

Chicken Infectious Anemia



Synonyms: Hemorrhagic syndrome,
Anemia-dermatitis
Blue-wing disease

~~Chicken Infectious Anaemia; Is a disease caused by the Chicken~~
Anaemia Virus (CAV). The disease is found worldwide. The virus can infect chickens of all ages but only young chicks may develop clinical signs. The virus can be isolated from different organs but targets mainly **the thymus** therefore impairing the maturation of T lymphocytes. More important than the disease caused by the virus in susceptible chickens is the damage (immunosuppression) it causes to the immune system.

Chicken Infectious Anemia

- **First identified in Japan in 1979. It was called the chicken anemia agent (CAA) and later referred to as chicken anemia virus (CAV).**
- **The disease is characterized by aplastic anemia, generalized lymphoid atrophy with concomitant immunosuppression, and subcutaneous hemorrhage.**
- **Primarily causes T-cells suppression.**

- It is often complicated by secondary viral, bacterial, or fungal infections.

The disease produced in young chickens most frequently involves severe bone marrow depletion with a reduction in hematocrit values.

It plays a major role in a number of multifactorial diseases associated with hemorrhagic syndrome and aplastic anemia.

- **It is generally accepted that chickens are the natural hosts of CAV.**
- All ages of chickens can be infected, the most severe clinical signs are seen in chickens younger than **2 weeks of age**.
- CAV has also been isolated from other species such as turkeys and CAV antibodies have been detected in quails.



Etiology

Virus Characteristics

Small, spherical, single stranded, non enveloped DNA-virus.

Family: Circoviridae.

Genus: Gyrovirus.

There is only one serotype but there are variations in pathogenicity.

Chemical and physical properties:

- ❖ Able to withstand pH of 3 and chloroform.
- ❖ Not inactivated by heating at 70°C for one hour or after 5 minutes at 80°C.
- ❖ Resistant to lipid solvents and to treatment for 2 hours at 37°C with 5% solutions of commercial disinfectants (ammonium compounds, amphoteric soap).

Economic Importance

The immunosuppressive effects of CAV on broilers are more economically significant than the disease itself.

The economic impact of CAV is mainly due to:

1. Bad performance (poor FCR and reduced weight gain). It has been proven that flocks that appear normal, but suffered from a subclinical CAV infection, performed less well when compared to flocks that remained negative throughout the growing period.
2. Increased condemnation rates at slaughter.
3. Presence of secondary infections.
4. Vertical transmission from breeders to their progeny which may result in clinical disease.

Transmission

Disease usually occurs during the first 3 week of life through;

1-Vertical transmission appears to be the most important means of dissemination. Vertical transmission occurs following the infection of hens in lay. The hen continues transmitting CIAV until antibodies appear in her blood, a period of approximately 7 days.

2-Horizontal transmission through infected organic material or contaminated equipment.

3- Chickens at any age are susceptible to infection by:

A-Oral route.

B- Respiratory route.

The importance of this virus comes from its:


1. Trans-ovarian transmission.

2. Potential for inducing immunosuppression alone or in combination with other infectious agents.

- **Period of Incubation**

- CAV is not highly contagious and it takes few weeks to spread through an entire flock.
- The incubation period is relatively long under field conditions, with the disease **taking weeks to spread** through the entire flock.

In natural outbreaks, peak mortality in broilers is commonly observed **between 17 to 24 days followed by a second wave of increased mortality **between 30 to 34 days of age.****

- 
- **Mortality**
 - **Clinical CAV rarely occurs, but occasional outbreaks are generally devastating.**
 - **Mortality is usually 5 to 10% although it has been reported up to 60 % in some cases.**

Pathogenesis

Chickens of all ages are susceptible to infection with CIAV.

However, clinical disease is seen only during the first two to three weeks of life although immunocompromised chickens may suffer from anemia later in life. Chicken infectious anemia virus persists only for 3 to 4 weeks in chickens with an intact immune system, but for as long as 7 weeks in **immunocompromised chicks**.

Age resistance to clinical disease caused by CIAV develops rapidly and becomes complete by 2 to 3 weeks of age.

Maternal antibodies from immune hens prevent clinical disease in young chicks. Because of passive immunity and age resistance, most infections with CIAV are subclinical.

