

Parasite Management for Small Ruminants

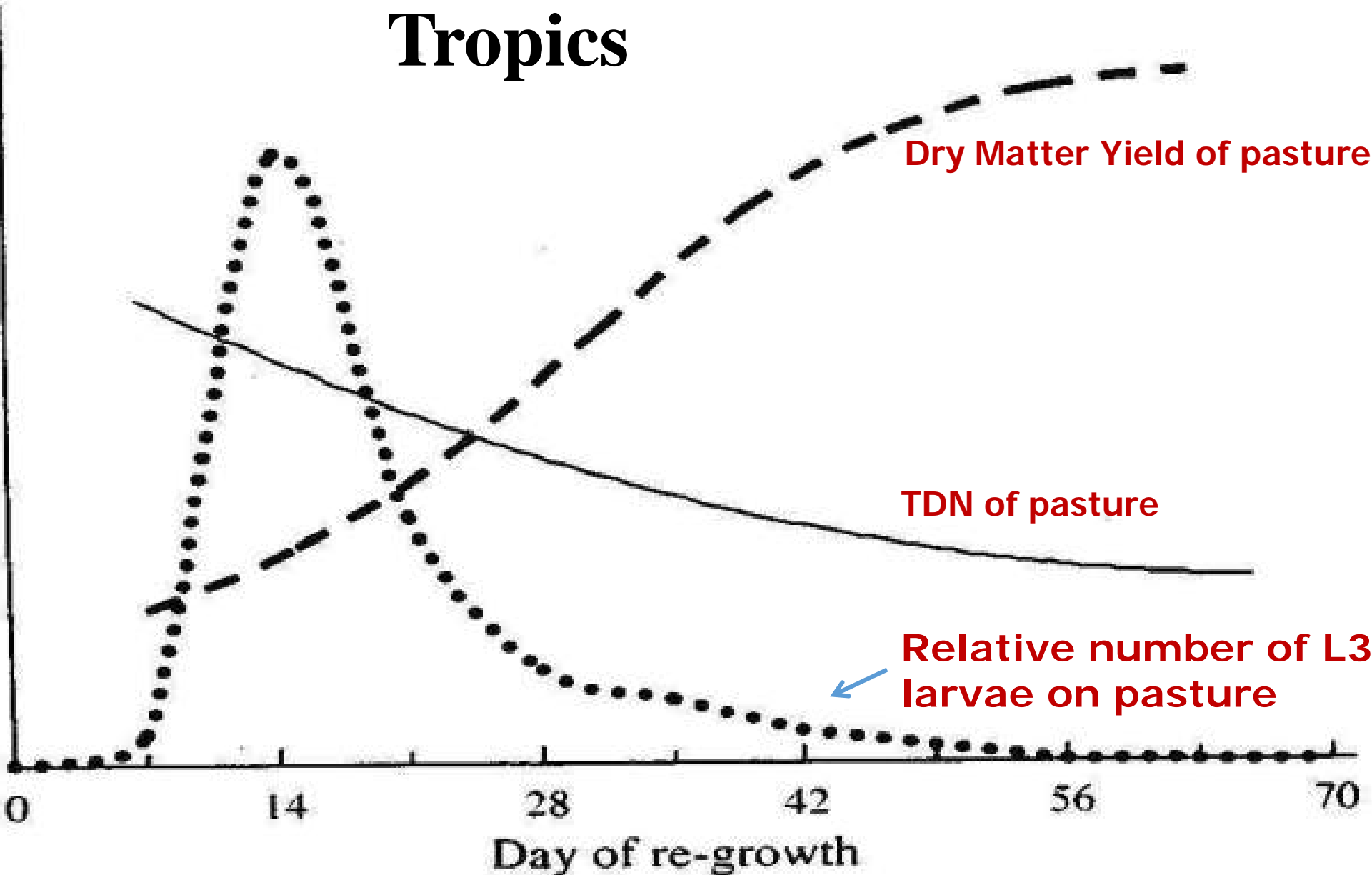
Part 2. Know your tools

- Pasture management – Evasive Grazing, avoiding the barnyard effect, etc.
- Nutrition and the Immune System
- Genetic selection
- Proper use of traditional weapons – Chemical dewormers
- Selective deworming

Pasture Management to reduce barber pole worm problems

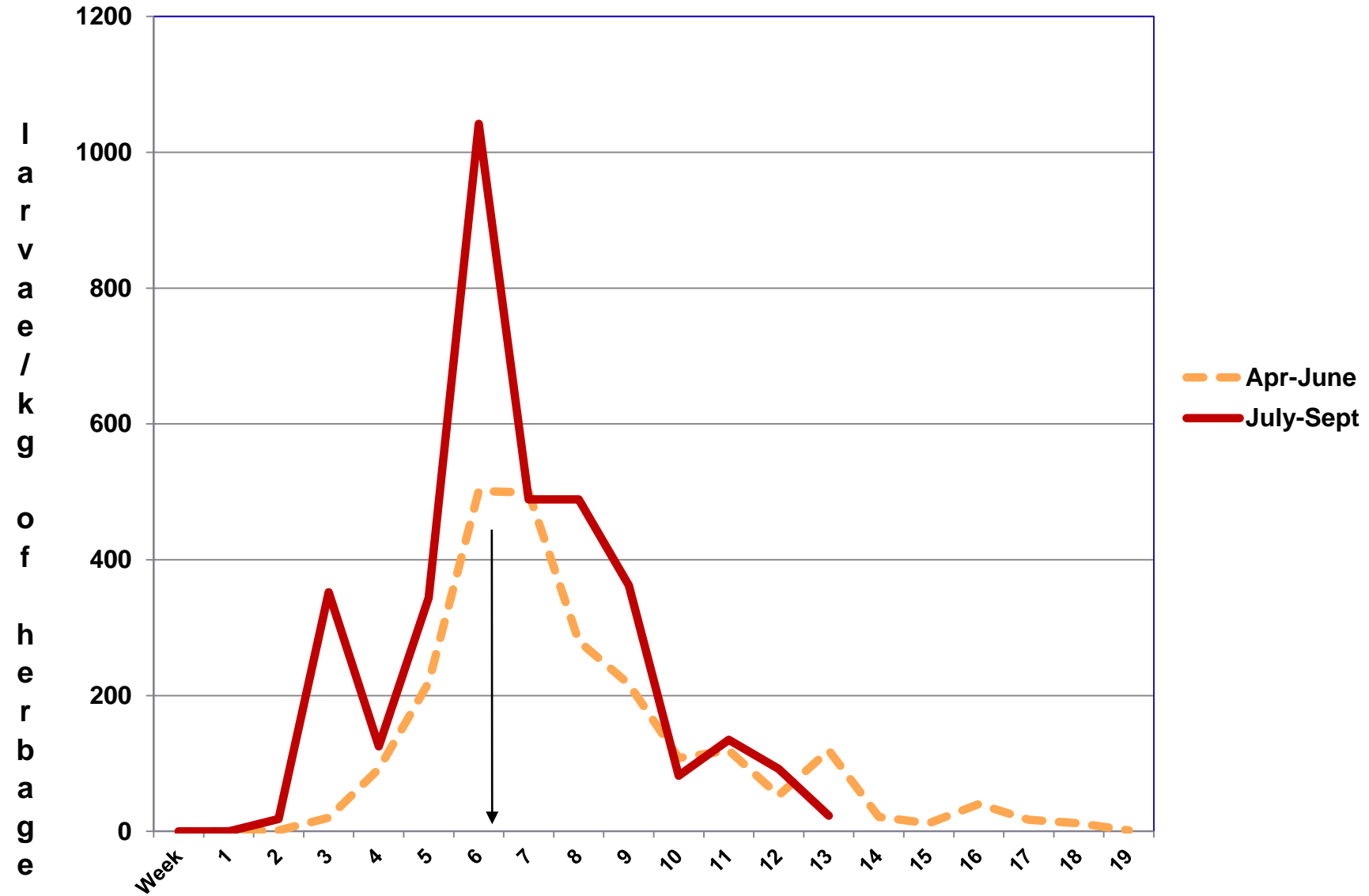
- Use clean or safe pastures – wise management decisions about pasture height, grazing duration and pasture rest - easy to say, difficult to implement for entire grazing cycle
- Use multispecies grazing
- Use alternative forages
- Give priority to recently weaned young stock -
 - > lactating does/ewes
 - > dry animals

