

Dewormer Resistance of Worms; How we got there and what we can do about it

Steve Hart

Langston University

What is Dewormer Resistance?

- The dewormer doesn't kill the worms or enough worms
- Expect a good dewormer to kill 100% of worms
- When it only kills 95% of worms we can be sure we have beginnings of dewormer resistance.
- Measured by Fecal Egg Count Reduction
- 1,000 epg before deworming and 300 epg 10 days after deworming - 70% FECR
- When we get down to 50% FECR, we are deworming more frequently and animals don't look good.

Oklahoma Farm FECR % in 2000

Farm	IVM	VAL	LEV	CYD
1	12	87	98	
2	37	88	99	
3	7	67	99	
4	63	85	92	
5		55	99	100
6	46	42	98	
7	41		91	
8		0	97	
9	69	74	94	

Factors in the Development of Anthelmintic Resistance

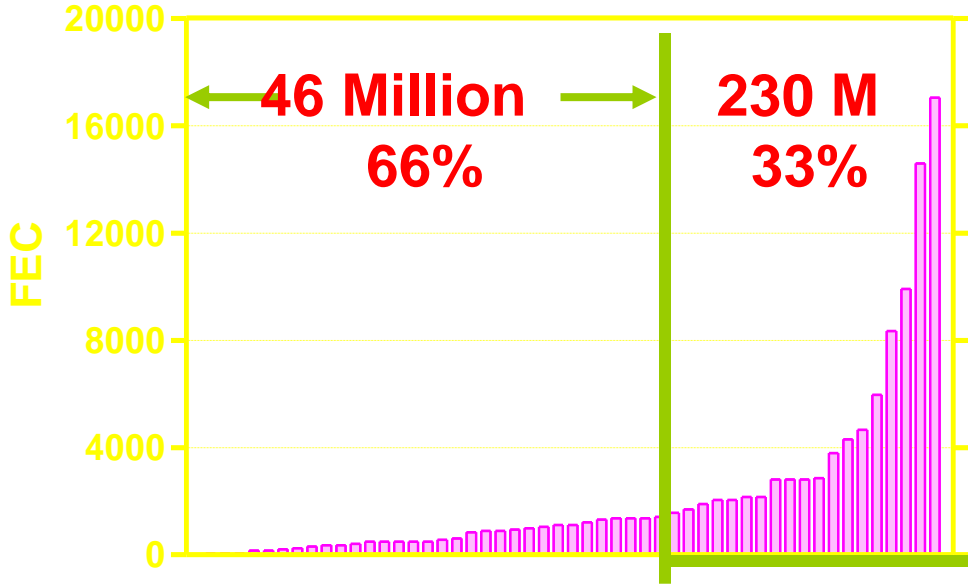
- Veterinarians and producers attempted to eradicate worms
- Producers-too much work to manage livestock, dewormers were cheap and easy
- Pharmaceutical companies sell all the dewormer they can and produce much advertising
- Worms are illiterate and can't read advertising to know that certain dewormers should kill them.

- Tom Craig

Mechanism of Developing Dewormer Resistance

- Worms have a “loose” genome-highly variable
- There is as much genetic difference between 2 worms as there is between man and monkey
- Downside is more worms die from lack of adaption, but worms are very prolific
- Upside is that 3 in a million worms has resistance to a brand new dewormer due to genetic difference in the dewormer’s target
- We gradually kill off all the non-resistant worms by deworming everything.

