MISSISSIPPI STATE UNIVERSITY
EXTENSION

Extending knowledge. Changing lives.

FAMACHA©

For the Control of *Barber Pole Worm (Haemonchus contortus)* in Small Ruminants

Statewide Training for Small Ruminant Producers

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MISSISSIPPI STATE UNIVERSITY
EXTENSION

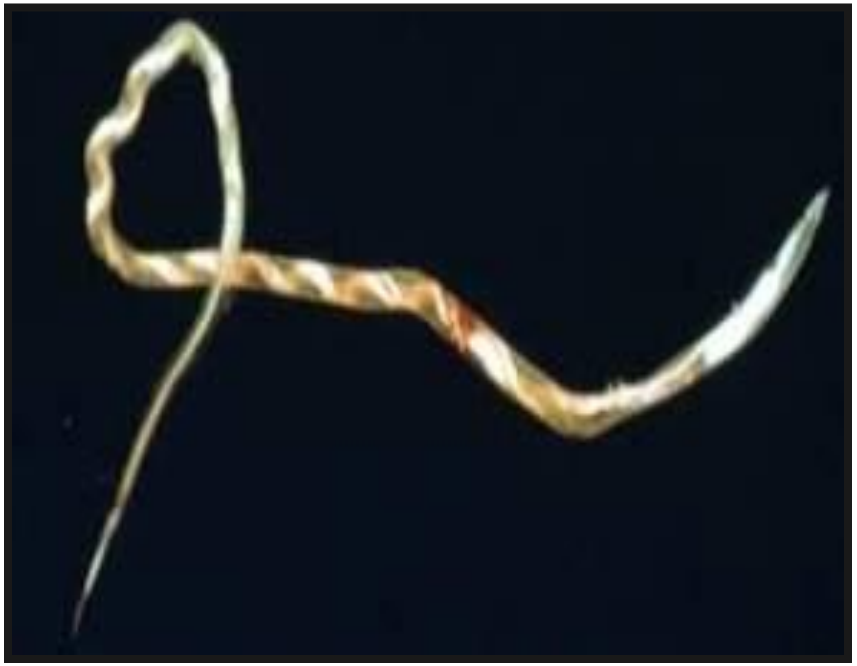
SARE
Sustainable Agriculture Research & Education

Control of Internal Parasites

Gastrointestinal parasites (Worms/Nematodes) are the primary health problem affecting sheep and goats in the world

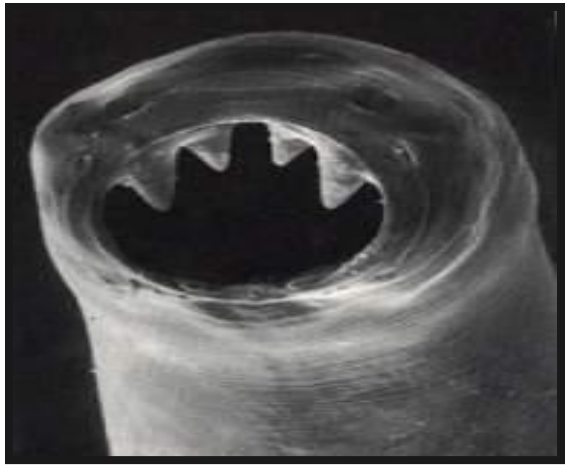
Barber Pole Worm

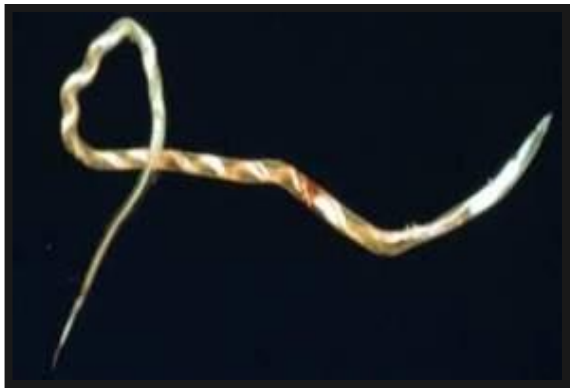
The Barber Pole Worm is the parasite of primary concern in the U.S.



Haemonchus contortus

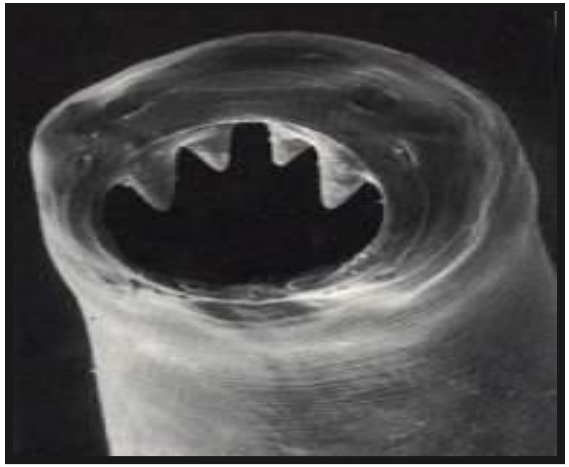
- Common names: barber pole, wire worm, large stomach worm.
- Blood-sucking roundworm that pierces the mucosa of the abomasum, causing blood and protein loss to the host.

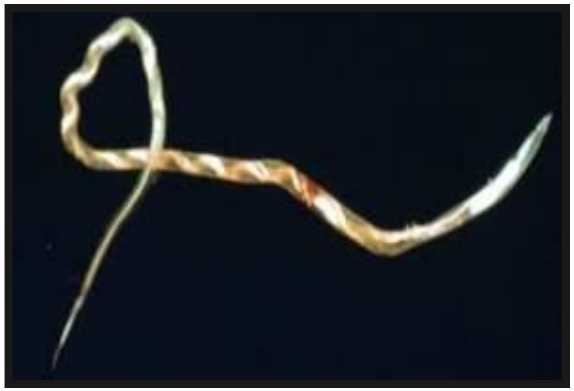




Haemonchus contortus

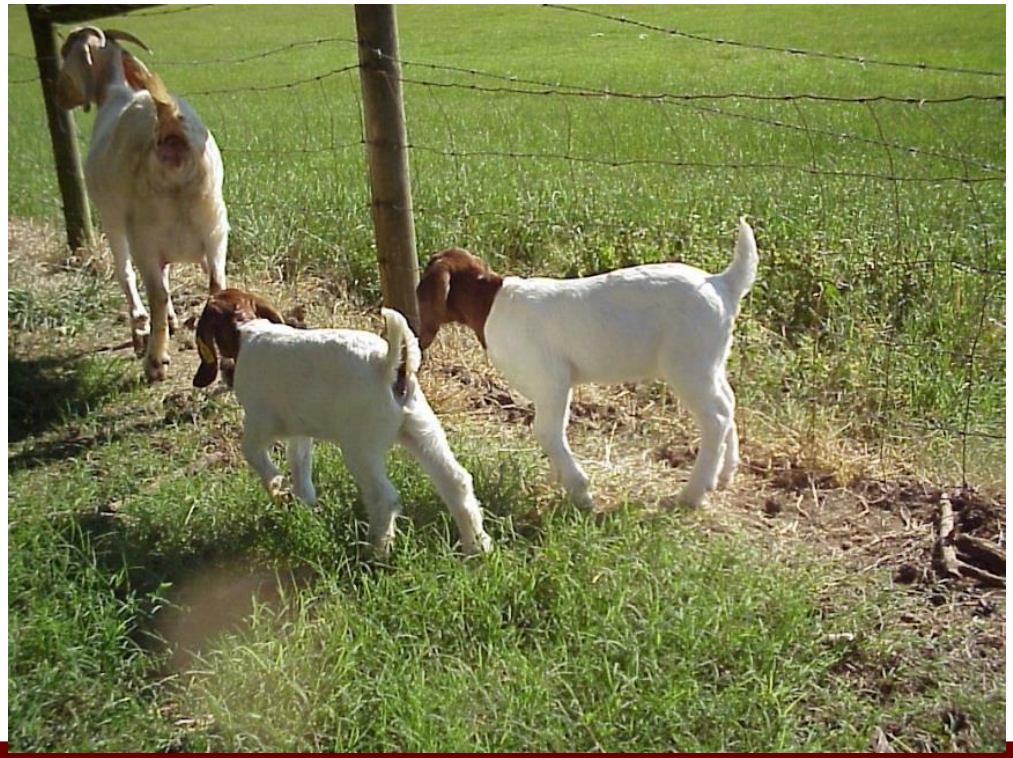
- Requires warm (60°F), moist conditions to complete its life cycle
- Pasture is the primary mode of transmission
  - estimated 80% of worm larvae is located in the first two inches of grazing vegetation.