Clinical Signs

Birds of all ages are susceptible to infection but the clinical signs are mainly seen in young birds **<2 weeks of age.**

Most outbreaks occur in broilers, followed by replacement pullets and are acutely reported at around 2 - 3 weeks of age.

Outbreaks in older birds (replacement pullets) have been reported when other immunosuppressive agents are involved (like Marek's Disease virus and/or Infectious Bursal Disease virus).

1-Anemia is the only specific sign with hematocrit values ranging from 6-27%.

2-Normal hematocrit value is 35%.

3-Depression, paleness, and anorexia are often seen.

4-Lesions on the wing (blue-wing) result from secondary bacterial infections leading to gangrenous dermatitis.

5-Exhibit a marked pallor that may extend to the internal organs.

6-Hemorrhages can be observed in the musculature and subcutaneously, with the wing tips frequently affected.

7-The bone marrow is pale or yellow in color and may have a fatty consistency.

8- Thymic atrophy and congestion is common and is considered diagnostic when associated with other typical signs or lesions.

9-Bursal atrophy is generally modest and transitory, typically occurring at 10 to 14 d of age in chickens vertically infected.

11-Severely affected birds generally die within 2 to 4 week of age survivors are often stunted.

Gangrenous dermatitis in the wings
Blue Wing disease (BWD)

Chicken Infectious Anemia

Gangrenous dermatitis in the wings - Blue Wing disease (BWD)
The skin lesions begin generally from wings and the adjacent areas.



Haemorrhages on the wing of a young chicken with Chicken Infectious Anemia, hence the name Blue Wing Disease.





Subcutaneous haemorrhages on the wing of a young chicken with Chicken Infectious Anemia. The name "Blue Wing Disease" is as a result of the blue discoloration seen.



Subcutaneous haemorrhage in a young chicken with Chicken Infectious Anemia, resulting in blue discoloration of the hock joint.

- **Postmortem Lesions**

- Focal lesions (mostly in the wings) appear as ecchymotic skin haemorrhages. **The bone marrow is pink to yellow in color.**
- The lesions turn blue and may break, releasing serosanguineous exudate which is prone to secondary bacterial infections, leading to gangrenous dermatitis. This can be especially notorious at the end of the wings, hence the name “Blue Wing