Distribution of FEC in Goat Herds

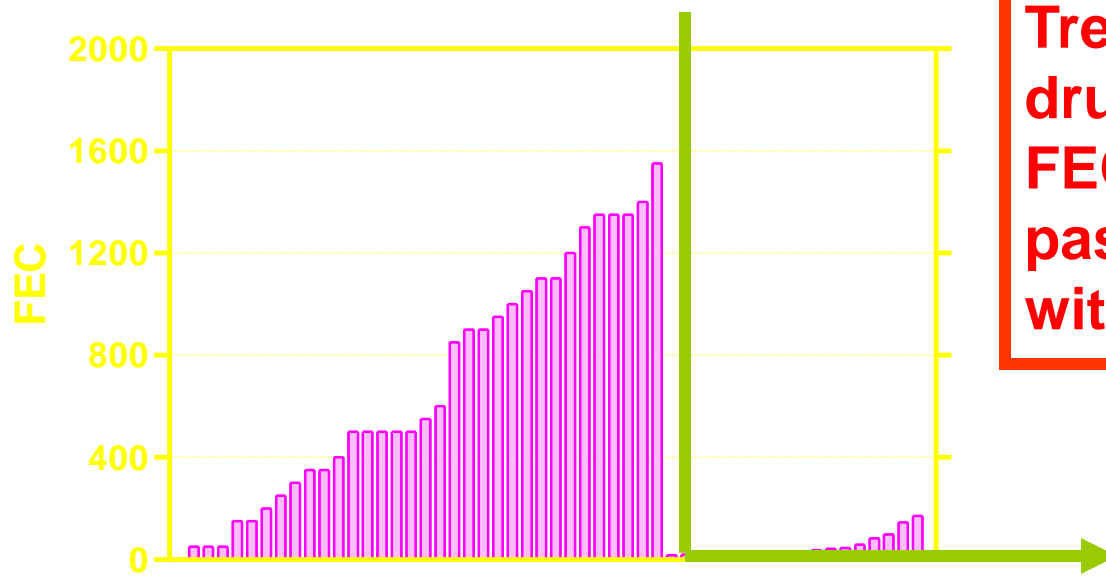


**Treating high 33%
Greatly Reduces
Daily Pasture
Contamination With
Eggs**

**33% of Goats
80% of Eggs**

**Treating 1/3 of
goats gives just
as good control
as treating the
entire herd**

What Happens If We Treat Only the High 33% ???



Treating high 33% with a drug that causes a 99% FECR reduces daily pasture contamination with eggs by 80%

**33% of Goats
< 5% of Eggs**

**Following treatment
> 95% of eggs are being shed by untreated goats
= REFUGIA**

Solutions for Dewormer Resistant Worms

- Management, especially pasture
- Selective deworming using FAMACHA and 5 point check
- Genetics-culling most susceptible and selecting most resistant animals for next generation
- Dewormer combinations
- Copper Oxide Wire Particles
- Tannin containing plants such as Sericea
- Nematophagus fungus

