Anthelmintics: eliminate different parasite stages in the host in order to prevent discharge of parasite eggs /larvae into the environment. Frequency of treatment should depend on;

- Factors that are likely to favour increased parasite existence and multiplication
- Biology of the dominant parasite
- Stocking rates of the area.
- Appropriate time is in the early dry season in which the heat from the sun will inhibit worm larval development.
- Among small-holder farmers, treatment of individual cases is more economical than mass treatment.
- Avoid frequent treatment as it promotes drug resistance, 3-4 times a year is appropriate.

Control by management involves;

Rotational grazing: in non-communal grazing systems grazing young animals ahead of adults prevents them from acquiring heavy worm infections on pastures.

Alternate grazing: by different host species reduces worm load depending on the degree of cross-transmission of parasites between host species.

Reducing the stocking rates: reduces pasture contamination with helminth eggs or larvae

The use of clean raised feed or water troughs: minimizes infections of animals with helminths.

Adequate nutrition: also reduces the pathogenic effects of helminths on animals. Some plants have nematocidal properties

Breeding resistant stocks: is based on genetic resistance of different breeds of animals to worm infections.

In general, the ideal approach towards an effective control of helminths in small ruminants is the integration of different control methods i.e. use of dewormers, adequate feeding, good hygiene, rotational grazing and alternate grazing with different species.

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Parasitic nematodes in small ruminant production systems

Parasitic nematodes are a major constraint to efficient animal production in pasture-based livestock systems in Uganda. Some affect the digestive system and are known as gastrointestinal nematodes (GIN), while others affect the respiratory system called lungworms.

Effects of parasitic nematodes on small ruminant production

The gastrointestinal nematodes damage the mucosal lining of the digestive tract causing digestive disorders which lead to

- Poor absorption of the digested feed and poor feed utilization
- Diarrhea
- Loss of appetite
- Emaciation
- Poor growth rates in young animals
- Reduced milk production
- Reduced immunity and hence susceptibility to other diseases
- Other parasitic nematodes such as

Haemonchus contortus suck blood causing anaemia, loss of blood proteins (hypoproteinaemia), inflammation of the jaws (bottle jaw) and belly (pot belly) especially in young animals and lead to death in extreme cases.

Lungworm infestation of the respiratory system leads to respiratory problems such as difficult breathing (dyspnea) with nasal mucus discharges and cough. When this is accompanied by secondary bacterial infections, it can lead to pneumonia and death.

Common parasitic nematodes affecting small ruminants in Uganda

The major common gastrointestinal nematode parasites in Uganda include barbar pole worm (***Haemonchus contortus***). Heavy infestation with this nematode parasite leads to loss of blood (anaemia) resulting into quick death.

Other major nematode parasites include; the scour worm (***Trichostrongylus species***) and the nodular worm (***Oesophagostomum***). Other less common worms include the thin-necked intestinal worms (***Nematodirus***) and the thread worms (***Strongyloides species***).

The common lungworms include the small lungworm ***(Muellerius capillaries)***, ***Protyostrongylus*** and ***Dictyocaulus spp***.

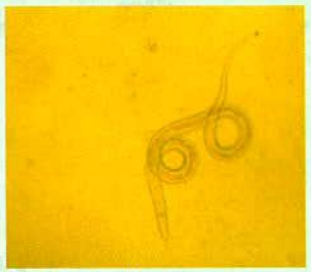


Fig 1: Oesophagostomum larva



Fig 2: Haemonchus larva

Signs of worm infestation in a small ruminants

Major signs include;

- Reduced appetite
- Weight loss
- Pot belly
- Constipation
- Mucoid scours (diarrhea)
- Hunched back
- Bottle jaw (Submandibullar oedema)
- Poor growth rate
- Difficult breathing (dyspnea)
- Coughing
- Sneezing with thick nasal mucous discharge if secondary
- bacterial infection occurs
- Rough coat with standing hair
- Weakness
- Pale mucous membranes (Anaemia)
- Death especially of young animals



Fig. 3: Nasal mucous discharge due to lungworm infestation



Fig. 4: Emaciation a young goat due to nematode infestation

Causes of increased worm infestation in a small ruminants

Rainfall or moisture: influences the survival, development and spread of infective larvae. Moisture facilitates horizontal and vertical movement of nematode larvae on pasture.

Temperatures: (22-30°C) enhances the development of nematode larvae while low temp 5°C and below inhibits their development.

Poor management systems: such as;

- High stocking rates with little rotational grazing increases pasture contamination with nematode eggs or larvae.
- Concentration of animals at watering points particularly, during the dry season results in massive contamination of pastures with eggs or larvae.
- Poor hygiene (excess litter accumulation and in a damp environment) provides environment for hatching of infective larvae

Tethering animals during the wet season: results in increased environmental contamination with infective larvae and incidence of clinical nematode infection.

Animal age: Young ones and are more susceptible than adults.

Poor nutrition: poorly fed animals have reduced resistance to worm infestation and readily succumb to increased effects of the parasites.

Physiological state: animals in late pregnancy and those after parturition are readily susceptible to worm infestation.

Control of nematode infestation in small ruminants

Control may be in three categories; by use of anthelmintics, management and control by breeding resistant stock