

## Super family TRICHOSTRONGYLOIDEA

### CHARACTERISTICS

- The trichostrongyloides are small, often hair like, worms which, with the exception of lung worm *Dictyocaulus*, parasitize the alimentary tract of animals and birds. تتطفل طفيليات هذه العائلة القناة الهضمية للحيوانات ماعدا ديدان الرئة
- The males have a well developed bursa and two spicules.
- The life cycle is direct and usually non migratory and the L3 is the infective stage.
- The trichostrongyloids are responsible for considerable mortality الوفيات and widespread morbidity الاصابات, especially in ruminants.

### الأجناس Genera

The most important alimentary genera are:

- |               |                  |                     |
|---------------|------------------|---------------------|
| 1. Ostertagia | 2- Haemonchus    | 3- Trichostrongylus |
| 4- Cooperia   | 5- Nematodirus   | 6- Hyostrongylus    |
| 7- Marshallia | 8- Mecistocirrus |                     |

### Genus: OSTERTAGIA

This genus is the major cause of ( parasitic gastritis ) in ruminants in all over the world.

- Host / Ruminants
- Site / Abomasum ( المنفحة ( المعدة الرابعة بالمجترات )
- Disease Name / Ostertagiasis

## Species

1. *Ostertagia ostertagi* ..... infect Cattle.
2. *Ostertagia circumcincta*..... infect Sheep and goats.
3. *Ostertagia trifurcate*..... infect Sheep and goats.

### *OSTERTAGIA OSTERTAGI*

- Adult worms are small (approximately 1 cm long) and brownish in color.
- They are difficult to see unless they are present in large numbers (thousands).
- All parasitic larval stages are found in the gastric glands of the abomasum
- Gastric glands must be digested in order to release the larvae for observation with a microscope.
- Species differentiation is based on the structure of the spicules. يتم التفريق بين الانواع اعتمادا على تركيب شوكة الجماع

### LIFE CYCLE

*O.ostertagi* has a direct life cycle.

1- Adults in the abomasum lay eggs that pass in feces.

2- After hatching , larvae undergo two molts to become infective third-stage larvae, which migrate onto herbage الأعشاب and are ingested by grazing cattle.

3- After ingested, these parasitic larvae grow and molt twice more to become egg-laying adults. Prepatent period is 17 to 21 days.

Note / Environmental conditions of cold or excessive dryness may trigger a condition known as hypobiosis, in which larval development is arrested so that maturation may take several months.

### Types or forms of Ostertagiasis

Ostertagiasis occurs in two forms:

- 1- Type I disease.
- 2- Type II disease.

### **Type Disease I**

- **Type I form occurs in calves during their first grazing season as a result of maturation of ingested larvae in the abomasums.**
- **This normally occurs from mid July onwards.**

### **Type Disease II**

- **Type II disease occurs as a result of resumed development of larvae which have undergone arrested development at the early fourth stage, or hypobiosis.**
- **This usually occurs in late winter or spring and results from the maturation of larvae ingested during the previous autumn.**

## **EFFECTS OF OSTERTAGIA ON HOST**

- 1- It causing erosion of the cells when Ingested larvae enter the glands of the abomasum, where they grow and molt to become adults ( during 17 to 21 days) .**
- 2- Cells damaged by the larvae are replaced by rapidly dividing cells that lack the function of producing hydrochloric acid and the enzyme pepsinogen.**
- 3- Changing the pH of abomasum. In a normal abomasum, the pH of the contents is maintained at 2 to 2.5. When large numbers of the cells are lost, the pH of the abomasal contents may rise to 7. And this case will lead to the following :-**
  - (a) pepsinogen is not activated to its active form, pepsin,**
  - (b) Proteins are not denatured and digested,**
  - (c) There is an increase in number of bacteria in abomasum.**
- 4- Another important result of the cell damage is leakage of blood proteins into the gut.**
- 5- Dietary energy and protein which would otherwise be used for growth must be used to replace these proteins. Weight loss is the result.**
- 6- Albumin in the intestine also inhibits fluid absorption by the gut, causing diarrhea. Severe infections may cause death.**
- 7- The loss of albumin also causes body fluids to collect in lower parts of the body such as under the jaw (bottle jaw) or in the abdomen (ascites).**
- 8- The disease condition produced by these worms is known as ostertagiasis and is characterized by severe diarrhea, edema, and weight loss leading to emaciation.**

