

سُبْحَانَكَ اللَّهُمَّ رَبِّ السَّمَاوَاتِ السَّبْعِ وَرَبُّ الْعَرْشِ الْمَجِيدِ



وَعَلَّمَ آدَمَ الْأَسْمَاءَ كُلَّهَا ثُمَّ عَرَضَهُمْ

عَلَى الْمَلَائِكَةِ فَقَالَ أَنْبِئُونِي بِأَسْمَاءِ

هَٰؤُلَاءِ إِنْ كُنْتُمْ صَادِقِينَ ﴿٣٦﴾ قَالُوا

سُبْحٰنَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ

أَنْتَ الْعَلِيمُ الْحَكِيمُ ﴿٣٧﴾

A microscopic image of a nematode worm, likely a parasite, showing its internal anatomy and external structure. The worm is elongated and curved, with a distinct head region and a tail. The internal organs, including the gut and reproductive system, are visible. The background is a light blue color.

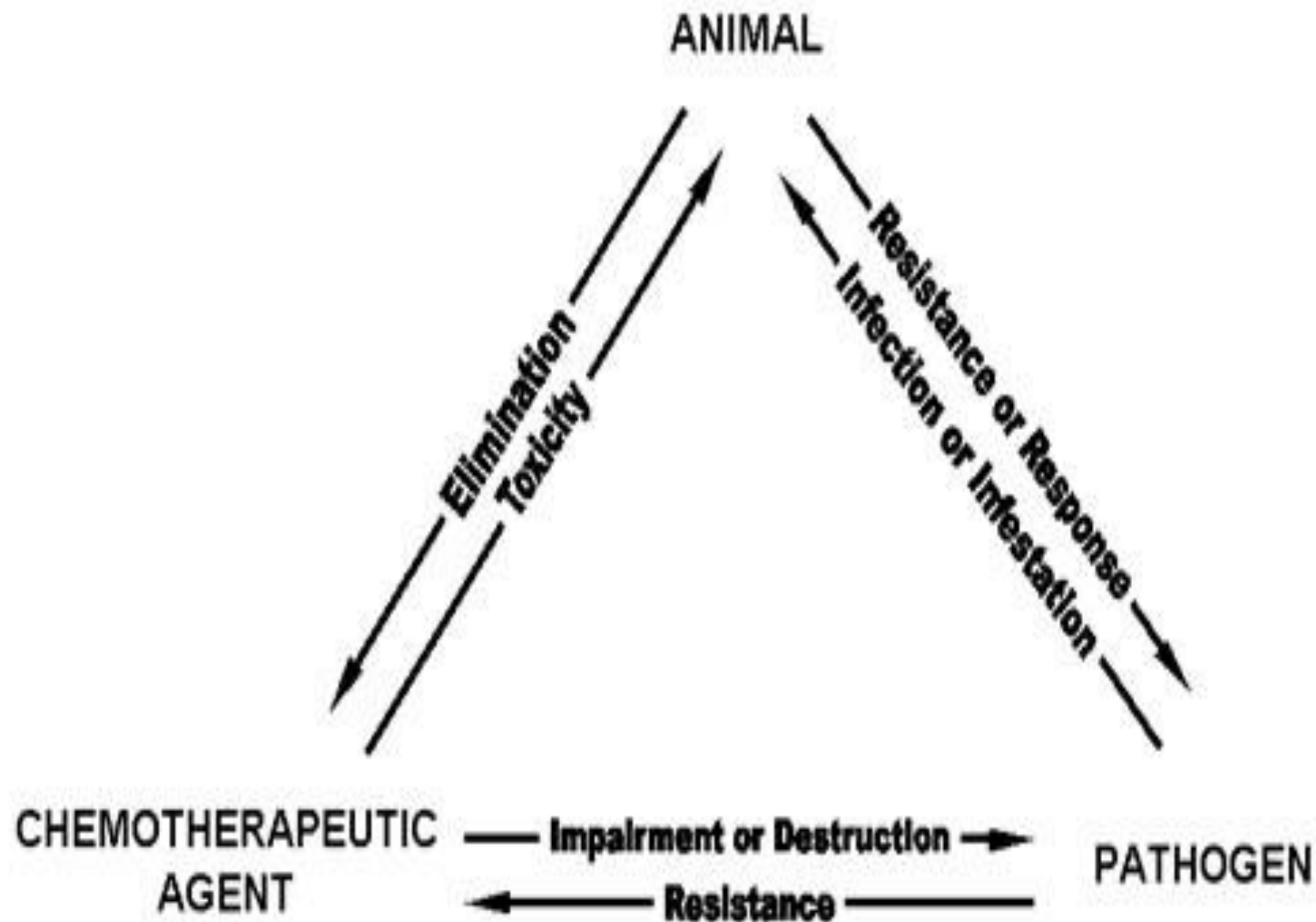
ANTHELMINTICS

By

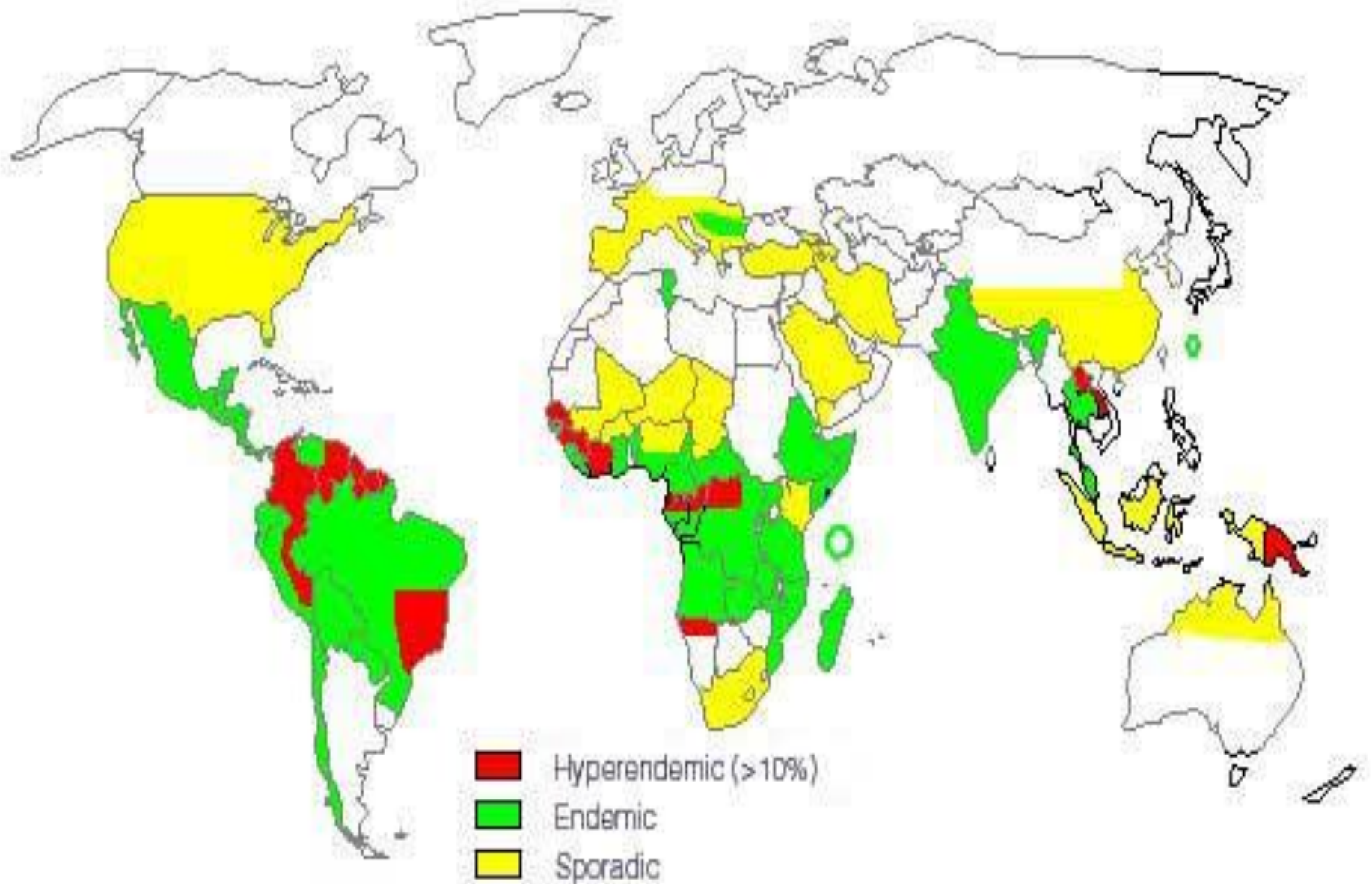
Prof. Dr. Mostafa Fayez

Topics

1. Diseases caused by Helminthes.
2. Drugs used.
3. Classification of drugs.
 - a. **Mode of action.**
 - b. **Chemical classification.**
4. **Principals of treatment.**
5. Conclusion.



Epidemiology



Principles of Anthelmintic Use

- An ideal anthelmintic should have the following properties:
 - Broad spectrum
 - Non toxic and safe to animal and user
 - Rapidly excreted
 - No residues in milk and meat
 - Easy to administer
 - Cost effective

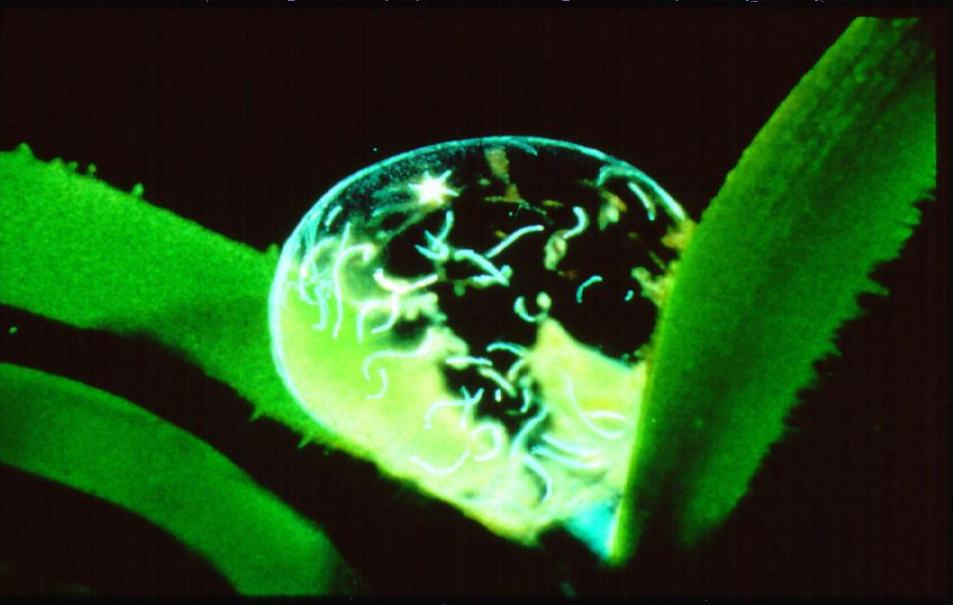


Stomach worms

- Primary
Haemonchus contortis
(barber pole worm)
- Secondary
Ostertagia
Trichostrongylus sp.
Nematodirus



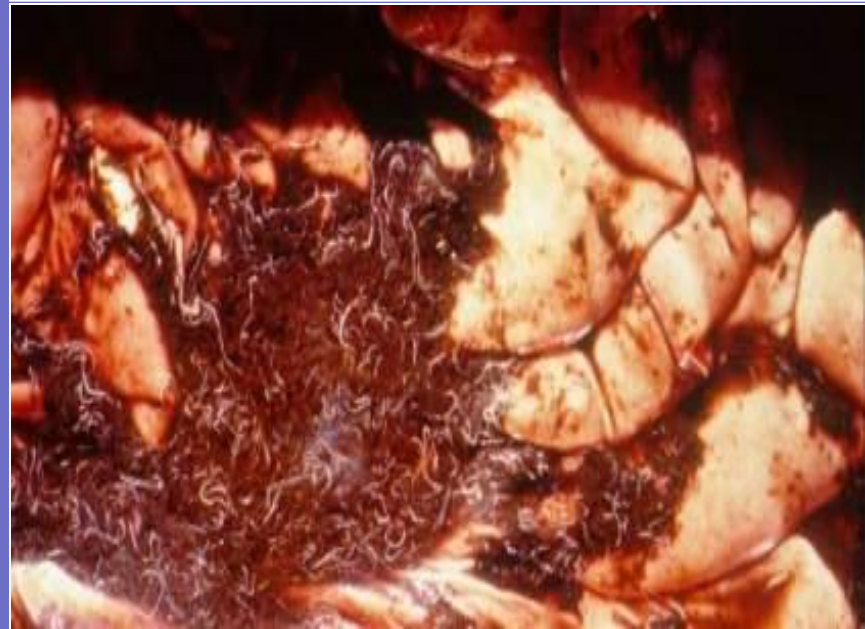
Pale mucous membranes



Internal Parasites

1 health problem affecting sheep and goats in warm, moist climates.

- ✓ Stomach/round worms
 - barber pole worm
- Tapeworms
- Lungworms
- Liver Flukes
- Meningeal worm
- ✓ Coccidiosis



Haemonchus contortus





Haemonchus contortus





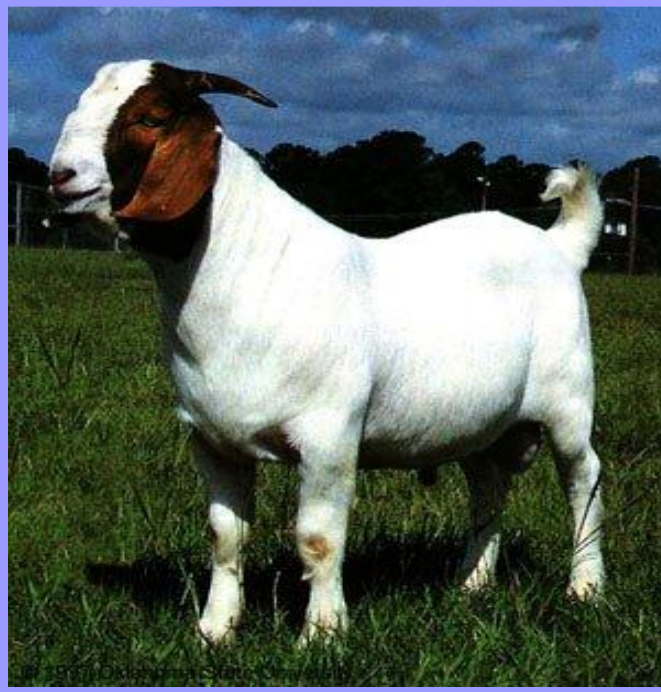
How do I know if I have a problem with worms?

