Ranikhet Disease
New Castle Disease in Poultry
(Compiled)

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RANIKHET DISEASE — A DREADED ENEMY OF POULTRY FLOCKS IT IS PREVALENT IN INDIA SINCE 1928. CHIKENS ARE HIGHLY SUSCEPTIBLE, IN GENERAL, YOUNGER THE CHICKEN THE MORE SERIOUS IS THE DISEASE.

Ranikhet disease has became a major menace to the world's poultry industry. It represents a serious economic challenge to all segments of the poultry. Various other poultry and birds as well as mammals including human, also may contract the disease. RD has been recognized in man as almost entirely a localized eye infection, pulmonary and generalized infections have been reported.

Newcastle disease is a viral disease of birds with a wide range of clinical signs from mild to severe. This disease is caused by a diverse group of viruses; the milder strains are endemic in the United States, while highly virulent strains are exotic. The highly virulent form of Newcastle disease is one of the most important poultry diseases worldwide. Chickens are particularly susceptible, and may experience morbidity and mortality rates up to 100 per cent.

Outbreaks of virulent Newcastle disease have a tremendous impact on backyard chickens in developing countries, where these birds are a significant source of protein and this disease is endemic. In developed countries, where the more virulent forms of the virus have been eradicated, trade embargoes and restrictions cause significant economic losses during outbreaks. In the United States, one epidemic in 2002-2003 resulted in the death of more than three million birds and caused industry losses estimated at $5 billion. Low pathogenicity isolates, which are common in poultry worldwide, can decrease productivity but have no impact on international trade.
The disease is also called as New Castle Disease or Doyle’s disease. It is an acute, infectious and highly contagious disease of fowls, characterized by respiratory Distress, nervous symptoms and high mortality.

* DISTRIBUTION:

1st recognized in the middle 1920’s. Doyle named the disease after the locality and demonstrated that it was distinct from the dreaded fowl plague or fowl pest. The disease was diagnosed at first in England during 1926 at New castle. In 1928, the disease was found in Ranikhet near Mukteshwar in Uttar Pradesh by Dr. Edward.

* SUSCEPTIBILITY:

Chicks are highly susceptible, adults are comparatively less. Turkeys, pigeons, ducks are also susceptible. In human beings, it causes Conjunctivitis. Birds of all ages are susceptible. Host ranges from chicken, turkeys, guinea fowls, ducks, doves, geese, pigeons, pheasants, crows, sparrows and other free flying birds.

* ETIOLOGY:

Newcastle disease is caused by viruses in the serotype avian paramyxovirus type 1 (APMV-1). These viruses, which are called either APMV-1 or Newcastle disease viruses (NDV), are members of the genus Avulavirus in the family Paramyxoviridae.

The disease is caused by a filterable virus, which belongs to micro group having a molecular weight 450 million. The virus is multi-shaped, tailed, sperm-like and filamentous form. The virus consisted of 67 per cent protein, 27 per cent lipids and a small amount of nucleic acid mainly deoxypentose. The virus possesses haemagglutination activity (HA) for chicken erythrocytes resembling that of Influenza virus.

The clinical signs vary with the pathogenicity of the isolate and the species of bird. There are three strains of this virus.

(1) VELOGENIC:

Very virulent - Velogenic strains cause severe, often fatal, disease in chickens. The clinical signs are highly variable. Most birds are lethargic and in appetent and the feathers may be ruffled. Conjunctival reddening and edema may be an early sign. Some birds develop watery, greenish or white diarrhea, respiratory signs (including cyanosis) or swelling of the tissues of the head and neck. Neurologic signs including tremors, clonic spams, paresis or
paralysis of the wings and/or legs, torticollis (twisted neck) and circling may also be seen. Nervous signs can occur concurrently with other symptoms but are generally seen later in the course of disease. Egg laying often declines dramatically, and eggs may be missshapen, abnormally colored, and rough or thin-shelled, with watery albumen. Sudden death, with few or no symptoms, is also common. Birds that survive for two weeks usually live but may have permanent neurological damage and/or a permanent decrease in egg production. The symptoms may be less severe in vaccinated birds. The common symptoms in Velogenic Form are

(1) Sudden Appearance with heavy Mortality
(2) Increases Respiration and Weakness
(3) Greenish Diarrhoea
(4) Reduced Egg Production with weak and Shell Less Eggs.
(5) Muscular Tremors and Torticollis
(6) Paralysis of Wings and Legs.
(7) Opisthotonus
(8) Prostration and death

(2) MESOGENIC -

MESOGENIC - Strains can cause acute respiratory disease and neurologic signs in some chickens, but the mortality rate is usually low.

(3) LENTOGENIC -

In chickens, lentogenic strains usually cause sub clinical infections or mild respiratory disease with coughing, gasping, sneezing and rales

The virus is present in all organs, secretions, excretions and fluids. It can be preserved for 6 months in 50 per cent glycerin in freeze. 50 to 55 degree Celsius temperature. At 37 degree Celsius, it can remain alive for 3 days and direct sunlight kills it within 30 minutes to 1 hour.

