



# Parasitic Gastro Enteritis – Therapy and control by Anthelmintics

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# Parasitic Gastro Enteritis – Therapy and control by Anthelmintics

- ▶ 1. Anthelmintics – Different classes, Mode of action
- ▶ 2. Maximizing dewormer efficacy
- ▶ 3. Targeted Selective Treatment





## Anthelmintics

- ▶ A valuable weapon that must be wisely used
- ▶ Long term control is possible only if **anthelmintics are used intelligently with prevention of resistance**
- ▶ Drugs that kills parasites by starving them or paralyzing them





## Dewormer use in parasite control

- ▶ All grazing ruminants have GIN infection
- ▶ Use of effective dewormers can control infection
- ▶ If resistance developed by worms to 1 drug in a group, resistant to all in group
- ▶ Hence judicious use is recommended
- ▶ **Don't practise blanket treatment** of all animals in a flock- Maintain Refugia
- ▶ Use **Targeted Selective Deworming program (TST)**





## Ideal characters of anthelmintics

- ▶ Efficacy with a broad spectrum of activity
- ▶ Wide margin of safety
- ▶ Shorter withdrawal period
- ▶ Economical
- ▶ Easy to administer



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## Different classes of anthelmintics in veterinary practice

### Benzimidazoles

- a. Albendazole
- b. Fenbendazole
- c. Mebendazole
- d. Oxfendazole

### Nicotinic agonists

### Imidazothiazoles

- a. Levamisole
- b. Tetramisole

### Tetrahydropyrimidines

- a. Morantel
- b. Pyrantel

### Macrocyclic Lactones(ML)

#### Avermectins

- a. Ivermectin
  - b. Eprinomectin
  - c. Doramectin
- #### Milbemycin
- a. Moxidectin

### Amino acetonitrile derivative

- a. Monepantel

### Salicylanilides and substituted phenols

- a. Closantel

### Spiroindole

- a. Derquantel



## How the dewormer drugs work ? Mechanism of action

### ► Impairment in cellular integrity of parasite

**Benzimidazole**

- Inhibitors of tubulin polymerization

**Salicylanilides and substituted phenols**

- Uncoupling of oxidative phosphorylation process

### ► Interference in neuro muscular coordination of parasites

**Imidazothiazoles &**

- Nicotinic agonists at acetylcholine receptors

**Tetrahydropyrimidines causing contraction and tonic paralysis**



- ii. Macrocyclic Lactones** - Binds to glutamate gated chloride the channel and trigger chloride influx, which hyperpolarizes parasite – paralysis and death of parasite
  
- iii. Monepantel**
  - Binding of drug to nicotinic acetylcholine receptors results in a uncontrolled flux of ions followed by a depolarization and irreversible paralysis
  
- iv. Spiroindole**
  - is an antagonist of B-subtype nicotinic acetylcholine receptors located at neuromuscular junction, leading





# Benzimidazole (White Dewormer)

## Products

- Fenbendazole - Panacur
- Albendazole - Albomar, Valbazen
- Oxyfendazole - Synantic

- **Broad spectrum**
- **Water soluble**
- **Wide margin of safety**
- **Effective against**

Adult and immature GIN  
 Hypobiotic larvae  
 Tape worm and flukes  
 Ovicidal

- **Widespread resistance**

## Dose

- **Albendazole**  
 Goats: 15 mg/kg b.wt  
 Sheep: 7.5 mg/kg b.wt

- **Fenbendazole**  
 Sheep : 5.0 mg/kg b.wt  
 Goat : 10 mg/kg b.wt

- **Withdrawal period : 6-8 days**





# Imidazothiazoles (Yellow drenches)

## Products

### → Imidazothiazoles

Levamisole – Nilverm, Levasol

## Dose

### Levamisole

sheep & goats : 7.5mg/kg –oral

### Tetramisole

sheep and goats : 15mg/kg

### → **Withdrawal period: 72 hrs**

- Clear drench
- Water soluble
- Broad spectrum of activity
- Not effective against arrested larvae
- **Narrow margin of safety**
- **Oral overdose may produce nervous symptoms**