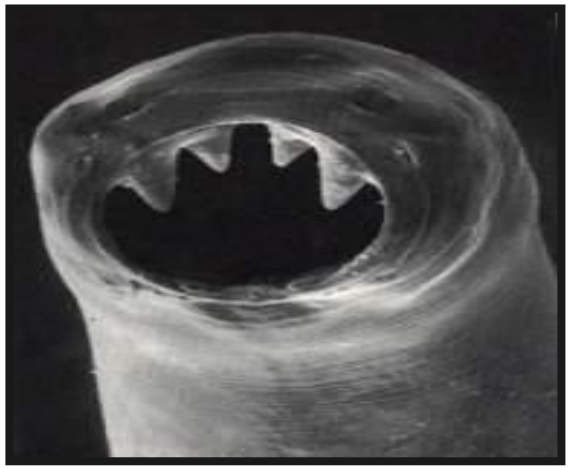


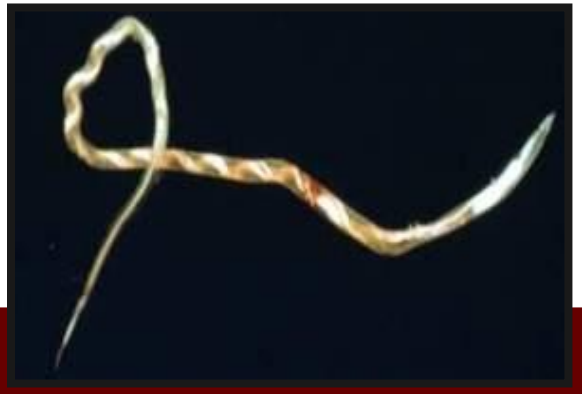


Haemonchus contortus

- Young animals and highly stressed adults are most vulnerable to its effects





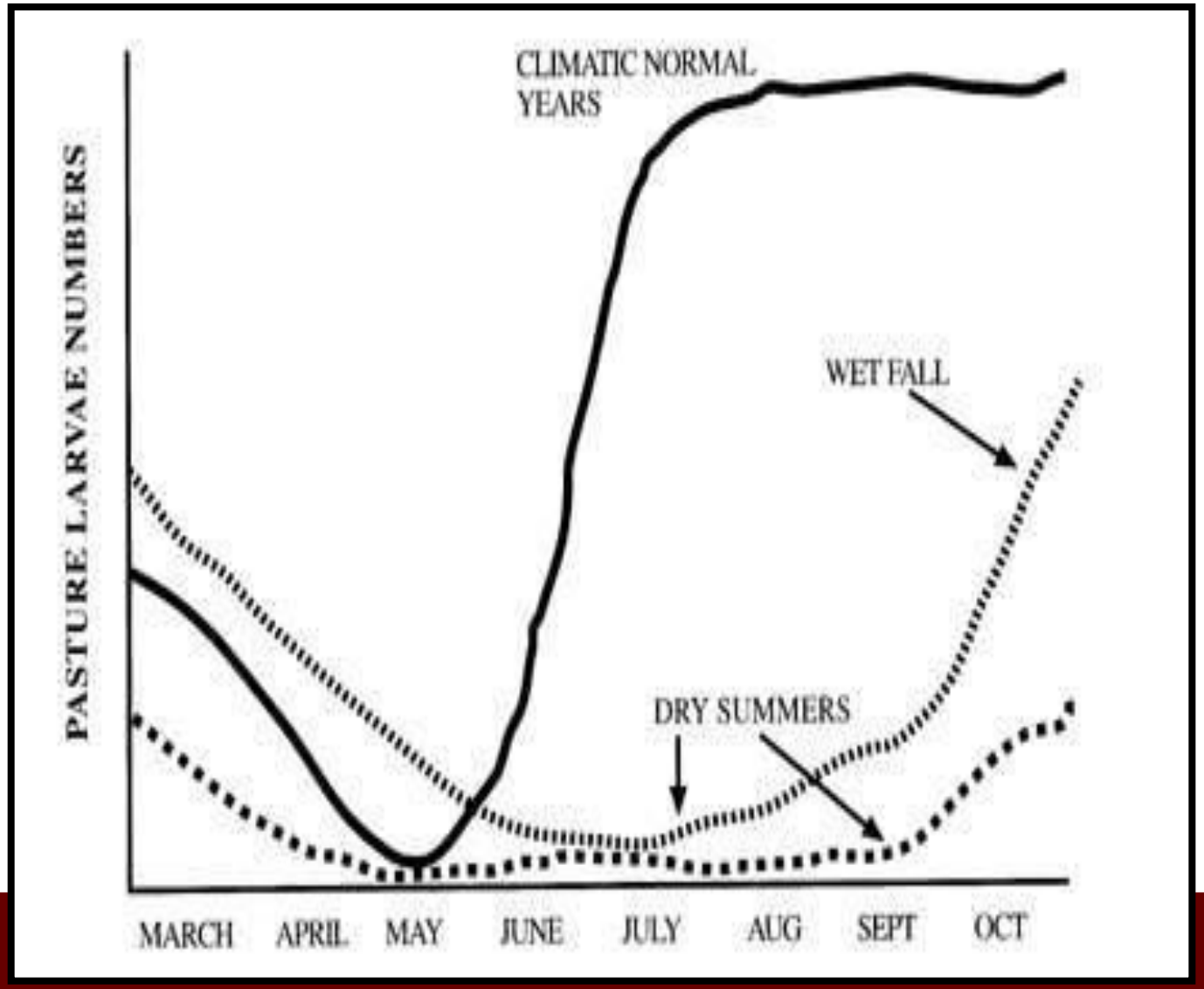


Barber Pole Worm Control

- **Prolific egg producer**
  - Estimated that 30% of the flock is responsible for 70% of the egg output

- **Very adaptable**
  - Can go hypobiotic (arrested state) to survive poor environmental conditions

Barber Pole Worm Count



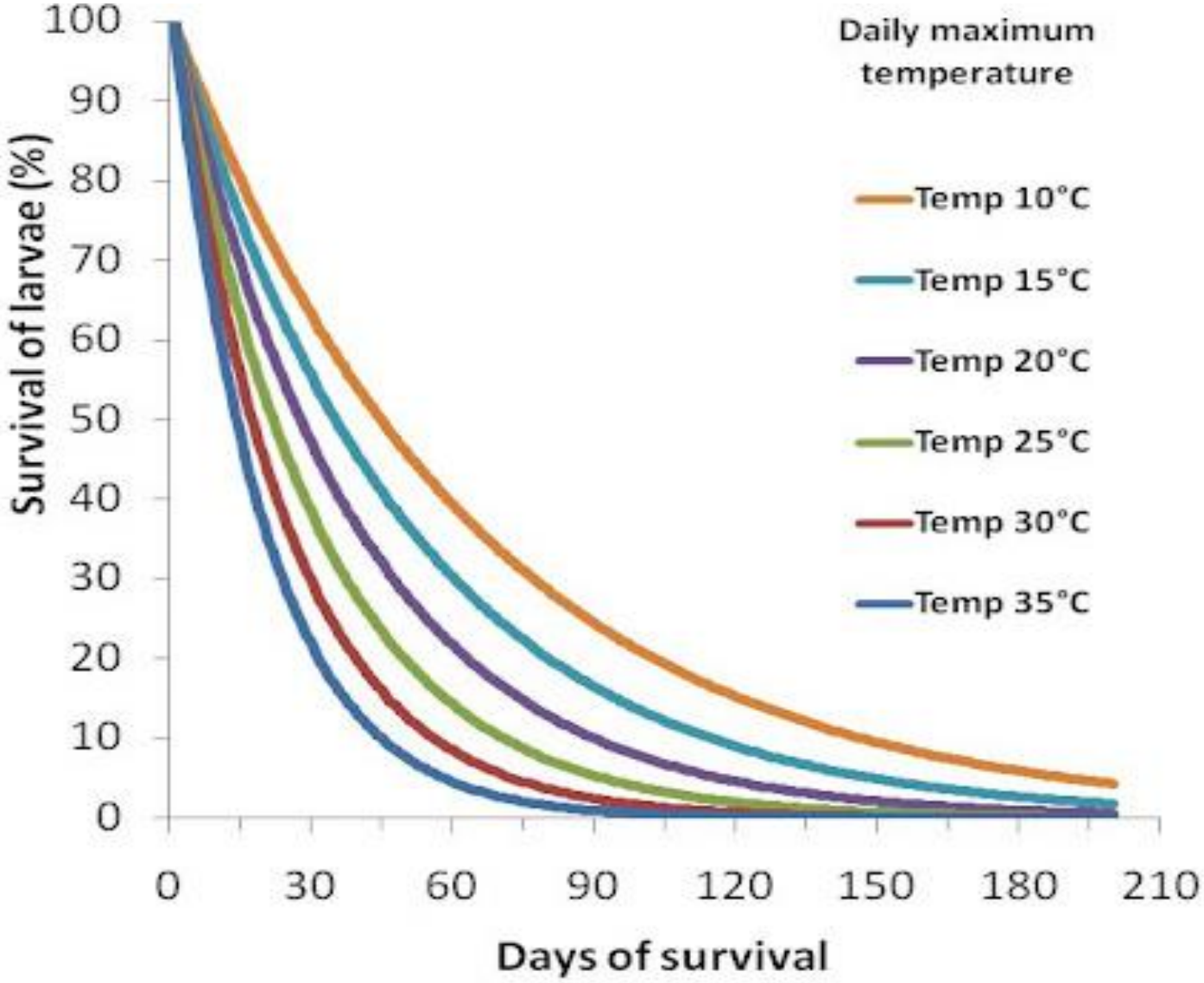
Barber Pole Worm Control

- **Extremely resilient**
  - Can survive on pasture for extended periods
  - 60 days rest needed to reduce pasture contamination to a low level
  - Some larvae WILL survive over winter

Has become resistant to most anthelmintics

THE PROBLEM TODAY!

Survival of barber's pole worm ineffective larvae on pasture at various daily maximum temperatures and 60% relative humidity



https://u.osu.edu/sheep/2020/02/18/larval-survival-of-barbers-pole-worm/

Symptoms of Barber Pole Worm Infection…

- Death
- Loss of Body Condition
- Anemia (pale mucous membranes)
- Edema – “bottle jaw” accumulation of fluid under jaw

What is FAMACHA???