- Do you see animals with clinical signs consistent with worms?
 - Diarrhea?
 - Weight loss?
 - Exercise intolerance?
 - Pale mucus membranes?
 - Peripheral edema (bottle jaw)?
 - Poor rate of gain?
- What is your death loss in the herd?
 - Do you know why animals die?













4
DANGEROUS - DOSE!

5
FATAL - DOSE!!



Benefits of Deworming

- Increased productivity
- Increased efficiency
- Better immune status
- Increased breeding efficiency
- Reduced pasture contamination

Parasitism

Economics of Parasite Control Calves

- More efficient
- Less susceptible to disease

Cows

- Increased milk production
- Better body condition
- Better breeding efficiency
- Less susceptible to disease

We Deworm Cattle For Only One Reason

- FOR THE MONEY



Drugs used





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Principles of Anthelmintic Use

- An ideal anthelmintic should have the following properties:
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 - Cost effective

I. Chemical classification of Anthelmintics

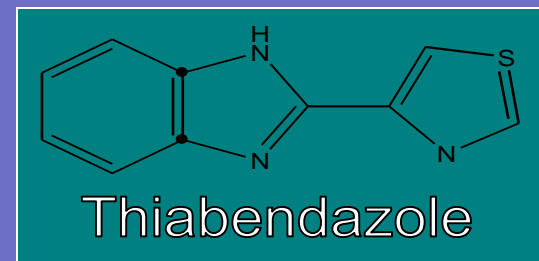
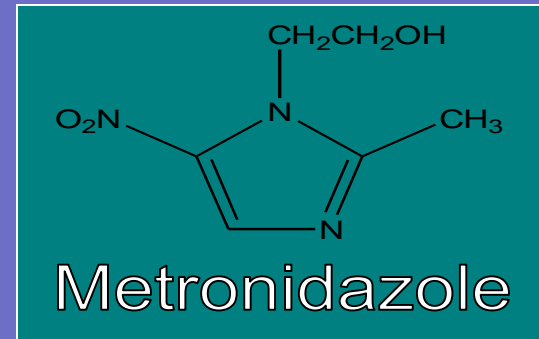
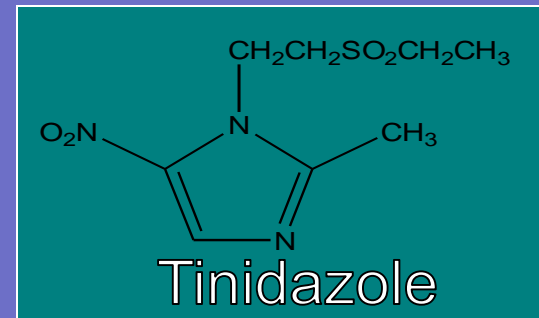
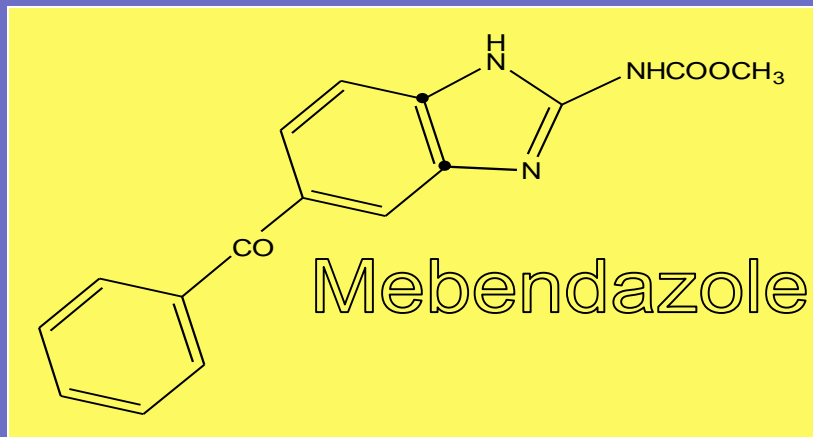
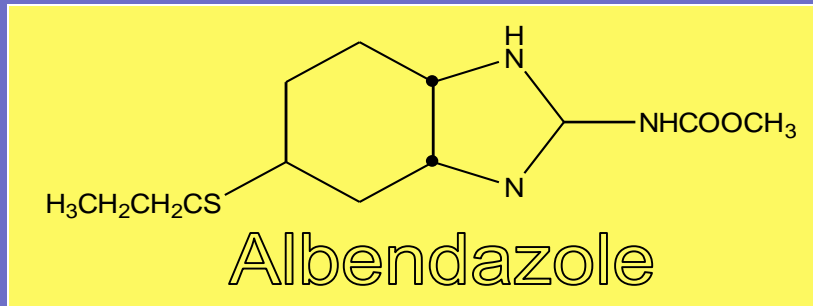
Dewormer Action Families

- All members of an action family share the same mode of action despite there being several members in the same family
- Only 3 broad spectrum families available
- Benzamidoles
- Levamisole and Morantel/Pyrantel
- Avermectins/Milbemycins

Benzamidoles

- fenbendazole (Panacur, Safeguard)
oxfendazole (Synanthic)
- albendazole (Valbazen) also kills flukes
- All kill eggs, lungworms and tapeworms
- Greatest level of dewormer resistance because of long history of use

Anthelmintics: Benzimidazoles



Anthelmintics: Benzimidazoles

- Benzimidazole drugs: mebendazole, albendazole, triclabendazole, metronidazole, tinidazole, thiabendazole
 - Currently, only mebendazole and albendazole are used to treat human infections
- Used to treat intestinal helminth infections, especially those caused by nematodes and cestodes
- Benzimidazoles first introduced in the 1960s, with resistance presenting within three years of their introduction
 - Originally used as fungicides to control plant diseases
- Mechanism of action:
 - Inhibits the polymerization of tubulin into microtubules
 - This inhibition prevents cellular division and the absorption of glucose in its intestines

II. Classification of Anthelmintics according to their mode of action

Oxamniquine causes worms to move to the liver - (mechanism unknown)

Thiabendazole suppresses egg and larvae production

Albendazole blocks tubule formation

Nucleus:
Nuclear membrane
Nuclear pore
Nucleolus

Smooth endoplasmic reticulum

Praziquantel increases membrane permeability, causing cell death

Mebendazole prevents cell use of glucose

Cilia with microtubules

Microtubules

Perioxosomes

Lysosomes

Cell membrane

Rough endoplasmic reticulum

Golgi apparatus

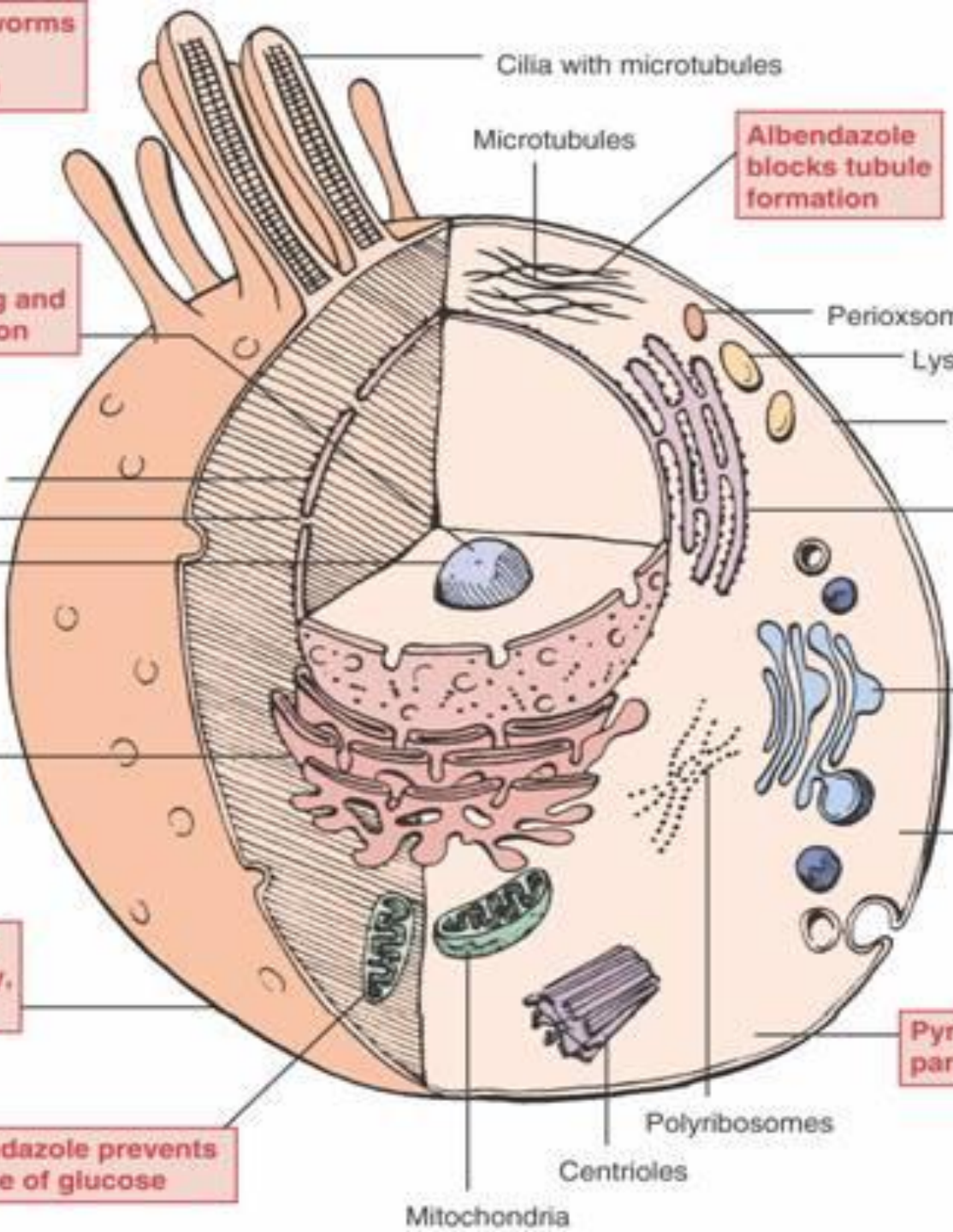
Ivermectin blocks calcium channels, leading to nerve and muscle paralysis and cell death

