Family: Eimeriidae

- The term coccidiosis usually reversed for infections caused by *Eimeria* and *Isospora* sp.
- Coccidia are mainly obligate intracellular parasites of the intestinal epithelium.

Note: Reproduction involves both;

1. **Asexual reproduction (schizogony or merogony):** Merozoites are produced within the host cells.

2. **Sexual reproduction** (gametogony), following gametogony, a zygote is formed which divides to produce spores (sporogony) and the **Oocyt** formed as a result of sexual reproduction.

Genus: *Eimeria*

Hosts:

Poultry, cattle, sheep, goats, pigs, horses and rabbits.

Site:

Epithelial cell of the intestine except in two species occur in kidney and liver.

Species:

Species belong this genus are caused disease called coccidiosis (bloody diarrhea disease), and important species are:

1-*E. tenella, E. necatrix, E. brunette, E. maxima, E. mitis and E. acervolina* → chickens.

2-*E. zuernii* and *E.bovis* → cattle.

3-*E. crandallis* and *E. ovinoidalis* → sheep.

4-*E. arloingi* and *E. caprina* → goats.

5-*E. leuckarti* → horses.

6-*E. stiedae* (liver) → rabbits.

7-*E. truncata* (kidney) → geese.

Distribution: Worldwide

Oocyst:

Sporulated Oocyst (infected stage): Contain **4 sporocysts** each with **2 sporozoites. (4×2=8 sporozoites).**

***Note:** *Isospora* sp.

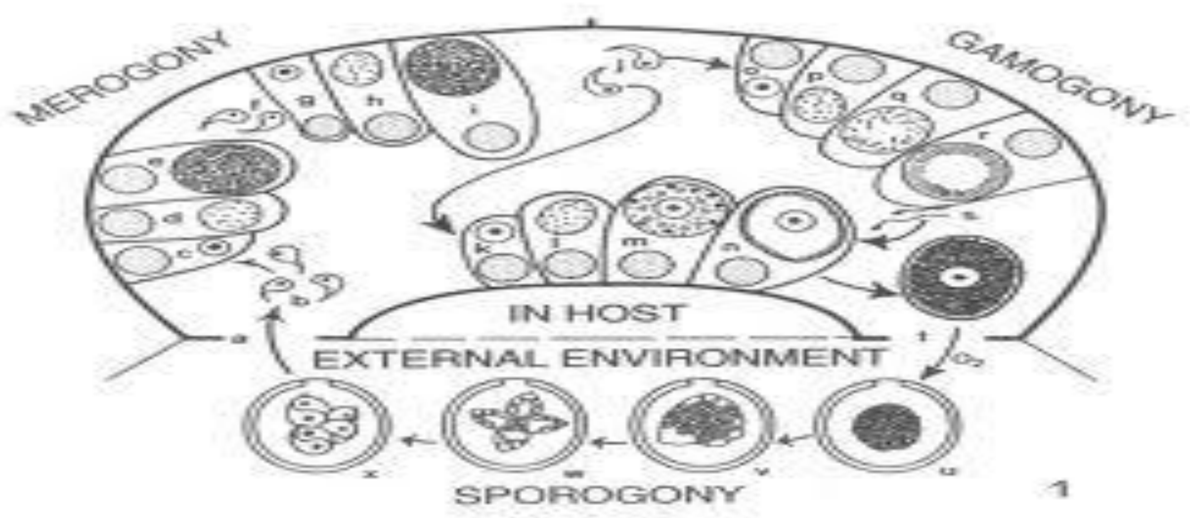
Oocyst: Sporulated Oocyst (infected stage): Contain **2 sporocysts** each with **4 sporozoites. (2×4=8 sporozoites).**

Mature oocyst

Immature oocyst

Life Cycle: ⟶ Monoxenous

This is divided into three phases: sporulation, infection and schizogony, and finally gametogony and oocyst formation. (Unsporulated oocysts are passed in the feces after that become sporulated Oocyst).



Factors effecting the pathogenesis of coccidiosis:

1- Site of the parasite growth: parasite grows in deep layers of the intestine is more dangerous than that grow in superficial layers.
2- Size of growing stage: The types with large growing stage (more than 5µm) are more dangerous than the others.
3- Numbers of ingested Oocysts: If there is large numbers of ingested Oocyst, there are more pathogenic effects.
4- Host age: The small ages are more susceptible than the older.
5- Viability of Oocysts: Humidity, temperature and O2 are effecting on the Oocysts viability.
6- Animal breed: Local breeds are more resistant than the foreign breeds.
7- Bacterial and viral diseases: Which increase the coccidial effect because their effect on body immunity.