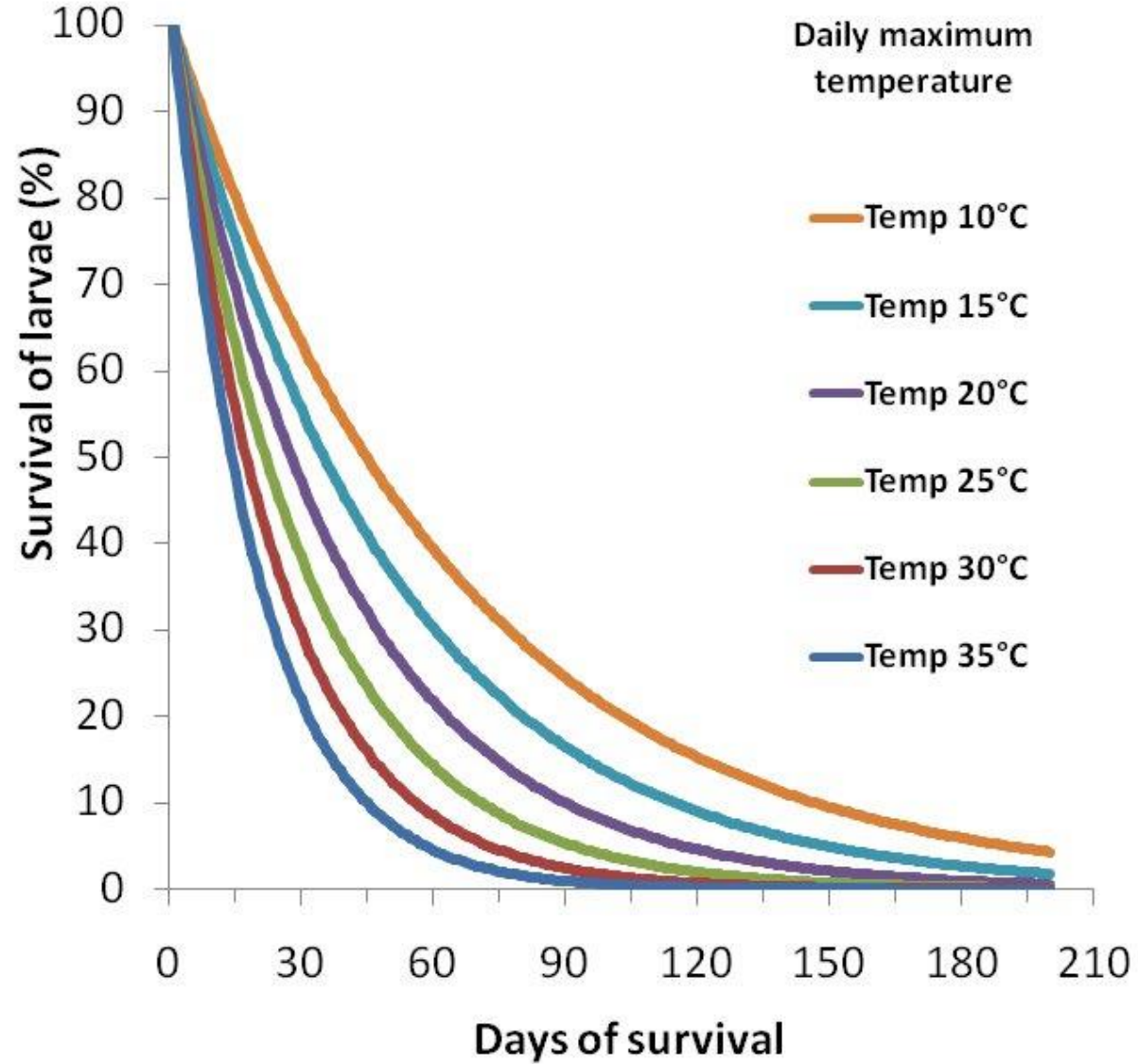
Rotation Grazing

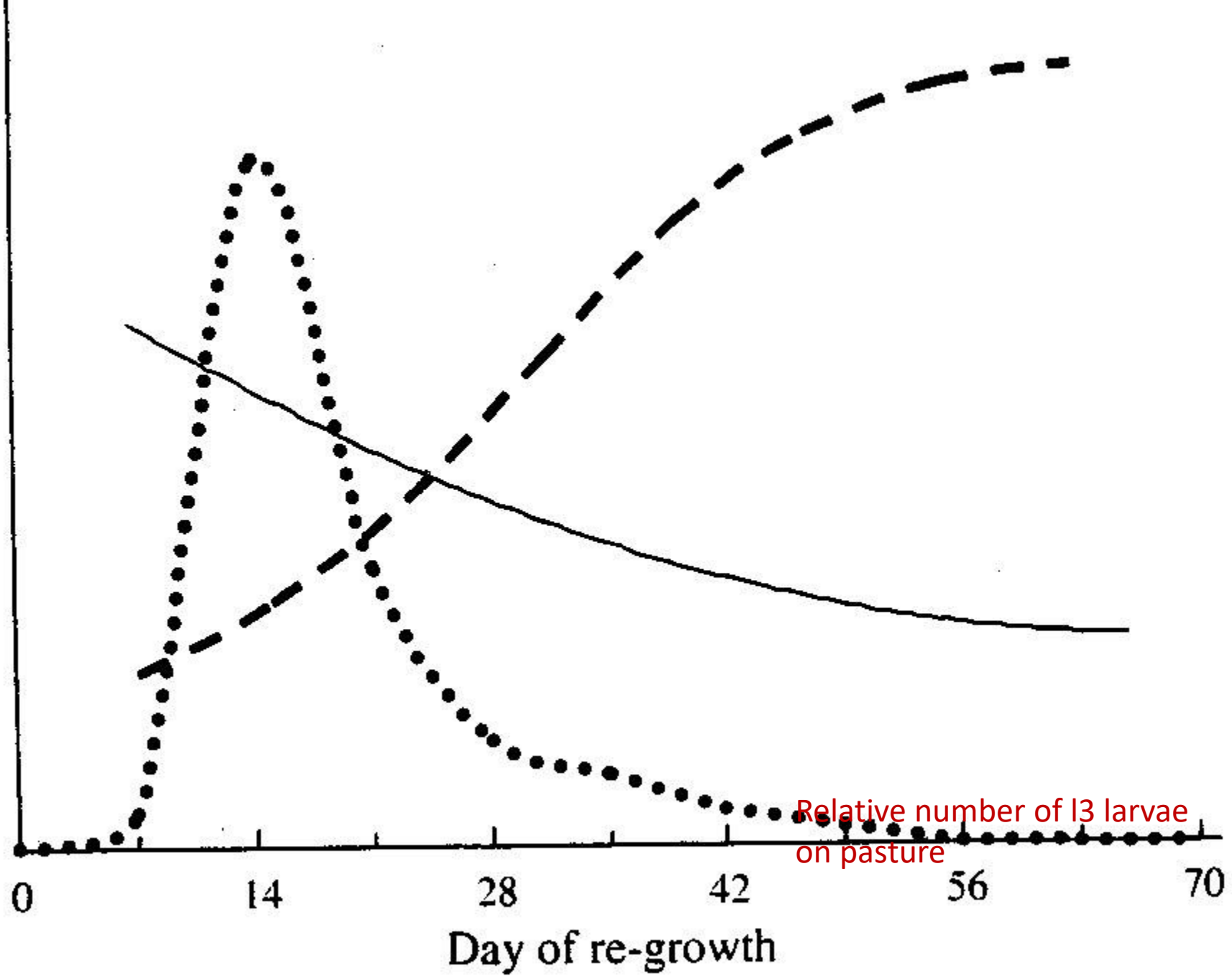
- Eggs hatch to infective larvae in 4-15 days depending on temperature
- Larvae require several days of heavy dew or 2 inches of rain in a months time to escape from the fecal pellet
- Larvae survive 35 days in 100°F and 150 days at 50°F
- If we can graze pastures for only about 4 days and move to a new pasture, we can avoid infective larvae.
- If we don't come back to that pasture until 80+% of larvae have died, we can avoid parasitic infection

Rotation Grazing

- The long rest period can be good for native forages, but most improved forages will deteriorate in quality.
- Can make hay on them between grazing by small ruminants.
- Can graze with cattle or horses that do not share the same worms as small ruminants.
- Can clip closely after animals leave pasture to slow regrowth and allow sun to help kill infective larvae.
- Do not graze within 4" of ground.
- Stocking rate less than 2 head per acre