# Tetrahydropyrimidines (Yellow drenches)

## Products

- ▶ Tetrahydropyrimidines  
Morantel – Banminth,  
Rumatel Pyrantel - Strongid

## Dose

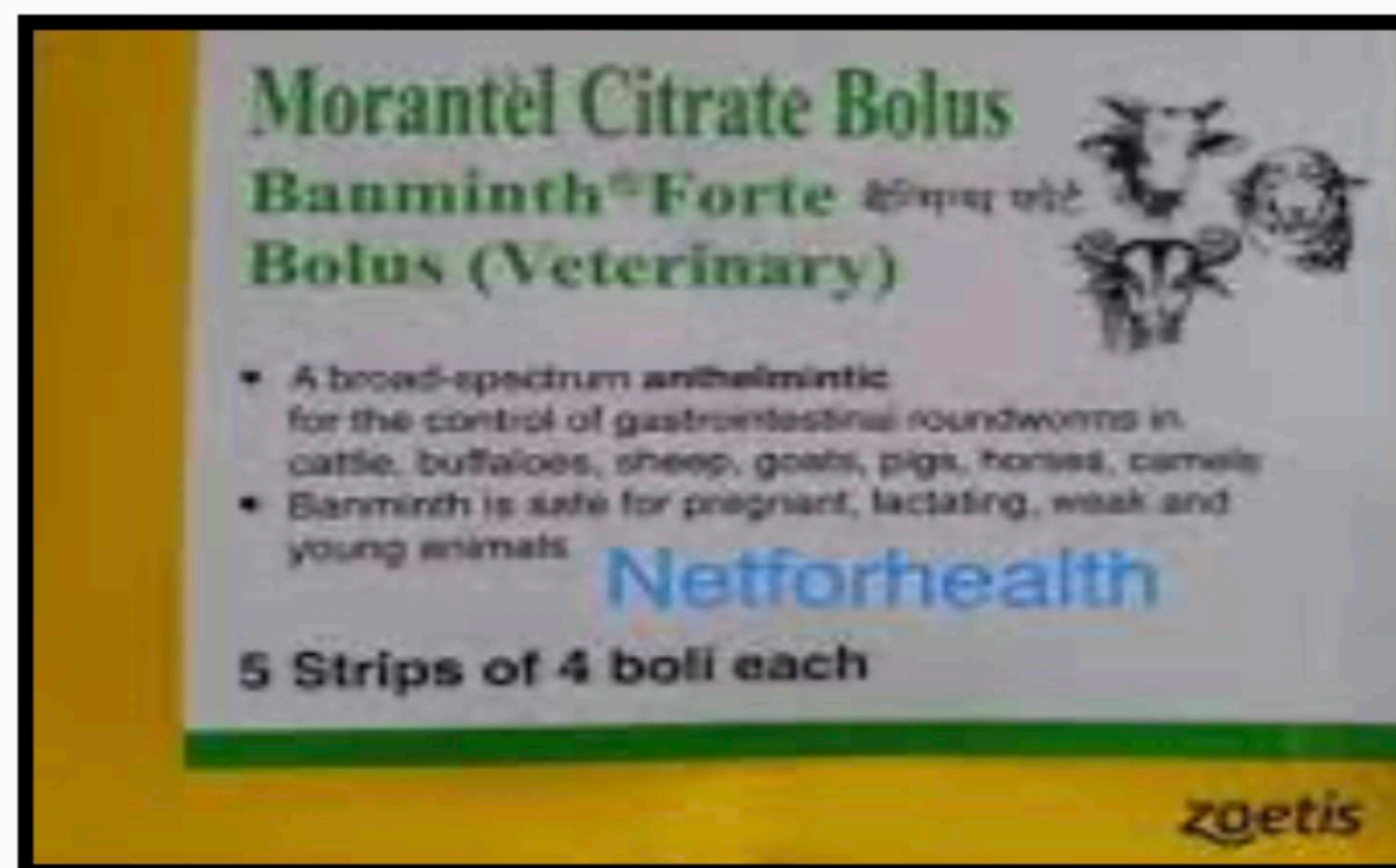
Morantel tartarate

Goats: 10 mg /kg – oral

## Withdrawal period:

Goats- 30 days

- ▶ Not effective against arrested larvae





# Macrocyclic lactones (Endectocide)

## Products

- Ivermectin – Ivomec, Eprinex
- Doramectin - Dectomax
- Moxidectin - Cydectin

## Dose

### Ivermectin

Fermentation product of *Streptomyces avermetilis*

Sheep : 0.2 mg/kg – oral

**Withdrawal period:** 14 days

### Moxidectin

Sheep: Oral drench - 0.2 mg/ kg

- Broad spectrum
- Effective against
  - Adult and immature GIN
  - Hypobiotic larvae
  - Lung worm
  - Ectoparasites
- Wide margin of safety
- **Persistent activity, widespread resistance to ivermectin**





## Amino acetonitrile derivatives

- ▶ **Monepantel**