Tropics



Temperate Climates

Barber pole worm population in pastures grazed 2 to 4 weeks



Evasive Grazing

- Move animals fast enough to prevent infection from feces deposited during current grazing period (autoinfection). **Takes 3-5 days to hatch at 77-79°F, 15-30 days to hatch at 50-52°F. Often ~5 to 14 days from egg to L3.**
- **Play it safe with 4 day (wet, warm) to 7 day (cooler, drier) grazing duration. Move earlier if pasture getting too short – i.e. 3 inches.**
- Allow a long enough rest period that there is substantial L3 die off before animals return to graze. (60 – 105 days)

Problem



- Pasture rest periods to control barber pole worm need to be longer than normal recommendations for either pasture health or nutritional value

Things you can do -

- Are there safe “pastures” that animals can be switched to as the grazing season progresses?
 - Brush pastures, hayfield regrowth, pastures that your cattle or horses have been grazing, crop residues, annual pastures
- Can you disrupt the worm cycle by
 - mowing the pasture extremely short during the rest period,
 - grazing other species during the rest period,
 - Harvesting a hay crop or baleage before resuming grazing

Pasture alternatives

- Livestock grazing tall-growing forages or browse will have less parasite problems (except for deer worm), because
 - 80% of worms live in the first 2 inches of the vegetation.
 - Grazing high-tannin forages may reduce the effects of parasitism.





**Forage
Chicory**



**Sericea
Lespedeza**

- 1) considered invasive plant
- 2) half the photosynthesis rate of alfalfa,
- 3) consumes a lot of water per lb. of forage produced
- 4) Allelotropic – inhibits germination of other forages such as ryegrass



**Birdsfoot
Trefoil**

Pure stands of chicory, birdsfoot trefoil, and *Sericea lespedeza* have been shown to reduce fecal egg counts and/or larval development.

- the amount present in a normal pasture mix does not appear sufficient to influence worm counts

