



# Goat Parasite Workshop

## Dewormers and Dewormer Resistance

### Introduction to Eye Scores

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# Proper Drug Usage

- **Drugs must be labeled for the use and species.**
  - Applies to both OTC and Rx drugs
  - Off label use is the domain of licensed veterinarians who must address the questions of dose, route, duration and withdrawal time
- **FDA regulations require a valid client-patient relationship (vet has been to your farm and knows your animals) for off-the label use of drugs such as dewormers.**
- **Violations are the liability of the producer!**

# 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
- **If a drug is not effective, other drugs in that family will not be either.**

# Benzamidoles

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

# Cell Depolarizers

- **Levamisole (Tramisol, Levasole)**
- **Morantel/Pyrantel (Rumatel, Positive Pellet)**
- **Basically only effective against roundworms**
- **Overdose can kill!! You must know what goats weigh to use safely.**

# **Avermectins/Milbemycins**

- **Ivermectin (Ivomec)**
- **Dormectrin (Dectomax)**
- **Eprinomectin (Eprinex)**
- **Moxidectin (Cydectin) long residual effect**
- **Effective against roundworms, arrested roundworms, lung worms, sucking lice**

# Use of Dewormers

- **Few are approved for use in goats**
  - Fenbendazole (Panacur or Safeguard)
  - Marantel (Rumatel or Positive Pellet)
- **Use larger dose than sheep or cattle per lb. because goats have faster rate of passage and larger livers.**
- **Administer orally back behind tongue so they go to the rumen**

# Use of Dewormers

- **Keep off pasture for 24 hours to drop eggs**
- **Observe withdrawal period before selling**
- **Pour-on works poorly in goats**
- **Dewormers should not be injected**



# Use of Dewormers

- **Increasing effectiveness of dewormer**
  - Hold animals off feed 16 hours and deworm and keep off feed 12 more hours (not late preg).
  - Deworm twice 12 h apart-Benzamidoles
  - Blocks or feed-problems with each animal getting dose
  - Deworming in water-suckling kids don't drink much

# Parasite Dewormer Strategies

## 1. Salvage save animal's life

Severe production loss has already occurred by this time and goats are more subject to other diseases

# Parasite Dewormer Strategies

- 2. Strategic-deworming at strategic times when worms are most likely to be a problem - Prekidding and weaning**

Strategic times neglect year to year differences in the weather

# Parasite Dewormer Strategies

**3. Opportunistic- when we are working the goats and it is convenient to deworm them.**

Effectiveness depends on when the time happens to fall that they get dewormed. Goats may need dewormed badly when we are not working them. They may not need dewormed when we work them.

# Parasite Dewormer Strategies

## **4. Tactical Deworming when weather conditions are favorable for transmission of parasites**

Barber pole worm requires 2 inches of rain in a month period and a mean temperature greater than 60F. Best to use fecal egg counts.

# Parasite Dewormer Strategies

- 5. Suppressive-giving dewormer at regular intervals ie. 30 days**

Expensive, effective in short term, but much faster development of dewormer resistance.

# Dewormer Resistance

- Biggest threat to the goat industry in the near future 3-5 years
- Means we will have to rely on techniques other than dewormers to control worms
- Animal selection
- Pasture rotation
- Co-species grazing
- Low stocking rates, etc

# What Is Dewormer Resistance?

- An effective dewormer will reduce fecal egg counts by 95 % 7-14 days after giving the dewormer
- Fecal Egg Count before deworming 1,000 eggs per gram
- 10 days after deworming 200 eggs per gram = 80% fecal egg count reduction



# Fecal Egg Count Reduction Tests

- Need 10 animals per group
- Need an average egg count of at least 200 eggs per gram
- All animals should have more than 100 eggs per gram
- Take post treatment samples at least 7 days up to 14 days after deworming
- Compare post-treatment with pretreatment

# Oklahoma Farm FECR %

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

# Dewormer Resistance

- **Georgia,**
- **Resistance to Valbazen 15/15 farms (100%)**
- **Resistance to Ivermectin 17 of 18 farms (94%)**
- **Resistance to Cydectin on 4 of 18 farms (22%)**

