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Grasso M. Ebako

University of Nebraska - Lincoln

Del Wilmot

Deputy State Veterinarian

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Newcastle Disease: What Nebraska Poultry Producers Need to Know

Newcastle disease is a rapidly spreading virus that attacks domestic poultry and other birds. This NebGuide explains disease transmission, symptoms and prevention and control.

*Grasso M. Ebako, Extension and Diagnostic Poultry Veterinarian
Del Wilmot, Deputy State Veterinarian*

- [Transmission](#)
- [Clinical Signs](#)
- [Gross Lesions](#)
- [Prevention and Control](#)

Introduction

Newcastle disease virus (NDV) is an acute, rapidly spreading viral disease that affects domestic poultry and other birds. It has a rapid onset and a mortality rate that can be as high as 100 percent. The disease is found worldwide, with the possible exception of some islands and Oceania.

Newcastle disease was first reported in 1926 in the East Indies and then in 1927 at Newcastle-on-Tyne, England, for which it is named. Newcastle disease virus is the type of strain for avian paramyxoviruses. The pathogenicity of NDV strains varies greatly depending on the host. Chickens are highly susceptible, while ducks and geese can be infected and show few or no clinical signs to the same strain.

Strains are designated according to species serotype or the type of birds from which the virus was isolated; the geographical location of isolation (either state or country); and the reference number or name/year of isolation. Numerous strains have been isolated worldwide, resulting in the identification of nine serotypes. Newcastle disease virus is categorized into three groups: lentogenic (mild); mesogenic (intermediate); and velogenic (high).

Velogenic strains are highly likely to cause disease and are easily transmitted. Mesogenic strains are intermediate, and lentogenic strains are least likely to cause disease in chickens. With extremely virulent viruses, the disease may appear suddenly and birds can die before showing any signs of having the virus.

Other factors that help predict the severity of the disease include the host species, age (highly fatal to

young chicks), immune status, and coinfection with other organisms.

Transmission

The virus mainly infects birds through their respiratory and gastrointestinal tracts. Chickens can spread the infection to their eggs but it is rare with velogenic strains because viremic hens usually stop laying. Embryos can be infected if their shells are contaminated with the virus. Although the virus is found in secretions from the nose and mouth, the main route of viral shedding is through birds' droppings. The virus is shed during incubation, the clinical state and for a limited time during convalescence.

Chickens are infected by aerosols and by ingesting contaminated water or food. The virus may be spread by the wind or insects. It can also settle on equipment and on people's shoes or clothing and be spread to birds. Immune birds can carry and intermittently shed the virus. The most common carriers include free-ranging waterfowl, psittaciformes (parrots, parakeets, cockatoo, macaws, etc.), some strigiformes (owls), and passeriformes (sparrows). Newcastle disease virus has an affinity for red blood cells, allowing it to spread throughout the host's body.

Clinical Signs

Isolates that cause the respiratory-nervous syndrome, even those that are highly pathogenic, usually produce few or no distinct gross lesions; however, isolates that cause viscerotropic syndrome often do. Velogenic and mesogenic virus isolates kill 10-day-old chicken embryos in two to four days, while lentogenic isolates usually kill in four to six days or not at all. The incubation period is generally from five to seven days with a disease course of 10 to 14 days. Newcastle disease virus remains in infected litter for up to two months and in dead chicken carcasses up to 12 months. The virus may affect birds in these ways:

- **Peracute death.** Several hours of depression caused by the presence of the virus in the bird's blood; watery and greenish diarrhea; swelling around the eyes and in the neck.
- **Acute gastrointestinal disease.** Voluminous greenish diarrhea accompanied by loss of appetite, lethargy and discoloration.
- **Acute respiratory disease.** Upper respiratory discharges, gasping for air, coughing and labored breathing.
- **Acute gastrointestinal and respiratory disease.**
- **Chronic central nervous system disease.** Drooping wings, dragging legs, twisted necks, circling, depression, loss of appetite, and complete paralysis. Spasms are seen in dying birds.

Central nervous system signs generally occur following an acute or undetectable infection. A bird that has partial immunity to the virus may exhibit symptoms somewhat different from those listed here.

Gross Lesions

Depending on the strain of virus and how it reacts, post-mortem findings are very variable. Affected birds typically have hemorrhages in the larynx, trachea, heart and stomach. Although the disease does not have lesions specific to it, typical lesions are proventricular hemorrhages usually seen on the surface near the junction with the ventriculus. The presence of hemorrhagic lesions in the intestine of infected chickens has been used to distinguish velogenic viscerotropic Newcastle disease (VVND) virus from nonvelogenic Newcastle disease (NVND) viruses, a distinction of regulatory control importance in the diagnosis of Newcastle disease in the United States.

Generally, gross lesions are not observed in the central nervous system of birds affected with Newcastle disease virus regardless of the pathotype. Airsacculitis may be present even after infection with relatively mild strains, and thickening of the air sacs with catarrhal or caseous discharge is often observed. Velogenic viral infection of chickens and turkeys in lay usually reveal egg yolk in the abdominal cavity with flaccid, degenerative follicles. The reproductive tract would be hemorrhagic and discolored.

Prevention and Control

Healthy chicks should be vaccinated as early as one to four days of age. However, delaying vaccination until the second or third week avoids partial blockage of the active immune response by maternal antibody. Consult with your local veterinarian to institute a vaccination program. Regardless, the most important factors in preventing the introduction of Newcastle disease virus and its spread during outbreaks are the conditions under which the birds are reared and the degree of strict biosecurity practiced at the farm. Exotic bird movement without health papers play a major role transmitting NDV and should be discouraged.

Here are some tips to prevent Newcastle disease:

- Strict biosecurity: Control movement of people/equipment.
- Surveillance: Report any unusual clinical signs including those mentioned above to Dr. Grasso Ebako by calling (402) 472-1434 or Dr. Del Wilmot, (402) 471-6837.
- Permit only essential workers/vehicles on your premises.
- Clean/disinfect service vehicles before they enter your premises and after they leave your premises.
- Provide clean clothing to visitors and employees.
- NO employee should own backyard poultry, pet birds or visit any live bird markets.
- Insulate your poultry houses to prevent wild birds from nesting or feeding.
- Notify the veterinary diagnostic center, (402) 472-1434, of any backyard poultry farm close to a commercial poultry operation for disease surveillance.

For more information on Nebraska Poultry Disease Surveillance Program (offering disease testing at no cost), contact:

- Dr. Grasso Ebako, extension and diagnostic poultry veterinarian; (402) 472-1434
- Dr. Del Wilmot, deputy state veterinarian; (402) 471-6837 or 1-800-572-2434 (M-F, 8 a.m. - 5 p.m.)
- Susan S. Joy, general manager, Nebraska Poultry Industries; (402) 472-8810
- USDA, (402) 434-2300

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