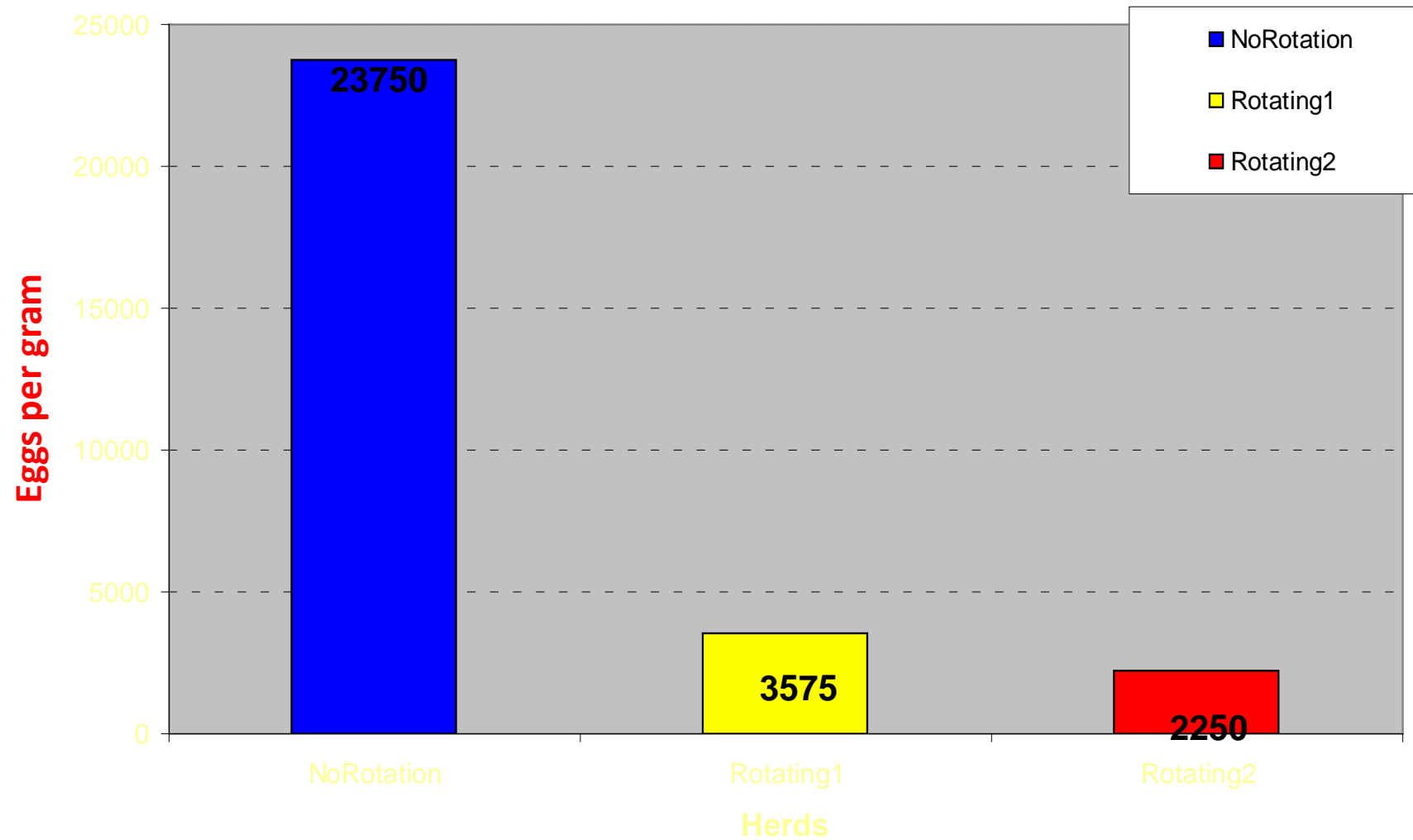
Barnyard Effect

- Barnyards with grass or other good forage
- → Lead to high concentration of manure and internal parasites in grazing material
- → Can contribute greatly to herd contamination with internal parasites
- → May have a "barnyard effect" in pastures that border barn and are not rotated

Rotational grazing in the spring appears to reduce the “barnyard effect” and delay the onset of summer parasite problems

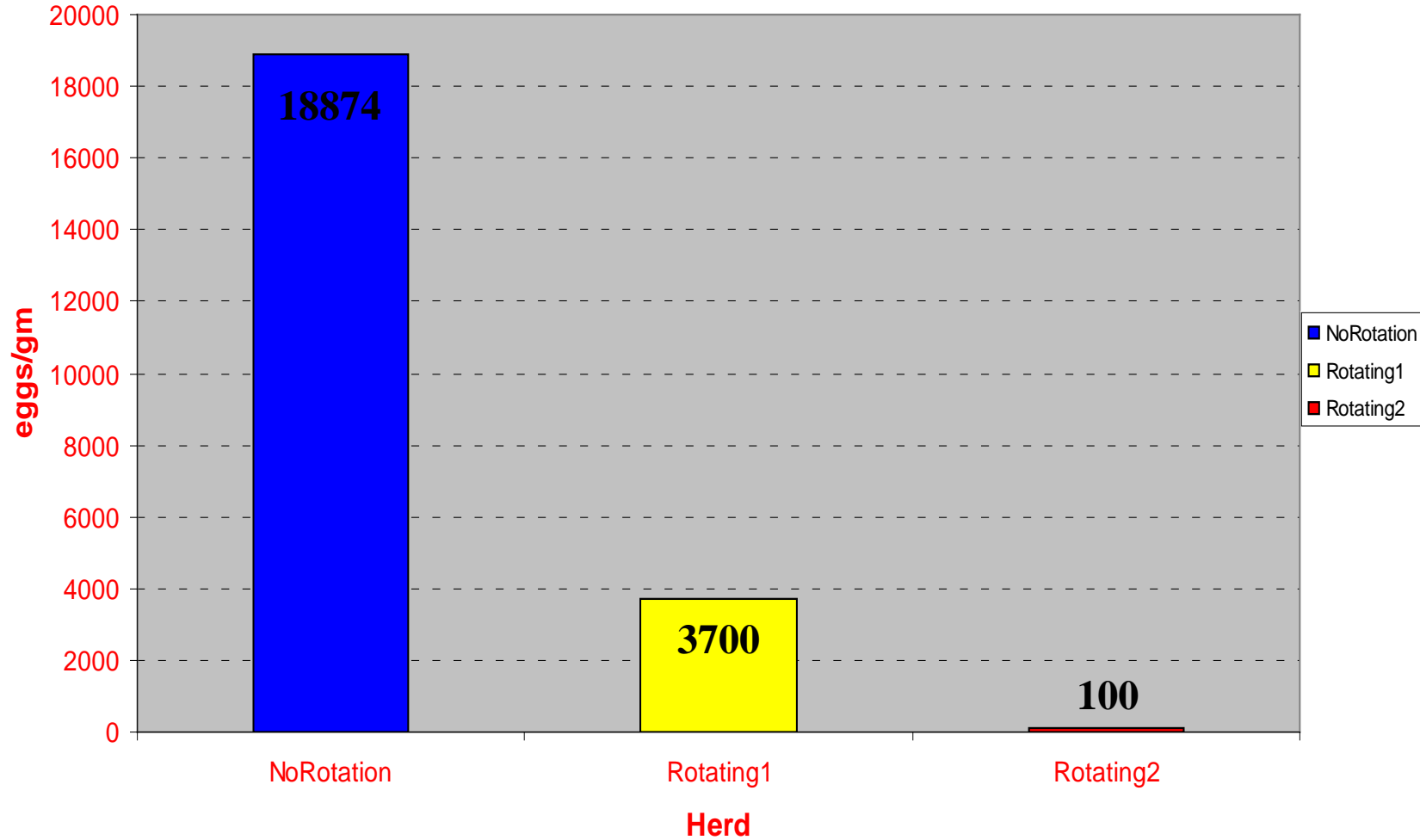
Please note that we are talking about herds that are rotating in the spring and summer and that by late July most of these also had high worm loads (3 study farms in NY)

Worm eggs per gram in herds that rotate versus herds that do not in State #1 (NY)



Please note that we are talking about herds that are rotating in the spring and summer and that by late July most of these also had high worm loads (3 study farms in VT)

