

2-Colibacillosis (E. coli infection).

***Definition:** it refers to any **localized** or **systemic infections** caused by avian pathogenic *E.Coli* (APEC), including colisepticemia, coligranuloma (Hjarre's disease), air sac disease (chronic respiratory disease) (CRD), swollen-head syndrome (**SHS**), Coliform cellulitis (inflammatory process), peritonitis, Salpingitis, Orchitis, Osteomyelitis/synovitis, Panophthalmitis, Omphalitis/yolk sac infection and enteritis.

***Etiology:** - caused by gram negative bacilli and it is mobile bacteria.

*Infection caused *E.Coli* are responsible for significant **economic losses**, for example **43%** of broiler carcasses condemned for disease at processing.

* **Classification of Colibacillosis:**

1-Localized Form.

2-Systemic Form.

1 -Localized Form:

- 1-Omphalitis/yolk sac infection.
- 2-Cellulitis (inflammatory process).
- 3-Swollen head syndrome.
- 4-Diarrhea disease.
- 5-Veneral colibacillosis (Acute vaginitis).
- 6-Salpingitis.
- 7-Orchitis.

2 -Systemic Form:

- 1-Respiratory-origin (Air sac), chronic respiratory disease, (CRD).
- 2-Enteric-origin colisepticemia.
- 3-Neonatal colisepticemia.
- 4-Layer colisepticemia.
- 5-Septicemia of Ducks.

***Colisepticemia Sequelae:**

- 1-Meningitis.
- 2-Panophthalmitis.
- 3-Osteomyelitis and Synovitis.
- 4-Coligranuloma (Hjarre's disease).

1 -Localized Forms of Colibacillosis:

1-Coliform omphalitis (yolk sac infection):-

Omphalitis is inflammation of navel (umbilicus).

*In bird, the **yolk sac** is usually involved too because of **its close anatomic relationship**.

*The infection occur follows contamination of **unhealed navel** with virulent strain of *E.Coli*.

***Fecal contamination of eggs** is considered to be the most important source of infection.

***Yolk sac infections** also result from transmission of bacteria from **chick's intestine** or from the bloodstream.

*Some embryos may **die** before hatching, particularly late in incubation, whereas others die at or shortly after hatching.

*The incidence of birds with **omphalitis** increase after hatching and declines after about **6 days** and continuing up to **3 weeks**.

***Gross lesion of yolk sac infection:-**

1-Swelling, edema, redness and possibly small abscess characterize the acute form of navel.

2-The **abdomen** is **distended** and blood vessels are hyperemic.

3-In severe cases the **body wall and skin undergo lysis** and are wet and dirty.

4-There may be other **non-specific changes** such as **dehydration**, visceral gout, emaciation, vent pasting, enlarge gall bladder.

5-The **yolk sac** is distended because it has **not absorbed** and **inflammatory products** have been added.

6-**Yolk sac is abnormal** in color, consistency and smell and may contain visible exudate.

***Microscopic lesions:-**

The wall of infected sac is edematous with mild inflammation, there is outer connective tissue zone adjacent by a layer of inflammatory cells containing heterophils, macrophage and giant cells, zone of necrotic heterophils and mass of bacteria and then the inner abnormal yolk contents, few plasma cells may be found in some yolk sacs.

2-Coliform cellulitis (inflammatory process):

***Cellulitis is inflammation of subcutaneous tissue** that extended beneath the normal skin.

***Cellulitis** is rare in mammals but **common in birds** with name of head swelling syndrome (**SHS**), which is involving the periorbital and adjacent subcutaneous tissue of the head.

*The disease also affects turkeys and guinea fowl.

*SHS usually caused by *E.Coli*, following upper respiratory viral infections (e.g. **avian pneumovirus, infectious bronchitis virus**), and increase of ammonia.

***The portal of entry** is consider to be **conjunctiva** or **inflamed mucous membranes** of the sinuses or nasal cavity.

3-Diarrheal Disease.

Birds infected with *E.Coli*, **dehydrated**, the intestine are pale and distended with fluid especially in cecum which is filled with **brown fluid and gas**.

4-Acute vaginitis (venereal colibacillosis).

(It means inflammation of vagina), it is **acute and fatal vaginitis** that affect (turkey hens shortly after first inseminated), characterized by vaginitis, cloacal and intestinal infection, peritonitis, egg binding and **internal laying**.