Pyrantel causes paralysis and cell death

Polyribosomes

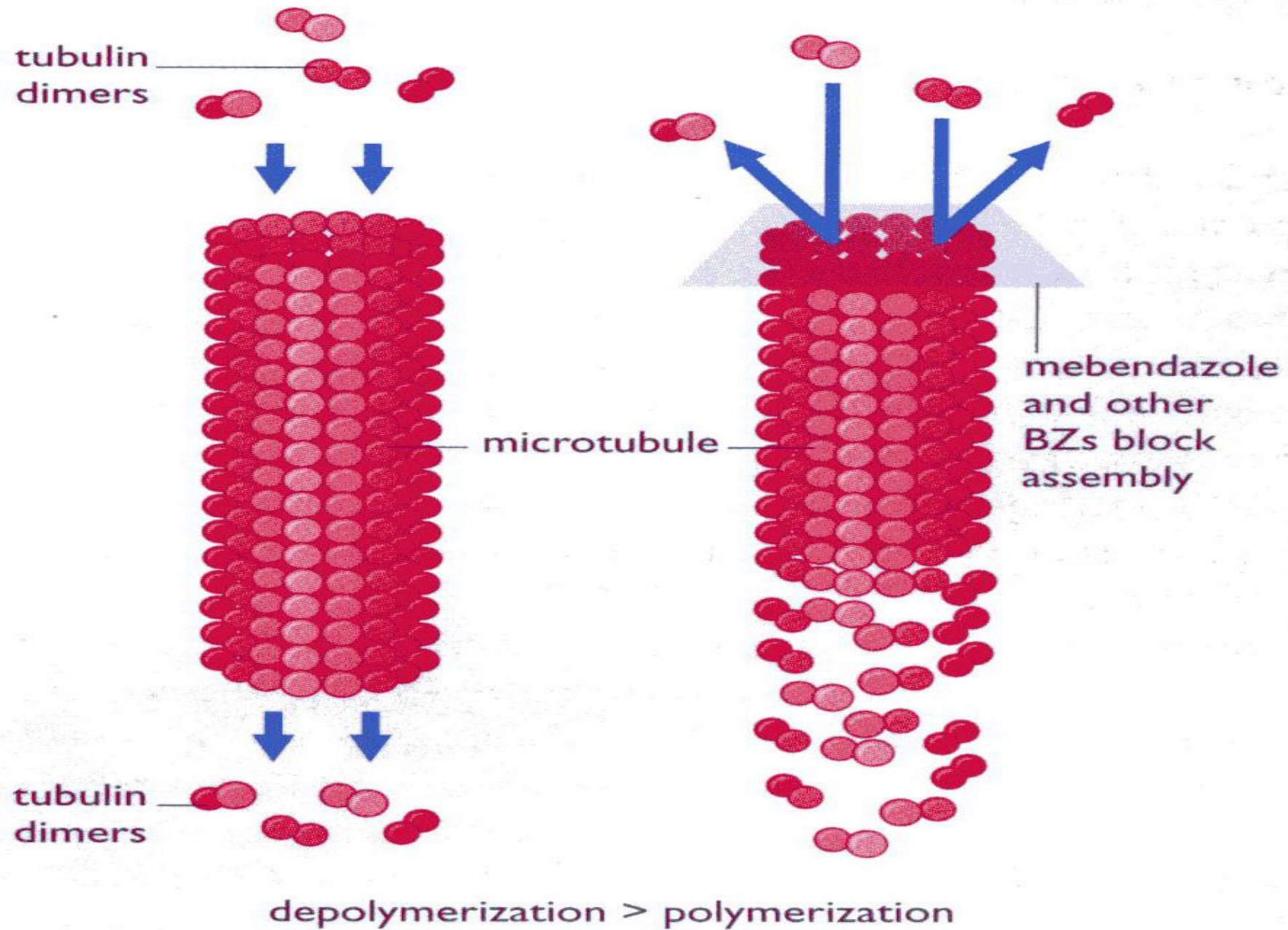
Centrioles

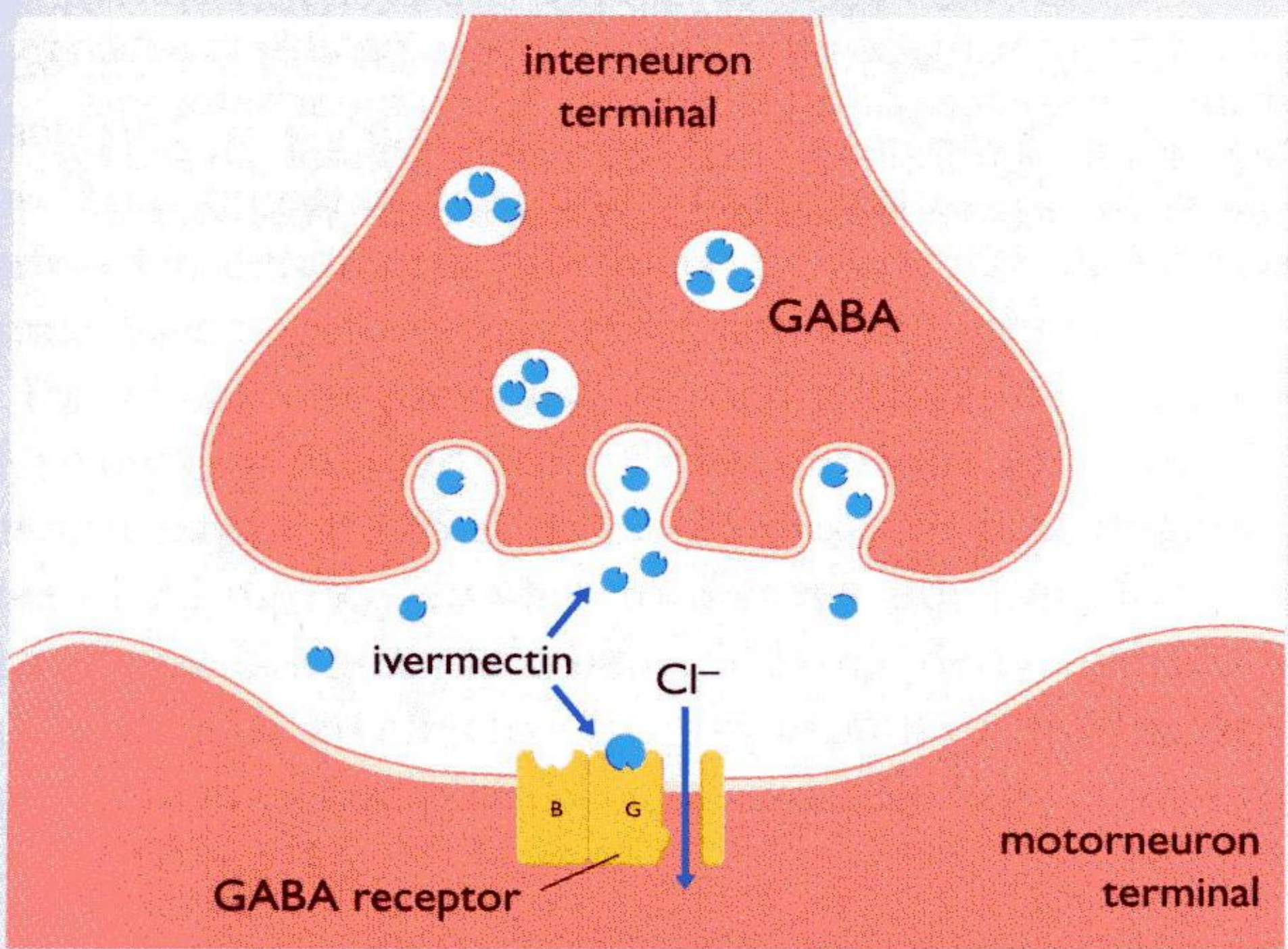
Mitochondria



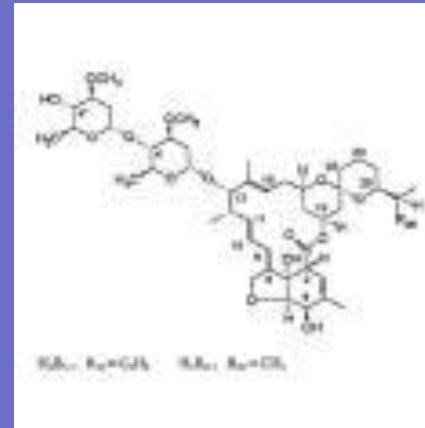
Fenbendazole

- works by keeping the worm from absorbing sugar (glucose), so that the worm loses energy and dies.





There are a number of agents against helminths (“worms”), piperazine and ivermectin are good examples which are used against roundworms and nematodes.



Ivermectin is now used against a wide range of parasites, roundworms, scabies, mites etc

Ivermectin Resistance



- Ivermectin overused
- Resistance in parasites
- Need new drug targets discovered
- Ligand-gated chloride channels may be the best drug targets



III. Classification according to the site of action of Anthelmintics

Site of action of Anthelmintics



Cuticle

Esophagus

Stylet

Eggs

Median Bulb

Vagina

Nerve Ring

Uterus

Esophageal Gland

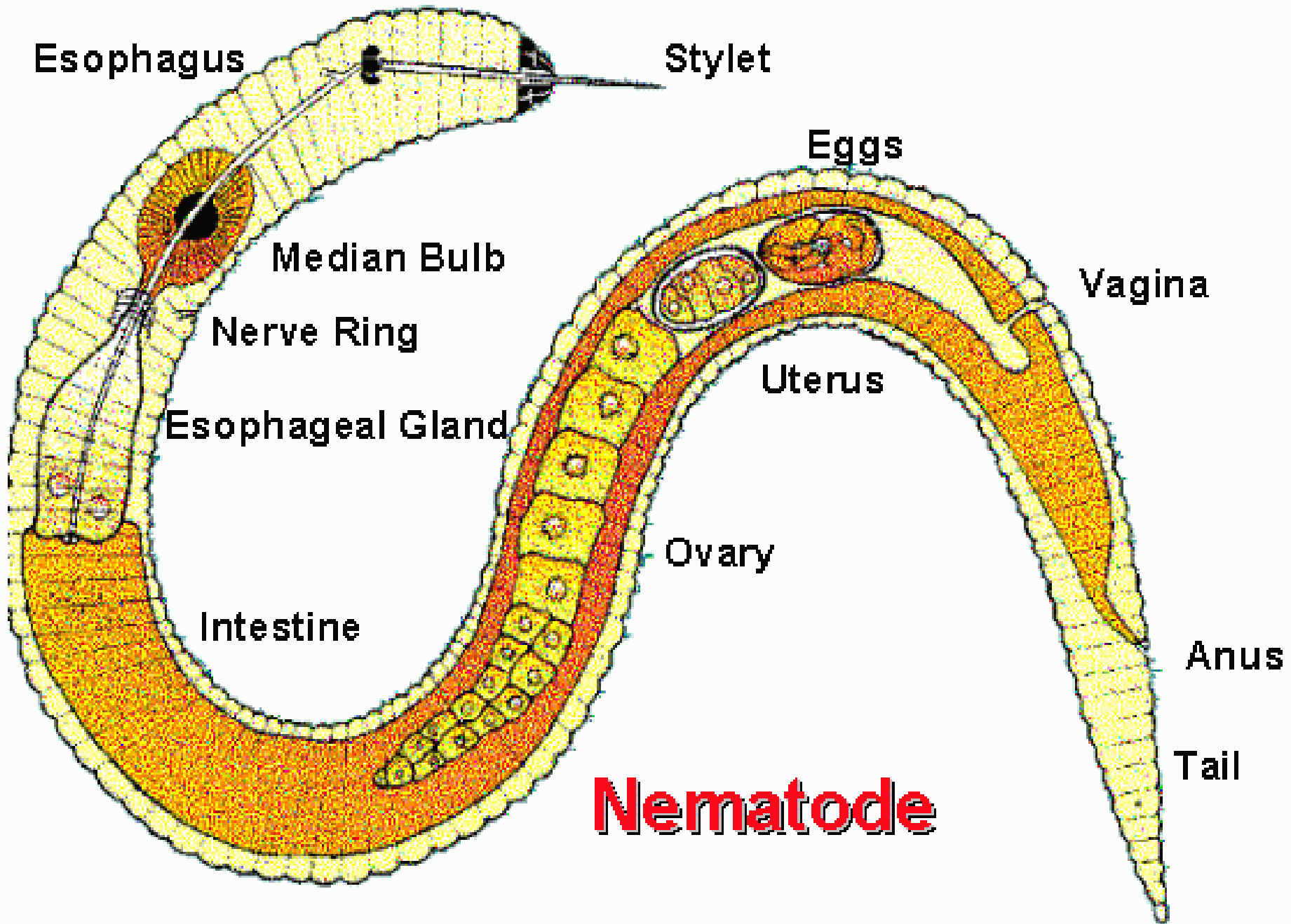
Ovary

Intestine

Anus

Tail

Nematode



Haemonchus contortus



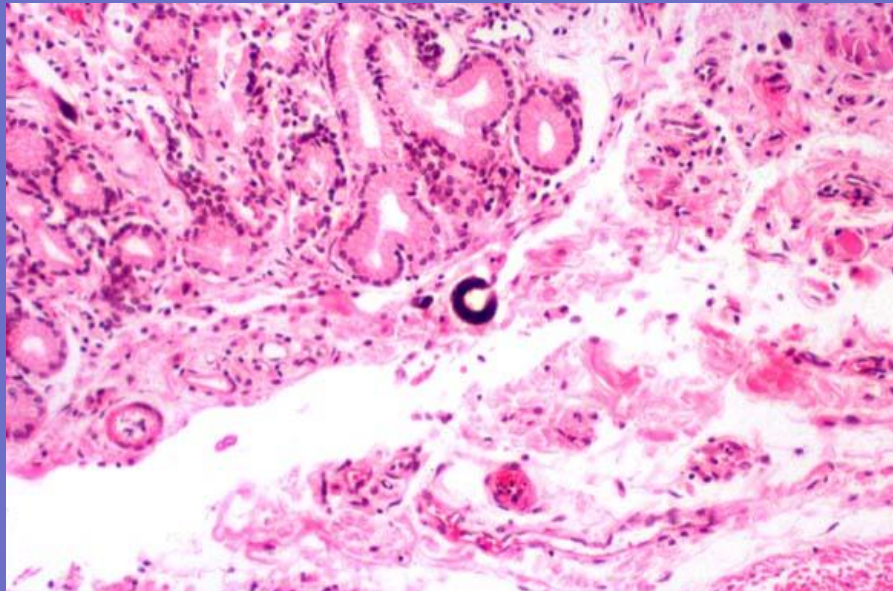
<http://ucdnema.ucdavis.edu/imagemap/nemmap/ENT156HTML/E156haemB>