**Worm eggs per gram in kids in herds that rotate vs herds that do not -
State #2**



Some options to help reduce barnyard effect –

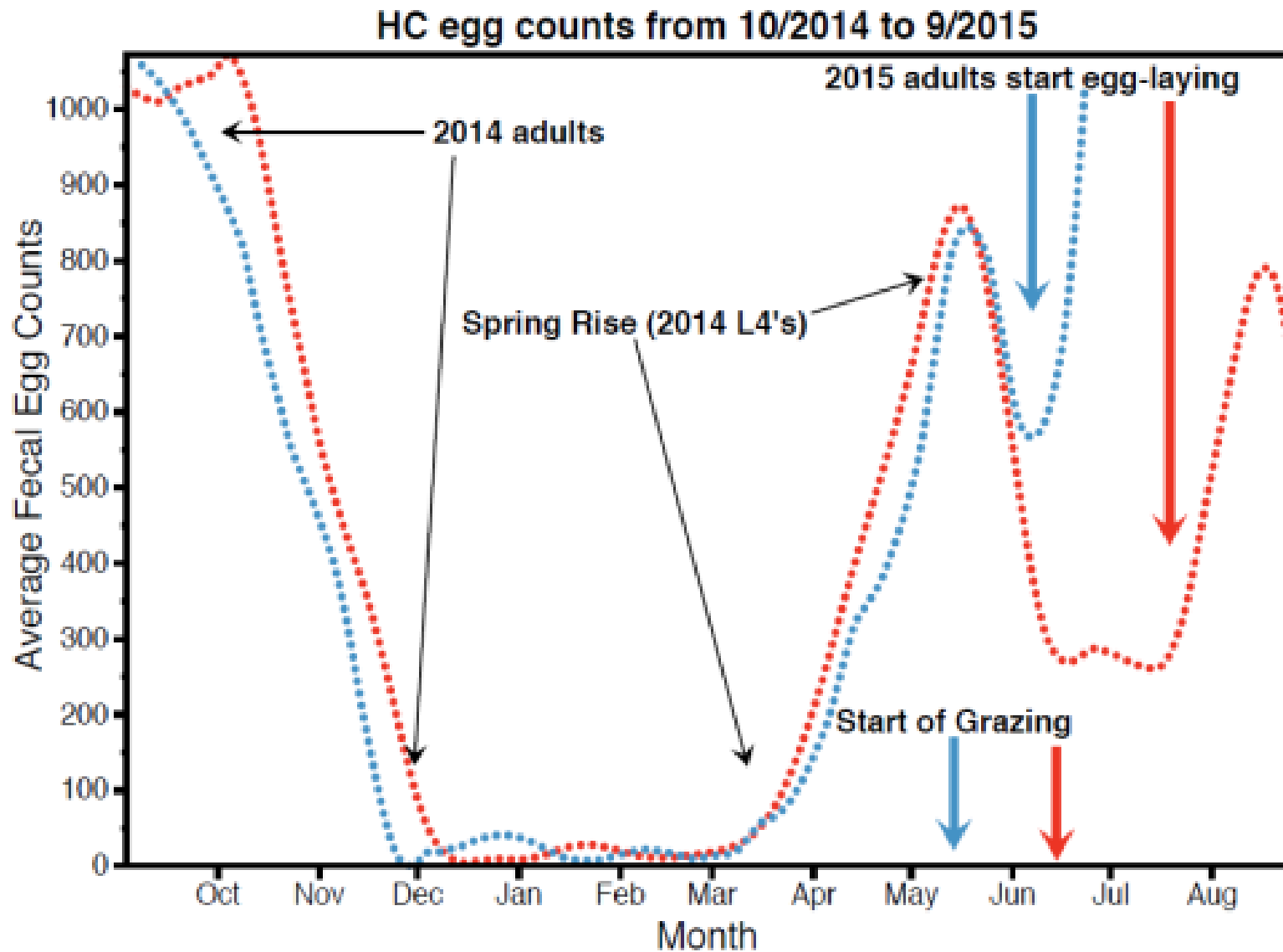
Can you implement any of them?



- lay down gravel, concrete, or herbicides
- close off access to barnyard or provide hay in barn at night when animals come in from pasture to cut down on night grazing in the barnyard
- Make barn yards small so that no grazing occurs
- Put in lanes or leave animals out 24/7

Spring Rise in barber pole worm egg counts

- Barber pole worm overwinters as dormant L4 (hypobiotic) larvae in hosts (goats, sheep)
- Estrogen surge at kidding, lambing or other cues of spring time cause L4 larvae to become adults and mate and produce eggs
- When the immune system is compromised by kidding, lambing or illness this can also cause the L4 larvae to break out of dormancy
- Same phenomenon occurs in other strongyle worms– but they may also overwinter outside



Blue line indicates barber pole worm (HC) fecal egg counts for ewes going out to pasture May 15th
 Red line indicated fecal egg counts for ewes kept in barn to flush out worm eggs until June 15th.
 Personal com., James Weber NESARE LNE14-337 2015 Annual Report

Immune Response

- Good nutrition stimulates immune system
- Many trace minerals (Se, Cu, etc.) and vitamins (Vit. E) important for good immune system. Work at WVU suggests bypass protein may also help boost immune system
- When goat/sheep are lactating or in late pregnancy, immune system is suppressed and does not fight parasites well.
- Protein consumption by ewes of 130% of daily requirements reduced flush of egg laying at lambing i.e. combats "Spring Rise"

Genetic Resistance

- Susceptibility to becoming infected with worms is affected by genetics as well as by environment
- Heritability for genetic resistance to strongyle worms appears to be similar to the heritability for milk yield
- Requires lots of records - compare fecal egg counts (FEC) for offspring of different sires

Chemical Dewormers

A valuable, limited resource that must be managed properly.

Three drug families

1) **Benzimidazoles**

Chemical name ends in
'..dazole

Fenbendazole, Albendazole,
Oxybendazole



2) **Nicotinics**

Levamisole, Morantel,
Pyrantel



3) **Macrolides**

Avermectins

Ivermectin, Doramectin
Moxidectin

Benzimidazoles – “white drenches”

- ***Fenbendazole*** – SafeGuard® or Panacur®
 - ***Albendazole*** – Valbazen®
 - ***Oxyfendazole*** – Synantic®
- Broad spectrum
 - Wide margin of safety
 - Effective against **tapeworms**
 - Valbazen
 - Effective against adult **liver flukes.**
 - Should not be administered to pregnant animals.



Nicotinics

- ***Levamisole*** - (clear drench). Tramisol ®, Levasole®, Prohibit®
 - ***Morantel***– Rumatel®, Positive Goat Pellet
 - ***Pyrantel*** - Strongid®
- Rumatel
 - Oral feed additive
 - Only effective against adult worms
 - Pyrantel
 - Only effective against adult worms
 - Levamisole
 - Broad spectrum
 - Effective against arrested larvae
 - Narrower margin of safety, especially injectable product



Macrolides

- ***Ivermectin*** –Ivomec® , Zimecterin® , Eprinex® , Promectin®
 - ***Doramectin*** - Dectomax®
 - ***Moxidectin*** – Cydectin® , Quest®
- Broad spectrum
 - Wide margin of safety
 - Effective against (sucking) external parasites
 - Moxidectin
 - Newest drug
 - Has “Persistent activity”



