Exotic Newcastle Disease

A global scourge

By Maurice Pitesky DVM, MPVM, ACPVM

Newcastle disease, or ND, is a highly infectious viral disease that can affect many kinds of birds, including domestic poultry and avian wildlife such as sparrows, pigeons, doves, crows, owls, cormorants, gulls, pigeons, and waterfowl. Specifically, over 240 species of birds are susceptible to ND virus.

However, chickens appear to be the most susceptible. In many parts of the developing world, outbreaks of exotic Newcastle disease in backyard chickens have a significant impact on food security in the populations most in need of table eggs and chicken meat as a source of protein. Because infection can cause a severe drop in egg production, mortality in hatching eggs, and high mortality in adult birds, prevention via vaccination, biosecurity, and other still-developing approaches is considered essential for global food security and subsistence food production.

Why is it called Newcastle disease?

Although the virus is technically termed an avian paramyxovirus 1 (APMV-1), viruses are often commonly named after the location where they were first discovered (think the Ebola River in West Africa). Newcastle disease was named for the town in which it was first diagnosed, Newcastle upon Tyne, England in 1926, although it also was found in Java, Indonesia around the same time. Within 10 years of this event, ND had spread to most of the world. This is most likely due to the wide susceptibility noted above in multiple avian species.

What is the difference between exotic Newcastle disease and Newcastle disease?

The disease is extremely variable in its severity, ranging from mild to severe, largely due to the different type or strains of the virus. The milder strains are considered endemic in North America. While there are many strains of the virus, the disease appears in three forms:

1 Lentogenic or mild: These strains are widespread and may not produce any clinical signs. They can be linked to mild respiratory infections. A few eggs may be soft-shelled, roughened, or deformed. These shell abnormalities can also be seen in birds that have avian influenza and infectious bronchitis. Therefore, like most clinical signs in poultry, no clinical sign is diagnostic of a specific disease. The only way to determine the causative agent is laboratory techniques including virus isolation from tracheal and cloacal swabs.

2 Mesogenic or moderate: The mesogenic strains are commonly associated with respiratory signs and occasional neurologic signs—like tremors, twisting of the head and neck, circling, and paralysis—with low mortality. Egg production is decreased significantly and egg quality is poor. Abnormalities are similar to the ones described in the lentogenic section.

3 Velogenic or or very virulent: The velogenic disease is also called exotic Newcastle disease, or END. Alternatively, the nomenclature for the lentogenic and mesogenic types is ND. The mortality rate for these velogenic strains can be up to 100 percent. Clinical signs include ocular and nasal discharge, diarrhea, bloody diarrhea, neurological signs, and high mortality. Unfortunately, one of the most common clinical signs is simply death. These clinical signs can also be seen in other diseases including fowl cholera, infectious bronchitis, infectious laryngeotracheitis, and highly pathogenic avian influenza. Therefore, as noted above the only way to determine the causative agent is via laboratory techniques including virus isolation.

In general, young birds are more susceptible than older birds to the lentogenic and mesogenic strains. Clinical signs are expected to be more severe in younger birds. In addition, the above mortality rates are for chickens. Chickens are more susceptible to morbidity (sickness) and mortality (death) with respect to ND and END. Other domestic birds, including turkeys, ostriches, geese and pheasants, are much less sensitive. The clinical signs described above also vary according to which tissues the virus preferentially infects. For instance, if the virus preferentially infects the nervous system, the neurological symptoms will be more pronounced.

Have we ever had END or ND in the US?

Most APMV-1 strains are the lentogenic and mesogenic strains which have been present in the US since about 1940. In commercial chickens these forms are well controlled by vaccinations. Interestingly, the lentogenic strains are often used in North America as vaccines. Like many vaccines, ND vaccines can be effective in controlling clinical disease. However, the vaccine does not prevent the virus from replicating, shedding, and spreading. In addition, for the vaccine to be effective multiple does need to be given. Therefore, if you are able to get a chicken that was vaccinated at the hatchery, you shouldn't assume your bird is protected for life against all ND viruses.