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





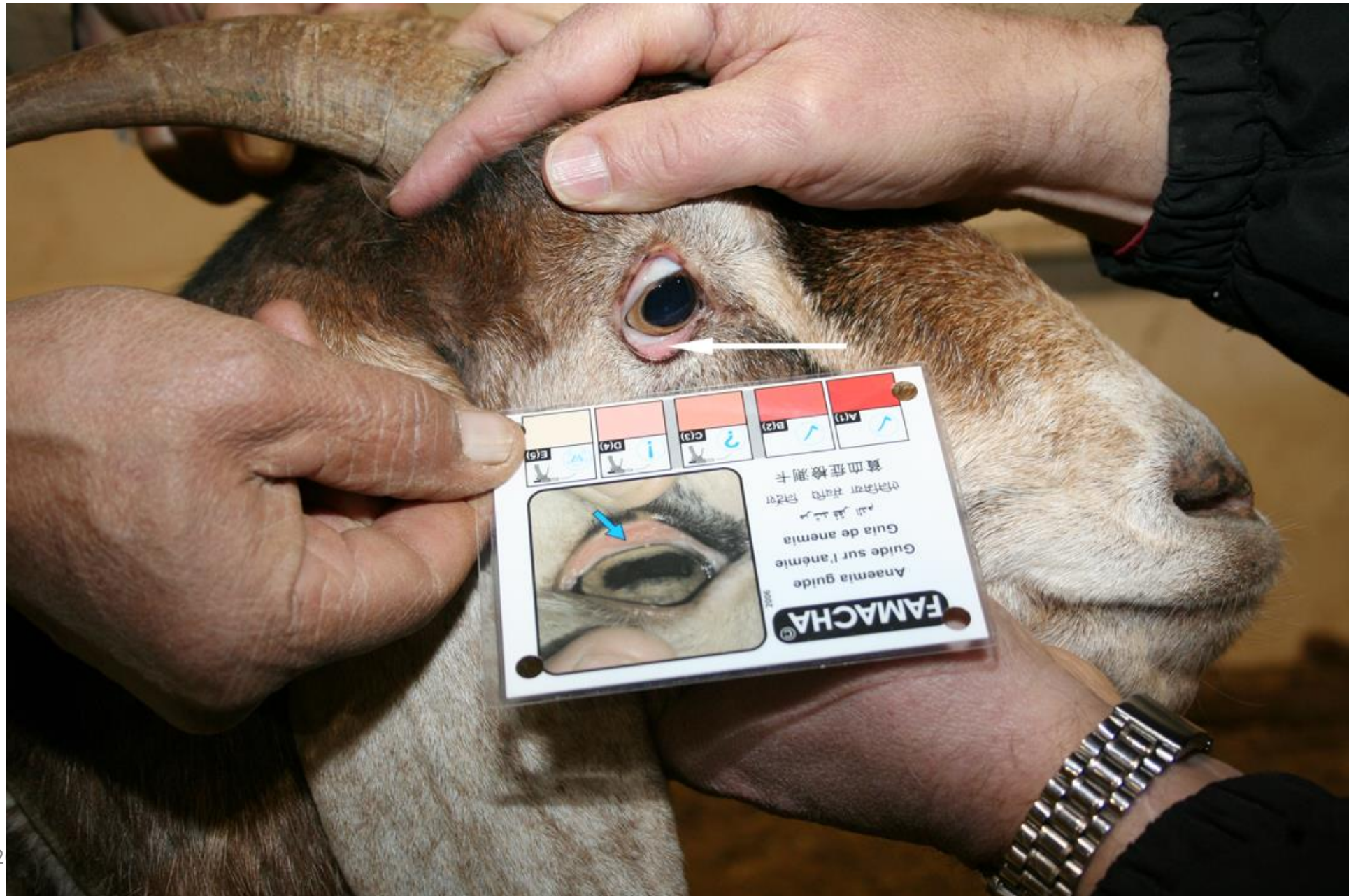
Rotation Grazing

- Graze cattle or horses with goats
- Provide browse for animals to eat
- Haymaking or tillage

Selective Deworming

- Deworming only animals that need it and leaving the rest in refugia.
- Selective deworming has been shown to halt, even slightly reverse the development of dewormer resistance.
- Problem is identifying the animals that need deworming.
- FAMACHA works well in sheep and less well in goats and only for the barberpole worm. Body condition works as good or better in goats as FAMACHA.
- 5 point check considers other factors in addition to FAMACHA-bottle jaw, body condition, diarrhea, hair coat, nasal bots (sheep) how animals move.