## **DIAGNOSTIC INFORMATION**

- 1- The clinical signs of inappetance, weight loss and diarrhoea**
- 2- The season. For example,**
  - a- Type I : occurs from July to September**
  - b- Type II : from March to May**
- 3- Faecal egg counts:-**
  - In Type I disease these can be more than 1,000 eggs per gram.**
  - In Type II counts are highly variable, may even be negative and are of limited value.**
- 4- Plasma pepsinogen levels. In clinically affected animals up to two years old these are usually raised.**
- 5- Post-mortem examination.**
- 6- Strongyle-type eggs appear in the feces.**
- 7- Larvae cultured from them may be identified as Ostertagia.**

## **TREATMENT**

- 1- Type I disease responds well to treatment at the standard dosage rates with any of the :- benzimidazoles (albendazole, fenbendazole or oxfendazole), the probenzimidazoles, levamisole, or ivermectin.**
- 2- All of these drugs are effective against developing larvae and adult stages.**
- 3- Following treatment calves should be moved to pasture which has not been grazed by cattle in the same year. The field where the outbreak has originated may be grazed by sheep or rested until the following June.**
- 4- For the successful treatment of Type II disease it is necessary to use drugs which are effective against inhibited larvae as well as developing larvae and adult stages.**
- 5- Only the benzimidazoles or ivermectin are useful in the treatment of Type II disease when used at standard dosage levels although the probenzimidazoles are also effective at higher dose rates.**

## **CONTROL**

- 1- Avoid overstocking**
- 2- Use pasture management to avoid the accumulation of infective larvae on herbage**
- 3- Treat regularly with anthelmintics.**

## Genus: HAEMONCHUS

This blood sucking abomasal nematode may be responsible for extensive losses in sheep and cattle, especially in tropical areas.

Hosts / Cattle, sheep and goats.

Site / Abomasum

**SPECIES :-**

1- *H. contortus*                      2- *H. placei*                      3- *H. similes*

- Until recently the sheep species was called *H. contortus* and the cattle species *H. placei*.
- However, there is now increasing evidence that these are the single species *H. contortus* with only strain adaptations for cattle and sheep.

**Distribution :** - Worldwide. Most important in tropical and subtropical areas .

### *HAEMONCHUS CONTORTUS*

#### IDENTIFICATION

A- Gross عيانيا

- 1- The adults are easily identified because of their specific location in the abomasums and their large size (2-3 cm).
- 2- In fresh specimens the white ovaries winding spirally around the blood filled intestine produce a 'barber's pole' appearance.

B- Microscopic مجهريا

- 1- The male has bursa and spicules; the female usually has a vulval flap.
- 2- In both sexes there are cervical papillae and a tiny lancet inside the buccal capsule.

#### LIFE CYCLE

The life cycle is direct.

- 1- The preparasitic phase is typically trichostrongyloid.
- 2- The females are prolific منتجة egg layers.
- 3- The eggs hatch to L1 on pasture and may develop to L3 in as short a period as 5 days but development may be delayed for weeks or months under cool conditions.
- 4- After ingestion, the larvae molt twice in close apposition to the gastric glands.
- 5- Just before the final molt, they develop the piercing lancet which enables them to obtain blood from the mucosal vessels.
- 6- As adults they move freely on the surface of the mucosa.
- 7- The prepatent period is 2-3 weeks in sheep and 4 weeks in cattle.

## **PATHOGENESIS**

- **The pathogenesis of haemonchosis is that of an acute haemorrhagic anaemia due to the blood sucking habits of the worms.**
- **Each worm removes about 0.05 mL of the blood per day by ingestion and seepage from the lesions so that a sheep with 5000 *H. contortus* may lose about 250 mL daily.**

### **Types of haemonchosis**

#### **1. Acute haemonchosis**

**In this condition anemia becomes apparent about two weeks after infection and is characterized by progressive fall in the Packed Cell Volume. (PCV)**

#### **2. Hyperacute haemonchosis**

**In heavier infections of upto 30,000 worms, apparently healthy sheep may die suddenly from severe hemorrhagic gastritis.**