- ▶ **New drug class in 25 years**
- ▶ **Unique mode of action**
- ▶ **Registered and released for use in few countries**
- ▶ **Excellent activity against worms that are resistant to other dewormers**
- ▶ **Zolvix - Dose : 2.5 mg /kg b.wt. – oral**
- ▶ **Withdrawal period : 14 days**





## Other groups

### Salicylanilides and substituted phenols

**Products**  
**Closantel**

**Dose - 7.5 -10 mg/kg-oral**



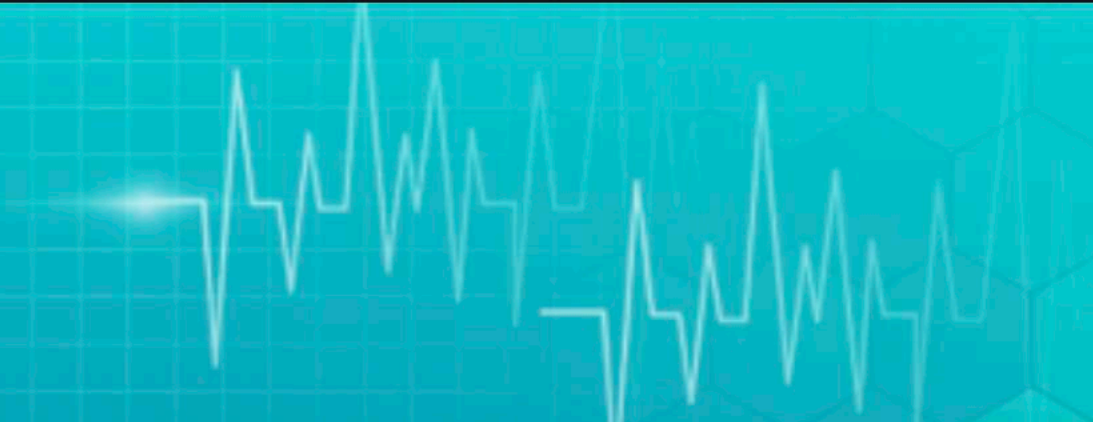
### Spiroindole

**Derquantel**

**Sheep: 2 mg/kg –oral**

**Withdrawal period 14 days**





# Dewormers combinations

- ▶ In recent time, **combination of dewormers are available in Asian market**
- ▶ Administering 2 or more dewormers of different classes is now being promoted to slow development of resistance
- ▶ Additive effect of treatments
- ▶ Ex. Fenbendazole + Ivermectin have additive effect