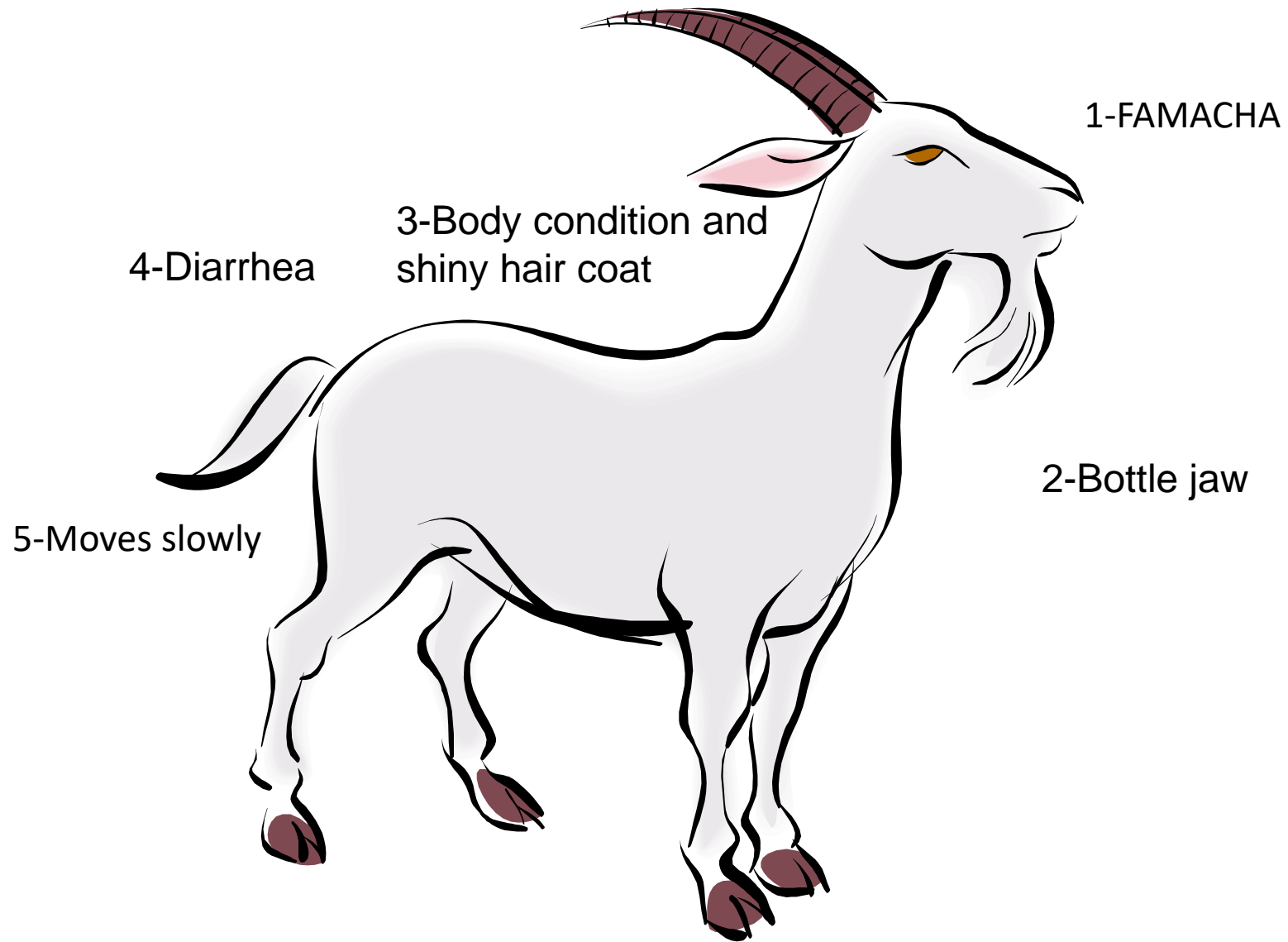
Selective Deworming With FAMACHA





Bottle Jaw-bulge under throat from edema

Five Point Check



Dewormer Combinations

- Using two or more dewormers from different classes.
- Using the most potent members of the class
- Valbazen, Prohibit, Cydectin are most potent members
- Can dilute 1-52 gram packet of Prohibit into 688 ml (23 ounces) of Valbazen (cattle version) and give at Valbazen dose 8 ml/100 lbs. for goats
- Cydectin is in an organic base and doesn't mix as well.