# Preventing Dewormer Resistance

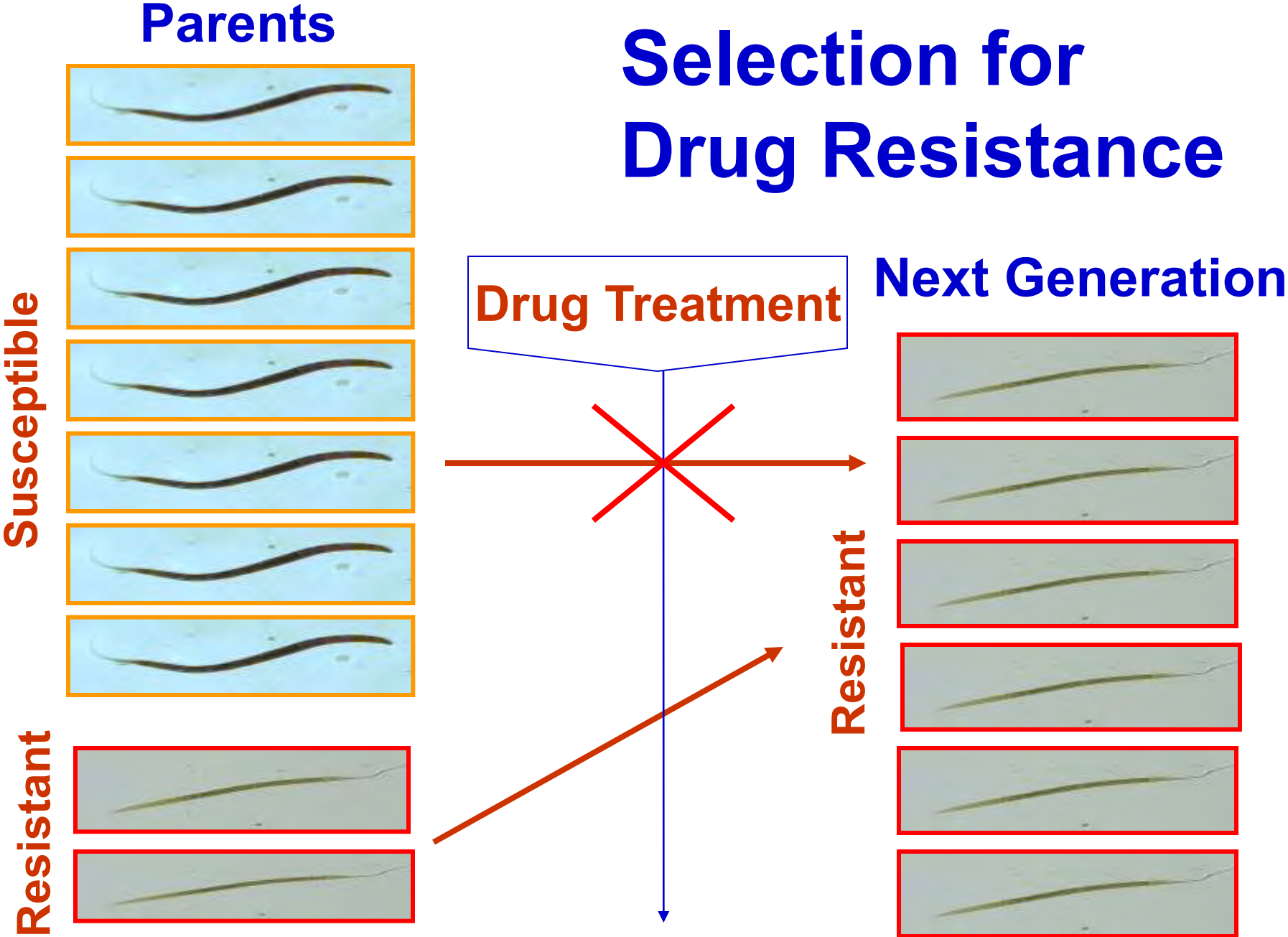
- Use the correct dose of dewormer
- No scientific evidence that rotation of dewormers will delay development of resistance
- Must verify that each dewormer is working by doing a fecal egg count reduction test
- If you are deworming more than 2-3 x a year you are increasing dewormer resistance
- Biggest factor is using other management practices to reduce need for deworming

