United Arab Emirates.

Tel:++971-2-5755155 / Fax:++971-2-5755001; Email: [mmuller@erwda.gov.ae](mailto:mmuller@erwda.gov.ae)