Dewormer Combinations

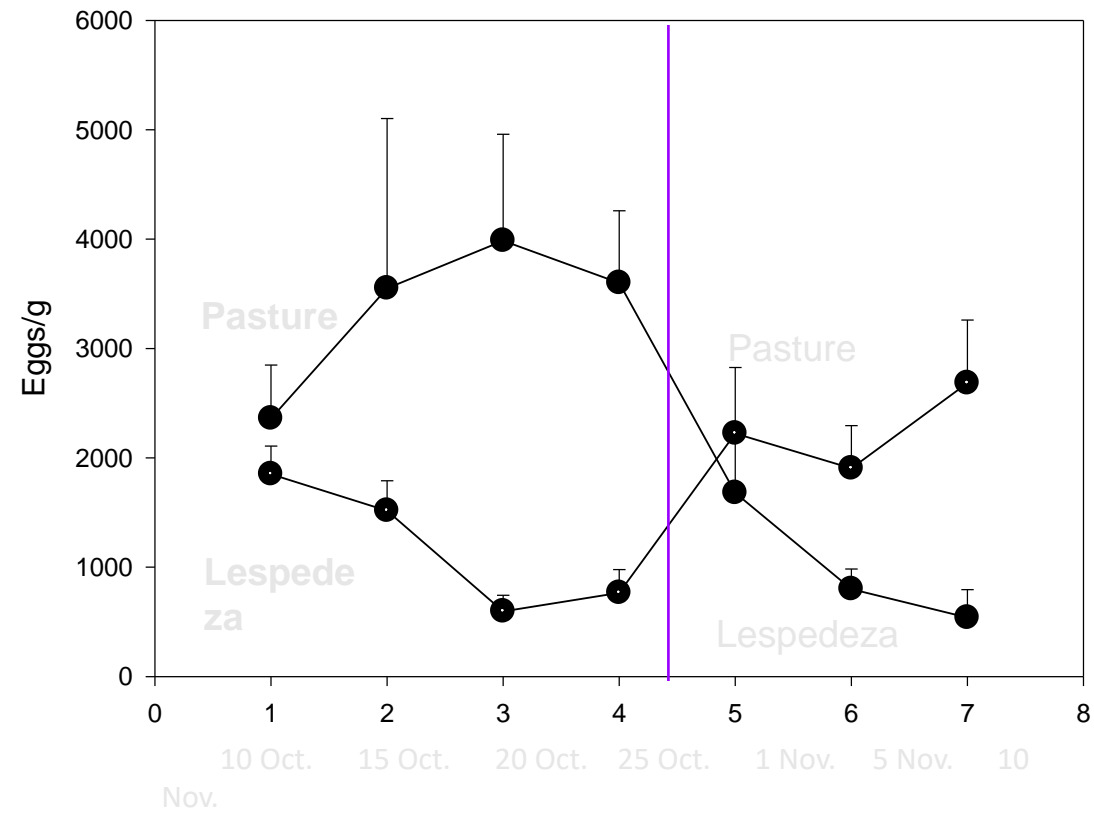
- Can use a mediocre and poor dewormer in combination and they may be quite effective.
- Must use selective deworming because otherwise you will develop complete resistance to both dewormers.

Copper Oxide Wire Particles

- Used to provide supplemental copper to sheep and cattle
- We don't know how it (Copasure) works, but it works pretty good, 80-95% fecal egg count reduction.
- Effective only on Barberpole worm
- Can purchase ready made 2 and 4 gram capsules
- Goat dose is 2 grams for under 50 lbs. and 4 grams for over 50 lbs.
- Sheep get half that dose
- Limit to twice a year to prevent copper toxicity

Research at Langston

- Short duration long rest period grazing 5 day duration, 65 day rest
Does and kids did not need dewormed all summer.
- *Sericea lespedeza*
- Reduces FEC by 50%
- Reduces hatching of eggs
- Reduces mobility of larvae
- Grazed whole summer without deworming



Genetics

- 20-30% of animals carry 70-80% of worms. Cull them, there will be only 20% of infective larvae on pasture.
- Identify with selective deworming-those that get dewormed the most get an all expense paid trip to the auction.
- Compare apples to apples-doeling to doeling, ewe with twins to ewes with twins.
- Look at males that sired these wormy girls-they need to go with their daughters to the auction.

Conclusion

- Deworming all animals helps to develop dewormer resistance
- Use selective deworming-leave at least 15% of animals undewormed
- Use pasture management to reduce the need for dewormer
- Combinations of dewormer are often effective
- Copper oxide wire particles can be effective against the Barberpole worm
- Cull wormy animals and their sires
- Use sericea lespedeza, chicory or birdsfoot trefoil to reduce parasite problems.