

Newcastle Disease

Dr. Bruce Hunter,¹ Ashley Whiteman,¹ Dr. Babak Sanei,² and Al Dam²

Species

Newcastle disease (ND) is a federally reportable Foreign Animal Disease and an outbreak can have huge economically impacts for both commercial poultry and non-regulated feather industries. All avian species can be affected. Strains of ND virus circulate in feral pigeons and in certain species of wild birds such as cormorants in North America.

Status in Canada

The highly pathogenic (velogenic) form of the disease is uncommon. Less pathogenic forms (mesogenic and lentogenic) are relatively common in backyard poultry and pigeons (both domestic and feral). Many commercial chickens are vaccinated with live lentogenic strains of vaccines, so these mild forms of virus are common and circulate in commercial poultry farms. The velogenic form of ND is federally reportable in Canada and in all member countries of the OIE (organization that regulates international world trade in animals and animals products). Any confirmed diagnosis of the velogenic form of ND would seriously affect the export of all poultry or bird products.... the main reason why this disease is of so much concern.

Etiology

Newcastle disease is caused by a virus classified as a paramyxovirus (PMV-1). A process called pathotyping is done on every NDV isolate to determine how virulent it is for chickens. There are several pathogenicity indexes used including mean embryo death times (time it takes for the virus to kill chicken embryos in the lab) or the chick intracerebral pathogenicity index (length of time it takes for the virus to kill chicks inoculated in the brain with the virus). Three pathotypes are recognized: the lentogenic (mild) strains are fairly common and commercial vaccines are prepared from these viruses; mesogenic (moderate pathogenicity) isolates are not reportable but cause concern and higher mortality; velogenic (highly virulent) strains cause serious mortality and this form is federally reportable.

The Disease

The mild lentogenic strains of NDV may cause mild respiratory tract lesions with birds developing swollen sinuses and tracheitis (inflammation of the windpipe) but generally infection with mild strains of the virus cause no clinical disease. Mesogenic forms may cause inflammation of the windpipe (tracheitis), air sac infections (airsacculitis), pneumonia and sometimes cause mortality. In laying hens egg production will drop. In pigeons, mesogenic strains of the virus can cause neurological signs including incoordination, twisting of the head, tremors, convulsions and death. This is an important disease of pigeons that can affect both their ability to race well and decrease productivity in squab and breeding operations.

The velogenic (very pathogenic) form affects all body organ systems. Lesions seen at necropsy include ulcerative lesions in the oral cavity and esophagus, hemorrhage and necrosis in the digestive tract particularly around the esophageal/proventricular junction and the cecal tonsils. There may be small hemorrhages on many organs and birds may have blue, discoloured combs, wattles and shanks of the legs caused by poor blood circulation. Affected birds often have pneumonia, sinusitis and conjunctivitis. Inflammation of the brain and spinal cord may result in a variety of neurological signs.



Chicken with velogenic ND showing severe nervous signs including the inability to stand and twisting of the head over its back. This bird has encephalitis.

Diagnosis

The diagnosis is based on the clinical signs, the suggestive lesions at necropsy and is confirmed by the recovery of the virus from affected tissues or by using specialized molecular tests. Every time a ND virus is identified it is sent to the federal government (CFIA) laboratories for pathotyping. If the isolate is velogenic (highly infective), the Canadian Food Inspection Agency will immediately quarantine the facility and depopulate the flock. Compensation for the birds is paid to the farmer.

CFIA will oversee clean up and disinfection of the infected premise and indicate when it is safe to bring in new birds.

Pigeon Paramyxovirus type 1 (PPMV-1) is closely related to Newcastle Disease virus (NDV). In spite of their close relationship, there are clear antigenic (antibody stimulating) differences between NDV and PPMV-1, which can only be determined by laboratory testing.

PPMV-1 was isolated for the first time from pigeons in the Middle East during the late 1970s and subsequently was introduced throughout North Africa. The virus was reported in Italy in 1981 and from 1981 to 1984, spread throughout the world. It was identified in Canada in the early 1980's. PPMV-1 has been isolated from pigeons, doves and ornamental birds in addition to commercial and feral pigeons. PPMV-1 infection in pigeons most commonly causes neurological signs including weakness, twisting of the head, head tremors etc. Sometime generalized signs and diarrhea (sometimes with hemorrhage) occur.

Pigeons can also be infected with exotic Newcastle disease virus, and when infected, they will show clinical signs, such as depression, diarrhea, and sudden death. Like infected chickens and turkeys, all ages are susceptible and can experience very high mortality (up to 90%). Pigeon lofts experiencing excessive mortality should immediately seek veterinary advice, submit birds to a local diagnostic laboratory, and stop all human and bird traffic in and out of suspect lofts.





Treatment and Prevention

There is no treatment for ND. If the mild strains of virus are involved good management and nutrition will help birds recover and antibiotics may help reduce the chance of secondary bacterial infections.

In the commercial chicken and turkey industries virtually all breeder birds and some growing flocks are vaccinated against ND. There is a vaccine available for use in domestic pigeons and it is recommended that all breeder birds and any birds entering races or attending bird shows be vaccinated.

Good biosecurity, adequate quarantine of birds returning from races or shows, prompt diagnosis and keeping breeding birds segregated from wild birds are important prevention methods.

Prevention

Prevention is possible through adherence to the principles of good on-farm and industry biosecurity, complimented by proper vaccination. Vaccines are available for commercial chickens, turkeys and pigeons. Poultry producers make the decision to vaccinate based on the value of their birds and risk levels. Virtually all commercial poultry breeder birds and egg laying birds are vaccinated against NDV several times during their life. Broiler chickens that are marketed at 39-43 days have a shorter risk period and some producers choose to not vaccinate. Pigeon breeders (both racing birds and those raised for squab) should all consider vaccination and racing pigeon clubs and bird shows should not allow birds to participate unless they have been properly vaccinated.

ND is endemic in populations of several species of wild or feral birds including gulls, cormorants and pigeons. These species pose a risk to your birds so sound biosecurity is very important.



UNIVERSITY
OF GUELPH¹

Ontario²

CONTACT

OMAFRA's
Agricultural
Information
Contact Centre:
1-877-424-1300