



# Integrated approaches in control of GI nematodes in small ruminants

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# Integrated approaches in control of GI nematodes in small ruminants

- ▶ 1 .Key points in parasites control
- ▶ 2 .Holistic worm management methods





## Need of Integrated Parasite Management (IPM)

- ▶ All grazing ruminants have GI parasites
- ▶ Causing productive and reproductive losses in small ruminants production
- ▶ Widespread worm resistance to dewormer drugs and classes
- ▶ Hence, effective parasite control by integrated parasite management (IPM)





## Key points in parasite control

- ▶ Our goal is not the creation of parasite free animals but **prevention of clinical disease and production losses**
- ▶ **GIN infection has to be managed - NOT possible to eradicate**





# Integrated Parasite Management (IPM)

## Holistic worm management

### MANAGEMENT (Non chemical methods)



- ▶ Husbandry practices
- ▶ Host immunity
- ▶ Host nutrition
- ▶ Pasture and grazing management
- ▶ Genetic selection
- ▶ worm trapping fungi
- ▶ Vaccines

### DEWORMERS (Chemical methods)



- ▶ Blanket Treatment (avoid)



- ▶ Use Targeted selective treatment (TST)

Allow Refugia  
Minimize resistance



# Clean Husbandry Practices

## Follow hygienic practices

- ▶ Proper cleaning of shed
- ▶ Clean floor surfaces
- ▶ Maintain **feeder height to avoid faecal contamination**
- ▶ Do not feed on floors
- ▶ Clean water free from faecal matter
- ▶ Provide proper ventilation





- ▶ **Avoid over crowding –proper stocking size**
- ▶ **Good bio security of farm premises**
- ▶ **Control of other diseases**
- ▶ **Quarantine of newly purchased stock**  
– Deworm with broad spectrum drugs
- ▶ **Culling of animals require more deworming**





## Host immunity

- ▶ Differs according to the worm species and levels of exposure to the parasite
- ▶ Sheep sooner and more complete than goats
- ▶ Need continuous exposure to parasites to develop and maintain immunity
- ▶ Age, nutrition and reproductive status have impact on immunity to GIN
- ▶ *H. contortus* induces poor acquired immune response even after re infection







# Host defense mechanisms

## Types of immunity

1. Innate  
inherited (rare)

ii. Acquired  
Acquired during life results  
from exposure to infection



## Self – cure phenomenon

- ▶ **Self defense mechanism**
- ▶ **Adult worms are expelled spontaneously when there is continuous re infection over a short period**
- ▶ **IgE mediated hypersensitivity reaction**
- ▶ **noticed in Barder's bole worm infection**



## Nutritional control of parasites

- ▶ Healthy animals are more resistant to parasites
- ▶ **Supplementation of protein and energy helps to build up immunity**
- ▶ Improved protein nutrition to more vulnerable animals (weaners, lactating animals)
- ▶ Vitamins and minerals in feed also important
- ▶ Weak animals are more susceptible to parasites
- ▶ Allowed to graze in a pasture with good vegetation



**PROVIDE GOOD NUTRITION**



# Practices of pasture and grazing management

- ▶ Establishment of clean / low risk pastures
- ▶ Pasture rest periods
- ▶ Pasture rotation
- ▶ Forage height
- ▶ Grazing time
- ▶ Tree fodder - browsing for goats (silvi pasture)
- ▶ Multi species grazing
- ▶ Hay making and cropping of grass
- ▶ Balanced supplementation





## Types of pasture

### Clean pasture :

- ▶ Pasture free from Parasites can be prepared by
- ▶ Cultivation of new pasture
- ▶ Pasture not grazed by small ruminants for past 6-12 months
- ▶ Pasture grazed by cattle in the previous year
- ▶ Burnt pasture

### Safe pasture :

- ▶ Low risk pasture –not heavily infected to effect the production of animals  
can be established by
  - ▶ Pasture grazed by young animals in summer
  - ▶ Grazing by other species in a longer period/season
- ↓
- Less chances of cross infection between species