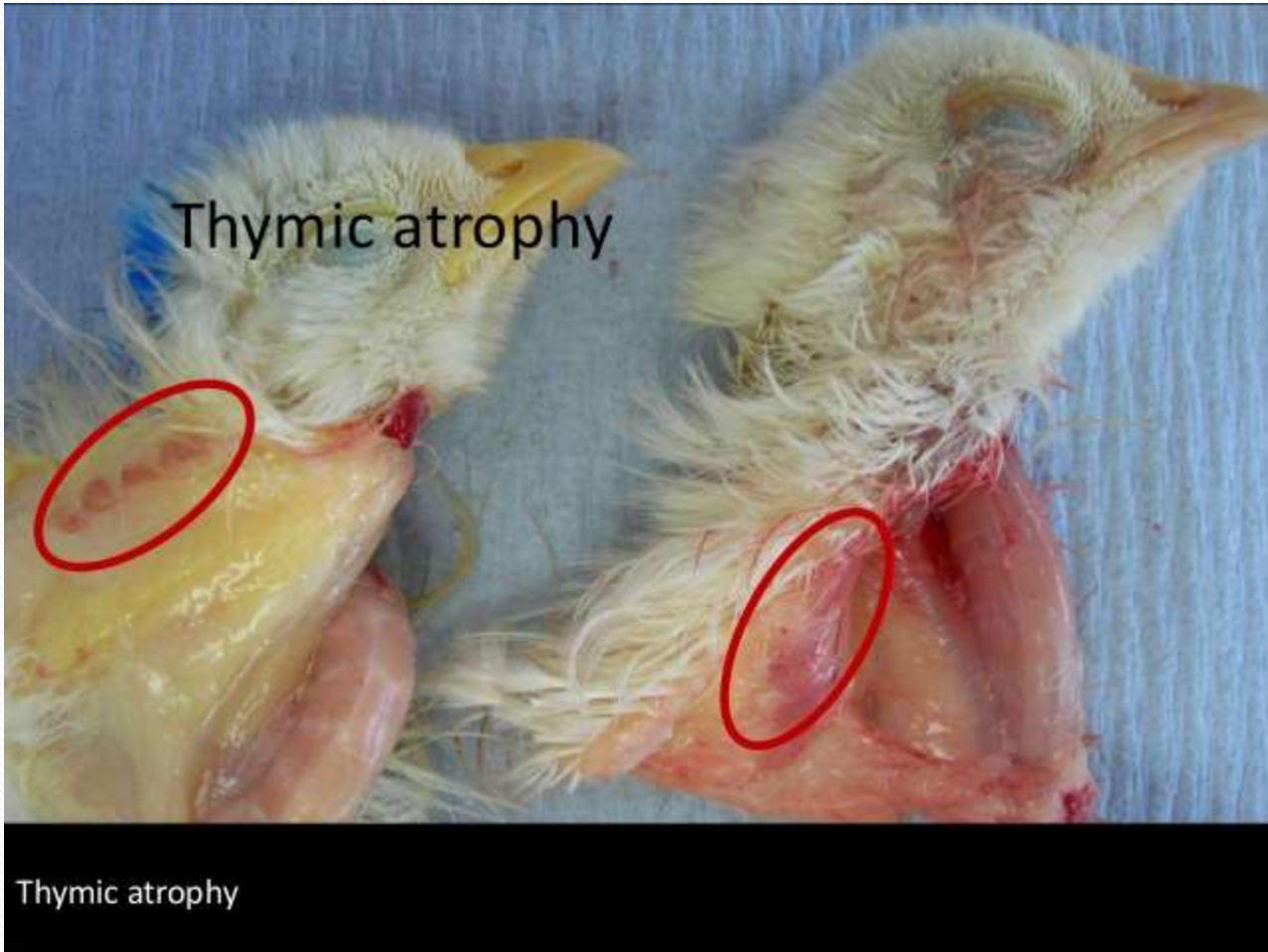




Subcutaneous haemorrhages and petechiae in the breast muscle of a young chicken with Chicken Infectious Anemia.



Subcutaneous petechiae on the hock of a young chicken with Chicken Infectious Anemia.



Thymic atrophy



● **Histopathology**

- Bone marrow depletion; erythrocytes, thrombocytes, and granulocytes are replaced by adipose tissue.
- Other lymphoid tissues including spleen and bursa of Fabricius are also atrophic but to a lesser degree and for a shorter duration.
- Inclusion bodies mostly found in hepatic cells

Diagnosis

- 1-Clinical signs in young chicks are indicative of CAV infection but laboratory tests are required for a definitive diagnosis.
- 2-Flock performance history, postmortem lesions, and the presence of other related diseases such as gangrenous dermatitis, and hemorrhagic syndrome.
- 3-Low hematocrit values.
- 4-Laboratory tests to identify the viral genome, antigen or antibodies are required for a definitive diagnosis.
- 5-Virus isolation from infected livers. Inoculate the virus into susceptible day-old chicks.
- 6-Indirect FA or ELISA tests are also available.
- 7- Because its viral disease we can used difinitive diagnosis by using PCR

Prevention and Control

1-Limiting vertical transmission

2- Basic management practices such as limited controlled site access, separate footwear and equipment for each site/house, and footbaths at the entrance to sites/houses all minimize the risk of introducing the virus

3-Monitor for the presence of antibodies at 10-12 weeks of age.

4- Application of a suitable disinfectant to reduce infectivity of any remaining virus particles. Applying disinfectants at the correct concentration with a suitable contact time is critical.

Generally products containing **formaldehyde, chlorine releasing agents, or ammonium compounds are suitable within the context of minimizing virus (and lowering infective dose) in the environment, rather than assuring complete inactivation.**

5-Prevention and Control Vaccination Program. The aim of vaccination is to protect the progeny from early infections (before 3 weeks) by means of maternally derived antibodies.

Prevention and Control

The immunization of breeding stock, several weeks before onset of lay, will efficiently prevent outbreaks of infectious anemia caused by CAV in their progeny.

This vaccine is given via the wing web stab between 10 and 18 weeks of age. **It should not be administered later than 6 weeks before the onset of egg production.**

Broilers and layer pullets are not commonly vaccinated against CAV in the field. Early protection is achieved by vaccination of the breeders through MDA.



Live vaccine, Del Ros strain
Wing Web Administration

For the active immunization of chickens
against Chicken Anemia Virus



Live attenuated freeze dried, Del Ros strain
Drinking Water Administration

For the active immunization of chickens
against Chicken Anemia Virus