## Use Anthelmintics appropriately...

- ▶ Administer all dewormers orally
  - Injectables have long residual – resistance
  - Pour-on products absorbed poorly
- ▶ Deworm with oral dosing syringe
- ▶ **Higher dosages for goats**
  - Goats metabolize drugs much rapidly than sheep
  - Rule of thumb- Goats should be given a dose 1.5 to 2 times higher than sheep
- ▶ **Goats are generally treated at 2X sheep dose (BZ) or 1.5X sheep dose (ML)**
- ▶ Low stress handling
- ▶ Proper storage of dewormers



image: Susan Schoenian- sheep 201





## Maximising Dewormer Efficiency

- ▶ Find out which dewormer works
- ▶ **Ensure proper dose is delivered**
- ▶ Best to do deworming in morning time
- ▶ Weigh animals prior to dose
- ▶ Don't under dose
- ▶ If scale is not available, plan for heaviest animals in a group of adults, kids/lambs etc.,
- ▶ Restrict the feed for 12-16 hrs prior may increase the efficacy
- ▶ Combination of dewormers with additive effect





## Drenching technique

Ensure proper drench technique

Deposit the oral dewormers over the tongue at the back of the mouth



Stimulate **closure of the oesophageal groove**



Drench bypassing ruminoreticulum



Better and faster absorption



## What mistakes we do in deworming?

- ▶ Deworming at frequent intervals  
6 to 8 times in a year/farm
- ▶ Deworming all animals at a time  
Blanket treatment - No Refugia
- ▶ Improper calculation of dosing  
inadequate dose - ineffective
- ▶ Use of an wrong anthelmintics  
Ivermectin to treat flukes and cestodes
- ▶ Don't use an incorrect route of administration  
Injectables in oral route





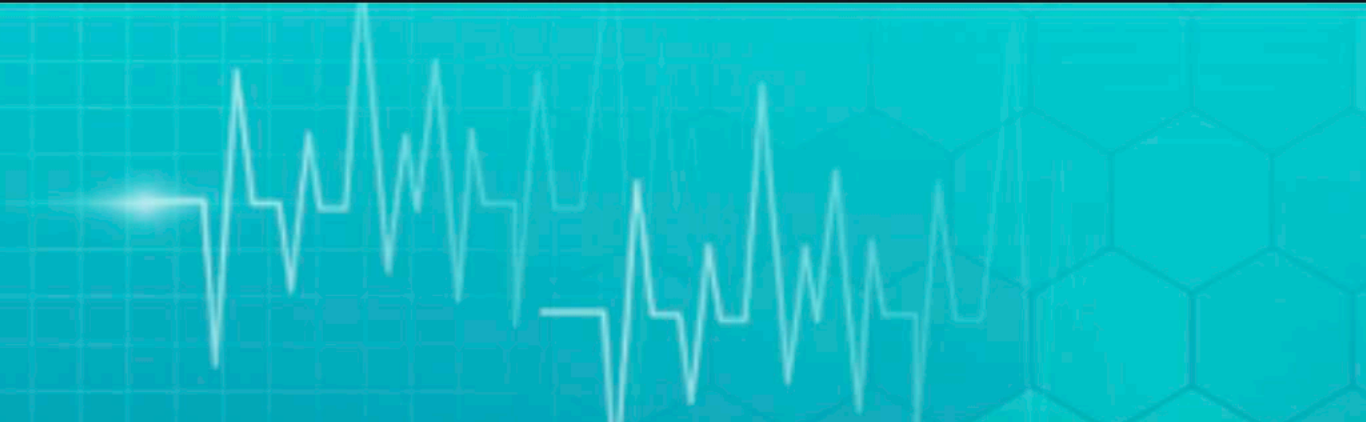
## Targeted Selective Treatment (TST)

- ▶ **Don't practise blanket treatment of all animals in a flock**
- ▶ **Only deworming those that requires treatment**
- ▶ **Leaving a portion of the flock/herd untreated –Increases Refugia -slows down resistance**
- ▶ **Increases “Refugia”: worms that have not been exposed to drugs- thus remain susceptible to treatment**
- ▶ **Allows animals to develop immunity**