<http://www.ksu.edu/parasitology/625tutorials/index.html>

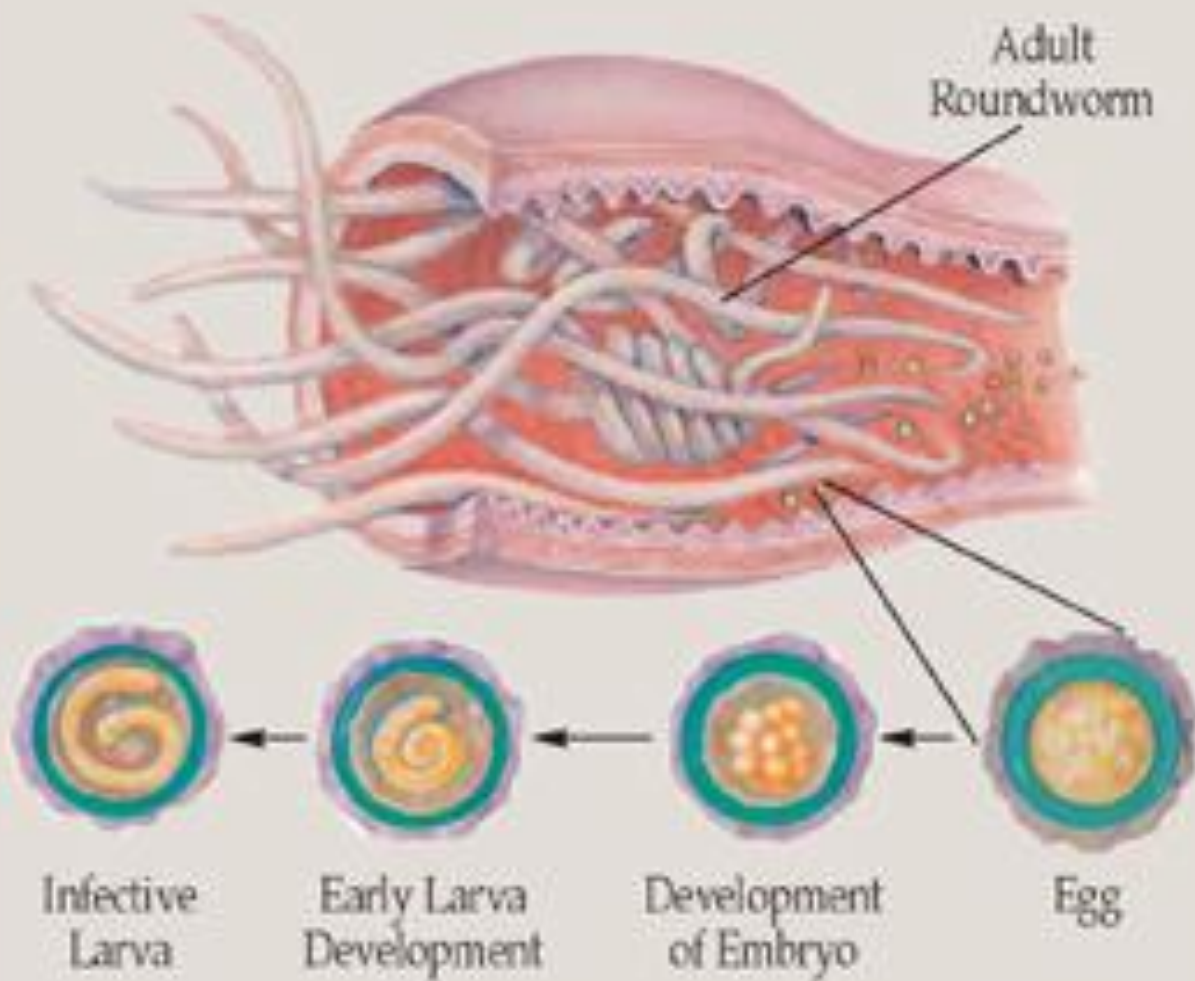
Barberpole Worm



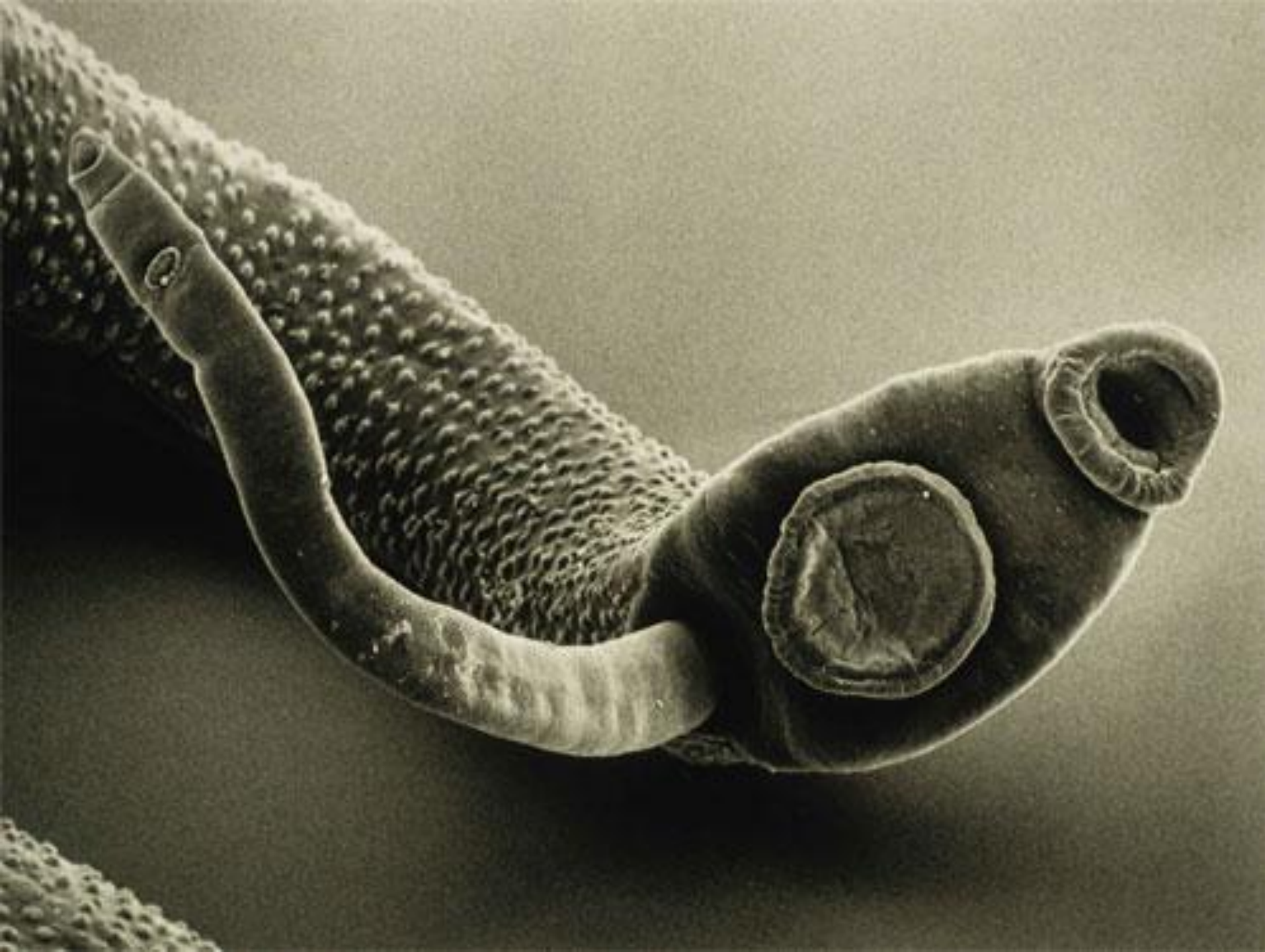
Strongyloidiasis



ASCARIDS



Inside the eggs, infective larvae develop in 2-4 weeks.



IV. Classification according to the Pharmaceutical form



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NET WT 25 LBS (11.3 kg)



Strongid C

(Ivermectin Mectran)
Equine Anthelmintic
Medicated
For Oropharyngeal Therapy

Directions:
Administer 1.5 mg of ivermectin per 1000 lbs of body weight orally once daily for 5 consecutive days. The medication should be administered with a small amount of feed or water.

Warnings:
Do not use in horses with known hypersensitivity to ivermectin or any of the other ingredients. Do not use in pregnant mares or nursing foals.

Adverse Reactions:
None reported.

How to Use:
See the enclosed information sheet for detailed instructions.

Storage:
Store in a cool, dry place. Do not expose to moisture.

Lot: [Illegible]

Exp. Date: [Illegible]







V. Classification according to Types of Administration

Types of Administration

Injectable

- Advantage – Easy to administer
- Disadvantage – Can create problems in the meat
- Disadvantage – Must be re-dosed every 60 days

Drench

Advantage – Very quick to administer (not as quick as Pour-On)

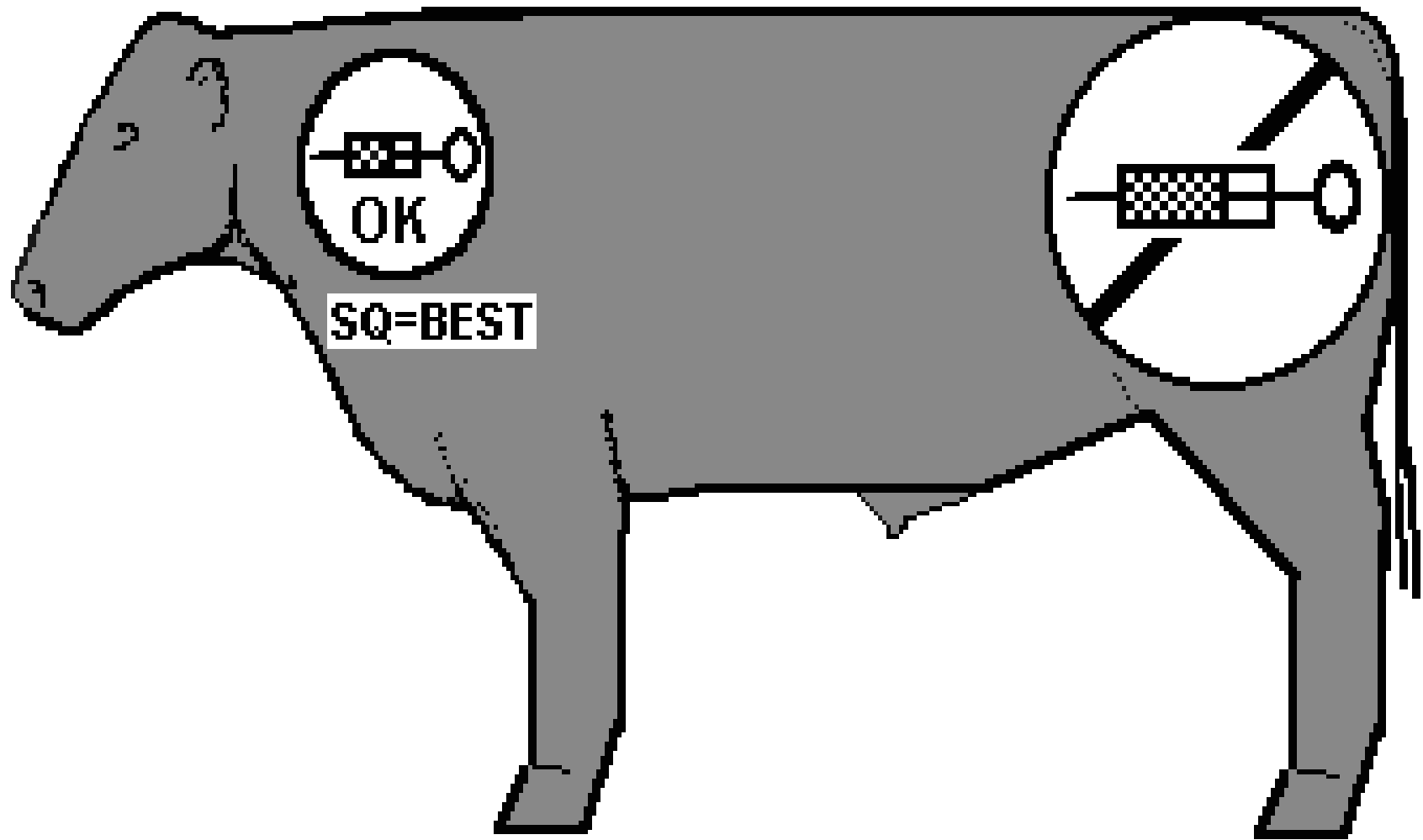
Disadvantage – Must be re-dosed every 60 days

Disadvantage – Cow can spit out most of the product

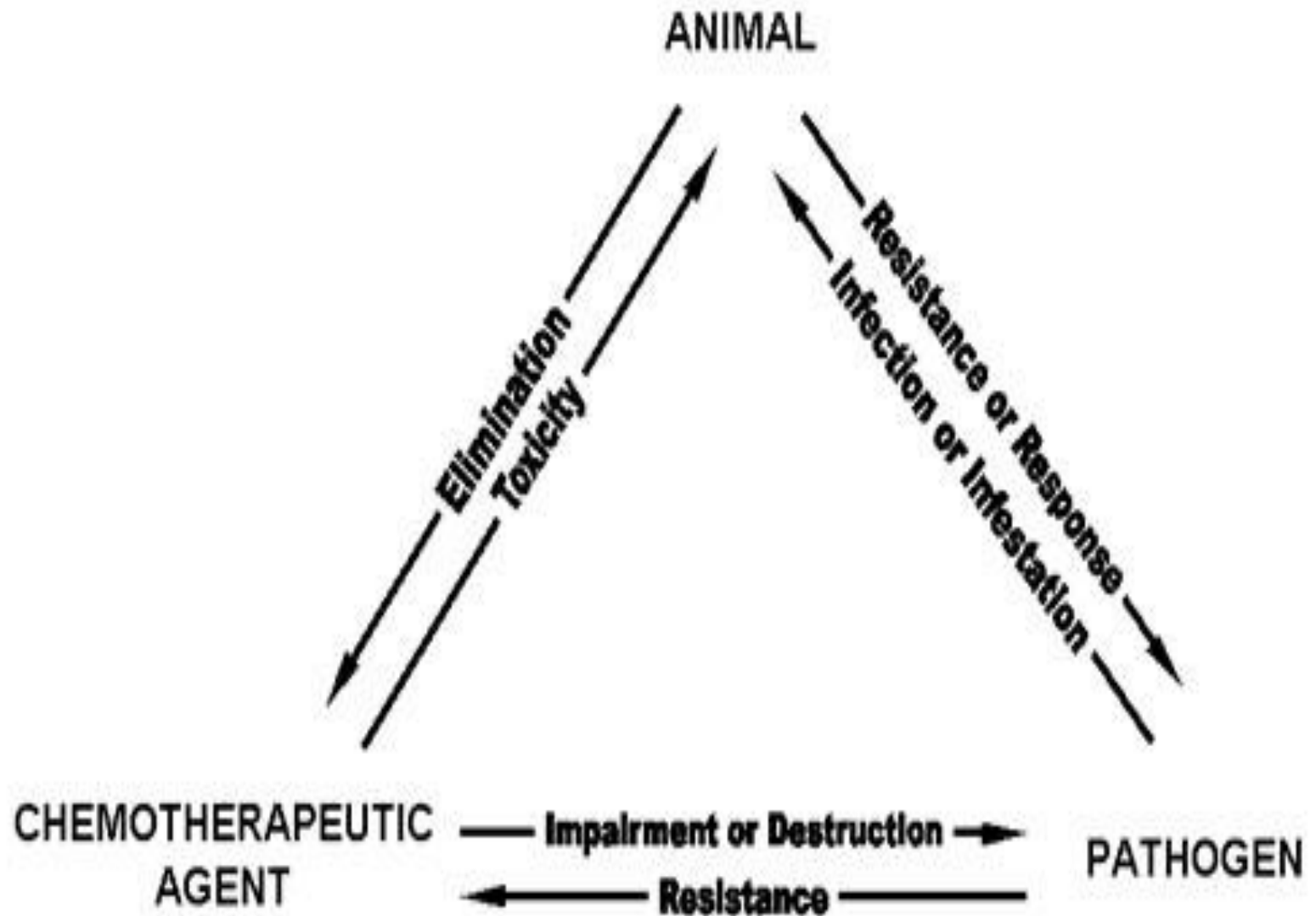
Bolus

- Advantage – Dosed only once in the cow's life
- Disadvantage – Much longer administration time
- Disadvantage – Administration requires training