- Novel system used to monitor barber pole worm infection in small ruminants
- Developed in South Africa due to the widespread emergence of drug resistant worms
- Originally for South African sheep, but has been validated for sheep and goats in the United States

What is FAMACHA???

- An eye chart for evaluating clinical anemia
  - Anemia is the primary symptom of infection
- FAMACHA© enables selective deworming of clinically parasitized animals, while leaving healthy animals untreated

What is FAMACHA©?

Technique

DO: Use proper FAMACHA© scoring technique to expose the lower eye mucous membranes and match them to the equivalent color on the chart.

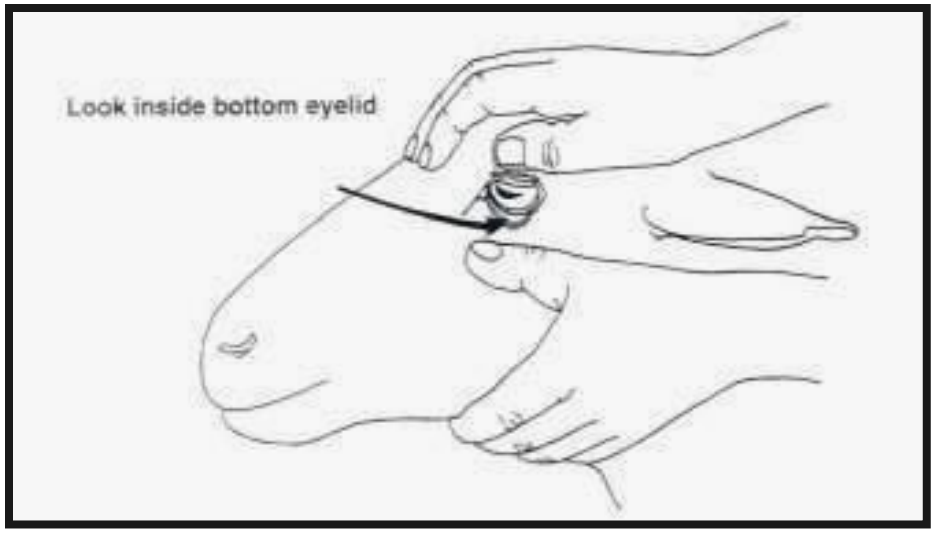
4-steps technique:

1.COVER the eye by rolling the upper eyelid down over the eyeball.
2.PUSH down on the eyeball. An easy way to tell if you are using enough pressure is that you should see that the eyelashes of the upper eyelid are curling up over your thumb.
3.PULL down the lower eyelid.
4.POP! The mucous membranes will pop into view. Make sure that you do not score the inner surface of the lower eyelid, but rather score the bed of mucous membranes.

ACSRPC Webpage: https://www.wormx.info/dosdonts

https://www.google.com/search?q=famacha+technique&rlz=1C1GCEA_enUS936US936&oq=famacha+technique&aqs=chrome..69i57.4399j0j7&sourceid=chrome&ie=UTF-8#kpvalbx=_tlBiYZH8AoWMxc8P26GY6AU18

What is FAMACHA???



Clinical Category	Color	Deworming recommendation
1	Red	No
2	Red-Pink	No
3	Pink	?
4	Pink-White	Yes
5	White	Yes

What FAMACHA does…

- Reduce the number of animals treated (though some may require treatment more often)
- Reduces drug use
  - Saves money on drugs
- Reduces selection for resistant worms, by increasing refugia: (worms not exposed to drugs)

Prolongs effectiveness of anthelmintics

What FAMACHA does…

- Identifies susceptible and resistant animals *(parasite resistance is moderately heritable)*
- Assists with selection and culling decisions
- Adds value to breeding stock

What FAMACHA will not do...

1) Eliminate the need for other parasite control methods
2) Save you time
   - You may deworm less frequently, but you'll spend more time checking your animals
3) Identify other potential parasite problems
   - Other GI worms
   - Coccidia, etc.

How to make FAMACHA work

- Always use the card
- **Do not** use a copy of the card
- Keep card in location where it will not fade
- Check flock often (every 2-3 weeks during the “worm” season)
- Have an easy way to handle your animals

FAMACHA© is not a magic bullet used to solve all problems.

It is another tool to use in a small ruminant management program.

Strategic Parasite Control

- Prevention is the best method for controlling parasites
- Successful parasite control means reducing or eliminating environmental contamination:

Strategic Parasite Control

Includes several key goals:

1) Animals being as free as possible of parasites during periods of low or reduced nutrition, i.e. wintertime
2) Females should be free of parasites at kidding/lambing
3) Eliminate recontamination of spring pastures for the first three months of the grazing season

Integrated Parasite Management (IPM)

- ❑ Pasture rest/rotation
- ❑ Safe pastures
- ❑ Multi-species grazing
- ❑ Grazing height management
- ❑ Alternative forages/treatments
- ❑ Nutritional supplementation
- ❑ Zero grazing
- ❑ Fecal egg analysis
- ❑ Proper anthelmintic use
- ❑ ***Selective Deworming***

Classes of Dewormers

Three general classes of dewormers: Benzimidazoles, Levamisoles and Macrocyclic Lactones

Classes of Dewormers

I-Benzimidazole - Fenbendazole (Safeguard, Panacur) and Albendazole (Valbazen)

II-Levamisole - Levisol, Tramisol and Morantel Tartrate (Rumatel)

III-Macrocyclic Lactones - Ivermectin (Ivomec) and Moxidectin (Cydectin)

Extra-label Drug Use

- Only Fenbendazole, Albendazole and Morantel Tartrate are approved for use in small ruminants
- Others (macrocyclic lactones) have been used as extra-label

Must be prescribed by a veterinarian working under a Veterinary/Client/Patient Relationship (VCPR).

Resistance

- Major problem with controlling parasitism in small ruminants is genetic resistance
- Due to:
  - Rotational deworming (frequency)
  - Underdosing

Increases the selection of resistant worms in animals which results in a population of "superworms" that can not be controlled with drugs

Resistance

Genetically controlled; once established in the population, those drugs can no longer be used effectively.

Only change dewormers when one does not work, then change between classes of dewormers.

New research has Indicated use of two products at once may be more effective

Resistance to Anthelmintics

Parasites have become resistant to most anthelmintics.

70% of parasite infection comes from 30% of the flock.

Identify resistant genetics in your flock! Cull parasite carriers!

Resistance to Anthelmintics

Resistance occurs when anthelmintic treatment fails to reduce worm egg counts by 90%.

Severe resistance exists when anthelmintic reduces egg count by less than 60%

Only 3 drug families!

- **Benzimidazoles**
- **Levamisoles**
- **Macrocyclic Lactones**

Combination Deworming….

New research indicates that use of two different groups of dewormers at the same time can increase the effectiveness of both and eliminate more resistant parasites as a result.

Use of Two Dewormers….

If two drugs each with 90% efficacy are used in rotation, then each time animals are treated, 10% of the worms survive (the resistant ones).

In contrast, if these same two drugs are used in combination at the same time, then the efficacy increases to 99%.

Administration of Dewormers

- Oral administration is preferred;
  - important to make sure the product is delivered over the base of the tongue
  - Insures the dose is

    delivered to the rumen;

    subsequently evenly

    throughout the

    gastrointestinal tract

Administration of Dewormers

The other form of oral administration is in feed products.

This does not ensure that all animals will receive an effective Dose;

Individual animals utilize these products differently

Other Parasites…

Lungworms- Difficult to detect in live animal

Coccidia- *Eimeria* spp. Protozoa, major disease issue in small ruminants

Meningeal worm- Parasite of white tail deer, causes neurological symptoms

The FAMACHA© system is not useful for any of these other parasites

Management Considerations…

- Predator Control
- Fencing
- Shelter
- Parasite Control
- Pasture & Grazing Management