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For these reasons, if you want to vaccinate your flock, work with a veterinarian who is knowledgeable about poultry disease control and vaccination protocols.

Outbreaks of END severely affect the poultry industry. In 1971, a major outbreak occurred in commercial poultry flocks in Southern California. In all, 1341 infected flocks were identified and approximately 12 million birds were depopulated. The eradication program cost $56 million and severely disrupted the operations of many commercial producers.

The most recent outbreak in the US occurred in 2002 and 2003. That END outbreak, originally confirmed in backyard poultry in Southern California, spread to commercial poultry operations in California and backyard poultry in Arizona, Nevada, and Texas. The outbreak, from discovery to eradication, lasted eleven months. The outbreak response led to the depopulation of over three million birds at a cost of approximately $170 million. Both outbreaks were also associated with an increase in egg and poultry meat prices to consumers.

How is the disease transmitted?

END is not endemic in North America. Based on the 1971 and 2002 outbreaks, the most likely way END is introduced into North America is through illegally imported birds from countries where END is endemic.

The virus can be spread from excretions from infected birds, aerosols, and feces. Consequently, the virus can be associated with contaminated feed, water, footwear, clothing, tools, equipment, and environment. Exposure of susceptible birds to any of these sources of virus can result in transmission via inhalation or ingestion.

With respect to hatching eggs, eggs laid by infected hens may also contain the virus. Typically if hens are affected egg production is severely decreased. If any hatching eggs are laid, the hatchability is also severely reduced.

Can I get it?

Humans who come into close contact with ENDV may develop a mild to moderate conjunctivitis (eye infection). Human to human spread has not been documented

Control and cure

Like many avian diseases there is no cure. In fact END is considered a "reportable" disease. This means that after a diagnosis is made, state and federal authorities need to be notified. Good biosecurity is essential toward preventing an outbreak.

Because END is endemic in many other parts of the world including Africa, Asia, and South America, birds should only be purchased legally and should never be imported from a country without proper paperwork and quarantine controls. As an example, live poultry cannot be imported from Mexico to the US because Mexico is considered endemic for END.

A recent outbreak of END in 2011 affected commercial birds in two Mexican states including Baja California Norte which borders Southern California. If you purchase poultry internationally, poultry should be bought only from suppliers who can certify that the birds have been imported legally or bred in the US and are healthy. Legally imported pet birds have been quarantined and tested for velogenic strains of APMV-1.

In addition to illegal importation, because wild birds can carry the virus without becoming ill, outbreaks can occur in domestic poultry after exposure to wildlife. Wild birds, especially

cormorants, gulls, and pigeons are considered primary sources of disease transmission.

As noted above, no specific clinical sign is 100 percent diagnostic of a specific avian disease. However, if you have a non-predator, high-mortality event coupled with a significant decrease in egg production, END should be in the back of your mind. In such an event, contact your state department of food and agriculture and/or the USDA. They have specially trained veterinarians who can help diagnose "foreign animal diseases" including END.

Because of the severity of the disease and the potential for further transmission of the virus, don't transfer suspected birds. The specially trained veterinarians will travel to your flock in order to collect appropriate samples that will be taken to a laboratory for virus isolation.

If your flock is determined to have END, the entire flock will be "depopulated" since the virus spreads rapidly. As poultry owners, it is important that we recognize this risk and understand why depopulation is an essential step in protecting other peoples' poultry.

We are very fortunate in that in North America END is not endemic like it is in parts of Latin America, Asia, and Africa. As noted above, we have not had END in America since 2002. In order to keep END outside of our borders, we all need to practice good biosecurity, such as keeping our birds and their environment secure and isolated from wildlife and nonliving (pond water used by wild birds) reservoirs for the disease.

In addition, we also need to recognize what our responsibilities are if and when our flock shows any signs consistent with an END outbreak. The quicker we are able to identify an outbreak of a foreign animal disease like END, the quicker a response can be started. In the long run this is the best way to protect our flocks and our neighbors' flocks.

About the author

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