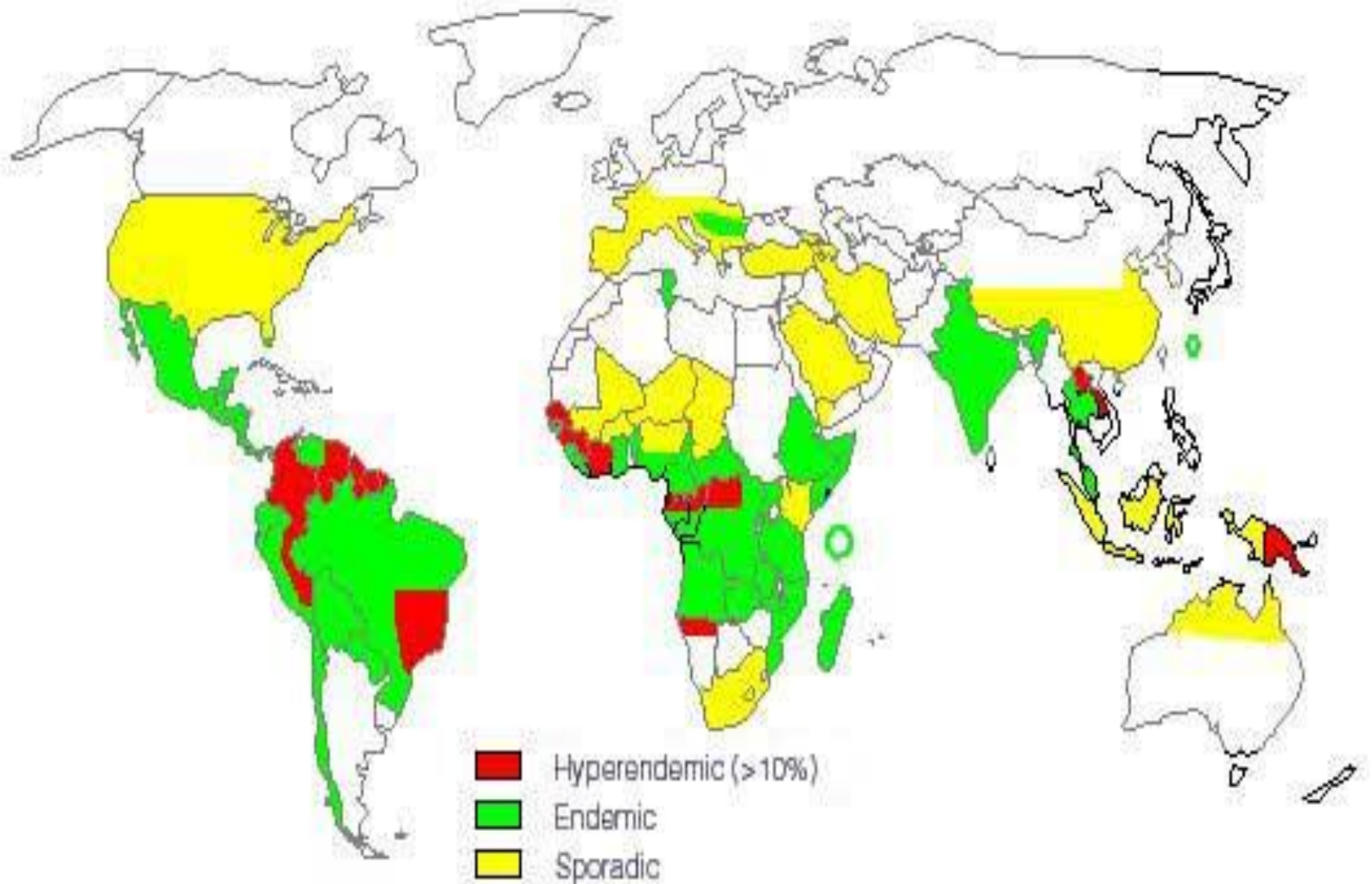


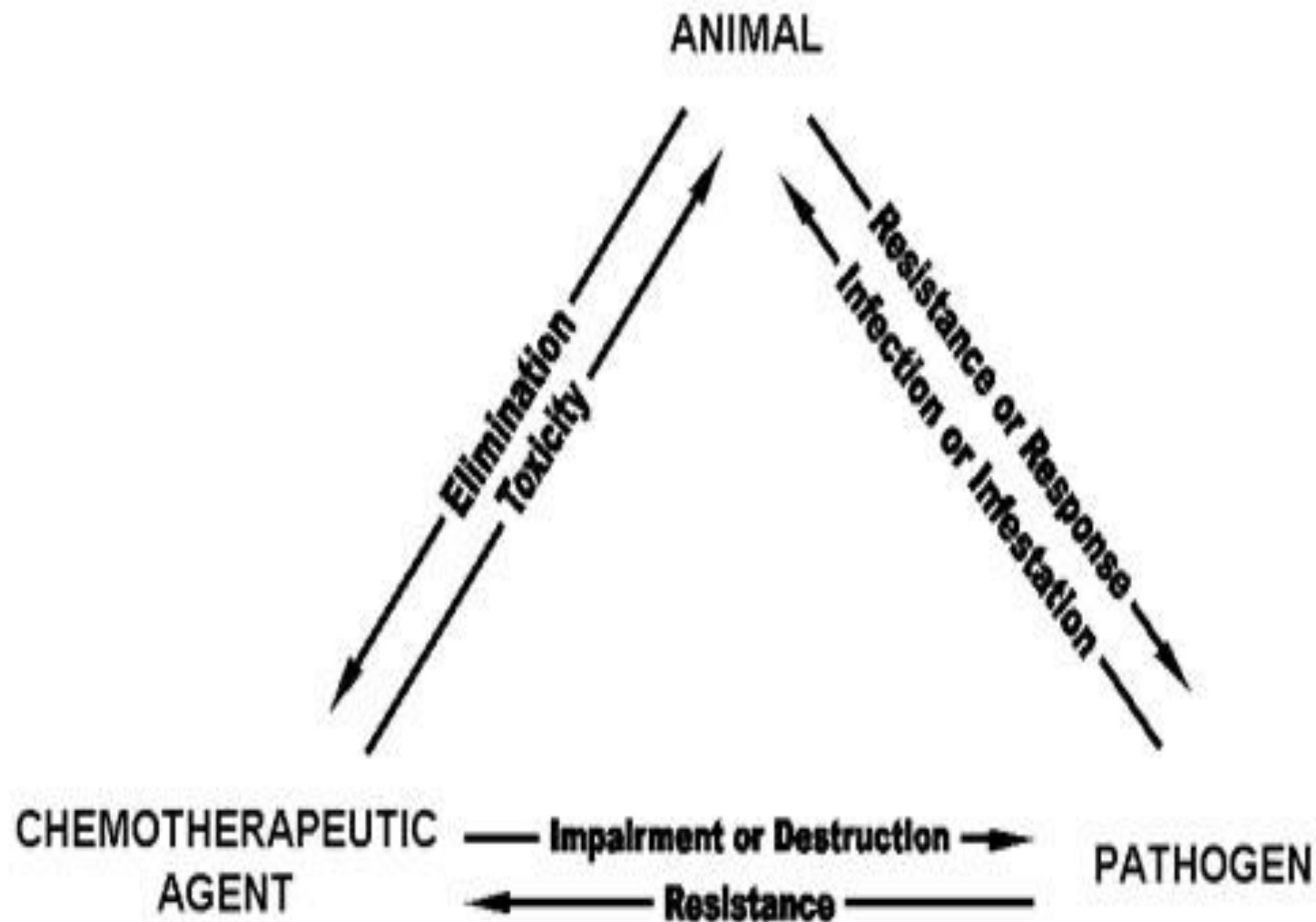


Never inject the rear. Don't Over Dose
Avoid I.M. injections if possible
Select sub-Q products when possible



Epidemiology





Anterior Mesenteric Artery

St. vulgaris larvae (Large strongyles)

Ectoparasites

(may transmit diseases such as EIA, EEE, WEE, West Nile virus)

Ticks (Lyme disease)

Mites, Lice, Flies and Mosquitos

Eye

Thelazia (eyeworm)

Lungs

Parascaris equium larvae

Dictyocaulus arnfieldi

Rectum

Oxyuris equi (pinworms)

Small Intestine

Strongyloides westeri (threadworm)

Anoplocephala (tapeworm)

Parascaris equorum (roundworm)

Liver

St edentatus larva

Fasciola hepatica

Stomach

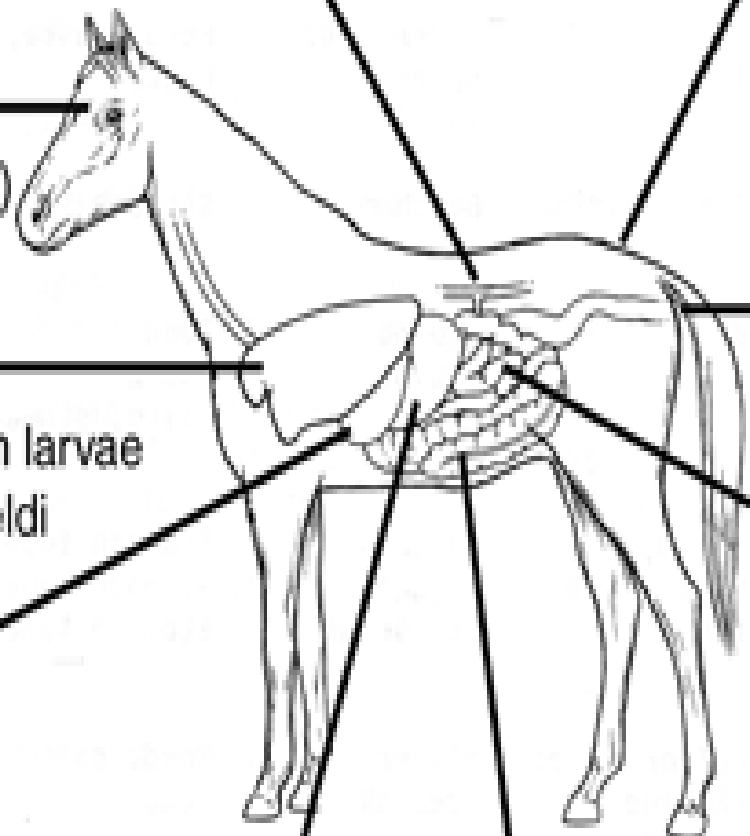
Habronema spp

(stomach worm)

Caecum & Colon

St. vulgaris, edentatus, equinus (Large strongyles)

Small Strongyles





















Parasites of Concern



Fasciola hepatica (Common Liver Fluke)

- Live in the bile ducts of the liver, and gallbladder
- Animals experience anemia and decreased growth
- Usually results in condemnation of the liver at slaughter



Bunostomum phlebotomum (Cattle Hookworm)

- Causes itching of the leg and feet
- Irritate stomach and intestines
- Feed on blood in the intestinal wall
- Causes bloody, tar colored diarrhea



Strongyloides papillosus (Intestinal threadworm)

- Most common in young calves
- Causes intermittent diarrhea, loss of appetite, and weight



Whole worm

Cooperia spp (Cattle Bankrupt worm)

- Lives in the Small Intestine
- Animals exhibit poor utilization of feed, taking a long time to reach market weight



Ostertagia ostertagia (Brown Stomach Worm)

- Affected cattle not only lose weight but often die
- Cells damaged by the parasite are replaced by rapidly dividing cells that lack function
- The most commonly found and economically important internal parasite



Toxocara vitulorum (Large Roundworm)

- Live in the Small Intestine
- Found especially in warm climates
- can travel through the lung and cause pneumonia
- Compete with host for food , causing diarrhea and weight loss

Tapeworms



Lungworms



Liver flukes



Our Enemies: Major Internal Parasites

- Haemonchus contortus
- Nematodes (round worms)
- Cestodes (tapeworms)
- Trematodes (flukes)



Risk Factors for Parasites

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

Which product should I use









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 - Easy to administer
 - Cost effective



Fasciola hepatica



(by P.W. Pappas and S.M. Wardrop)



Age of fluke (weeks)