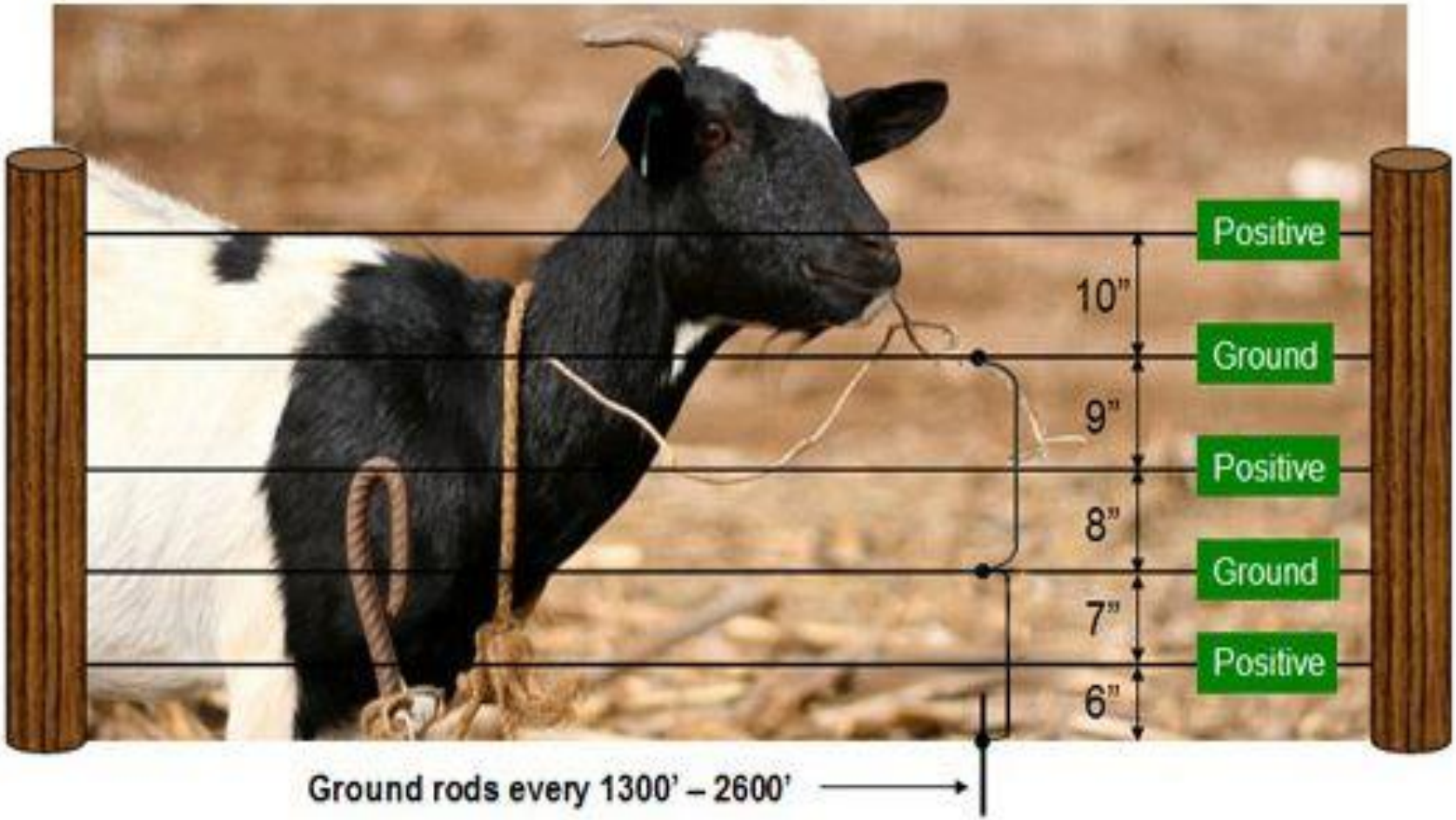
Predator Control…

Guard dog and fencing that is 5 - 8 strand, high tensile energized fence or net wire with wider mesh.

Fencing…

- High Tensile electric/energized
  - 5-8 wire perimeter at least 40”-42” tall, the bottom wire 6”-8” from the ground and 6”-12” spacing between wires
  - 2-6 strand interior
  - Ground rods every 1,300’-2,600’

Fencing…


Positive
10"
Ground
9"
Positive
8"
Ground
7"
Positive
6"
Ground rods every 1300' – 2600'

Fencing…

- Woven Wire

  (Galvanized high tensile is available)

  – 39” tall and at least 1 barbed strand

  – 6”x12” mesh is preferred to minimize horns being caught

  – May run an electric offset wire 12”-15” from the ground to reduce animals getting caught or climbing on fence

Fencing…

Shelter…

Goats and sheep need some type of shelter from rain and other extremes

Grazing & Pasture Management

“Another Tool in Parasite Management”

Grazing Management Objectives…

- Manage forage to meet goat/sheep nutritional needs
- Manage internal parasite levels
- Maintain pasture condition

Utilize Proper Stocking Rates…

Lower stocking rates and higher residuals will generally have less of a parasite build up in the pasture.

How Many Per Acre?

- Stocking rates vary by:
  - Pasture quality
  - Rainfall
  - Forage species
  - Time of year
  - Soil fertility
  - Amount of supplementation
  - Grazing management (continuous, rotational or intensive)

Stocking rate…

6-8 head per acre is a safe stocking rate on well managed pastures for small ruminants

Grazing Preferences…

- Goats
  - Prefer browse over grass
  - Prefer forbs over grass
  - Prefer grass over clover
  - Prefer taller plants
  - Tend to graze perimeter before center of pasture
  - Graze from the top down

Grazing Preferences…

- Sheep
  - Prefer grass over browse
  - Prefer grass over forbs
  - Prefer grass and clover

Grazing Preferences…

Percentage Diet Preference of Sheep and Goats

	Sheep	Goats
Grass	60	20
Weeds	30	20
Browse	10	60

Spring Grazing…

- Keep pastures vegetative
- Rotate frequently to increase the intake of high-quality plants and prevent regrowth from being eaten too soon
- Rest pastures 20-30-days to allow plants time to recover

Summer Grazing…

- Have cool season pastures fully utilized by the end of June, then rest all summer if possible
- Graze warm season grasses such as lespedeza, chicory, etc.

Fall/Winter Grazing…

- Start using cool season pastures
  - By fall pastures will have had 60-90 days of rest from the summer
  - Defer grazing on some pastures to stockpile for winter grazing

Fall/Winter Grazing…

- Allow warm season pastures to rest all winter
- Rotate similar to spring, but stay in each pasture a slightly longer to allow a longer rest period (35-40) days
  - Forage quality will not drop as quickly in the fall
- Utilize stockpiled grasses for winter feeding
  - Strip graze to improve utilization

RESOURCES

WWW.WORMX.INFO

WWW.MSUCARES.COM

AGRICULTURE/LIVESTOCK /GOATS AND SHEEP

A Healthy Animal is a Happy Animal!

Leyla Rios

- **Animal Scientist** (Venezuela)
- **Master Science** (Venezuela)
- **PhD** (Scotland UK)
- **University Professor >20y** (Venezuela)
- **Researcher 5y** (Colombia)
- **Assistant Professor MSSTATE**

My Research lines in the last years have been:

- Use of bioactive forages and plant extracts for sheep and goat parasite control
- Welfare of foraging animals

Sustainable parasite control

vs.

Integrated parasite control

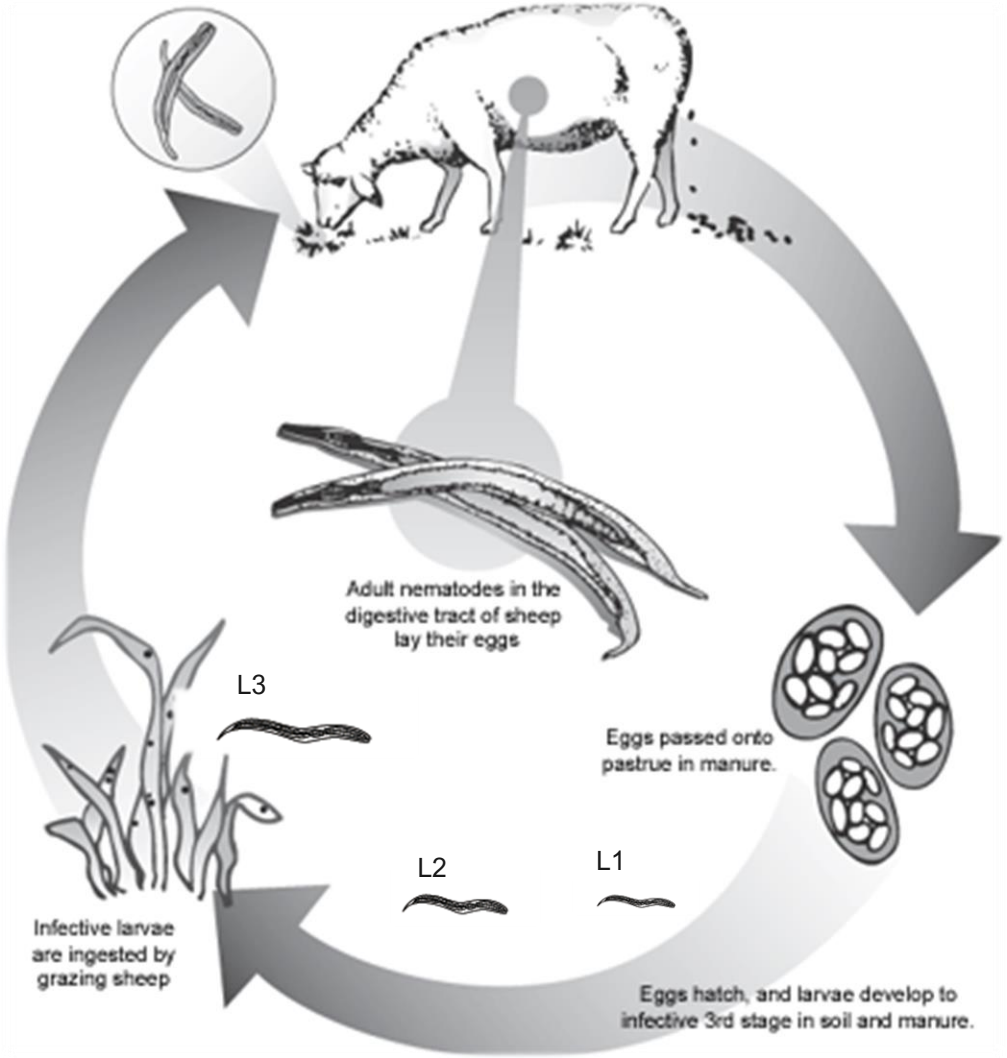
vs.

