

## CLASS COCCIDIA

### Families

- (i) *Eimeriidae* intracellular parasite of intestinal epithelium
- (ii) Sarcocystidae

OOCYST: Oocyst wall in composed of two layers & in generally clear and transparent in a well- defined double outline. It may be somehow yellowish / green in color in some spp.

- Identification may be by :
- Shape - spherical, ovoid/ellipsoidal.
- Refractile shell and some spp possess a small pore @ one end (micropyle) which is often covered by a polar cap in may be prominent.
- **COCCIDIA**

These organism are intracellular parasite of the epithelial cells except few exception.

*Eimeria stidae* (liver of rabbit)

*Eimeria truncata* (kidney of geese)

They have a single host in which they undergo asesual and sexual multiplication.They are host specific and tissue tropic.

The macro and microgamonts develop independently, the latter producing many gametes.

A zygote results from their union and by a process of sporogony, a variable number of spores (sporocysts) which contain 1/ more sporoioten are formed. Sporogony occurs outside the host. members of the family can be differentiated by the numbers of sporocysts and sporoziotes, they possess.

	Sporocysts	sporoziotes
Tyzzeria	0	8
Isospora	2	4
Eimeria	4	2
Wenynella	4	4
4 (not enclosed in any sporocyst)		

**COCCIDIA LIFE CYCLE**

Can be divided into 3 phases

- (a) Sporulation
- (b) Infection and schizogony
- (c) Gametogony and Oocyst formation.

**SPORULATION**

Unsporulated Oocysts are passed out in faeces. Under suitable conditions (Oxygenation and optimal Temperature (27°C): the nucleus divides twice and the protoplasmic mass forms conical bodies radiating from a central mass.

Each of these nucleated cones becomes rounded to form a sporoblast. While in some spp the remaining protoplasm forms the Oocysts residual body.

Each sporoblast secretes a wall of refractile material and become sporocysts while the protoplasm within divides into 2 banana - shaped sporozoites

Time taken for these changes varies according to Temperature but under optimal condition it takes 2-4 days.

The oocyst now consisting of an outer wall enclosing 4 sporocysts each containing 2 sporozoites is called. A SPORULATED OOCYST within an infective stage

**INFECTION AND SCHIZOGONY (ASEXUAL REPRODUCTION)**

The host becomes infected by ingesting the sporulated oocyst. The sporocysts are then liberated either mechanically or by CO<sub>2</sub> the sporozoites activated by trypsin and bile leave the sporocyst. In most spp each sporozoite penetrates an epithelial cell, rounds up and become a trophozoite.

After a few days each trophozoite has divided by multiple fission to form a schizont which contains a large number of elongated nucleated organisms – merozoites: when division is complete and the schizont is mature, the host cell and the schizont rupture and merozoites escape to invade neighboring cells schizogony may be repeated, the number of schizont generations depending on the spp.

**GAMETOGONY AND OOCYST FORMATION**

Asexual reproduction (schizogony) terminates when the merozoites give rise to M and F gametocytes. Factors responsible for the switch are not known fully.

Macrogametocytes are Female and remain unicellular but increase in size to fill the parasitized cell. They are different from a trophozoite/developing schizonts by the fact that they have a single large nucleus.

The M microgametocytes each undergo repeated division to form a large no of flagellated uninucleate organism – microgametes

Microgametes are freed by rupture of the host cell, one penetrates a macrogamete and fusion of their two nuclei occur. A cyst wall is formed around the resultant zygote known as OOCYST. There in no further Development until this Unsporulated Oocyst is liberated from the body in faeces.

PPP varies: 5 days in poultry/ 3-4weeks in some ruminant spp

## ISOSPORA

Genus contains many spp and parasitises a wide range of hosts. Differences in isospora life cycle compare to Eimeria:

- (1) Sporulated oocyst contains 2 sporozoites
- (2) Extraintestinal stages seen in spleen, liver and lymph nodes of the pig may reinvade the intestinal mucosa and cause clinical signs.
- (3) Rodents may, by ingestion of oocyst from dog and cats become infected with asexual stages and act as reservoirs.

## COCCIDIOSIS OF LIVESTOCK

### CATTLE

Affects cattle under 1 yr but is occasionally seen in yearlings and adults.

Spp : Abt 13 have been recorded.

Strain (a) *Eimeria zuernii* (b) *E. bovis*  
(c) *E. alabamensis*

*Eimeria zuernii* is the most pathogenic, attacking the caecum and the colon. In heavy infections it produces a severe bloodstained dysentery accompanied by tenesmus.

Prepatent period 17days. It produces small spherical Oocysts of 16µm in diameter.

*E. bovis* also affects caecum and colon producing a severe enteritis and diarrhoea in heavy infections.

Characteristically schizonts may be found in the central lacteals of the villi.