Extra-label drug use

- Only Fenbendazole (SafeGuard®), Morantel (Rumatel®) and Albendazole (Valbazen ®) are FDA-approved for goats.
- Only Albendazole (Valbazen ®), Ivomec ® drench, and Levamisole (drench and bolus) are FDA-approved for sheep.
- Use of a product that is different than its label constitutes **extra-label drug use** and requires a veterinary prescription in context of valid **veterinarian-patient-client relationship**. Few are approved for dairy animals.
- Should use exaggerated withdrawals when using drugs extra label (keep records). Check with <http://www.farad.org/>



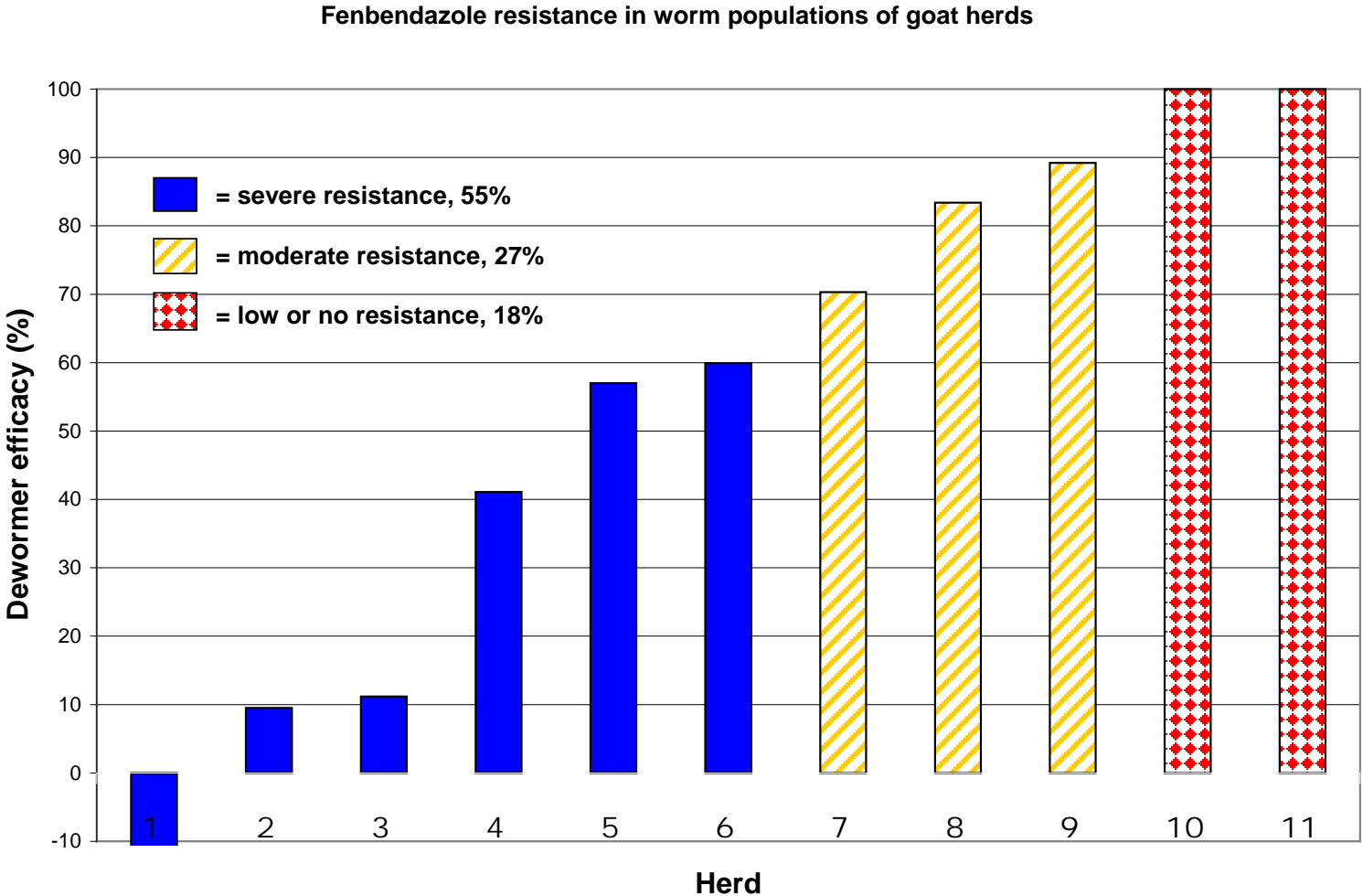
Traditional parasite control:

Maximize parasite control to

Maximize production and health

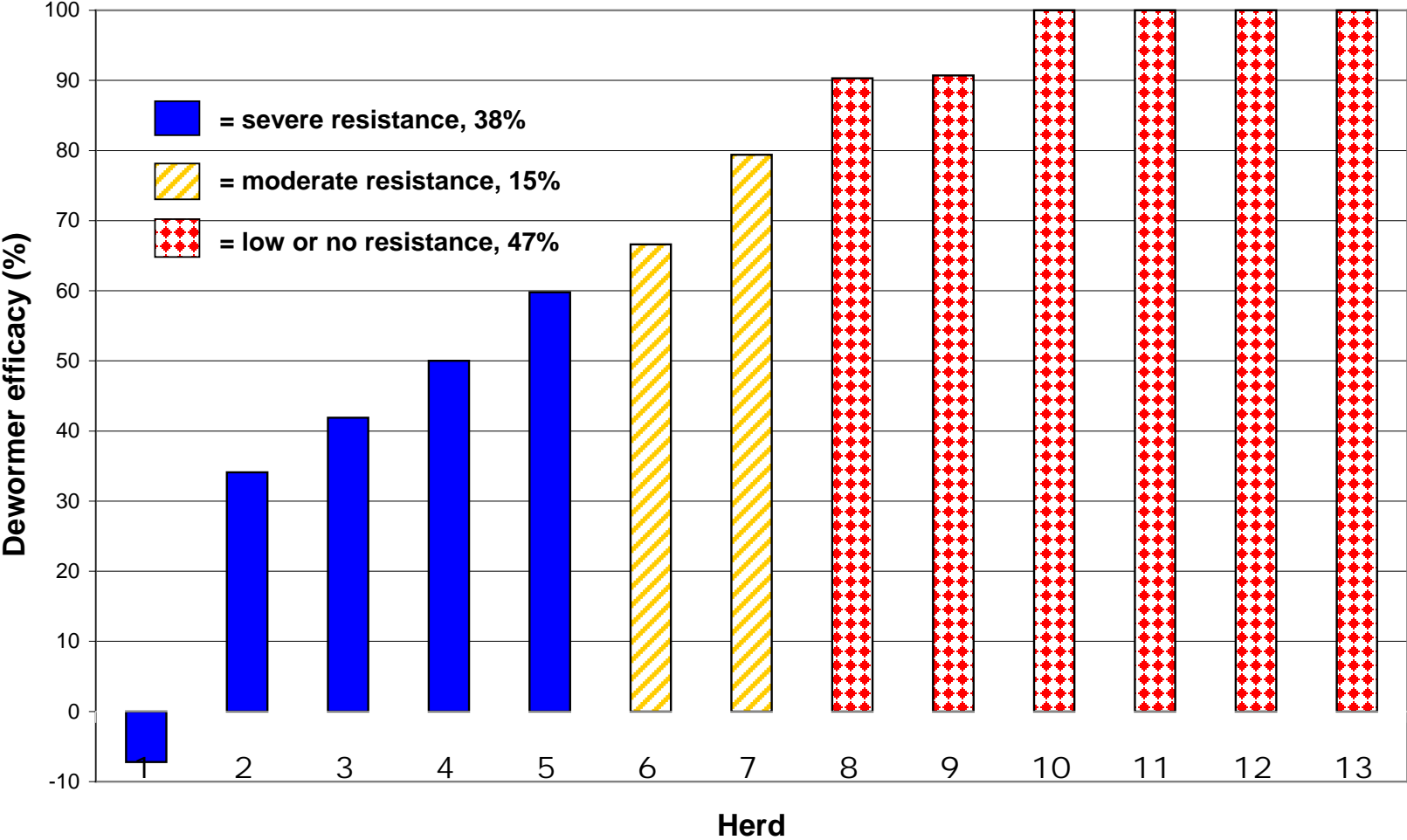
- Entire herd dewormed to meet needs of the most susceptible
- Strategic deworming of whole flock
- Rotate anthelmintics (dewormers) during the year
- Move to clean pastures at time of deworming
- If parasite control is poor, ask your vet for a new drug
- Good new drugs about every 10 years through the 1980s.
- **BUT BUILDS PROBLEMS**