Targeted selective treatment

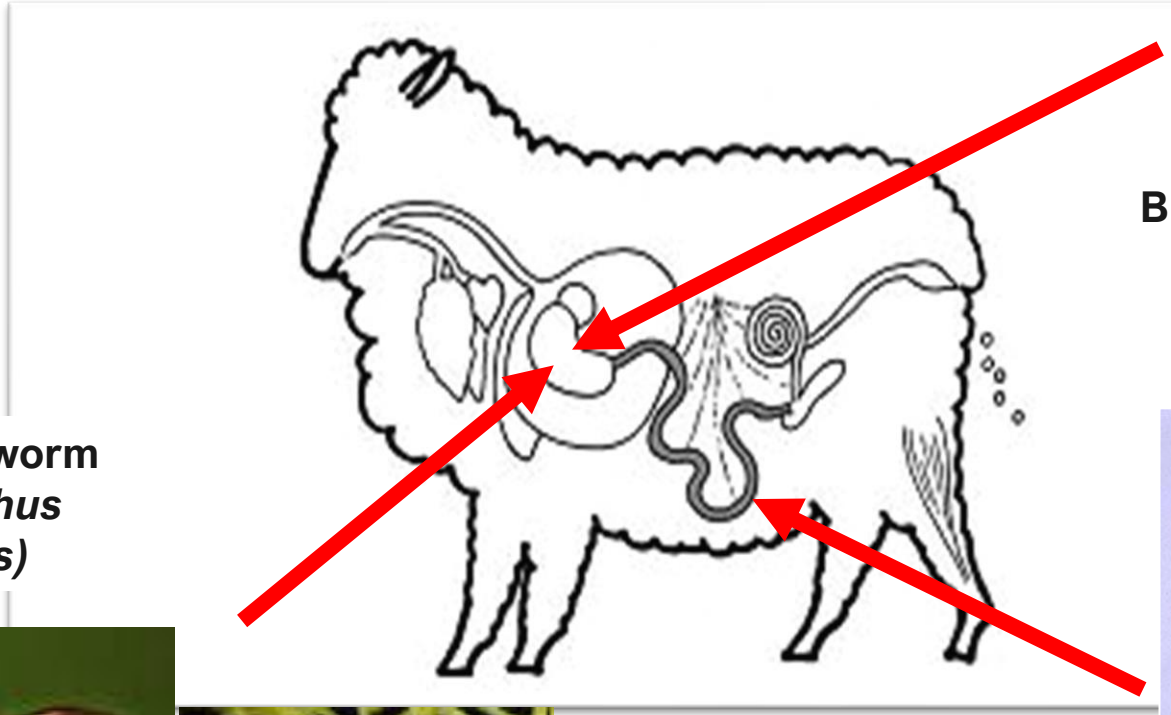
Life Cycle Gastrointestinal Nematodes

Short life cycle. On average 2 to 3 weeks, and as short as 7 days

Has a direct life cycle. No intermediate host is required



Gastrointestinal parasites of small ruminants



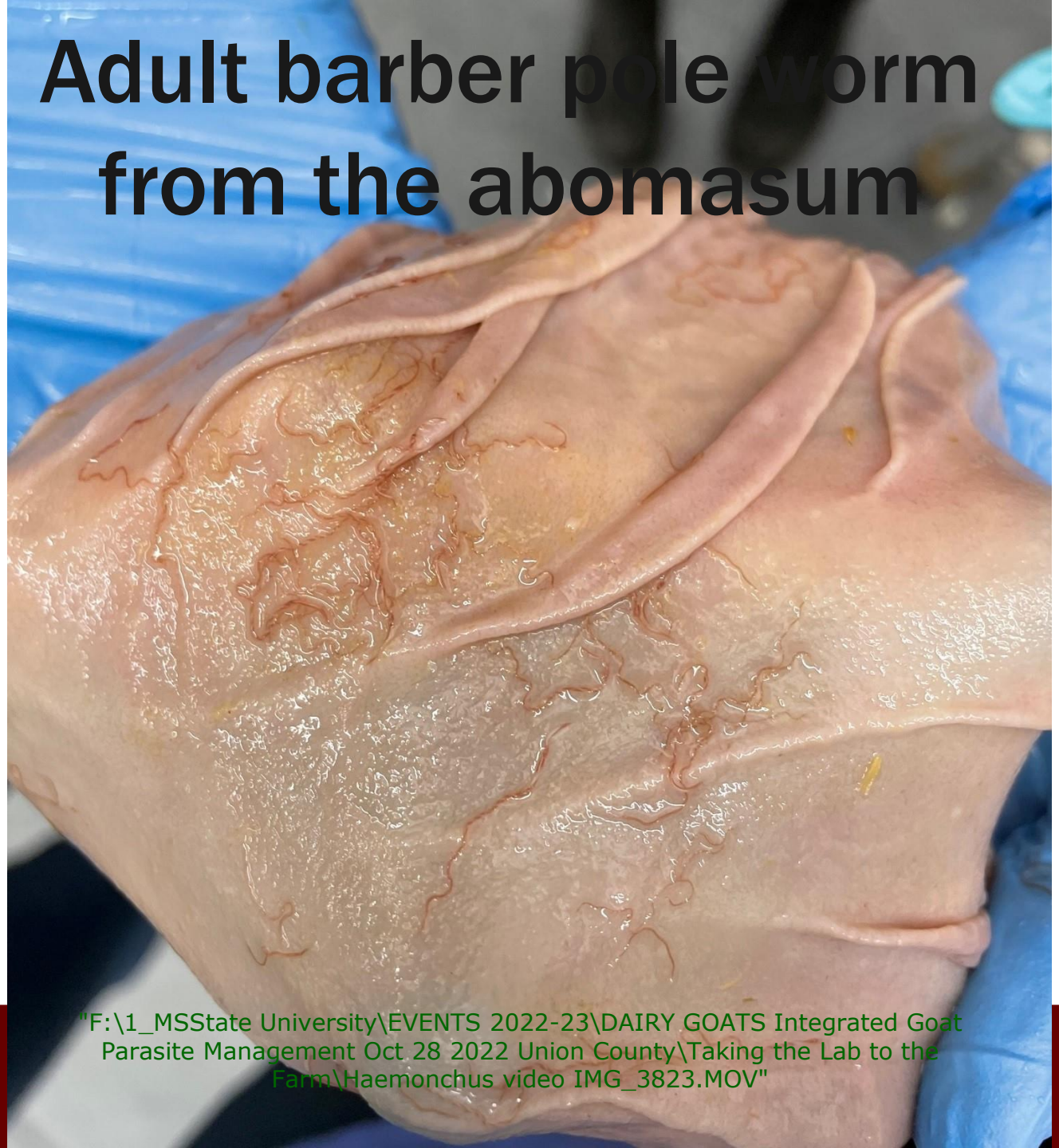
Brown stomach worm (*Teladorsagia circumcincta*)

Barberpole worm (*Haemonchus contortus*)

Bankrupt worm or Blac scour worm (*Trichostrongylus colubriformis*)

Link: http://www.goatbiology.com/animations/haem.html

Adult barber pole worm from the abomasum



"F:\1_MSState University\EVENTS 2022-23\DAIRY GOATS Integrated Goat Parasite Management Oct 28 2022 Union County\Taking the Lab to the Farm\Haemonchus video IMG_3823.MOV"

Sustainable:

Able to continue over a period of time

Meeting our own needs without compromising the ability of future generations to meet their own needs

Sustainable parasite control
&
Integrated parasite control

Sustainable parasite control: minimize animal production loss, preventing parasitic diseases, avoiding anthelmintic resistance (Besier, 2012). Uses the **REFUGIA** concept.

Integrated Parasite control: somehow is a sustainable parasite control that integrates chemical and nonchemical options (Kahn and Woodgate, 2012).