5-Salpingitis (Adult).

***Inflammation of the oviduct** caused by *E.Coli* result in decrease egg production and sporadic mortality.

*Infection occurs when *E.Coli* ascends the oviduct from the cloaca.

***Gross lesion:-**

In chronic cases the oviduct is marked distended and thin walled with single or multiple masses of **caseous exudate** which is laminated, often contains a central egg.

*Extension of infection leads to peritonitis.

2-Systemic Forms of Colibacillosis:

Colisepticemia is presence of *E.Coli* with its toxin in the blood stream.

1-Virulence and number of organism against efficacy of host defenses determine duration, degree, and outcome of the disease and pattern and severe of lesions.

2-Colisepticemia progress through the following **stages**: acute, subacute, chronic granuloma inflammation.

3-Characteristic feature of Colisepticemia at necropsy are **tissue** that develop a **green discoloration** following **exposure to air** and **characteristic odor** possibly related to **indole** produced by organism.

1-Pericarditis is common and is a characteristic of **Colisepticemia**, and vessels in pericardium become hyperemic and the pericardium becomes cloudy and edematous, and pericardial sac covered by fibrinous exudate.

2-Respiratory-origin Colisepticemia:-

E.Coli enter to the circulation following damage to the respiration mucous by **infectious or non-infectious agents**, like infectious bronchitis virus (**I.B**), Newcastle disease (**ND**), **Mycoplasma**, and **ammonia**, are the most common predisposing agents, the resulting disease, referred to as **air sac disease, chronic respiratory disease (CRD)**.

3-Enteric-origin Colisepticemia:-

1-It is most common in Turkeys, E.Coli enter to the circulation and tissues following damage to the intestinal mucosa by infectious agents, and the most common predisposing agent is Hemorrhagic enteritis.

2-Lesions are typical of the acute septicemia; affected birds are in good physical condition and have **full crops containing feed and water**.

3-The most characteristic lesions are congestion or green discoloration of the liver, marked enlargement and congestion of the spleen, and **congested muscles**.

4-Neonatal Colisepticemia:

1-Chicks are affected within the **first (24-48) hours after hatching**, mortality remains elevated for 2-3weeks and usually totals **(10-20) %**, up to **5%** of the flock may be **stunted** and require culling.

2-Initial lesions consist of **congested** lungs, edematous serous membranes and splenomegaly.

3-The proventriculus and lungs develop a **dark to black color**.

5-Layer Colisepticemia:-

1-**Colisepticemia** is usually disease of **young** birds, but outbreaks of acute ***E.Coli* infection (resembling fowl typhoid or fowl cholera)** occur in **mature** chickens and turkeys.

2-The majority of **outbreaks** are associated with **onset of egg production**.

3-**Death** usually occurred **suddenly without signs** although depression and or dirty vent.

4-Cumulative mortality ranged up to **10%** and mortality remained elevated for **(3-10 weeks)**.

5-**Polyserositis** (perihepatitis, pericarditis) and peritonitis.

6-**Control** through **chlorination of water** or treatment of flock with **antibiotic**.

3-Colisepticemia Sequele:-

Death is usual outcome of colisepticemia, but some birds may **completely recover** or **recover with residual sequelae**.

*If the bird does not control ***E.Coli***, it can localized in **poorly protected sites** including the **brain, eyes, synovial tissues** (joints, tendon sheaths, sternal bursa) and bones.

*In immature females, **salpingitis** can occur when there is involvement of nearby air sacs.

***Infectious Bronchitis infection** of the oviduct may also important predisposal factor in immature salpingitis.

***Ascites** develop from the **direct action of endotoxin** on the pulmonary vascular system.

1-Meningitis. (uncommon)

Meningitis is affected of Meninges, but in some birds there also is involvement of the brain (encephalitis).

*The lesions are evident at necropsy as zone of discoloration adjacent to major blood vessels.

***Microscopic lesions:-**

Fibronheterophilic to heterophilic exudate, the lesion becomes more granulomatous with time.

2-Panophthalmitis (uncommon).

It is inflammation of **entire eye**, the infection is unilateral.

***Gross lesion:-**

The eye is swollen, cloudy to opaque and may be hyperemic initially, later the eye **shrinks as it undergoes atrophy.**

3-Osteoarthritis and synovitis.