Bovine Coccidiosis:

Occurs worldwide and usually affect cattle under one year old, but it is occasionally seen in yearling and adults. Out of 13 species are recorded, only two species are considering principal pathogens:

1. ***E. bovis***: Infect small intestine, found in Iraq and pathogenic, causing **Summer coccidiosis**.

2. ***E. zuernii***: Infect large intestine, found in Iraq, pathogenic, circle or semi-circle oocyst, causing **Winter coccidiosis** and **Nervous coccidiosis**.

Clinical Signs:

The calves with 3wks-6monthes of age are more affective, and the important C.Ss. are:

1. Bloody diarrhea. **2.** Tenesmus. **3.** Anemia. **4.** The animal may be dead before it reaches to the Oocyst stage. **5.** Weakness with emaciation. **6.** Death in not treated cases.

Ovine and caprine coccidiosis:

Several types of *Eimeria* are infecting the sheep and goats like:

1- *E. ovinoidalis*: Infect sheep, worldwide distribution, pathogenic, oval oocyst.

2- *E. parva*: Infect sheep and goats, worldwide distribution, pathogenic, circle or semi-circle oocyst.

3- *E. crandallis*: Infect sheep and goats, sub-spherical oocyst.

Clinical Signs:

The young animals are more susceptible than the older:

1- Yellow-greenish or bloody diarrhea.

2- Abdominal pain.

3- Anorexia and Emaciation.

Treatment:

1- Amprolium 50mg/kg BW with water or food for 3-4 days.

2- Sulphaguanidine 2g/day for 3-4 days.

3- Nitrofurazone 7-10mg/kg for 3-4days.

Poultry coccidiosis:

Species and site of parasitize:

A. In front part of intestine (duodenum):

1. *E. mitis* **2.** *E. praecox* **3.** *E. acervulina* **4.** *E. hagani*

B. In middle part of intestine (jejunum):

1. *E. necatrix* **2.** *E. maxima* **3**.*E. brunette*

C. In caecum:

1. *E. tenella*

Note: The *E. tenella* and *E. necatrix* are more risky than other types.

Clinical Signs:

1- Bloody diarrhea.
2- Increase mortality.
3- Ruffled feathers.

Epidemiology:

1- The young birds are more susceptible to infection.
2- Number of ingested Oocysts is playing an important role in the intensity of clinical signs.
3- Wild birds play role in the distribution of infection.
4- Veterinarians and workers are playing role in the distribution of infection.
5- Crowding and bad management help in occurring of infection.

Diagnosis:

1. C.Ss. 2. P.M. 3. Faecal examination (observe oocyst).

Treatment:

1- Amprolium 0.125% with food.
2- Sulfamethazine 0.2% with water or 0.4% with food.

Control:

1- Use of anticoccidial drug with food.
2- Discard of faeces.
3- Entering of sun light to the rear station with good ventilation.
4- Avoid the crowding.
5- Prevent the wild animals from entering the rear stations.

Family: Cryptosporidiidae

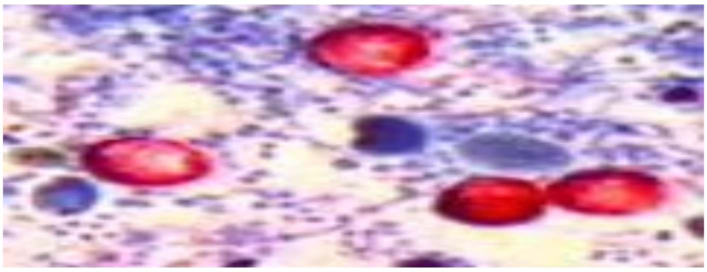
This parasite cause disease called cryptosporidiosis.

Site:

- Microvilli of small intestine (particularly in ileum). (unlike other member of Eimeriidae,
- *Cryptosporidium* does not enter the cells of the host, the schizonts and gametes develop in parasitophorous envelope apparently derived from microvilli).

Identification:

Oocyst contains 4 sporozoites without sporocysts.



Transmission:

The infection occurs through the contamination of food and water with the oocysts.

Species:

The cryptosporidiosis considers as a zoonotic disease between human and animals, and there are 19 types of this genus, for example:

1- *C. parvum* ⟶ calves
2- *C. muris* ⟶ mice
3- *C. meleagridis* ⟶ poultry, parasitize in the GIT and respiratory tract of poultry.

Distribution: Worldwide

Life cycle: Monoxenous

The host (excrete sporulated Oocyst with feces)

The contaminated of food and water with the Oocysts (Ingested by host).