Sustainable parasite control

1) Help control the parasites inside the animal

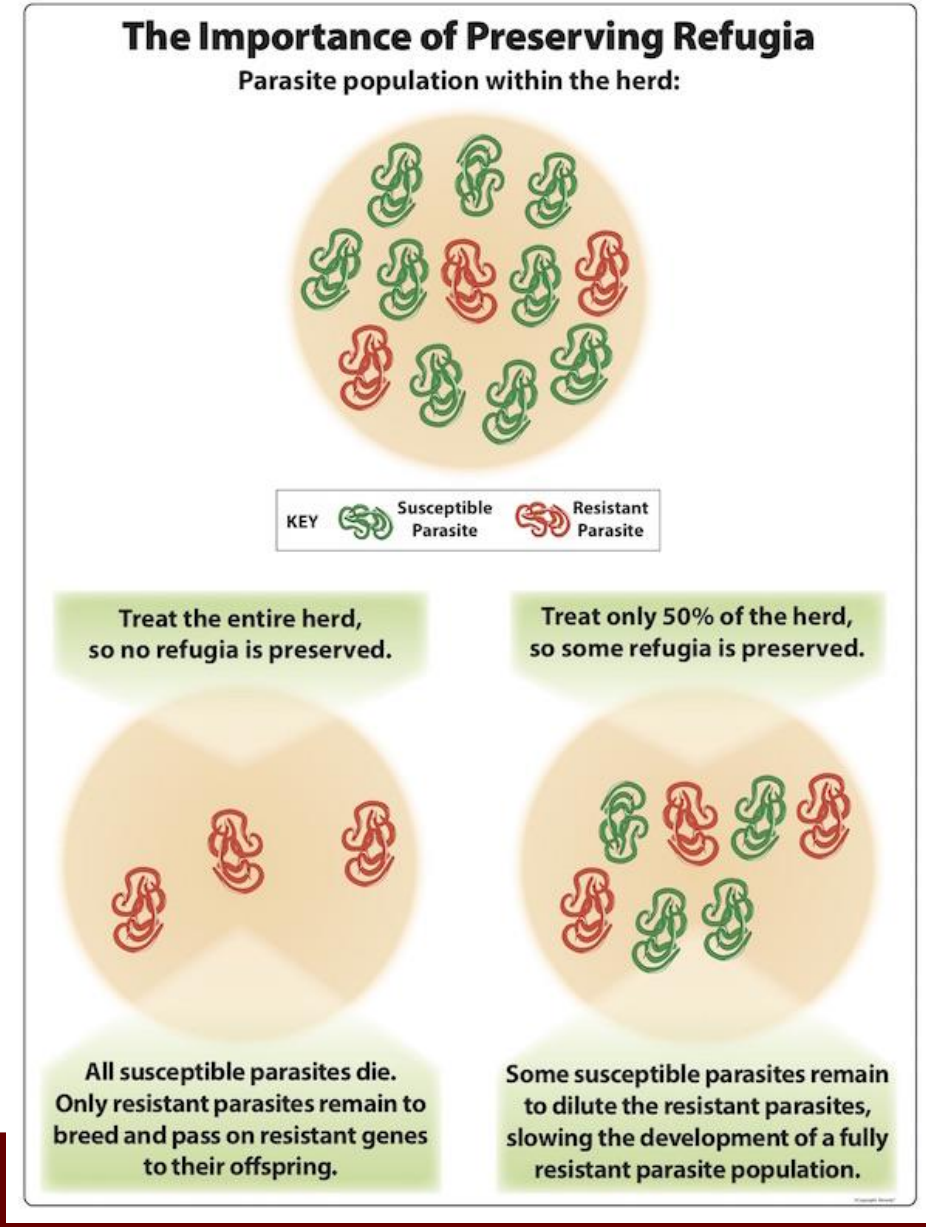
- **Selection / culling animals,** keeping in the herd the most productive and resistant animals
- **Use of resistant breeds,** some sheep and goat breeds that tend to be more tolerant to parasitism and that despite their parasite load, grow and reproduce properly
- **Selective deworming or TST,** use of the indicators is a successful way to maintain refugia, deworming only those animals that require it.
- **Strategic supplementation of the herd,** adequate nutrition of the animals, and their level of immunity to resist different diseases
- **Alternative treatments,** copper particles (COWP), bioactive forages, etc

Sustainable parasite control

2) Help reduce the ingestion of parasites from the pasture.

- **Adequate periods of rotation/rest of the paddocks** (break the life cycle)
- **Grazing of young/low immunity animals in "clean" grasslands**
- **Avoid overgrazing** (grass under 4”)
- **Use of bioactive forages or plants containing secondary metabolites**
- **Use of multispecies paddocks**
- **Using plants of different heights allows animals (mainly goats) to alternate grazing with browsing**
- **The use of mixed animal species grazing**
- **Alternative treatments** such as nematophagous fungi (*Duddingtonia flagrans*, BioWorma®),

REFUGIA



https://www.bimectin.com/responsible-use-exports/responsible-anthelmintic-use-resistance

Sustainable Practice

Do not BLANKET DEWORM your animals,
USE EXTERNAL INDICATORS: body condition, feed intake, weight gain & FAMACHA

Targeted selective treatment (*TST*)

https://www.merck-animal-health-usa.com/safe-guard/goats

Five point check©

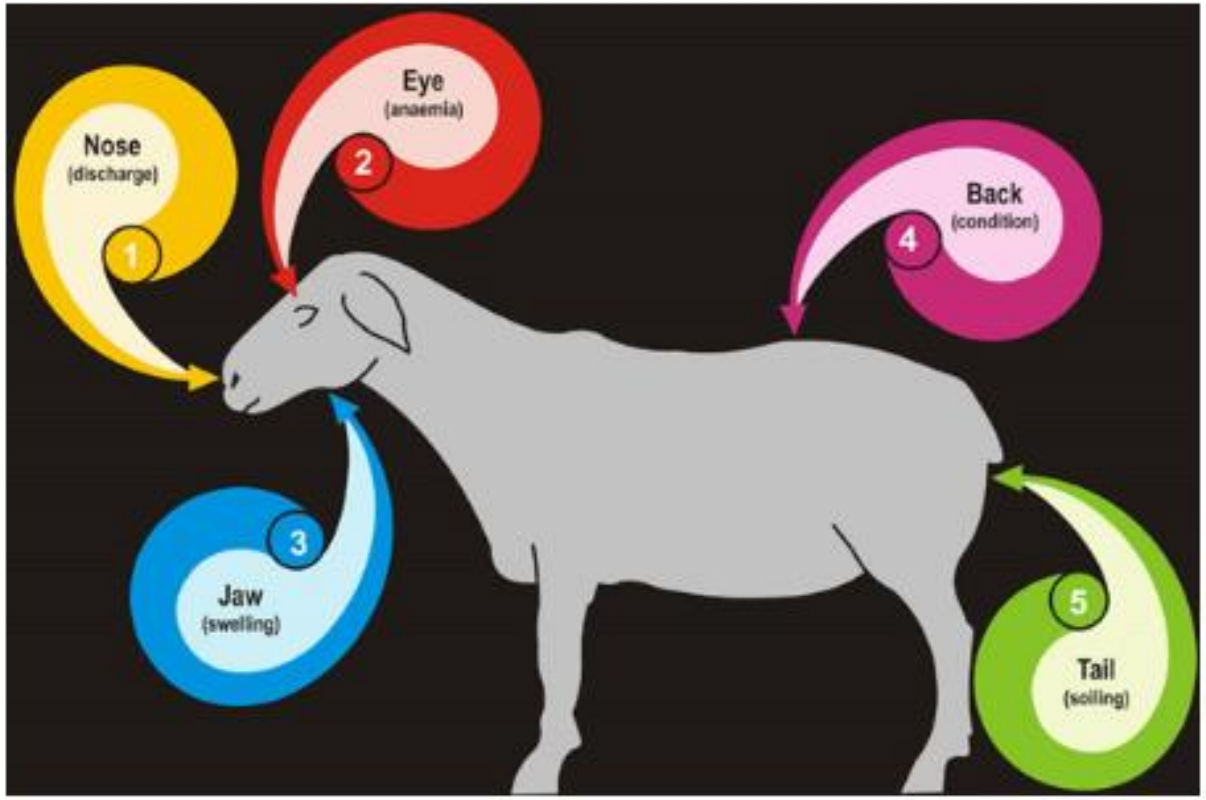
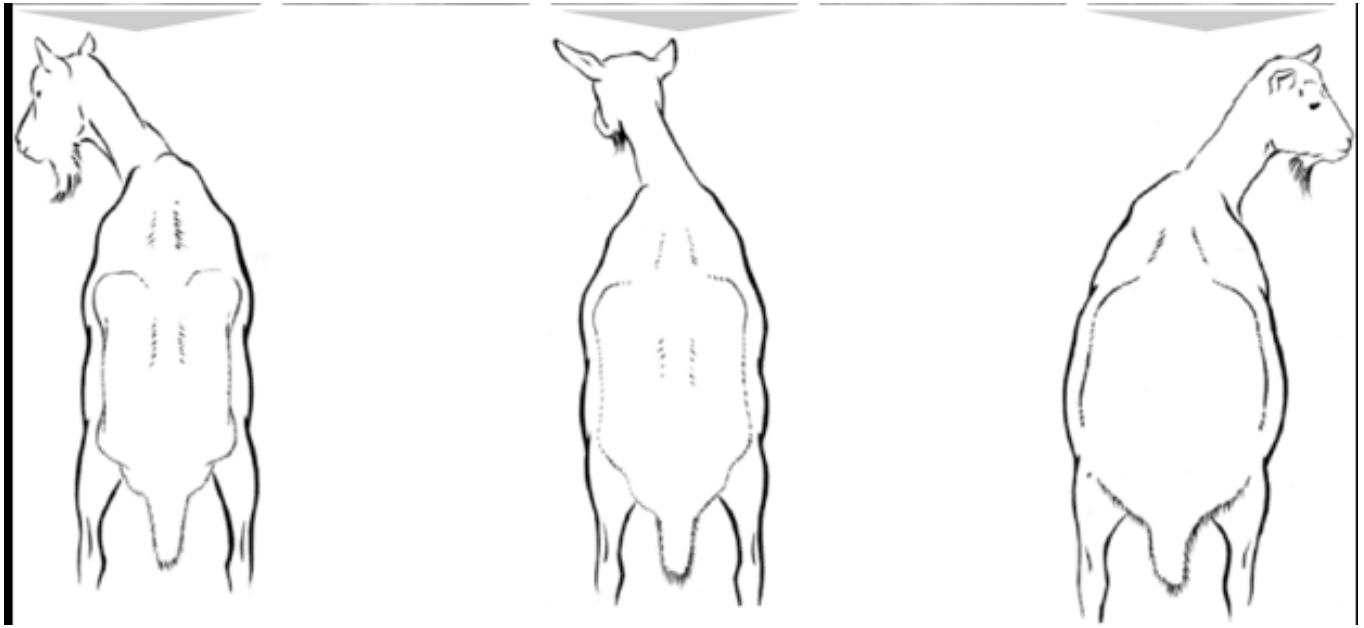


Fig. 1. The Five Point Check©.

