AVIAN PNEUMOVIRUS INFECTION

DEFINITION

Avian pneumovirus (APV) infection is an infectious respiratory disease of turkeys, characterized by coughing, swollen sinuses and nasal discharge and lowered feed and water consumption. It has not been observed in broiler or layer type chickens in the U.S. In other parts of the world APV infection of turkeys has been called turkey rhinotracheitis (TRT), and APV infection of chickens has been called swollen head syndrome (SHS).

OCCURRENCE

1. APV infections have been described throughout the world. Only Canada and Australia report no avian pneumovirus.

2. The host range for APV has not been established. The virus has been isolated from turkeys in many parts of the world. Experimental studies have shown chickens, ducks, guinea fowl and pheasants to be susceptible. Serological studies have detected antibody in ostriches and herring gulls. Using RT-PCR, APV RNA has been detected in geese, coots, sparrows, swallows, starlings and an owl. A seasonal incidence with peaks in the spring and fall has been observed.

HISTORICAL INFORMATION

1. Turkey rhinotracheitis, caused by an avian pneumovirus, was first identified in South Africa in the late 1970s and is now known to be present in many European, Asian and Central and South American countries.

2. In the U.S.A. APV was first identified in Colorado turkeys in 1997 by workers at the National Veterinary Services Laboratories (NVSL) in Ames, Iowa. Subsequently the disease was detected serologically, using an ELISA developed at NVSL, in Minnesota turkeys in the spring of 1997. It is likely that the infection was present in Colorado and Minnesota prior to 1997. It has remained in Minnesota turkeys infecting 40 to 50% of the flocks each year since 1997, and there has only been limited spread to neighboring states.

ETIOGENESIS

1. Avian pneumovirus is a member of the Paramyxoviridae family, subfamily pneumovirinae, genus metapneumovirus. Avian pneumoviruses are difficult to isolate, but once recovered from affected birds APVs grow in embryos and tissue culture systems. Unlike other members of the paramyxovirus family, pneumoviruses do not hemagglutinate.

2. Two pneumoviruses from Europe have been characterized as Type A and Type B avian pneumoviruses. The recent U.S.A. isolates, antigenically and genetically distinct from the two European types, have been tentatively called Type C APV. Pneumoviruses have a fusion (F) protein and a glycoprotein (G) as surface antigens. Limited studies indicate that there might be partial cross protection between APV types.

3. Pneumovirus is present in respiratory secretions and excretions of infected birds where it is protected by organic material. The virus is susceptible to detergents and disinfectants, survives drying for at least a week, survives many freeze-thaw cycles, survives in a pH range of 5 to 9 and survives for long periods of time under cool and moist environmental conditions. In poultry litter it has been shown to survive for three days at 20 to 25 C and for 14 to 30 days at 8 C.
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EPIDEMIOLOGY

1. The natural reservoir of APV is unknown. Limited studies have implicated wild and domestic birds. Whether the virus persists in recovered turkey flocks is also unknown. TRT virus has been detected in oviduct tissue, and neonatal infection has been observed, but no proof of egg borne transmission has been shown.

2. The virus is transmitted by direct contact between infected and susceptible birds and is believed to be transmitted by indirect contact including exposure to aerosol droplets or to virus-contaminated boots, clothing or equipment. Airborne transmission has been demonstrated in the laboratory, but such transmission from farm to farm is unproven.

CLINICAL SIGNS

1. The clinical signs are extremely variable and seem to depend on the age, gender, concurrent infections, and environmental factors. Silent infections are possible. Listlessness, huddling, coughing, sneezing, rales, swollen sinuses, nasal discharge and stained shoulder feathers may be observed. As clinical signs subside birds may begin to die. Mortality rates in market turkeys range from nil to 80%, but death is usually due to secondary infections. FSIS condemnation rates are usually elevated if turkeys are infected within two weeks of processing.

2. Turkey breeder hens may have a decline in egg production of 10 to 30% and lay increased numbers of cull eggs. Mortality in breeders is usually 0 to 2% but may be higher if live pasteurella vaccine has been used in the flock.

LESIONS

There are few striking lesions because the disease is mild. There may be mild tracheitis, airsacculitis, lung congestion and inflammation of the turbinates. With early APV strains detected in U.S.A. microscopic lesions have been limited to infiltration of turbinates with lymphocytes, macrophages and plasma cells and excess mucus secretion, but more recently deciliation has also been observed. Secondary infections with E. coli or other bacteria may cause more severe lesions.

DIAGNOSIS

The history and signs of coughing, nasal discharge and swollen sinuses may be suggestive of APV infection but are similar to other respiratory infections. Confirmation of the diagnosis requires laboratory tests. The virus is difficult to isolate from swabs or tissues of affected birds so other laboratory tests used today are: immunohistochemistry on formalin fixed turbinate tissues, RT-PCR to detect viral RNA in tracheal swabs, choanal swabs or turbinates, and ELISA to detect pneumovirus-specific antibodies.

CONTROL

1. The reservoir of pneumovirus in nature is not known but wild birds are suspected. Whether or not infected flocks remain a source of virus for their whole life is also not known, but they should be considered a potential source for life. Prevention of pneumovirus infection requires preventing the introduction of the virus by direct or indirect contact from these possible reservoirs (wild birds and infected flocks).
2. Since the disease is spread by direct and indirect contact, strict biosecurity and a good sanitation program are imperative. A minimum biosecurity program for controlling APV would include:

   A. Crews that handle birds (vaccination, moving, live haul, insemination) must be controlled. Crew members should wear disposable or freshly laundered clothing including footwear.
   B. Equipment that moves from farm to farm and comes in contact with poultry or birds (rendering, moving, live haul trucks and dumpsters, loaders, vaccination equipment) should be washed with detergent and disinfectant.
   C. Poultry facilities should be wild bird proofed.

3. A live attenuated vaccine is available in the Midwestern USA. Killed autogenous oil emulsion vaccine has been used after live vaccines in turkey breeders.

4. A routine monitoring program is suggested for areas where APV infection has been a problem. Serological screening of blood samples and PCR testing of choanal swabs can provide early detection so that other control measures can be instituted.

TREATMENT

There is no treatment for pneumovirus infections other than good care. Reduced density, increased supplemental heat and good management conditions are associated with reduced financial loss due to the disease. Antibiotic treatment has been used to reduce the effects of concurrent bacterial infections.