Flukicide

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Albendazole

50 - 70%

80 - 99%

Oxyclozanide

Nitroxynil

50 - 90%

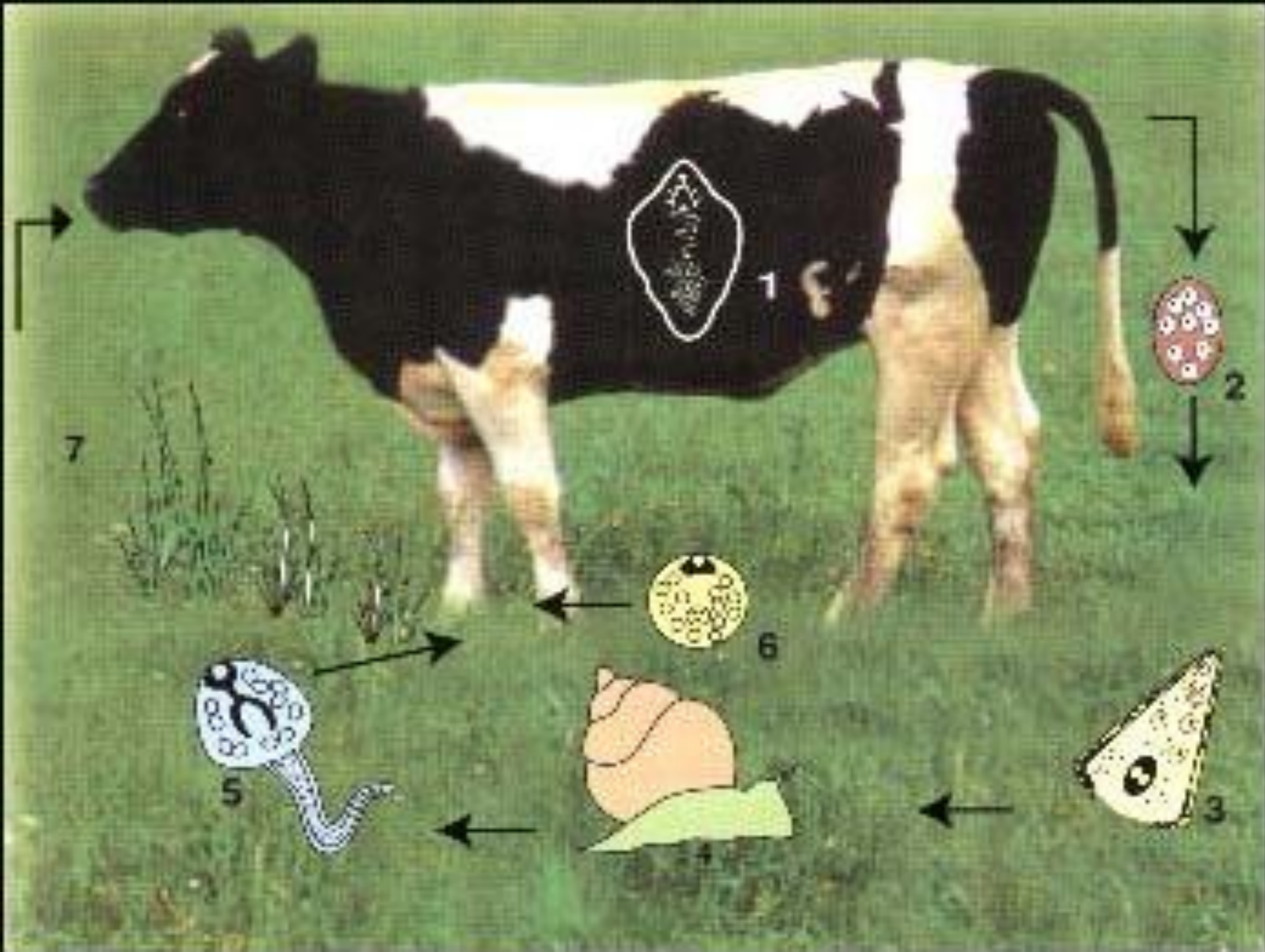
91 - 99%

Closantel

Triclabendazole (TCB)

90 - 99%

99 - 99.9%



کیورافلوک

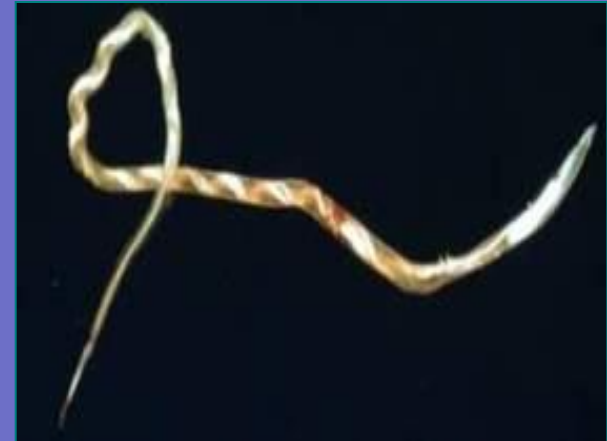


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Gastro-intestinal parasites

#1 health problem affecting small ruminants

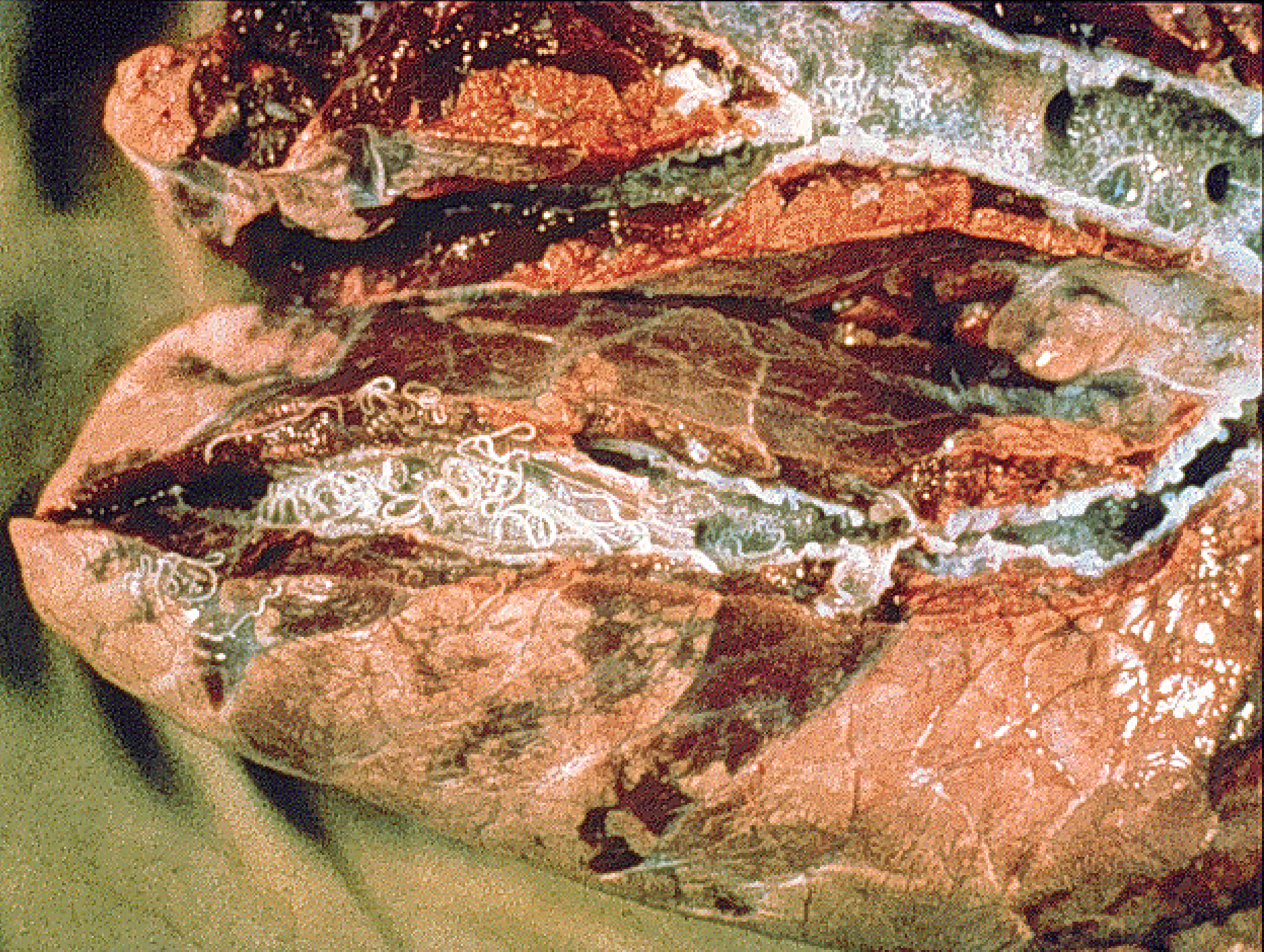
- ✓ Round worms
 - ✓ Barber pole worm
 - *Ostertagia*
 - *Trichostrongyles*
- Lungworms
- Tapeworms
- Liver flukes
- Meningeal (deer) worm
- ✓ Coccidia









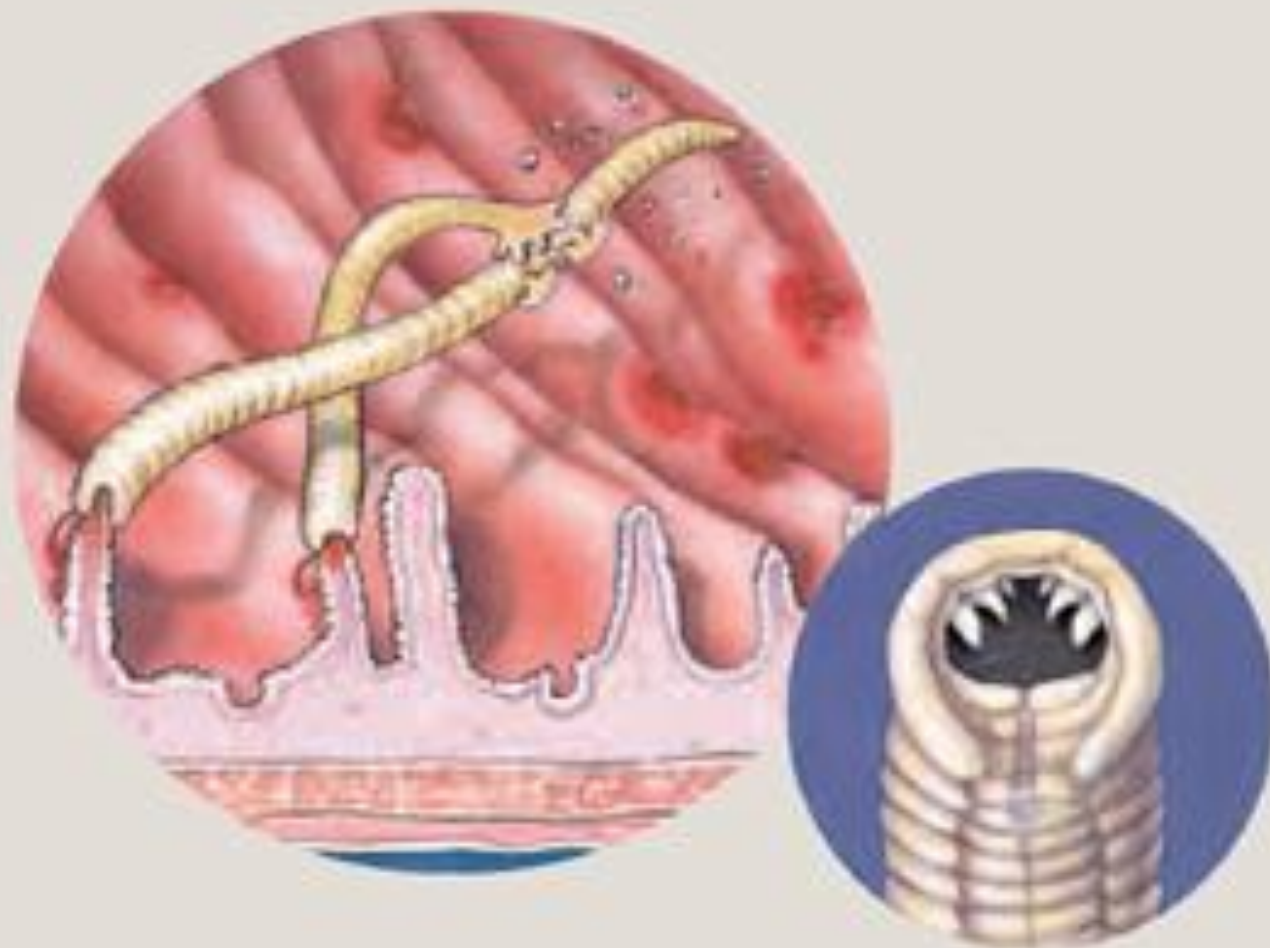


کیورازول ۱۰%



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ANCYLOSTOMA CANINUM

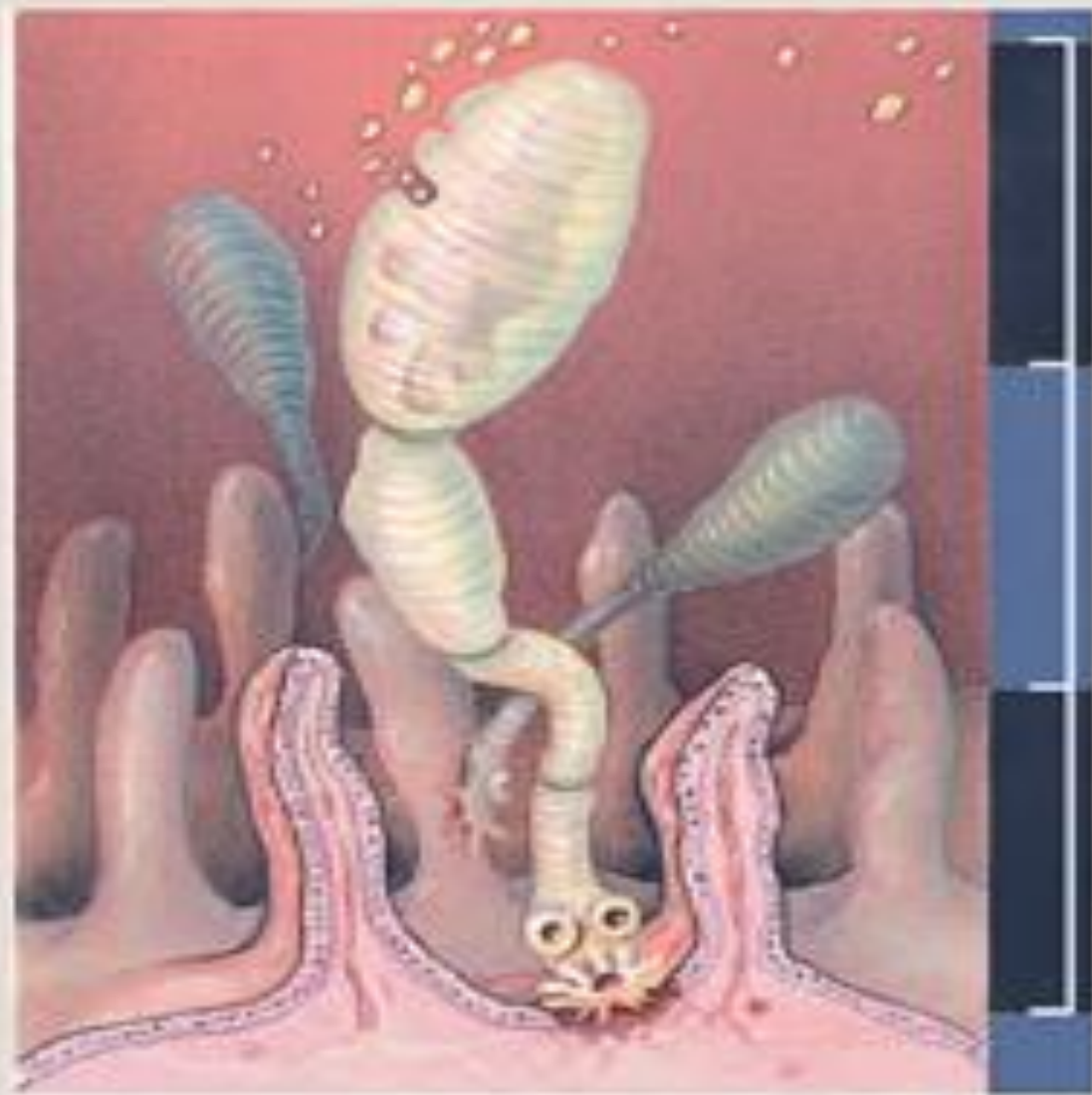


Worms use their sharp teeth to bite and chew the pet's stomach and intestines. The biting causes blood loss, weakness and sores in stomach and intestine. Severe blood loss may be fatal, especially in young animals.