The Five Point Check© for targeted selective treatment of internal parasites in small ruminants by G.F. Bath & J.A. van Wyk. Small Ruminant Research 86 (2009) 6–13

Common signs of parasitism

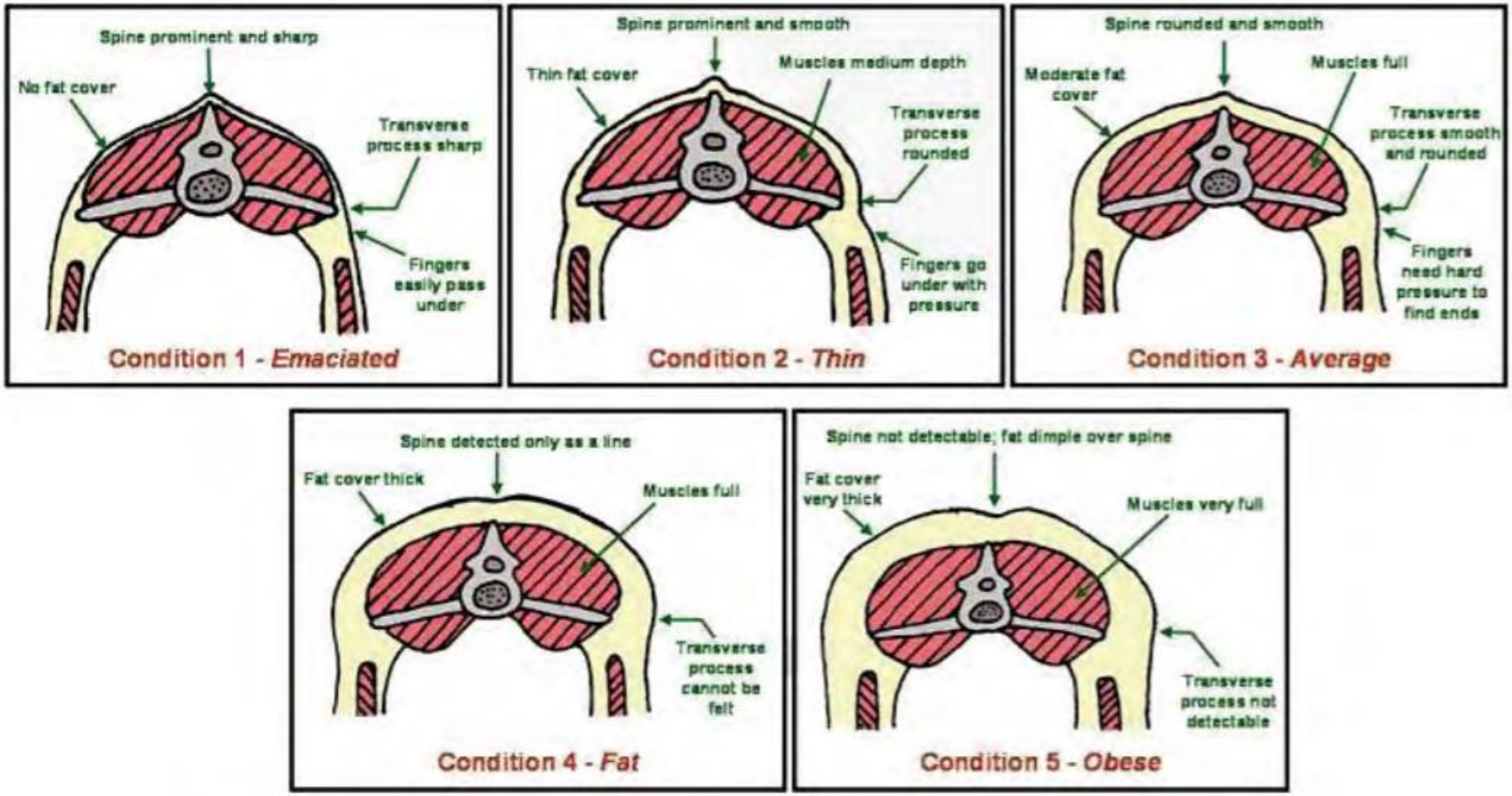
Poor Body condition



2 3 5

A. Vieira, S. Brandão, A. Monteiro, I. Ajuda, G. Stilwell
Journal of Dairy Science 2015 986597-6608DOI: (10.3168/jds.2015-9428)

Body Condition Scores – Sheep/Goats



Adapted from "Body Condition Scoring of Sheep" by J.M. Thompson and H. Meyer (Oregon State University).

Source: Russell, 1984. Farm Practice, Body condition scoring of sheep

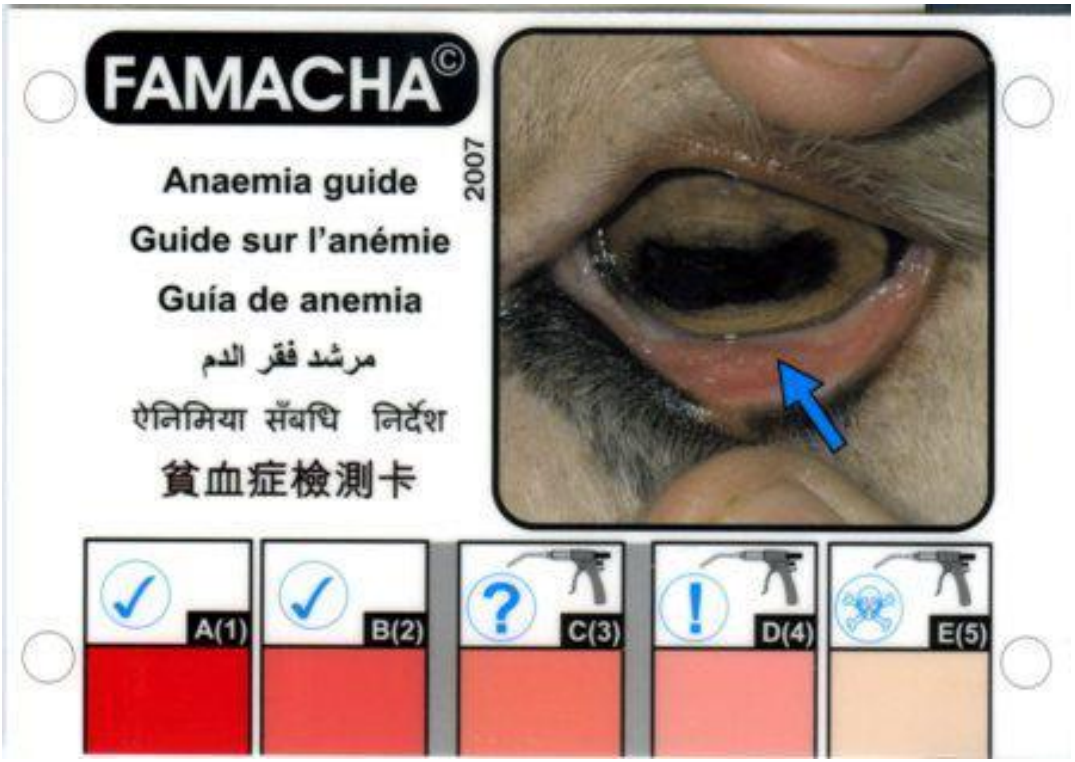
Common signs of parasitism

Submandibular edema

Francisco A. Rojo-Vázquez, Jorge González, Julia N. Hernández, María Martínez-Valladares. 2017. Resistencia genética a helmintosis digestivas. Albeitar