## Pasture rotation and rest

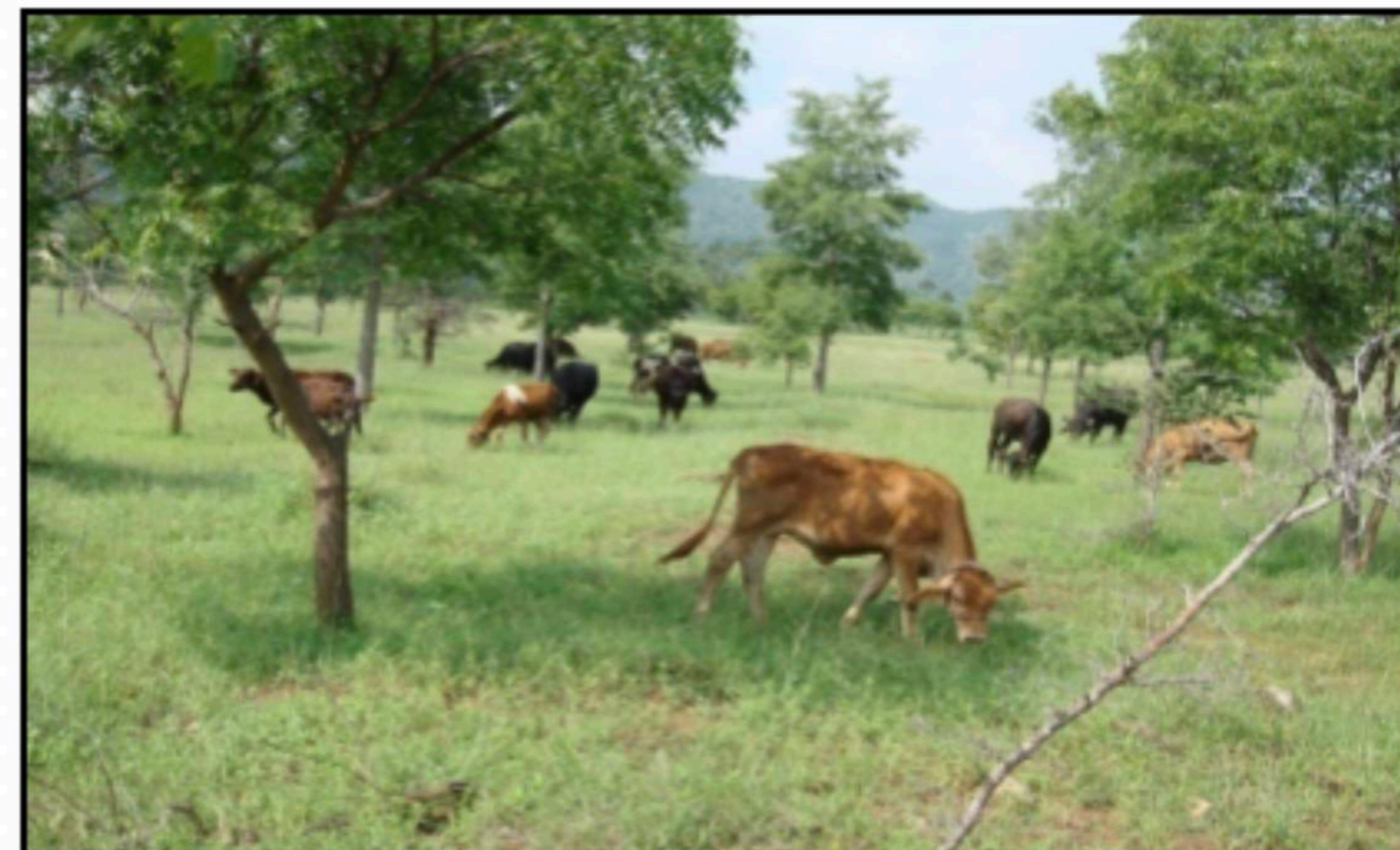
- ▶ **Grazing management technique**
- ▶ **Sub divisions of pasture in to small paddocks**
- ▶ **Each paddock is grazed for a short time and rested for a much longer time**
- ▶ **Framing of resting time to cause larval death (8-10 weeks)**
- ▶ **Better applicability in tropical climate**
- ▶ **Continuous reduction in Pasture Larval burden**





## Mixed / Alternate grazing system

- ▶ **Two or more host species in an environment do not share common parasite species**
- ▶ **Alteration between species can be a successful tool in worm control**
- ▶ **Cattle and buffalo act as vacuum cleaner to the pasture if grazed before or after sheep and goat**
- ▶ **Best example is low intensity of GI nematodes in field flocks because of different animal species on same pasture**