TRICHURIS VULPIS



FAMILY TAENIIDAE

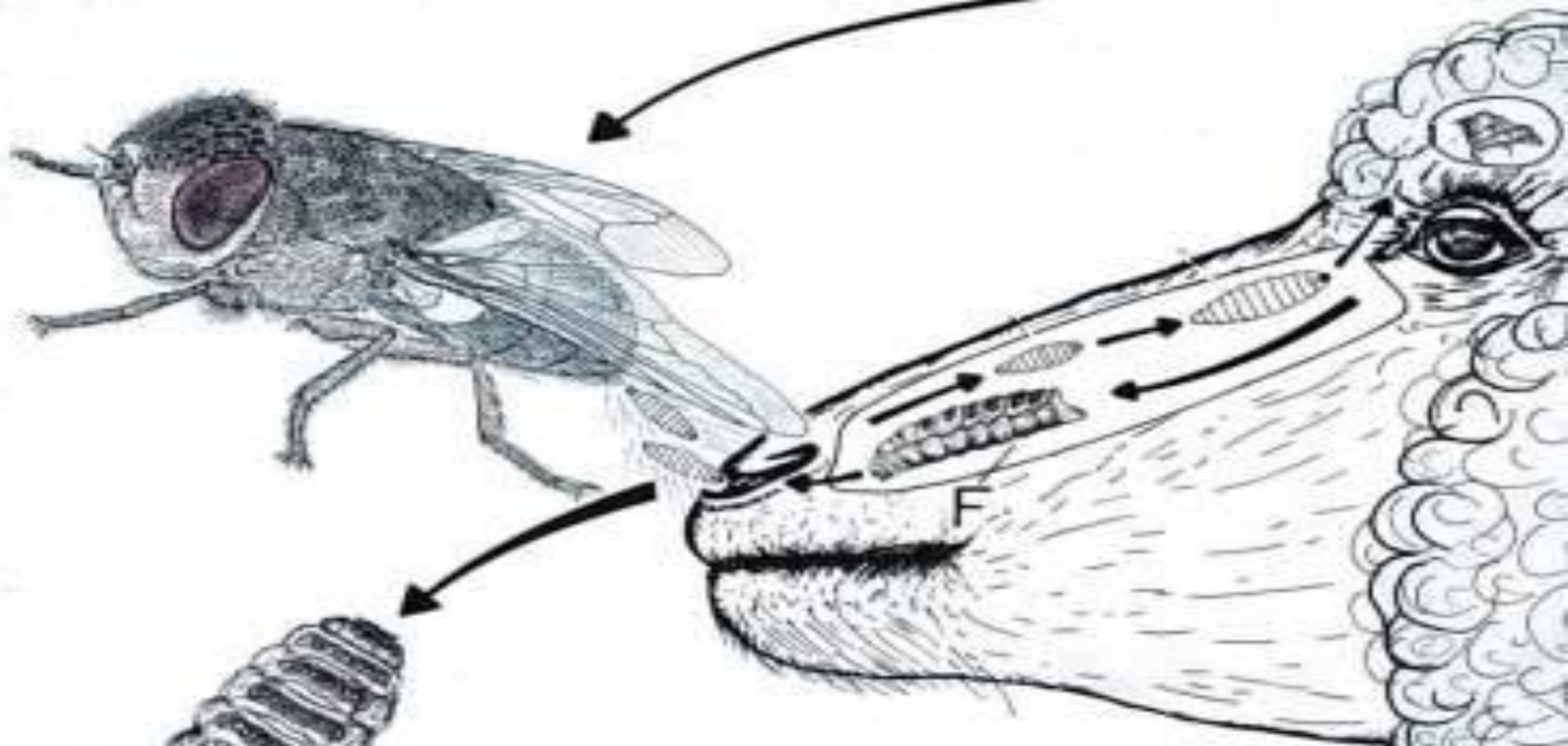


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کیورازول ۱۰%



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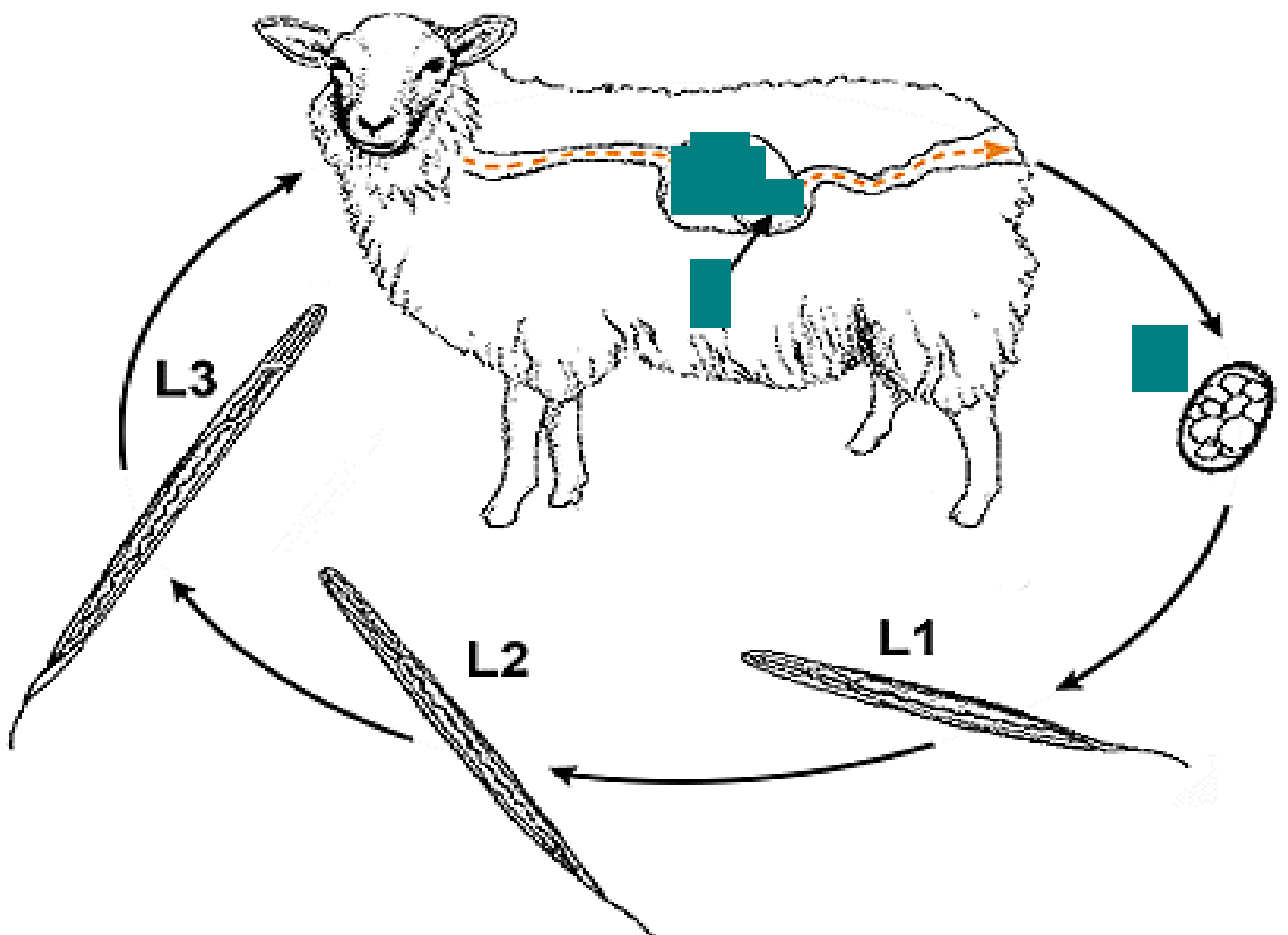


Flystrike

Myiasis







کیورازول ۱۰%



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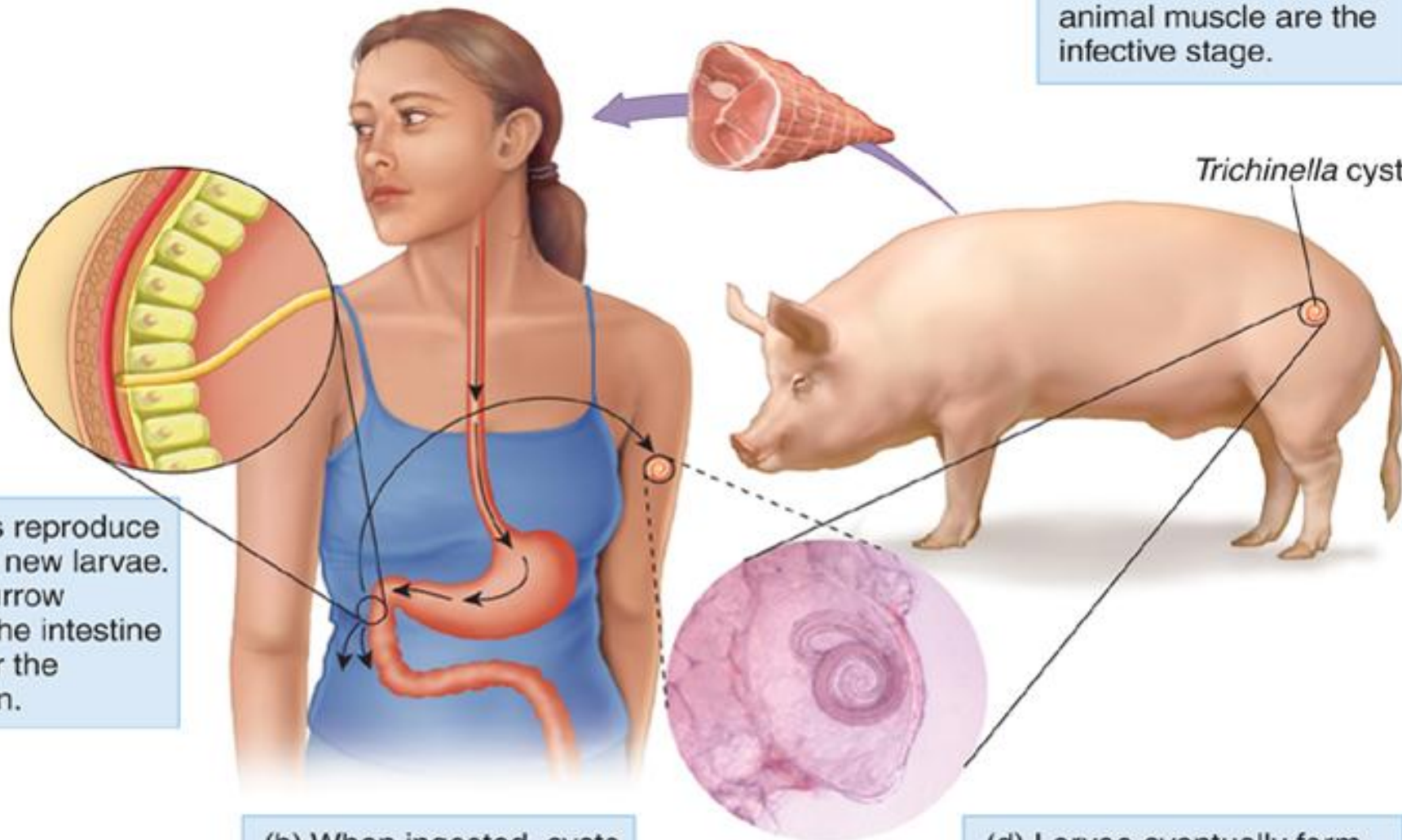
- L3 larvae caught in a dew droplet on a stem of grass

کیورازول ۱۰%



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(a) Larvae encysted in animal muscle are the infective stage.



Trichinella cyst

(c) Adults reproduce and form new larvae. These burrow through the intestine and enter the circulation.