Pp = 18 days , oocyst are large, egg shaped and measure 28x20µm. The disease is dependent on epidemiological conditions which precipitate a massive intake of Oocysts e.g. overcrowding in unhygienic yards/ feedlots. It may also occur at pasture where livestock congregate around water troughs .*E. alabamensis* has been responsible for outbreaks of diarrhoea in calves recently turned out to calf paddocks.

## DIAGNOSIS

Based on history and clinical signs, presence of oocyst of pathogenic spp in faeces)

## TREATMENT

Sulphadimidine (orally/ parentally), Repeat @½ the initial dose level on each of the next 2days. (2) combination of Amprolium and ethopabate / decoquinate may be used.

## PREVENTION

Based on good management- especially Feed troughs and water containers should be moved regularly and bedding kept dry.

## SHEEP

Coccidiosis is seen mainly in young lambs and kids with an apparent increase in prevalence under intensive husbandry.

Majority of Sheep (erp those under a year) carry coccidian, There are 11 spp but only 2 are known to be highly pathogenic.

2 pathogenic spp:

EIMERIA crandallis } pp = 15days.  
EIMERIA ovinoidalis. }

Oocyst.

EIMERIA crandallis: thick shelled, sub spherical

EIMERIA ovinoidalis: Elipsoidal with a distinct innershell. Both have polar caps.

Heavy infections in lambs are responsible for severe diarrhea which sometime contain blood pathogenic lesions are mainly in the caecum and collon where gametogony of *E. crandallis* and 2<sup>nd</sup> stage schizonony and gametogony of *E. ovinoidalis*.occur. The lesion cause local haemorrhage and oedema, villous atrophy may be a sequel resulting in malabsorption.

Lamb are usually affected between 4-7weeks of age (peak infection @ around 6 weeks.

## DIAGNOSIS

Management History, age of the lambs.

P M lesions

Feacal examination for Oocysts

### **TREATMENT**

As in cattle

### **PREVENTION**

Based on good mgt & regular moving of feed & water troughs stagnancy / humidity helps in sporulation.

### **. GOAT**

*EIMERIA ninakohlyakimovae*

*E. arlongi*

Infection is mainly by ingestion of oocysts from the environment.

Sporulation in goats takes abt 2-3days.

### **LIFE CYCLE**

After a susceptible goat ingests sporulated Oocysts "spores" are released and enter the cells lining the intestines. In the intestine they go through several stages of development. The intestinal cells are destroyed and thousands of smaller forms of coccidia are released. These smaller forms reinvade and damage other intestinal cells. Eventually sexual stages are reached and new oocysts are passed into the environment. The complete cycle takes about 2-3years.

Clinical signs. Loss of appetite, slight, short – lived diarrhea to severe cases involving great amount of dark and bloody diarrhoea . At times death.

### **TREATMENT**

Sulfa drugs (labelled for use in goats)

- Coccidiostats.

### **PREVENTION**

Isolation and sanitation (prevent spread through the herd)

Addition of coccidiostats to goat's feed. Decoquinate (Decox) and lasalocid (Boratec) Treat kids @ 3 weeks of age with Albon Repeat after 3weeks. Afterward introduce coccidiostat

## **D. RABBITS**

3 main pathogenic spp	PP:	Oocysts
<i>EIMERIA stiedae</i>	18days	37x21µm ellipsoidal
<i>EIMERIA flavescens</i> pp	5-7days	31x21µm ovoidal
<i>EIMERIA intestinalis</i>	5-7days	27x18µm pyriform

Commonest around weaning.

Clinical signs (*E. stiedae*)

Wasting, diarrhoea, ascites & polyuria.

Produce severe cholangitis

Grossly liver is enlarged & studded with white nodules.

*EIMERIA flavescens* & *EIMERIA intestinalis* (intestinal spp) are more significant in commercial rabbit farm. They cause destruction of the crypts in the caecum resulting in diarrhoea & emaciation

## DIAGNOSIS

Best made by a PM examination

However, in practice, demonstration of many Oocysts in faeces is often used as an indication that rabbit requires regular treatment.

## TREATMENT

Sulphadimidine / sulphaquinoxaline in drinking water

## CONTROL

Daily cleaning of cages, hutches/ pens, provision of clean feeding trough.

Rear animals on wire floors (large units) coccidiostat are incorporated into feed.

## PIGS.

About 10 spp have been described but their importance is not clear.

*EIMERIA deblickei* has been described as causing clinical disease and severe pathology.

Recently *Isospora suis* has been incriminated as the cause of a naturally occurring severe enteritis in young piglets. Aged 1-2 weeks.

*Isospora suis* pp = 4-6 days Oocyst is ellipsoidal about 17x13µm and when sporulated contain 2 sporocysts each with 4 sporozoites

