Cryptosporiidae

Cryptosporidiosis

- This disease is seen in neonatal period of calf, lamp and yeanling.
- The major cause of death is severe diarrhea.

Cryptosporidiosis

- The disease caused by diarrhea in neonatal period is called as "Neonatal Diarrhea Syndrome"
- Primer etiological agent is *Cryptosporidium* spp. in the neonatal diarrhea syndrome of calf, lamp and yeanling.
- There are also the enteropathogenic viruses (Coronavirus, Rotavirus), bacteria (*E. coli, Salmonella* spp.) and parasites in the ethology of neonatal diarrhea syndrome.

Cryptosporidiosis

- Cryptosporidiosis is a zoonotic disease.
- It is more common in persons engaged in husbandry, young and immunosuppressive people (HIV etc.).

Cryptosporidium genus

- *C. muris, C. andersoni* and *C. parvum* in humans and mammalians
- *C. baileyi* and *C. meleagridis* in birds
- In cattle, *C. parvum* locates in the lower part of the small intestine, while *C. andersoni* locates in abomasum.

C. parvum **and** *C. andersoni*

- These two species can be easily discriminated in terms of shape and size in microscopy.
- The species that cause neonatal diarrhea is *C. parvum*.
  - *C. parvum* has not host-specificity.
  - This protozoon locates in epithelial cells of digestive system of humans and mammals.
  - It also locates in epithelial cells of bile duct, respiratory tract and pancreas of people with weak immune system.
- *C. andersoni* is mostly found in weaner calves and adult cattle. The distribution of the disease is limited. They cause mild infection.

Oocyst

- *Cryptosporidium* oocysts have single membrane-wall and are 4-7 μ m.
- They have no micropyle, polar cap and oocyst residuum.
- There is no sporocyst into the sporulated oocyst.
- There are 4 free sporozoites.

Cryptosporidium

- Developmental style of *Cryptosporidium* species is monoxene.
- They usually have not host specificity.
- They are usually found in small intestine epithelium and parasitophore vacuoles.
- They can be found in respiratory system of birds (bursa fabricius and tracheal epithelium) and humans and pancreas and gall bladder of monkey.

Cryptosporidium

- *Cryptosporidium* infection causes high mortality and morbidity in calf, lamp, yeanling and birds.
- The period in which animals are most susceptible to natural infections is the neonatal period immediately after birth.
- *C. parvum* courses with high mortality and morbidity in 2-7 days old lambs and 4-15 days calves.

Transmission

- *Cryptosporidium* oocysts that are spilled by the infected stool can directly infect to the next host because they complete the sporogony phase in the host.
- The infection is occurred by oral taking of food and water that are infected with sporulated oocysts.
- It has been reported that the oocysts can be taken by means of respiratory system.
- The oocysts are very resistant to the environment conditions and can survive for months (average 6 months) at 20°C. These features are important factors in the spreading of the disease.

- Cryptosporidiosis is very common in cattle in many parts of the world.
- Cryptosporidiosis courses with high morbidity in lambs and it can cause high mortality with other pathogens.
- It is encountered as both sporadic and epidemic cases in goats.
- The subclinical or clinical infections are seen depending on host-immunity in horses.

- In dogs, the disease is generally seen in puppies (less than 6 months)
- Information on cryptosporidiosis in cats is insufficient.
- In rabbits, the disease is mostly seen in milk-sucking kittens (8-12 days old)
- The disease affects both respiratory and digestive systems in birds.

Development

- They pass schizogony, gametogony and sporogony stages in host epithelial cells.
- The wall of the oocysts taken by mouth are broken up in the small intestine and free sporozoites adhere to microvillus of epithelial cells in small intestine.
- A parasitophorous vacuole is formed around the sporozoites.
- The sporozoites turn into round trophozoite forms and then they multiply by means of schizogonic division.

Development

- Trophozoites turn into Type I meronts that each has 8 merozoites.
- While a part of merozoites cause auto-infection by binding to the epithelial cells, the rest of merozoites turn into Type II meronts that each has 4 merozoites.
- With the disintegration of the meronts, the merozoites are released and they turn into micro and macrogamonts by binding to the epithelial cells.
- The zygote occurs after microgamet enter inside of macrogamet.

- 20% of the zygotes turn into thin-walled oocysts, while the rest of zygotes turn into thick-walled oocysts.
- The oocysts are subjected to the sporogonic division and 4 sporozoites develop in them.
- Thin-walled oocysts cause auto-infection.
- Thick-walled oocysts are thrown out with feces.
- Oocysts in fresh feces are infectious and can survive for months in the environment.

Clinical Findings

- The most important clinical finding is diarrhea.
- The stool color changes from light yellow-white to green-black, while the texture of the feces varies from soft to watery. The stool has fibrin, gas bubbles and blood.
- Symptoms such as loos of appetite, tremor, unbalanced walking, loss of electrolyte, fatigue, weight loss, growth retardation and slight increase in body temperature can also be seen.
- Diarrhea lasts 4-17 days. The infection may cause high mortality in this period.

Diagnosis

- Microscopic, immunological and molecular methods are used for the detection of cryptosporidiosis.
- The oocysts can be seen in the preparates after staining carbol fuscin and Ziehl-Neelsen stains.
- The caproantigenes can be detected by direct fluorescent antibody and ELISA assays by using monoclonal antibodies.
- PCR can be used to diagnose oocysts in both fecal and environmental samples.
- In necropsy, the diagnosis is made with the appearance of developmental stages of the protozoa in the mucosa of the intestine in the stained smears

Treatment

- The initial treatment should usually be as supportive treatment.
- Spiramycin, **lasalocid sodium, halofuginone lactate**, decoquinate and paromomycine are drugs that are partly effective.
- These drugs reduce the severity of the disease by reducing the oocysts production and diarrhea.

Prevention and Control

- The most important factor in protection against cryptosporidiosis is immunity.
- It is very important that newborns rake enough colostrum after birth.
- The ability of the newborn to adsorb the antibodies is also diminished by the pronged postnatal period.
- Farm management and hygiene are also important in protecting against the infection.
- To prevent contamination, newborns must be kept clean, dry, airy and separate from other animals.