## **TST- Decision making tools**

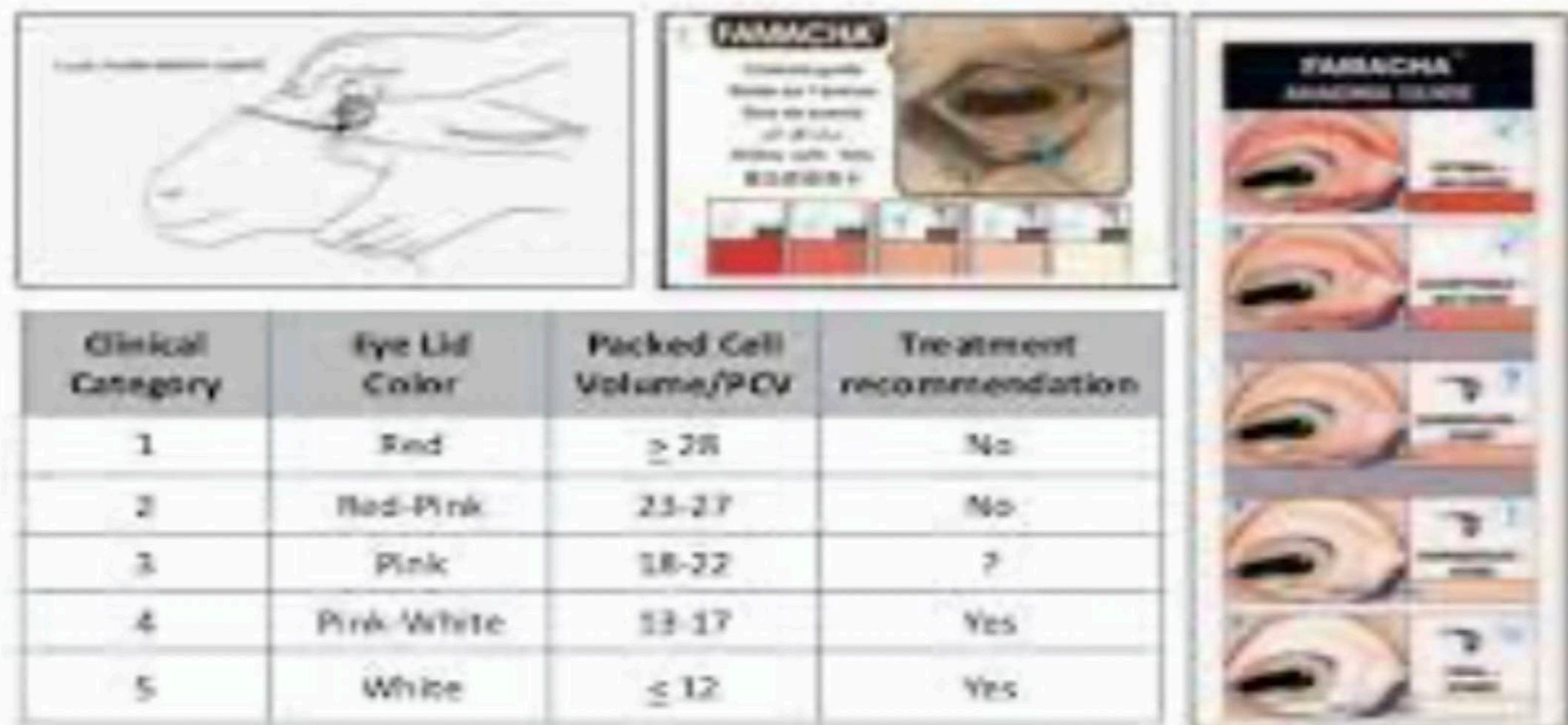
- ▶ **i. FAMACHA eye anaemia system**
- ▶ **ii. Five point check**
- ▶ **iii. Happy factor - Performance based system**



# FAMACHA eye anaemia system

- ▶ Developed in South Africa in response to growing Anthelmintic resistance
- ▶ Named for originator- Dr. Francois Faffa Malan – Faffa Malan Chart
- ▶ Method to assess level of anaemia in animals- due to blood sucking parasite, mainly *Haemonchus sp.*
- ▶ Deworming decision making tools for Barber's pole worm