Reach to Microvilli of small intestine (particularly in ileum

First generation of schizogony

First generation of merozoites

Second generation of schizogony

Second generation of merozoites

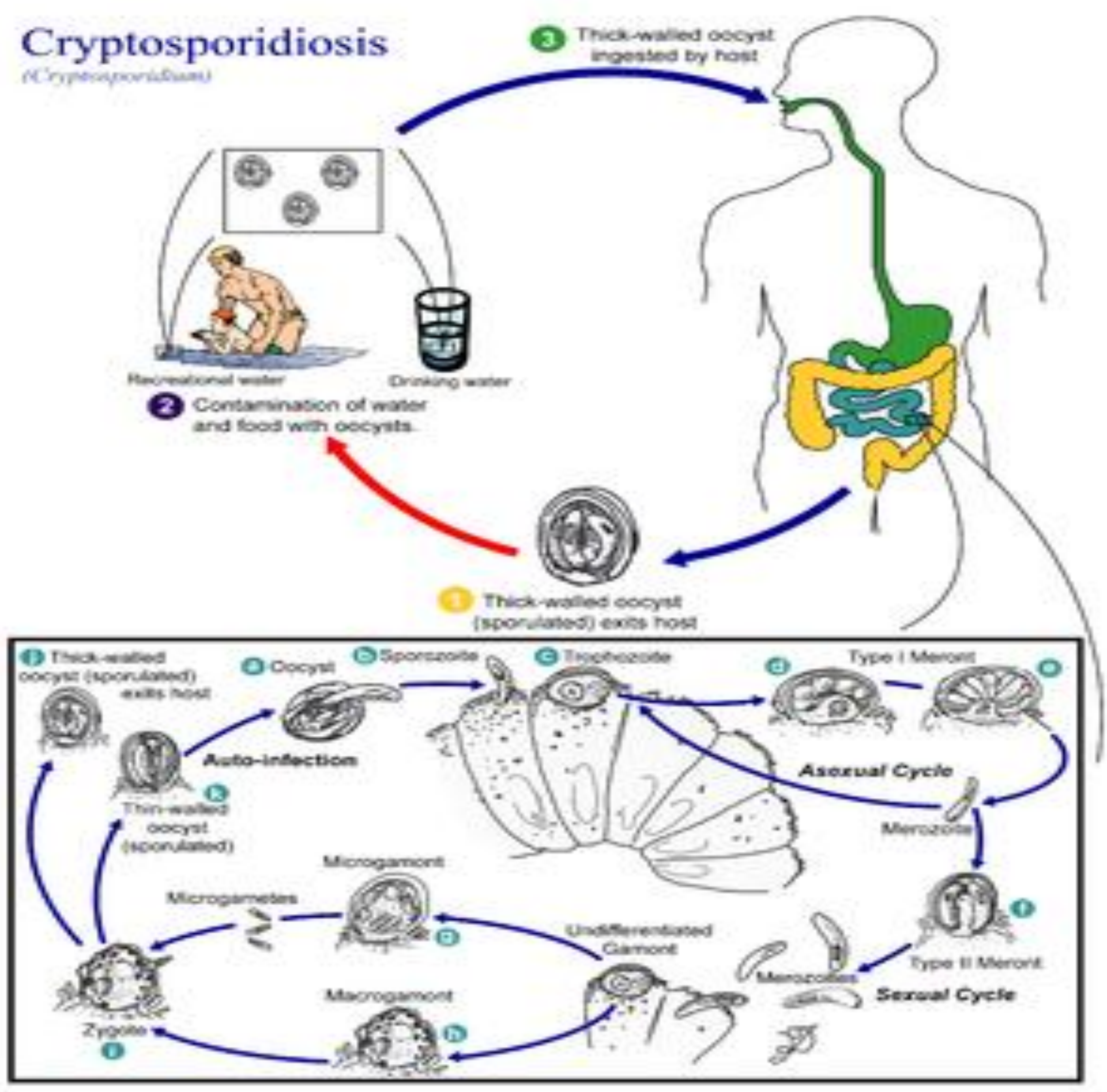
Male

Fmale

Copulation : Zygote

Thick- wall Oocyst 80%

Thin- wall Oocyst 20%



Clinical Signs:

1- Severe diarrhea.
2- Loss of weight.
3- Emaciation and occasionally death.
4- Some time there is mixed infection with rota virus and *E. coli* bacteria; they increase the severity of the disease.
5- The young animals are more susceptible to the infection.

Diagnosis:

1. C.Ss. 2. Faecal examination to observe the sporulated oocyst. 3. Serological tests 4. PCR technique.

Treatment:

There is no affecting treatment.