The virus remained viable for up to 255 days in a hen house, at ambient temperatures of 11°C (12°F) to 36°C (97°F). At 23-29°C (73-84°F), RDV is reported to survive in contaminated litter for 10 to 14 days, and at 20°C (68°F) in soil for 22 days. Flies might be able to transmit RDV mechanically, but it is still uncertain whether insects can carry enough virus to infect poultry. The importance of arthropod-borne transmission may vary with the type of housing and flock management.
The virus may remain viable for at least 6 months in bone marrow and muscle tissues of fowl carcasses stored under "trade chilling" conditions. Skin of both dressed and plucked infected carcasses of market poultry stored at 24 degree F to 36 degree F remains infective for at least 60 days.

The epidemiology of RD Virus is incompletely understood; however, wild birds, particularly waterfowl, may be the reservoir hosts for lentogenic viruses. These viruses could become more virulent after becoming established in poultry. Some recent outbreaks were apparently caused by velogenic viruses that emerged from local, low pathogenic isolates.

**INCUBATION PERIOD:**

The incubation period in poultry varies from 2 to 15 days depending on the virulence of the strain and the susceptibility of the population. In chickens infected with velogenic isolates, an incubation period of 2 to 6 days is common. Incubation periods up to 25 days have been reported in some avian species.

**TRANSMISSION:**

New Castle disease virus transmitted by inhalation or Ingestion (fecal/oral route).

Transmission Routes are as follow:

1. Inhalation (Air Borne)
2. Ingestion (Contaminated FEED AND WATER)
3. Movement of Live Birds and other Animals
4. Movement of People and Equipment
5. Contaminated Vaccines
6. Movement of Poultry Products

Direct contact with infected birds,
Indirect contact such as infected utensils, feed, water, litter

**SYMPTOMS:**

Affected birds may be weak, with paresis or paralysis of one or both legs and/or wings, in coordination, tremors, torticollis and/or drooping of the head. Sick or dead birds can be found in the same nest as apparently normal nestmates. Sudden death, Lack of energy and appetite, swelling of head, eyelids, comb, wattles and legs, Purple discoloration of the wattles and combs, Nasal discharge, Coughing and sneezing, Diarrhea.
There are three forms of the disease

(1) PER-ACUTE FORM:
In this form most of the birds found dead within 3-4 days

(2) ACUTE FORM:
In this form the birds loses it's appetite. It crouches, huddles. The respiration is distressed, low and gasping inhalation through half opened beak, temp rises upto 110 Fahrenheit. There is watery discharge from mouth, nose, saliva hangs in strands. There is watery and yellowish diarrhea as well as spasms.

(3) CHRONIC FORM:
In this form, paralysis of legs and wings occur due to degenerative changes in the nerves. Size of virus is 115nm and the bird dies due to Inanition.

* SIGNS AMONG BABY CHICKS AND GROWING CHICKENS:
Gasping, coughing, aphonia, depression, partial or complete inappetance, increased thirst are the common findings of respiratory system. Nervous signs including partial or complete paralysis of extremities, muscular tremor and rhythmic, clonic spasms. Peculiar altitudes including “Torticollis”, opisthotonus, emprosthotonus and lateral deviation of head, partial or complete paralysis of one or two legs was the only sign observed in several outbreaks of RD.

* SIGNS IN LAYING FLOCK:
The disease usually appears suddenly and spreads quickly through susceptible flocks, drop in egg production, laying of soft or imperfectly shelled, profuse fluid diarrhea, rapid dehydration of body, also effects like Absence or tremuculous air cells, watery albumen and a rough discolored
and chalky shells egg quality. A high per cent of hens lay abnormal eggs upto 45 days after

* POST-MORTEM CHANGES :

Emaciation, dehydration, hemorrhages in proventriculus. Rarely ulcers in intestine, haemorrhages in caecal tonsils, liquification of ovas, haemorrhages in brain, congestion in trachea, spleenomegaly, haemorrhages found on liver, lungs, kidneys, mesentry, bursa.

The grass lesions found are Hemorrhagic lesions on the papillae of Proventriculus, Caeca and Small Intestines. Congestion of Trachea, Presence of Egg Yolk in the abdominal Cavity.

* Diagnosis -

Diagnosis can be made on the basis history, vaccination, age, Sudden death, symptoms and lesions. The laboratory diagnosis is carried out by using following tests namely Biological inoculation, HA, HI test, Virus Isolation, Elisa Technique and PCR techniques.

Diagnosis can be made on
(1) Symptoms and Lesions
(2) Detection of Antibodies
(3) Virus Isolation. (Biological Innoculation in embryonated eggs and HA/ HI Tests.
Differential Diagnosis:

(1) Fowl plague/Avian influenza - Infectivity of the virus is very high i.e. 1:10000, subcutaneous hemorrhages on shank, Buldging of head, Cyanosis of Comb and wattle, 100 per cent mortality.

(2) Spirochetosis - The causative agent is Borrlia anserina

(3) Infectious Laryngo - tracheatis: Haemagglutination test is negative

(4) Fowl Cholera: The causative organism is Pasturella aviseptica-bipolar organism, Infra-orbital/facial swelling-unilateral occurs

(5) Fowl typhoid: Causative organism is salmonella gallinarum. There are digestive disturbances.

*PREVENTION AND CONTROL:

(1) Strict Biosecurity Practises: KOHRSOLIN - TH SPARY 3 per cent.

(2) Vaccination.

Control: No treatment is advisable; sanitary measures are to be taken. Poultry house, incubators should be properly disinfected sterilization of utensils may be carried regularly. Quarantine measures may be taken. Keep the incoming birds in isolation ward for 15 days.