## FAMACHA© System

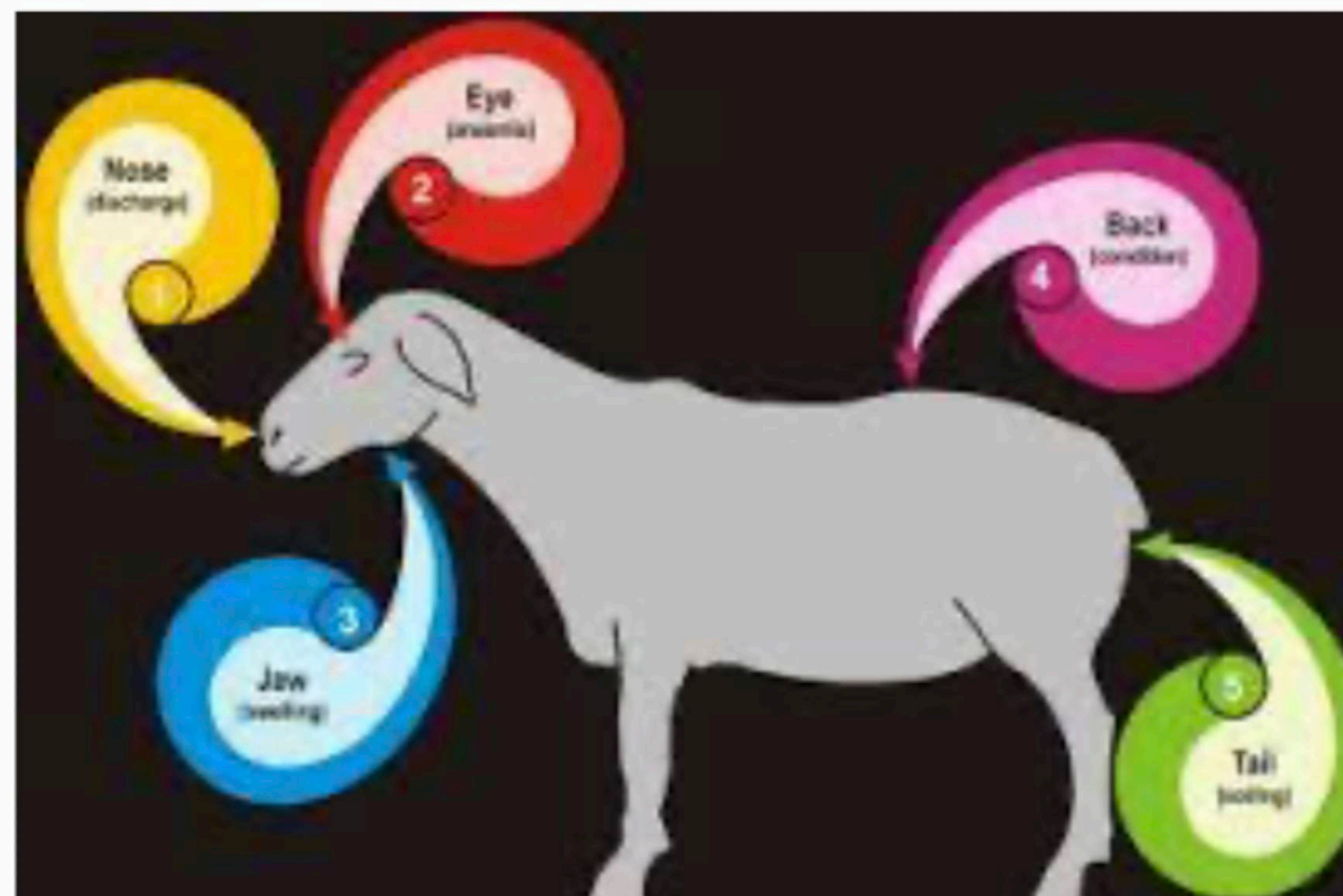


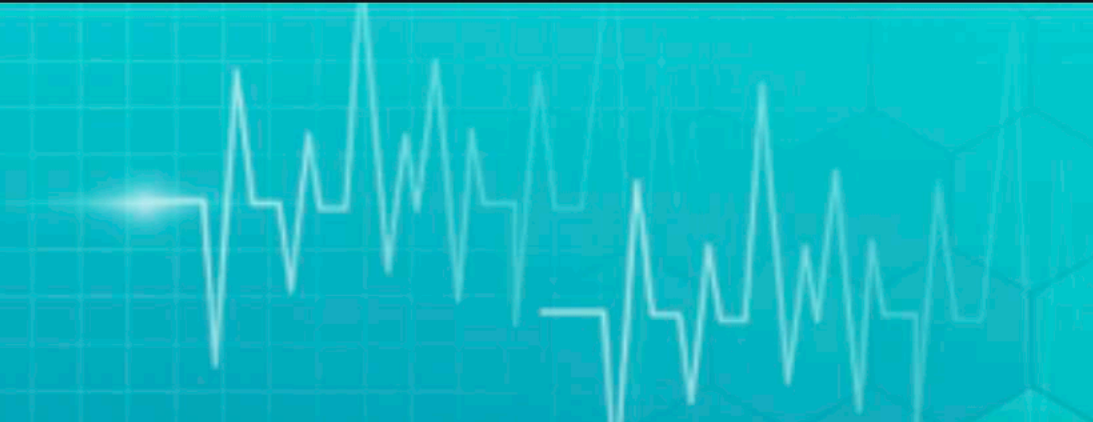
Clinical Category	Eye Lid Color	Packed Cell Volume/PCV	Treatment recommendation
1	Red	≥ 28	No
2	Red-Pink	23-27	No
3	Pink	18-22	?
4	Pink-White	13-17	Yes
5	White	≤ 12	Yes



## Five Point Check

- ▶ An extension of the FAMACHA system
- ▶ Includes criteria for all worms that commonly affect small ruminants
- ▶ Five check points on animal's body –eye, back, tail, jaw and nose





# Consider all 5 points when making deworming decisions Useful to decide whether to deworm animals of FAMCHA scores -3



Check Point	Observation	Possibilities
<b>1. EYE</b>	Anemia 1-5 (SMACIAD card)	Barber pole worm (Haemonchus) Liver fluke Hook worms Other worms and causes
<b>2. BACK</b>	Body condition score 1-5 (BCS card)	Brown stomach worm (Teladorsagia) BANKRUPT worm (Trichostrongylus) Nodular worm Other worms and causes
<b>3. TAIL</b>	Fecal soiling (1-5) Tag score card	Brown stomach worm (Teladorsagia) BANKRUPT worm (Trichostrongylus) Coccidia (Eimeria) Nodular worm (Oesophagostomum) Other worms and causes
<b>4. JAW</b>	Soft swelling "bottle jaw" 1-5	Barber pole worm (Haemonchus) Coccidia (Eimeria) Liver fluke Hook worms Other worms and causes
<b>5. NOSE</b>	Discharge 1-5	Nasal botfly Lungworm Pneumonia Other causes
<b>5. COAT</b>	Coat condition 1-5	Barber pole worm (Haemonchus) Brown stomach worm (Teladorsagia) BANKRUPT worm (Trichostrongylus) Coccidia (Eimeria) External parasites Other causes