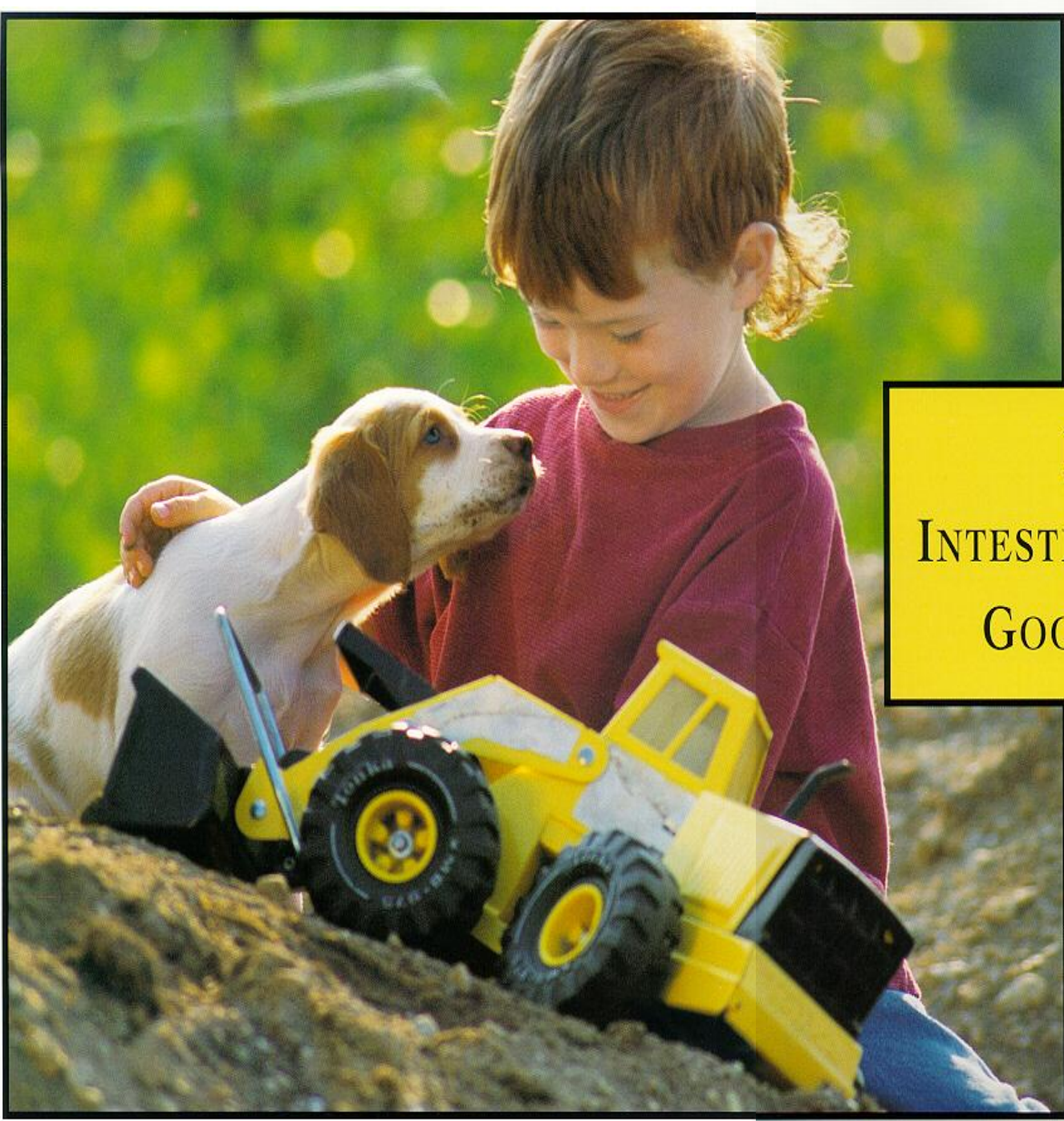
(b) When ingested, cysts hatch and mature in the intestinal lining.

(d) Larvae eventually form cysts in skeletal muscle that can remain for years. Circle shows a biopsy of human skeletal muscle infected with the coiled larvae of *Trichinella spiralis*.

کیورازول ۱۰%



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**DOGS AND CATS
SHOULD BE DEWORMED
REGULARLY TO
REDUCE THE RISK OF
INFECTIONS FROM
PETS TO PEOPLE,**

**DON'T LET
INTESTINAL WORMS RUIN
GOOD CLEAN FUN.**

**ACCORDING TO THE
CENTERS FOR
DISEASE CONTROL AND
PREVENTION (CDC).**

Ask your Veterinarian to deworm your pet!

**STRATEGIC DEWORMING.
REDUCING THE RISK.**





TAPEWORM LIFE CYCLE



APPLICABLE LARVAE

Dronal/Dronal Plus
Anthelmintic Anthelmintic
Anthelmintic Anthelmintic

Effectiveness
in treating
tapeworms



and the effectiveness
of the product



Tapeworms are
found in
the intestines

Tapeworms
are found
in the
intestines



www.bayer.com

کیورازول ۱۰%



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کیورازول ۱۰%



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Our Weaknesses is Poor Management

- Poor nutrition:
 - Can't fight parasite infestation without any energy
- We haven't been culling
 - Get rid of the goats that harbor worms
 - Some are genetically more prone to infestations
- We haven't been smart dewormers
 - Manage correctly to decrease deworming

The new guidelines for anthelmintic use and worm control

1. Work out a control strategy with your veterinarian or advisor.
2. Use effective quarantine strategies to prevent the importation of resistant worms in introduced sheep and goats
3. Test for AR on your farm
4. Administer anthelmintics effectively
5. Use anthelmintics only when necessary
6. Select the appropriate anthelmintic for the task
7. Adopt strategies to preserve susceptible worms on the farm
8. Reduce dependence on anthelmintics



Thank
You!

*To Dr. Mahmoud Abdalla and all
members of A&LM family*



Questions, comments











اکوپریم



AQUAPRIM

پینٹو مایسین



PENTOMYCIN

ترايوكسيل



TRIOXYL L,A

Controlling Internal Parasites:

- The key to parasite control is to break the life cycle of the parasite. This is accomplished through good management practices and deworming at strategic intervals.
- Some of the more common deworming strategies are: Pre-lambing treatment, prophylactic treatment in the spring, and the treat-and-move strategy. Each of these strategies has different guidelines and goals.
- Pre-lambing treatment calls for treating bred ewes 2 to 4 weeks before lambing. They should be wormed on a drylot so they do not infest their pastures. A wormer that is commonly used for this is levamisole, because it is effective against worms in hypobiosis and it will prevent their further maturity.
- The prophylactic treatment in the spring refers to treating sheep every 2 to 3 weeks

ترايوكسيل



TRIOXYL L,A







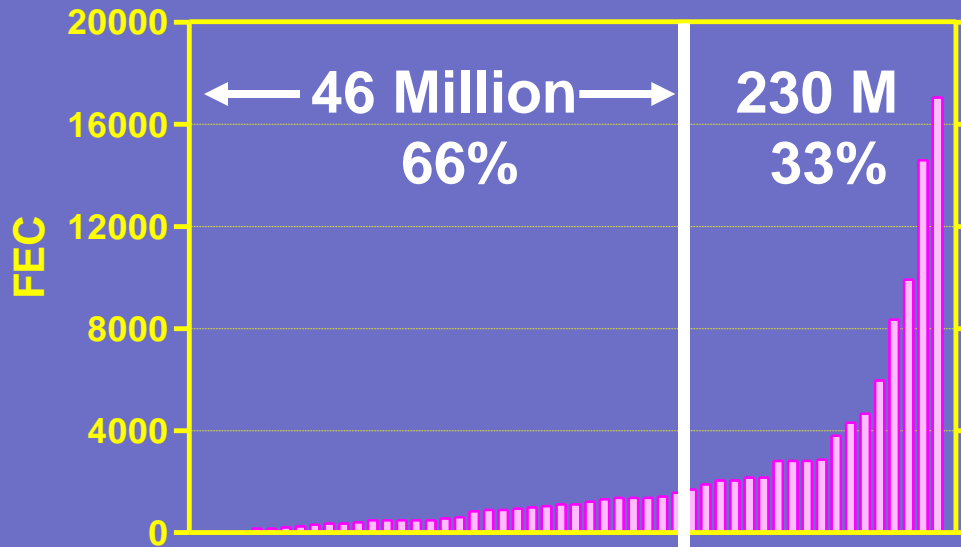
Planning a Parasite Control Program

- 6. Deworm new animals coming on your place with 2 classes of dewormer
- 7. Notice eye mucous membrane color when you check animals
- 8. Use good nutrition

Control strategies and principals

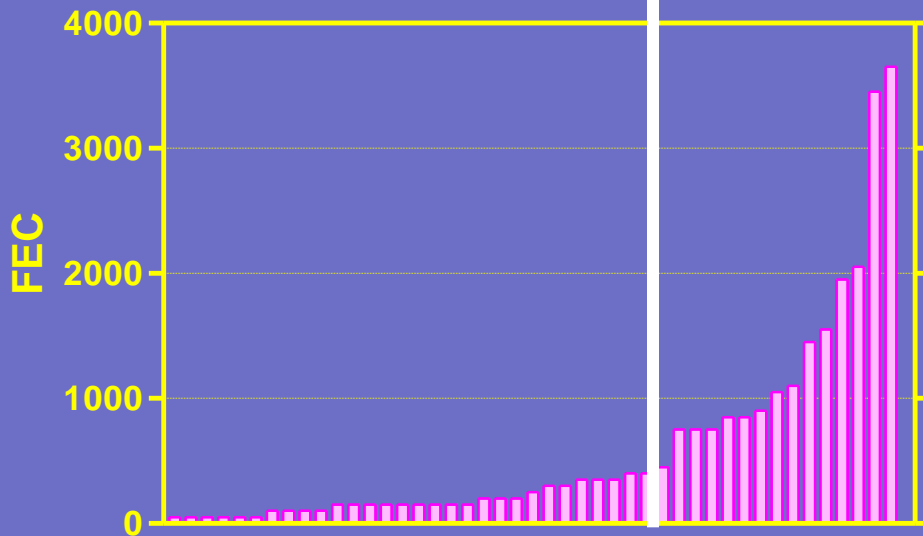
- Deworming is most beneficial in neonates
- Pastures are less contaminated in early spring and mid-summer
- Strategic deworming will limit pasture contamination
- Spring deworming limits pasture contamination
- Pasture rotation will limit exposure to parasite ova

Distribution of FEC in Goat Herds



Treating high 33%
Greatly Reduces
Daily Pasture
Contamination With
Eggs

33% of Goats
80% of Eggs

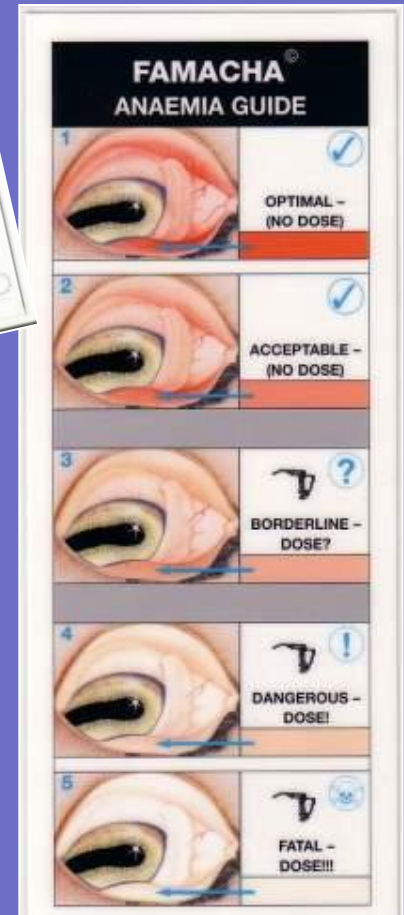
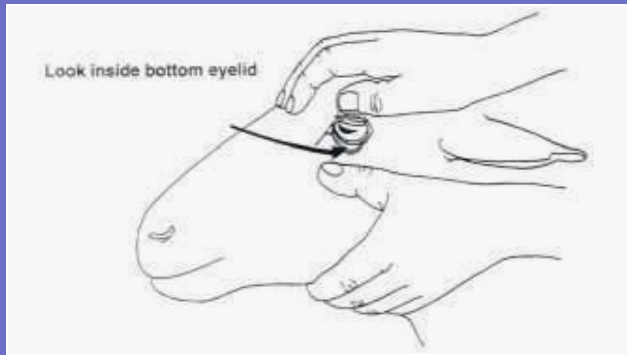


Individual Goats

Over 1 Month:
Pasture
Contamination
Reduced By:
5.7 Billion Eggs

A System

for assessing anemia and barber pole worm infection in small ruminants



Clinical Category	Color	PCV	Deworm?
1	Red	≥ 28	No
2	Red-Pink	23-27	No
3	Pink	18-22	?
4	Pink-White	13-17	Yes
5	White	≤ 12	Yes

sheep ↑

↑ goats

Selective Treatment Protocol

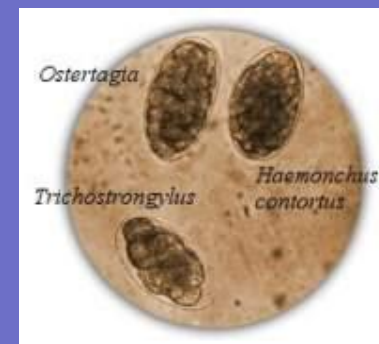
- Examine each goat individually every 3 weeks during the warm season.
- Use eye color chart to determine those that are anemic and need dewormed.
- Deworm and record the animal's number.

Concept for Selective Treatment

- All animals do not carry the same worm burden. Some animals are more resistant to worms than others. We should deworm only those animals that need it. The animals that didn't get dewormed will have susceptible worms to dilute the resistant worms of the animals that were dewormed.

~~Deworming~~ Parasite Control Program

- Good management
- Pasture rest/rotation
- Alternative forages
- Zero grazing
- Mixed species grazing
- Genetic selection
 - between and within breeds
- Fecal egg counts
 - Monitor pasture contamination
 - Test for drug resistance
- ✓ Selective deworming



~~Deworming program~~ ~~Integrated Parasite Management~~ (IPM)

- Do not overstock pastures and pens.
- Don't overgraze.
- Rest pastures sufficiently.
- Enable browsing.
- Practice selective deworming, not prophylactic deworming.
- Administer drugs properly.
- Determine which drugs work on your farm.
- Select goats which are more resistant to internal parasites.
- Practice good sanitation.
- Use coccidiostats.



Planning a Parasite Control Program

- 1. Monitor parasite problems with fecal egg counts or eye scores
- 2. When you have a parasite problem determine why and change parts of management that you can
- 3. Only use dewormer when necessary
- 4. Deworm only animals that need it
- 5. Cull wormy animals

NICLOSAMIDE

a second choice drug to praziquantel for the treatment of most tapeworm infection including *T. solium* infection

inhibit oxidative phosphorylation and stimulate the activity of ATPase

side effects- the drug may expose the patients to the risk of cysticercosis