Comparison of fecal egg counts before and 7 to 10 days after deworming in NY and PA goat herds



Comparison of fecal egg counts before and 7 to 10 days after deworming in NY and PA goat herds

Ivermectin resistance in worm populations of goat herds



Dewormer Resistance

2007 Results

- 83% severely or moderately resistant to Safeguard
- 53% severely or moderately resistant to Ivermectin
- Also saw resistance to albendazole (Valbazen), doramectin (Dectomax), and levamisole (Prohibit)
- **Our results indicated that dewormer resistance was fairly common in pasture-based goat herds in New York and Northern Pennsylvania by 2007.**

What Causes Resistance To Dewormers ???

- Frequent Treatments
 - ≥ 3 treatments per year
- Treating and moving to clean pasture
- Under dosing
- Treating when few larvae are on the pasture
- **Treating all animals at same time**



Effective Use of Dewormers

Few are approved for use in goats Fenbendazole (Panacur or Safeguard), Morantel (Rumatel or Positive Pellet), Albendazole (Valbazen) now carries a goat dosage

- Use 1.5 -2X sheep or cattle dose per lb. LW when deworming goats because goats have faster rate of passage and larger livers. Pour-on works poorly in goats and sheep (check w/ vet).
- Administer orally back behind tongue so dewormer goes to the rumen rather than the true stomach.
- Observe withdrawal period before using milk or slaughtering
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- Dewormers should generally not be injected
- Dewormers in feed or water -> hard to get right dose in animal

Use of Dewormers

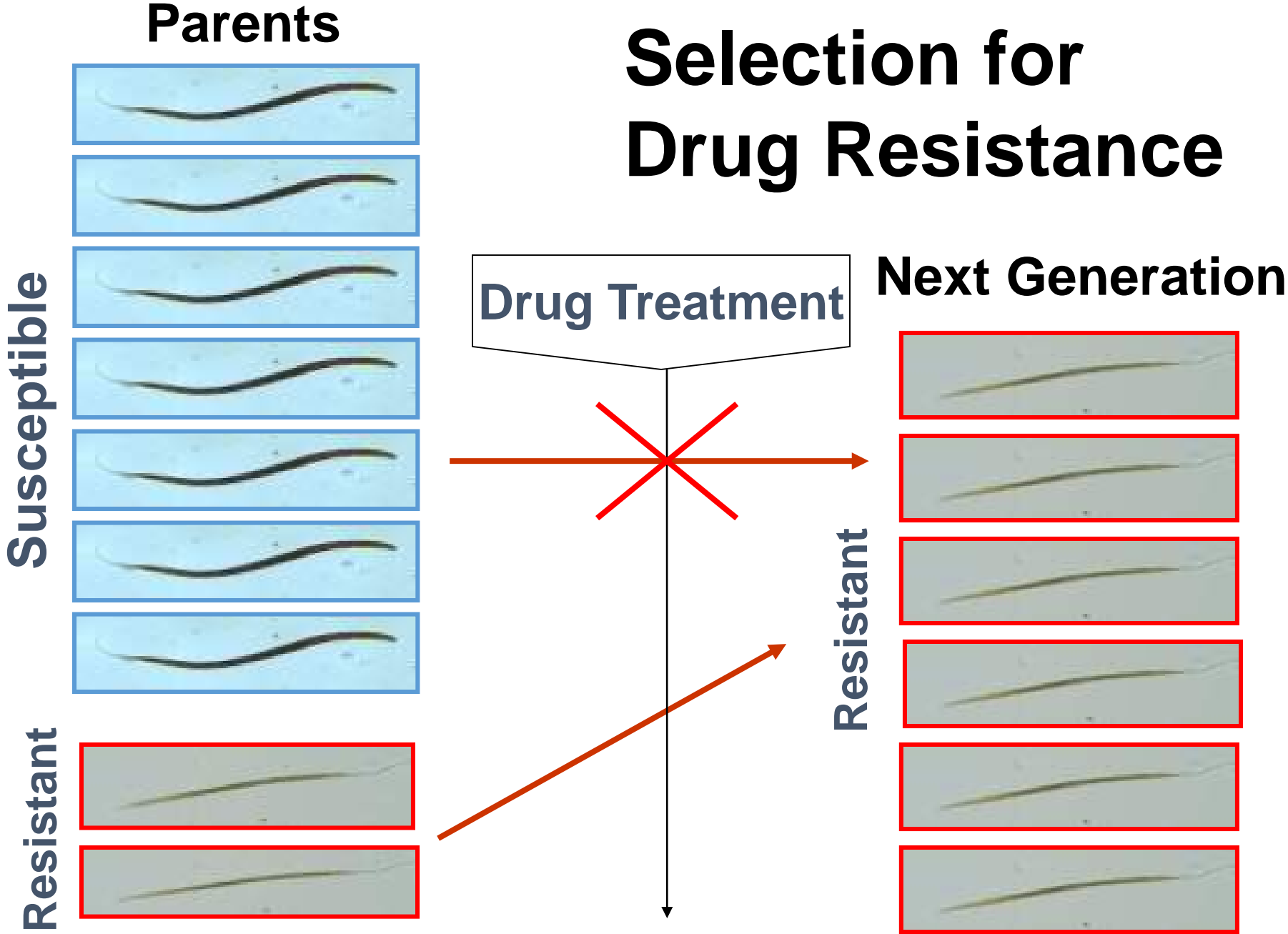
Increasing effectiveness of dewormer when resistance starting to occur:

