DUCK VIRUS HEPATITIS
(DVH)

DEFINITION

Duck virus hepatitis (DVH) is a peracute, rapidly spreading viral infection of young ducklings characterized by a short course, high mortality, and by punctate or ecchymotic hemorrhages in the liver. Three different viruses are known to cause DVH.

OCCURRENCE

DVH type 1 occurs primarily in commercially raised Pekin ducklings and is seen almost exclusively in ducklings less than 5 weeks of age. Natural outbreaks have not been reported in other species. The disease is probably present in all major duck-raising areas of the world. DVH type 2 is seen exclusively in the United Kingdom and affects ducklings up to 6 weeks of age. The United States is the only country in which DVH type 3 has been observed. Ducklings up to 5 weeks of age are susceptible to DVH type 3.

HISTORICAL INFORMATION

A disease that probably was DVH type 1 first appeared in New York in 1945. A similar disease, called duck viral hepatitis, appeared on Long Island in 1949 and killed an estimated 750,000 ducklings. Subsequently, the disease was reported in many other states and from many countries throughout the world. In the United States the disease remains one of the major diseases of the duck-raising industry. DVH type 2 was first reported in DVH type 1-vaccinated ducklings in Great Britain in 1965. In 1969, DVH type 3 was reported to occur in DVH type 1-immune ducklings on Long Island.

ETIOLOGY

1. The etiologic agent of DVH type 1 is an enterovirus in the family Picornaviridae. It is chloroform resistant and does not hemagglutinate; features that help separate it from most other viral diseases of ducks. The virus is rather stable and difficult to eliminate from contaminated premises. Serologic variants of DVH type 1 have been reported.

2. DVH type 2 has been identified as an astrovirus. As with DVH type 1, the virus is fairly resistant. DVH type 3 is caused by a picornavirus unrelated to DVH type 1.

3. DVH type 1 can be isolated from typically affected livers in embryonating chicken or duck eggs, 1-day-old ducklings, or duck embryo kidney or liver cell cultures. DVH type 2 is difficult to isolate, whereas DVH type 3 can be isolated on chorioallantoic membranes of 9-10-day-old duck embryos.

4. DVH viruses stimulate a high degree of immunity in ducklings that survive infection and in inoculated adult ducks. A potent antiserum can be made from the blood of such ducks. The blood can be collected at slaughter and the sera harvested. Antibodies for prophylactic use may also be obtained from the yolk of eggs produced by immune breeders, or from the eggs of chickens hyperimmunized with the virus.

EPIZOOTIOLOGY

1. DVH type 1 is a highly contagious disease. The virus is excreted by recovered ducklings for up to 8 weeks after onset of infection. Susceptible ducklings can be infected by contact with infected ducklings or their contaminated pens. The virus can survive for 10 weeks in contaminated brooders and for 37 days in feces. DVH type 2 is transmitted via both the oral and cloacal routes. Survivors excrete virus for up to 1 week postinfection. DVH type 3 is similar to but less severe than DVH type 2.
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2. Wild birds have been suspected of acting as mechanical carriers of virus over short distances. The viruses do not appear to be transmitted through the egg and there are no known vectors of the disease.

CLINICAL SIGNS

DVH type 1

1. The incubation period is very short, often around 24 hours in experimental birds, and morbidity is close to 100%. Onset and spread within a flock are very rapid and most mortality occurs within 1 week of onset.

2. Affected ducklings at first lag behind the flock. Within a short time they squat with their eyes partially closed, fall on their side, kick spasmodically, and soon die. They often die in the opisthotonus position [Fig. 1; Duck viral hepatitis; Cornell U]. Death often occurs within 1 hour of the appearance of signs.

3. Mortality is age related and occurs as follows: ducklings less than 1 week old—up to 95% mortality; ducklings 1-3 weeks old—up to 50% mortality; ducklings over 4 weeks and older ducks—negligible mortality.

4. In older or partially immune ducklings, signs and losses may be so limited that the disease may go unrecognized.

DVH type 2

Affected ducklings die within 1-2 hours of being sick. Clinical signs usually appear within 1-4 days postinfection. Signs include convulsions and opisthotonus. Mortality ranges from 10 to 50% and nearly all birds with clinical signs die. DVH type 3 is similar to DVH type 1 but mortality is rarely over 30% and morbidity is higher.

LESIONS

1. The lesions observed with all three viruses are similar.

2. The cadaver may be in opisthotonus, the position in which many of the ducklings die.

3. The liver is swollen and contains punctate or diffuse hemorrhages [Fig. 2; Duck viral hepatitis; Cornell U]. The kidneys may be swollen and the spleen enlarged. Microscopically, there may be areas of hepatic necrosis, bile duct proliferation, and some degree of inflammatory response.

DIAGNOSIS

1. The sudden onset, rapid spread, short course, and focal, hemorrhagic hepatitis in young ducklings suggest a diagnosis of DVH.

2. DVH type 1 can usually be isolated in embryonating chick or duck embryos or 1-day-old susceptible ducklings. Once the virus is isolated, it can be identified by serum neutralization using known hepatitis antiserum. Identification is also possible by inoculation of the virus into both susceptible and immune ducklings. DVH type 2 can be identified through electron microscopy on liver or blood. DVH type 3 cannot be isolated in chicken embryos and is difficult to reproduce in ducklings. The chorioallantoic membranes of duck embryos are the preferred route. A direct fluorescent test on duckling liver has been reported.

3. The disease must be differentiated from duck viral enteritis, Newcastle disease, and avian influenza. In contrast to the viruses of DVH, the viruses causing those diseases are susceptible to chloroform; also the viruses of influenza and Newcastle disease hemagglutinate erythrocytes.
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CONTROL

DVH type 1

1. In the initial stages of outbreak, all susceptible ducklings should be inoculated intramuscularly with duck hepatitis viral antiserum. One inoculation should be adequate if the antiserum is potent.

2. Unexposed ducklings can be actively immunized using a chicken embryo-adapted apathogenic vaccine. However, young ducklings with parental immunity may not respond to vaccination.

3. Many duck breeders prefer to vaccinate their breeding stock at 3-4-month intervals to maintain a high antibody titer. Those birds then will transmit antibody through their eggs to the progeny. The progeny will usually be protected through the critical early weeks. Breeder birds should be vaccinated at least 2 weeks before their eggs are to be saved for hatching. Both live and inactivated vaccines are available.

DVH type 2 and 3

Vaccines for breeders are in the experimental stage only. Strict biosecurity procedures must be employed. Information concerning vaccines or antiserum can be obtained by contacting the Duck Research Laboratory, Eastport, Long Island, NY 11941.

TREATMENT

Treatment is of no value.