Common signs of parasitism

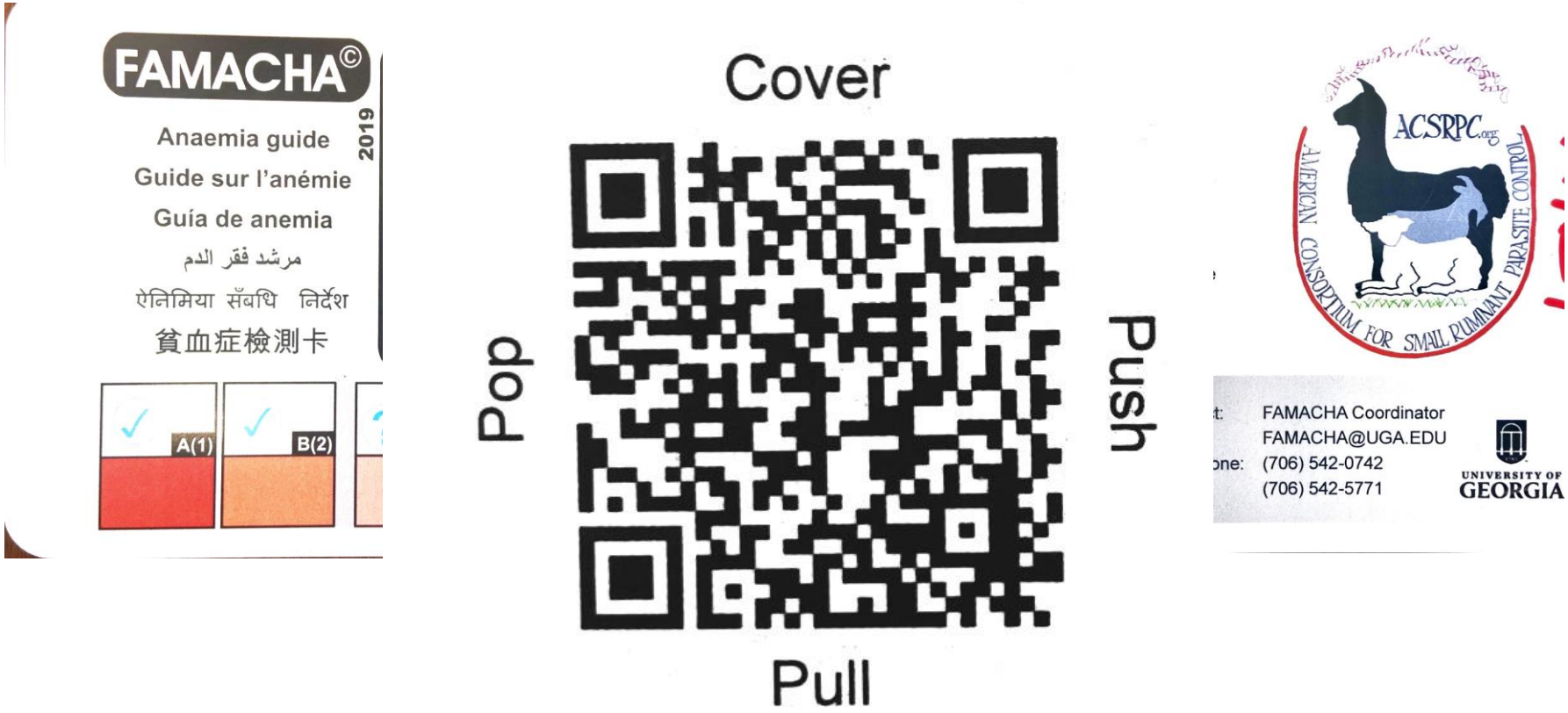
Anemia



FAMACHA chart, created by Dr. **FA**ffa **MA**lan **CHA**rt from South Africa who is the creator of the score for **selective treatment for controlling the level of barber's pole worm** (*Haemonchus contortus*)

Dr. Faffa Malan

FAMACHA© Card



FAMACHA© Video

What is FAMACHA©?

Technique

DO: Use proper FAMACHA© scoring technique to expose the lower eye mucous membranes and match them to the equivalent color on the chart.

4-steps technique:

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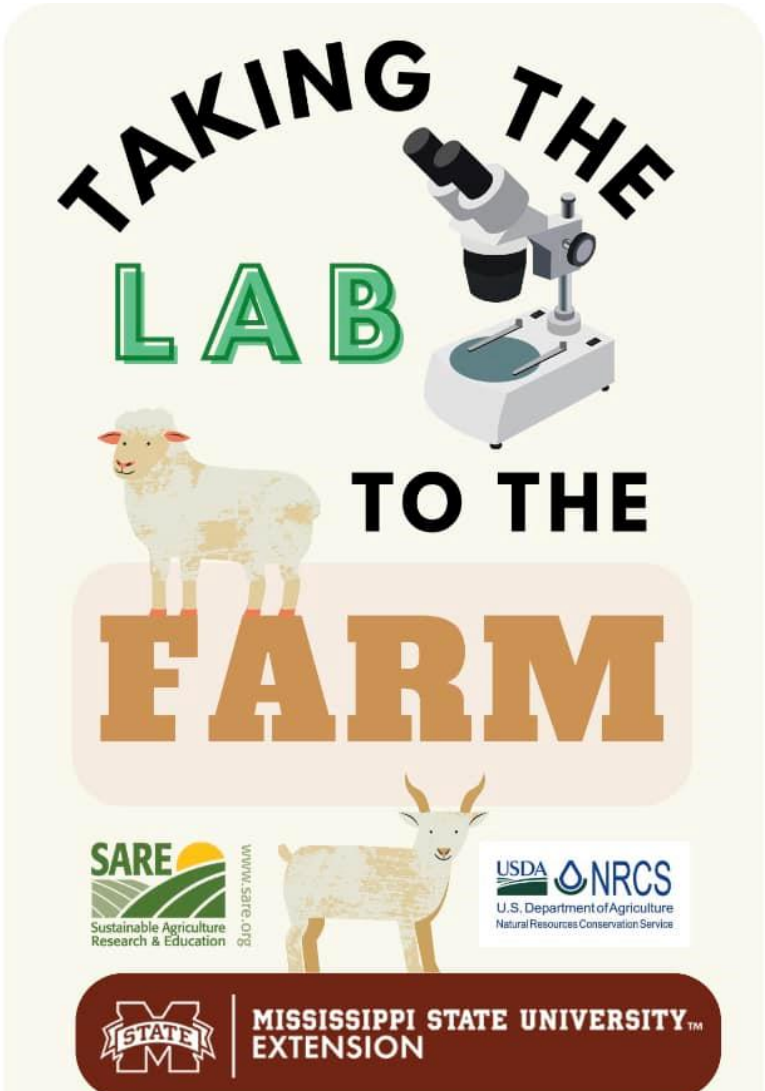
ACSRPC Webpage: https://www.wormx.info/dosdonts

https://www.youtube.com/watch?v=tmeZkqGQnMg

What else can help me to control parasites?



Alternative treatments: Use of Bioactive Forages

Ethnoveterinary → Medicinal Plants

Bioactive forages

Plant secondary metabolites (PSM)

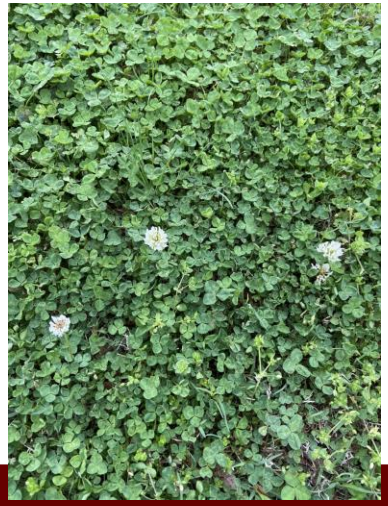
Substances manufactured by plants that exert a wide range of effects on the plant itself and on other living organisms, induce flowering, fruit set or maintain perennial growth. PSM can act as antimicrobials, antifungal, antiparasitic, perform the role of attractants or repellents. Over 50,000 PSM have been discovered in the plant kingdom, i.e.:

- Tannins
- Alkaloids
- Saponins
- Lectins

Bioactive Forages

Temperate

Sainfoin
Clover (Trifolium sp.)
Crotalaria sp.
Sericea lespedeza
Garlic (Allium sativum)



Tropical

Tropical leguminous

Cool season perennials

Birdsfoot trefoil (*Lotus corniculatus*)

Alfalfa (*Medicago sativa*)

Chicory (*Cichorium intybus*)

Clover (*Trifolium sp.*)

USE OF BIOACTIVE FORRAGES

Perennial peanut (*Arachis glabrata*)

Lespedeza (*Lespedeza cuneata*)

Kudzu (*Pueraria montana*)

Warm season perennials

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What plants with secondary metabolites do we have in the south or Bioactive Forages ?

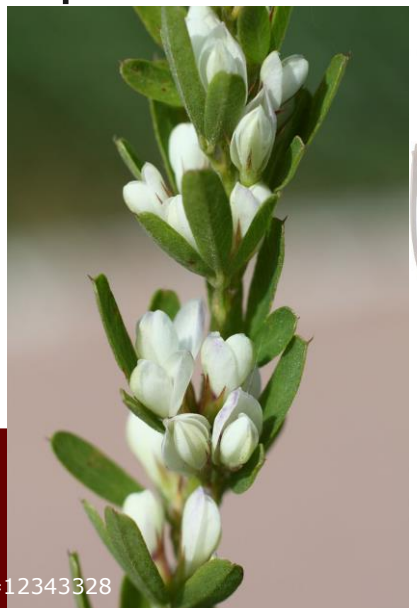
http://extension.msstate.edu/agriculture/forages/legumes

Alternatives to dewormers

Copper wire particles (COWP) and combinations with bioactive forages

Burke et al. (2010)

- COWP helped reduce FEC in periparturient ewes and does
- Sericea lespedeza hay reduced FEC compared bermudagrass hay.
- Sericea lespedeza + COWP improved reduction FEC in ewes and does



https://www.wormx.info/copper-oxide-wire-particles
https://www.ars.usda.gov/research/publications/publication/?seqNo115=204132

Alternatives to dewormers

Duddingtonia flagrans) / Nematode trapping fungi

- Now in the US as Bioworma®
- Active Constituents: *Duddingtonia flagrans*
- It is a natural fungi that can be found in soil / pasture
- Non-chemical or biological free-living nematode control that interrupts the life cycle of the worms
- The spores go in the feed, resist digestion and pass into the manure where germinate and traps and consumes the emerging larvae
- Spores are safe for animals, humans and environment

Costs of feeding Bioworma®

Daily Dosage Rates for Grazing Animals

Bodyweight	Dose	Cost Per Animal Per Day*
50 lbs	0.8 oz	$0.23–$0.29
100 lbs	1.6 oz	$0.46–$0.58
200 lbs	3.2 oz	$0.93–$1.16
400 lbs	6.4 oz	$1.85–$2.32
500 lbs	8.0 oz	$2.32–$2.90
750 lbs	12.0 oz	$2.78–$3.48
1,000 lbs	16.0 oz	$3.70–$4.63
1,200 lbs	19.2 oz	$4.63–$5.79

(*) Costs are provided as an estimate only. Qty. purchased and freight charges may affect final pricing.

100 ewes / does of 100 pounds = 60$/day

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Questions?

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