- Hold animals off feed 16 hours and deworm and keep off feed 12 more hours (not in late pregnancy – why? Might bring on ketosis)
- Deworm twice 12 h apart- Benzimidazoles
- Deworm on the same day with 2 dewormers (do not mix together) from different families (only when selectively deworming)

Traditional → Leads to Dewormer Resistance and destroys the “Refugia”

- The proportion of the population that is not selected by dewormer treatment – In “refuge” from dewormer
- Refugia includes the worms in untreated animals, and the eggs and larvae on pasture before treatment
- Provides a pool of genes sensitive to dewormer – Dilutes genes resistant to dewormer

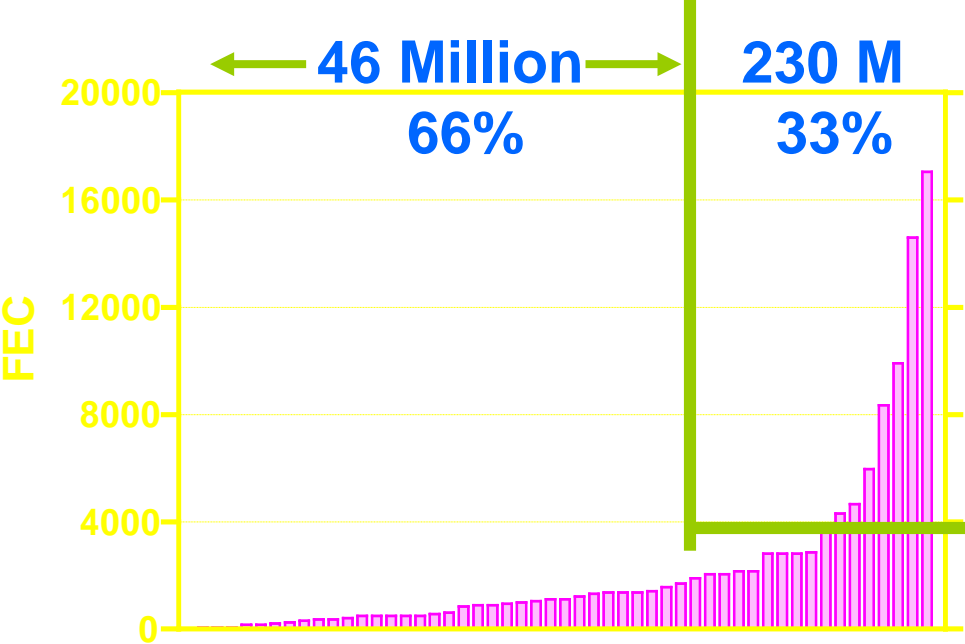
Selection for Drug Resistance



Selective Treatment

- Parasites are not equally distributed to all individuals
- Resistance of animals to the parasite differs
 - 20-30 % of animals harbor 80% of worms responsible for most of egg output and pasture contamination

