



Newcastle Disease in Cormorants—A Follow-up

In July 1992 an outbreak of Newcastle disease occurred among double-crested cormorant (*Phalacrocorax auritus*) chicks on islands in Lakes Michigan, Superior, Huron, and Ontario, and at locations in Minnesota, Nebraska, and South Dakota. The outbreak was characterized by neurologic signs and death and all Newcastle disease virus (NDV) isolates were the same pathotype (velogenic neurotropic). This pathotype has a history of causing death in domestic fowl. Mortality in the double-crested cormorant chick population varied by site from 10 to 95%.

Follow-up studies were initiated in 1992 and 1993 by the National Wildlife Health Research Center to determine (1) the approximate age at which chicks were exposed to NDV, (2) if relatively high NDV antibody titer is an indicator of current infection with the virus, (3) if neurologic signs correlated with exposure to NDV, (4) if NDV could be spread by the fecal route, (5) the extent of NDV exposure in other populations at risk, and (6) NDV exposure of the 1993 double-crested cormorant population.

Follow-up Methods and Sites Are Selected

Sera obtained from chicks before and during the die-off and from adult and juvenile double-crested cormorants after the die-off were tested for NDV antibody. Virus isolation was attempted from tissues and cloacal swabs collected during the die-off. Serum samples were also obtained from herring gull (*Larus argentatus*) and white pelican (*Pelecanus erythrorhynchos*) chicks during the die-off. We

examined 253 birds, including 230 double-crested cormorants, 16 herring gulls, and 7 white pelicans. A serum titer of greater than or equal to 1:10 was considered to be specific evidence of exposure to NDV, and a bird with neurologic symptoms was considered to be sick.

Before the die-off, sera were collected and furnished to the National Wildlife Health Research Center by wildlife biologists monitoring the double-crested cormorant population in Lake Michigan. On Spider Island in Lake Michigan, 58 sera were obtained from double-crested cormorant chicks during five visits in June and July 1992. On Hat Island in Lake Michigan, 23 serum samples were obtained from double-crested cormorant chicks during one visit each month in June and July 1992.

During the die-off, three islands in Lake Huron, one in Lake Superior, three in Lake Michigan, and two in Marsh Lake, Minnesota, were selected for study. The chick population on Spider and Hat islands in Lake Michigan was sampled again so that results obtained before and during the die-off could be compared. Sera, carcasses, and cloacal swabs were obtained on a single visit to each site during late July 1992. In 1993 (after the die-off), juvenile and adult cormorant sera were obtained in Mississippi on 24 February and in Minnesota on 27–29 April 1993.

Cormorant Chicks Were Infected With NDV After 18 Days of Age

Chicks seem to have been infected with NDV after maternal antibody to NDV disappeared. As the age

(based on wing cord) of the double-crested cormorant chicks increased, the likelihood of NDV infection and neurological signs also increased. Antibody titer of 1:10 to 1:20, probably maternal, was detected in prefledged chicks up until the age of 16–17 days. In chicks between 18 and 28 days old, this antibody seemed to wane because chicks in that age range had NDV antibody levels of less than 1:10. In chicks older than 28 days, NDV antibody titer ranged from 1:80 to 1:2,560 in birds with neurologic signs. Because approximately 10 days are required to produce detectable antibody, NDV infection probably occurred after the chicks were 18 days old.

Relatively High NDV Antibody Titer Is an Indicator of Current Infection

Newcastle disease virus, neurologic signs, and relatively high NDV antibody titer were commonly associated in the same chick. All (34/34) of the sick but only 7.7% (7/91) of the healthy double-crested cormorant chicks had antibody to NDV virus. NDV was isolated from the tissues of 29% (10/34) of the sick double-crested cormorant chicks with antibody.

The high frequency at which NDV was isolated from the cloacae suggests the possibility of fecal shedding of the virus. NDV was isolated from 54% (7/13) of cloacal swabs from sick chicks. NDV was isolated from the cloacal swabs of only 2.3% (2/84) of healthy cormorants without antibody to NDV and was not isolated from any (0/7) of the cloacal swabs of the healthy cormorants with antibody to NDV.

Of the total sample, 27% (34/125) of the double-crested cormorant chicks, all (7/7) of the white pelican chicks, and none (0/16) of the herring gull chicks were sick. None of the sick white pelicans and none of the herring gulls had antibody to NDV.

NDV Titer Is Generally Low in 1993 Cormorant Sera

If exposure to NDV occurred during the die-off (summer 1992), low titer may represent waning antibody. Antibody imparted to the embryo (maternal) may be even lower by the time the eggs are laid. Sufficient work has not been done to determine whether this type of antibody is protective against NDV infection. Of the 105 juvenile and adult cormorants sampled in February and April 1993, 48% (51) had NDV antibody. The antibody level was generally low: 41% (21/51) had a titer of 1:10, 39% (20/51) had a titer of 1:20, 18% (9/51) had a titer of 1:40, and 2% (1/51) had a titer of 1:80.

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