# Do Not Buy Resistant Worms

- All new additions should be quarantined and aggressively dewormed upon arrival
- Deworm with 3 anthelmintics from different drug classes
- Should remain in quarantine for 10 - 14 days
  - Perform FEC to confirm that no eggs are shed



# Selection for Drug Resistance



# Why Doesn't it Seem As Bad As it Sounds ???

- Not all worms on farm are resistant to anthelmintics
- Killing some worms may relieve disease symptoms
  - Removing 50% of worms will result in clinical improvement
  - It appears that the treatment was effective
  - Animals require treatment again very soon
- Eventually most worms become resistant and treatment fails – animals may die

# Refugia

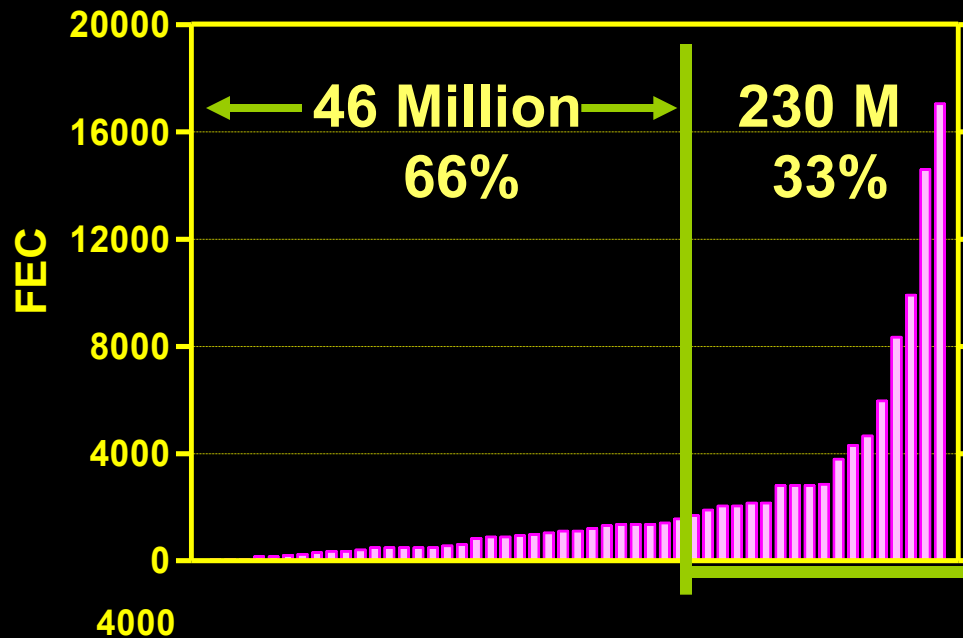
- **The proportion of the population that is not selected by drug treatment**
  - In “refuge” from drug
- **Worms in untreated animals**
- **Eggs and larvae on pasture**
- **Provides a pool of genes sensitive to dewormer**
  - Dilutes genes resistant to dewormer
- **Until recently, overlooked as the most important component of drug resistance selection**