#### **3. Chronic haemonchosis**

**This develops during a prolonged dry season when reinfection is negligible, but the pasture becomes deficient in nutrients.**

## **SYMPTOMS OF BARBER POLE WORM**

- 1- Barber pole worm consumes 1-5 drops of blood per day.**
- 2- Causes anemia (low red blood cell number), hypoproteinemia (low blood protein), edema and ultimately death**
- 3- Blood is normally 36% red blood cells.**
- 4- Deworm when 20% red blood cells.**
- 5- Goat is at death's door at 8% red blood cells.**
- 6- Coccidiosis, liver flukes, and lice can cause anemia**
- 7- Look at color of mucous membranes under lower eyelid, gums, inside vulva:-**
  - **Dark pink color is good.**
  - **pale watery color indicates anemia**
- 8- Bottle jaw, a collection of fluid (edema) under the lower jaw.**

## DIAGNOSIS

- 1- The history and clinical signs Bottle Jaw
- 2- Faecal examination (Differential Feature of haemonchosis)
- 3- Postmortem examination.

## TREATMENT

Only 3 broad spectrum families available

1. Benzamidoles
2. Levamisole
3. Avermectins/Milbemycins
4. Salicylanilide

### Benzamidoles

- 1- fenbendazole (Panacur, Safeguard) oxfendazole (Synanthic)
- 2- albendazole (Valbazen)
- 3- Greatest level of dewormer resistance because of long history of use

### Levamisole Morantel/Pyrantel

- 1- Levamisole (Tramisol, Levasole, Prohibit)
- 2- Morantel/Pyrantel (Rumatel)
- 3- Basically only effective against roundworms

### Avermectins/Milbemycins

- 1- Ivermectin (Ivomec)
- 2- Dormectrin (Dectomax)
- 3- Eprinomectin (Eprinex)

Moxidectin (Cydectin) long residual effect

Use of Dewormers as following :-

- 1- Few are approved for use in goats
- 2- Use 1.5 times the sheep dose because goats have faster rate of passage and larger livers to metabolize the drug
- 3- Do not return to same pasture but send to new uncontaminated pasture
- 4- Observe withdrawal period before selling goat
- 5- Dewormers should not be injected Dewormer Resistance
- 6- An effective dewormer will reduce fecal egg counts by 95 % during 7-14 days after giving the dewormer
- 8- Fecal Egg Count before deworming 1,000 eggs per gram and will reach After 10 days after deworming to 200 eggs per gram = 80% fecal egg count reduction

## RISK FACTORS FOR PARASITES

(العوامل الخطرة التي تزيد من شدة الإصابة بالطفيلي)

- 1- Warm weather.
- 2- Two inches of rain in a month.
- 3- High stocking rates.
- 4- Thin animals.
- 5- Animals in lactation.
- 6- Long residence السكن أو البقاء on a pasture.

## PLANNING A PARASITE CONTROL PROGRAM

- 1- Monitor parasite problems with fecal egg counts or eye scores
- 2- Only use dewormer when necessary.
- 3- Deworm only animals that need it.
- 4- Cull ذبح wormy animals الحيوانات المصابة
- 5- Notice eye mucous membrane color when you check animals.
- 6- Use good nutrition.

## THE SELF CURE PHENOMENON

### ظاهرة الشفاء الذاتي

- 1- In areas of endemic haemonchosis, after a period of heavy rain, the EPG drop sharply to near zero due to the expulsion of the major part of the adult worm burden.
- 2- This can also be reproduced experimentally by superimposing an infection of *H. contortus* larvae on an existing adult infection in the abomasum.
- 3- The expulsion of adult worm population is considered to be the consequence of an immediate type hypersensitivity reaction to antigens derived from the developing larvae.
- 4- However, it is not necessarily associated with protection against reinfection because the larvae challenge may develop to maturity.
- 5- The self cure is probably of mutual benefit to both host and parasite.
- 6- The host gains a temporary relief from persistent blood loss while the ageing parasite population is replaced by a vigorous نشيط young generation.

## *MECISTOCIRRUS DIGITATUS*

- This blood sucking abomasal parasite commonly present in buffalo and cattle is similar to *H. contortus* macroscopically.
- Microscopically, it is distinguishable by having long narrow spicules.

The prepatent period is also longer, being 60-80 days.