## Other grazing Management practices

- ▶ Periodically renovated with ploughing and tillage – **break faecal pellets and exposed to sunlight**
- ▶ Tannin rich forages are recommended
- ▶ Alternate grazing – Large animals followed by small ruminants
- ▶ Lower the stocking density decreases PLB





## **Establishment of silvipasture (Trees +Grass) for goats – best suited model**

**Maintaining goats in browsing reduces parasitic infection**







## Grazing time and herbage height

- ▶ Larvae move to the top of herbage when the presence of dew/ intensity of light is low
- ▶ Limit grazing time in sun light, diminishes the risk
- ▶ Most of the larvae live in **first 5-10 cm of vegetation from surface**
- ▶ Do not graze pasture below 10 cm of grass height
- ▶ Longer forage height reduces parasite exposure





## Destocking and fodder conservation

- ▶ Majority of **larvae are removed** with fodder to be conserved
- ▶ Remaining larvae on the top of pasture are exposed to sunlight and drying
- ▶ No new eggs have been deposited due to destocking in field
- ▶ Provides **better opportunity for pasture growth with minimum infectivity**





## Intensive or confinement system

- ▶ Stall fed (Zero grazing)
- ▶ Maintain animals in worm free conditions
- ▶ High cost investment
- ▶ No worm problems
- ▶ No source of infection
- ▶ Coccidiosis and flea infestation are major issues





## Breeding of animals for worm resistance

- ▶ Long term process
- ▶ Geographical variation in breeds
- ▶ Varying levels of parasitic resistance reported in Indian breeds - Garole, Munjal breed, Coimbatore sheep
- ▶ Select resistant animals based on records (EPG/TST tools)
- ▶ Cull susceptible animals with high EPG and require more treatment
- ▶ Do not select replacement stock with high EPG /more treatment flocks
- ▶ Use resistant breeds for breeding



Garole sheep



Coimbatore sheep



## Gene marker test

- ▶ **Gene marker tests** will help to identify sheep that have lower FEC - breed dependent.
- ▶ Research ongoing to identify genomics of such animals
- ▶ The **CarLAR saliva test (Carbohydrate Larval Antigen)** developed in New Zealand measures antibodies to the L3 stage of GIN
- ▶ This test helps to select sheep that develop immunity more rapidly or to cull animals that do not.





## Parasite trapping fungi

### *Duddingtonia flagrans*

- ▶ Belongs to a group of **nematophagous fungi** that physically entrap nematodes through an adhesive hyphal net
- ▶ The additive contains the fungus in the form of chlamydospores and is intended to control pathogenic nematodes on pasture
- ▶ Fungus that traps and kills round worm larvae in manure of animals
- ▶ Mix with **supplement for daily administration**



Courtesy: Dr. G.Ponnudurai



- ▶ Main objective is to clean up pasture
- ▶ Reduces re infection of pastures, resulting in cleaner pastures
- ▶ Ready to use **commercial products are available (Bio Worma)**
- ▶ Feed when parasites are active
- ▶ Feed to most susceptible animals in flock

Periparturient females  
Lambs / kids & others





# Vaccines

- ▶ Developed for Haemonchosis
- ▶ **Barbervax** – A commercial vaccine in Australia, UK & New Zealand
- ▶ Requires three priming dose followed by two or three additional vaccinations for a total of five to six vaccine doses in a year.
- ▶ Highly effective
- ▶ Research is ongoing to develop vaccine against scour worms







## Integrated strategy

- ▶ Integration of different approaches will be sustainable in view of management of anthelmintic resistance in future
- ▶ There is **no silver bullet** to manage parasitic infection, hence, integrating various practices is the key to success
- ▶ **Regional worm management programme** should be developed for effective control of PGE
- ▶ Success of pasture management depends on ability of farmers / organisation to understand and implement them.



# Update on Control of Gastro Intestinal Nematodosis in small ruminants





# Update on Control of Gastro Intestinal Nematodosis in small ruminants

- 1. Parasitic Gastro Enteritis (PGE)  
- Etiology and Transmission of GI nematodes**
- 2. Epidemiology and pathogenesis of GI parasitism**
- 3. Economic impact and Diagnosis of GI Nematode infections**
- 4. Parasitic Gastro Enteritis – Therapy and control by Anthelmintics**
- 5. Integrated approaches in control of GI nematodes in small ruminants**



*Thank you*