Distribution of FEC in Goat Herds

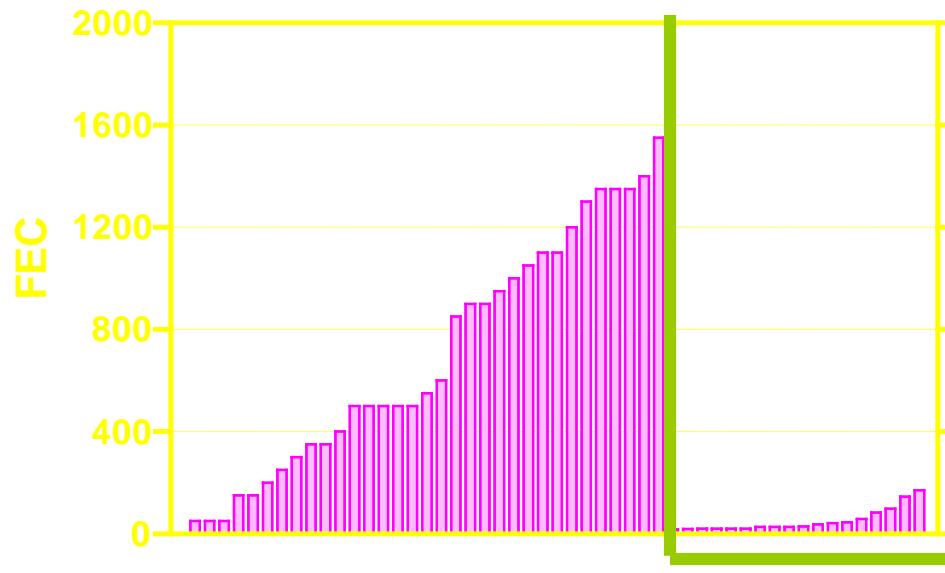


**Treating high 33%
Greatly Reduces
Daily Pasture
Contamination With
Eggs**

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

**Treating 1/3 of
herd 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%

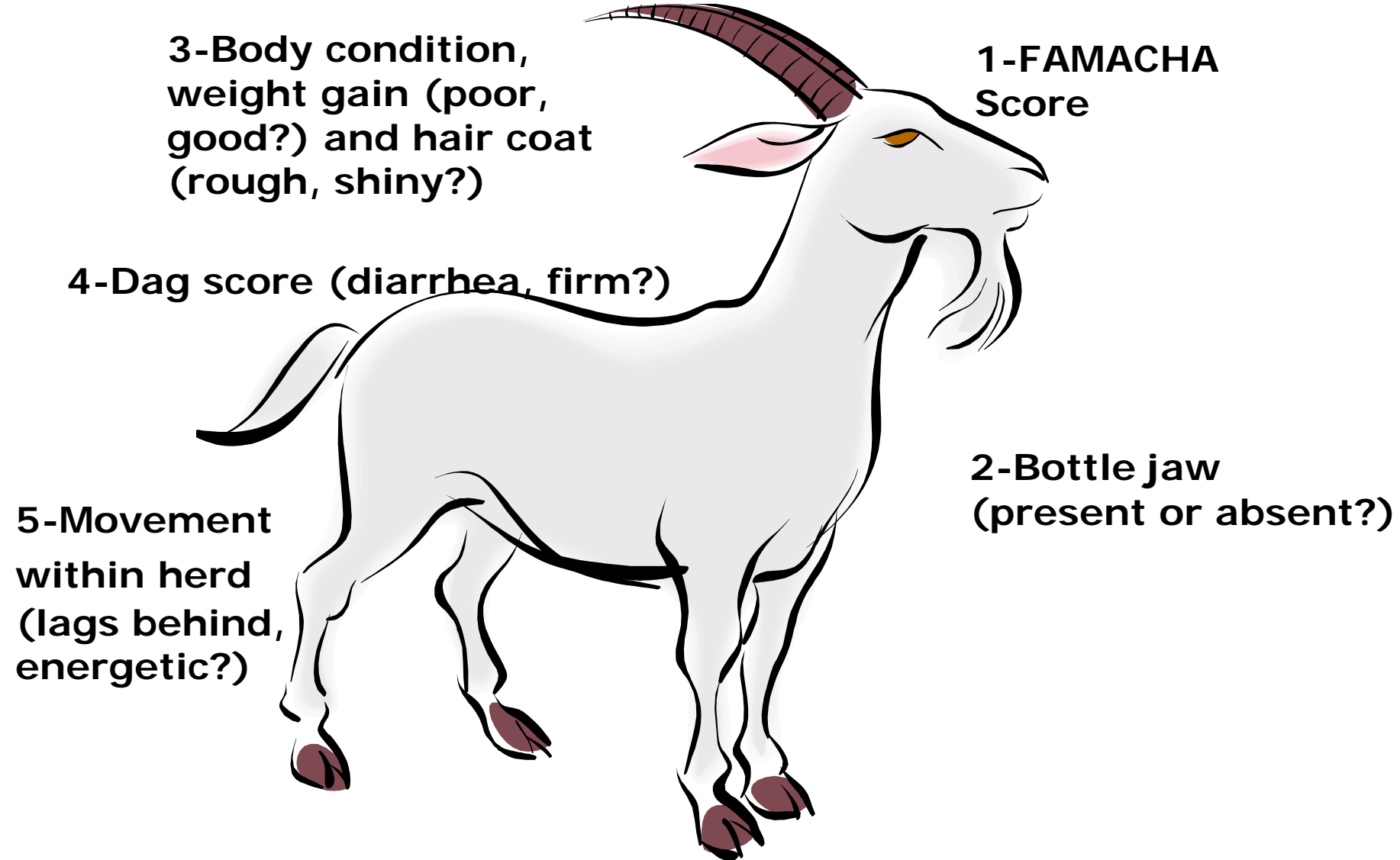
**33% of Goats
< 5% of Eggs**

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

How Do We Achieve Selective Treatment???

- **5 Point check needs to include FAMACHA in order to monitor for barber pole worm as well as signs of other parasite infestations that are easy to observe such as diarrhea and poor growth.**
- **The FAMACHA[®] system**
 - Developed in response to development of severe dewormer resistance in South Africa
 - Method of selective deworming that substantially decreases the number of deworming treatments given in a flock
 - **Significantly decreases the rate of development of anthelmintic resistance**

Example Five Point Check



FAMACHA©



Look at color of membrane inside lower eyelid (Cover, Push, Pull and POP!

Treat adults at scores 4 and 5*

Treat lambs & kids at scores 3, 4, and 5

- If in doubt, score at paler category

- Do not use in isolation – use FECs, evasive grazing, and other effective management practices.

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

Selective Treatment

FAMACHA – For accuracy,

- 1) Do in sunlight or very bright lighting (e.g. high intensity 500 watt quartz work light).
- 2) Do at least every two weeks during the grazing season, only good for barber pole worm, take a certification course,
- 3) Be aware of other potential causes of anemia (sucking lice, liver flukes, disease, etc.) or red membranes (irritation, fever, etc.).



Integrating the FAMACHA[®] System

- If there are <10% in categories 4 or 5, then safe but remember to treat categories 4 and 5
- Treat 4's and 5's with an effective anthelmintic
- You must know what drugs are effective on your farm, this is where FEC can really help!
- Re-examine herd two weeks later



Integrating the FAMACHA[©] System

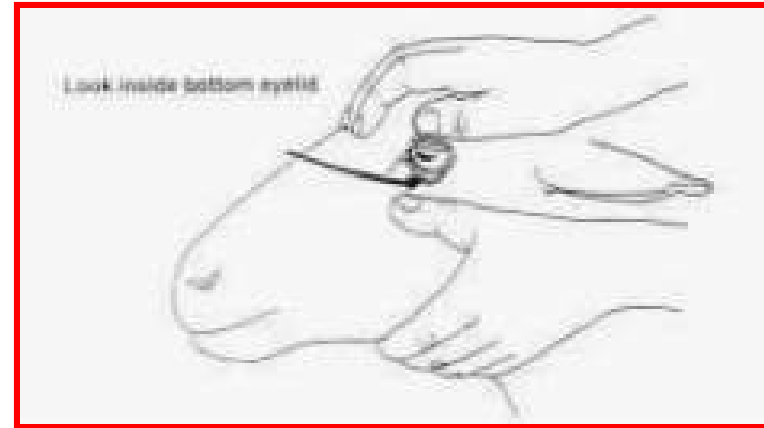
- **If >10% of flock/herd in categories 4 & 5, consider treating 3's as well**
- **Change pastures if possible**
 - **Do not treat all animals before move**
- **HOWEVER, You want to avoid getting to this stage by checking frequently enough that you catch the problem before >10% are 4's and 5's.**
 - **If this happens, start checking 1X per week**

Recommended To Treat 3s When:

- **>10% of herd or flock is in categories 4 or 5**

OR

- **Young animals**
- **Ewes/does around the time of lambing/kidding**
- **Thin, poorly conditioned animals**



If down to 1 effective drug, consider using less effective drugs on your "category 3" animals

Do Not Buy Resistant Worms!



- All new additions should be quarantined and aggressively dewormed upon arrival
- Deworm with all 3 dewormer classes – do not mix together; give separately on same day
- Should remain in quarantine for at least 14 days
 - Do not put their manure on pasture
 - Perform FEC to confirm that no more worms are being shed