*Localization of *E.Coli* in **bones and synovial tissues** is common **sequel** to colisepticemia.

1-Mild to severe **lameness** and **poor growth**, and affected birds are victims of **cannibalism.**

2-**Polyarthritis** refers to involvement of more than one joint.

4-Coligranuloma (Hjarre's Disease).

In chickens and turkeys is characterized by **multiple granulomas** in **liver, ceca, duodenum** and mesentery, but **not spleen.**

***Prevention:**

***Fecal contamination** of hatching eggs is most important way that *E.Coli* transmitted between flocks, **therefore:-**

1-Collecting eggs frequently.

2-Keeping **nest material clean.**

3-Not using floor eggs.

4-**Discarding corrupt eggs**, or those with obvious fecal material.

5-**Fumigating or disinfecting** egg within (2hours) after they are laid can reduce transmission.

6-**Ultraviolet irradiation** can reduce or eliminate *E.Coli* and other bacteria.

7-Application of sanitizers by electrostatic spraying improves efficacy.

***Control:**

1-High **protein** diets with vitamins **A and E**, selenium.

2-Use pelleted feed or hot pellet.

3-**Chlorination** of drinking water and use closed watering system (nipple).

4-Add native flora from resistant chickens.

5-Control ventilation.

6-Effective vaccination programs.

***Treatment:**

1-Using **Antibiotic** after **sensitivity test** to avoid antibiotic resistance transmission to human pathogens, and before using antibiotic, we can use antimicrobial drugs.

2-**Anticoccidal** also has antimicrobial activity.

3-To decrease use of antibiotics, we can alternative methods, including **Prebiotic, enzymes, digestive acidifiers, vitamins, immune enhancer, Anti-inflammatory drugs.**

4-Vitamin **E** has **prophylactic and therapeutic benefits.**

5- Use of aspirin.

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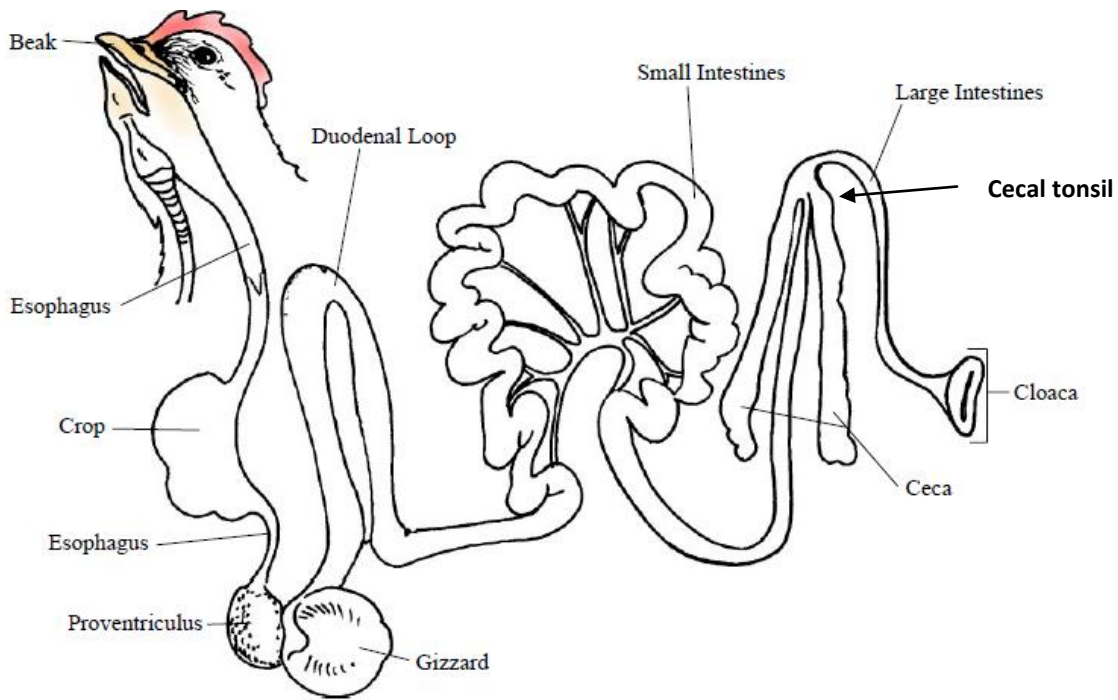


Illustration #8. The digestive system of poultry.