Five point check

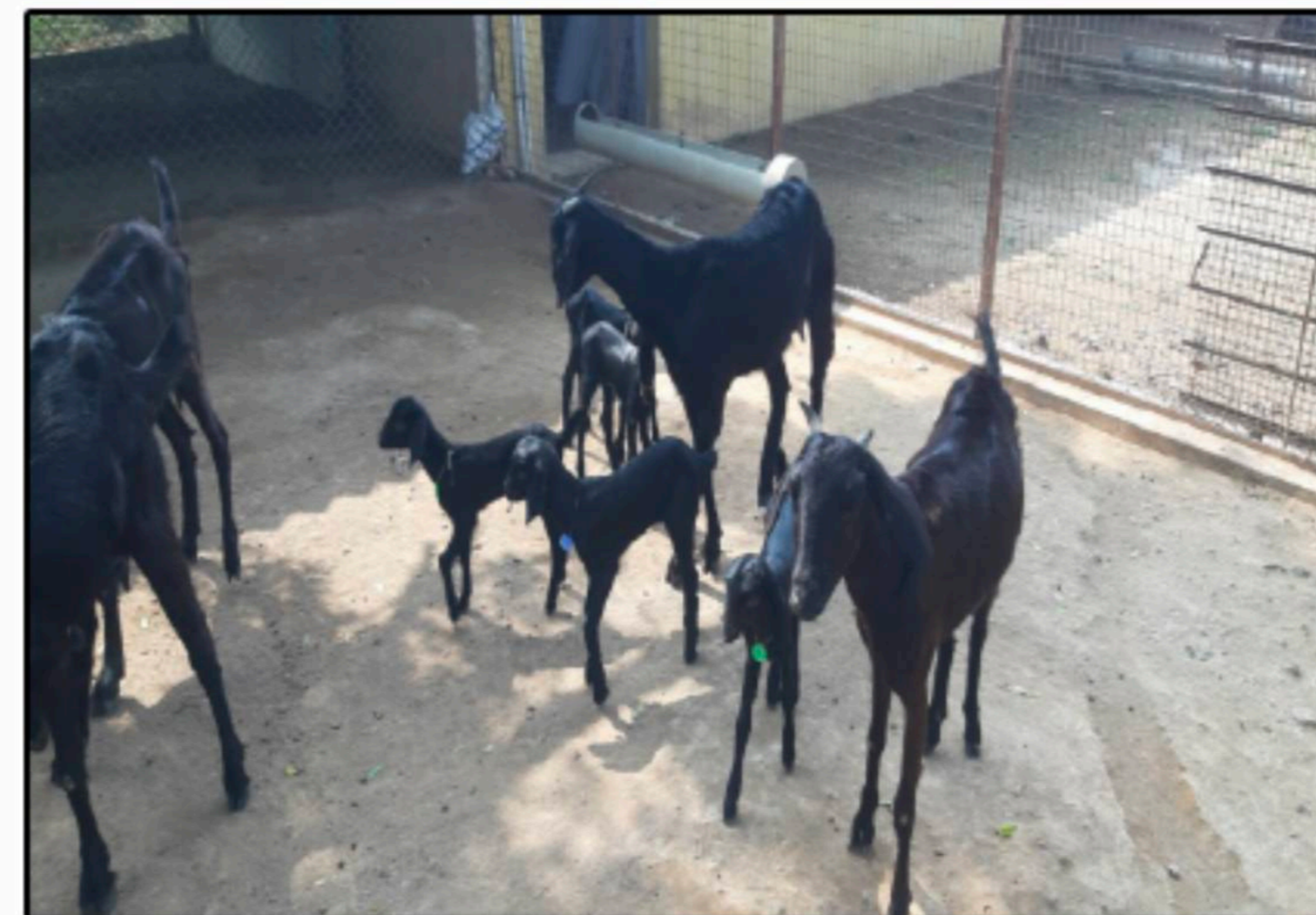
Courtesy : Gareth Bath





## Control of Periparturient egg rise in small ruminants

- ▶ Increased egg counts around the time of –parturition
- ▶ Deworm the animals based on TST- decision making tools
- ▶ Maintain animals in **good plan of nutrition** –Protein and minerals supplementation
- ▶ Keep pregnant animals off pasture during this period
- ▶ Schedule lambing/kidding in a time when parasitic incidence is less





## Conclusion

- ▶ **Anthelmintics are valuable, limited resource that must be wisely used**
- ▶ **Administering combination of dewormers of different classes can be promoted to slow development of resistance**
- ▶ **Use Targeted Selective Treatment**



*Thank you*