# Concept Behind Selective Treatment

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

# Distribution of FEC in Goat Herds



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

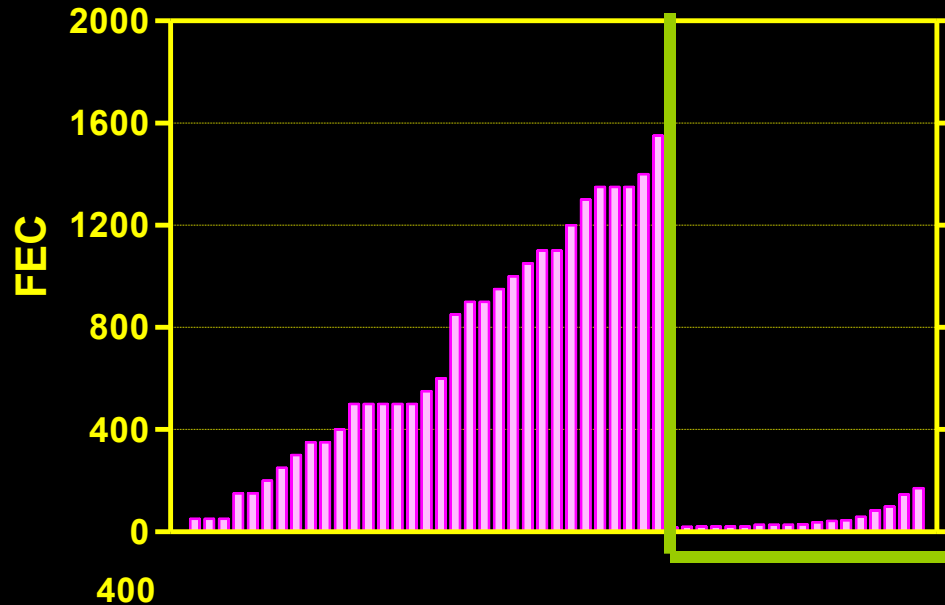
**33% of Goats  
80% of Eggs**

FEC  
3000  
2000  
1000  
0

Individual Goats

**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%**

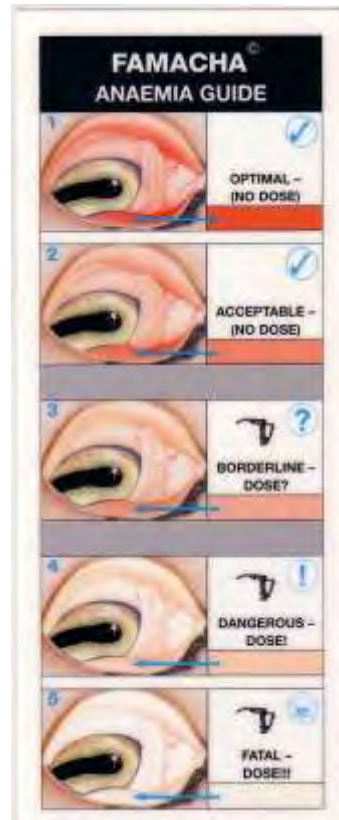
**33% of Goats  
< 5% of Eggs**



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

# Selective Treatment

# FAMACHA

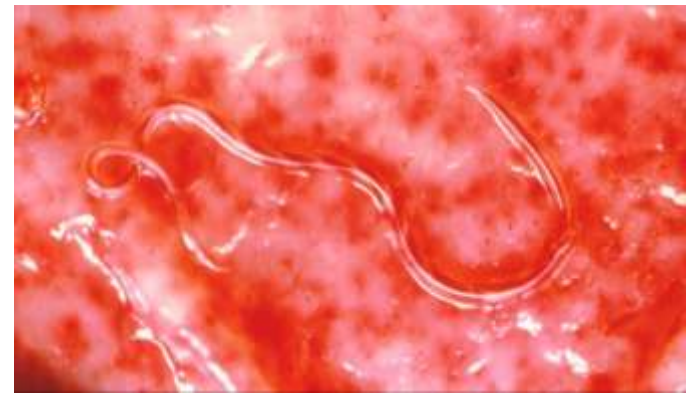


# How Do We Achieve Selective Treatment ???

- **The FAMACHA<sup>©</sup> system**
  - Novel technique for the assessment of *Haemonchus contortus* and need for Tx.
  - Developed in response to emergence of severe dewormer resistance in South Africa
  - Method of selective chemotherapy which leads to a large reduction in the number of deworming treatments given
    - significantly decreases the rate of development of anthelmintic resistance

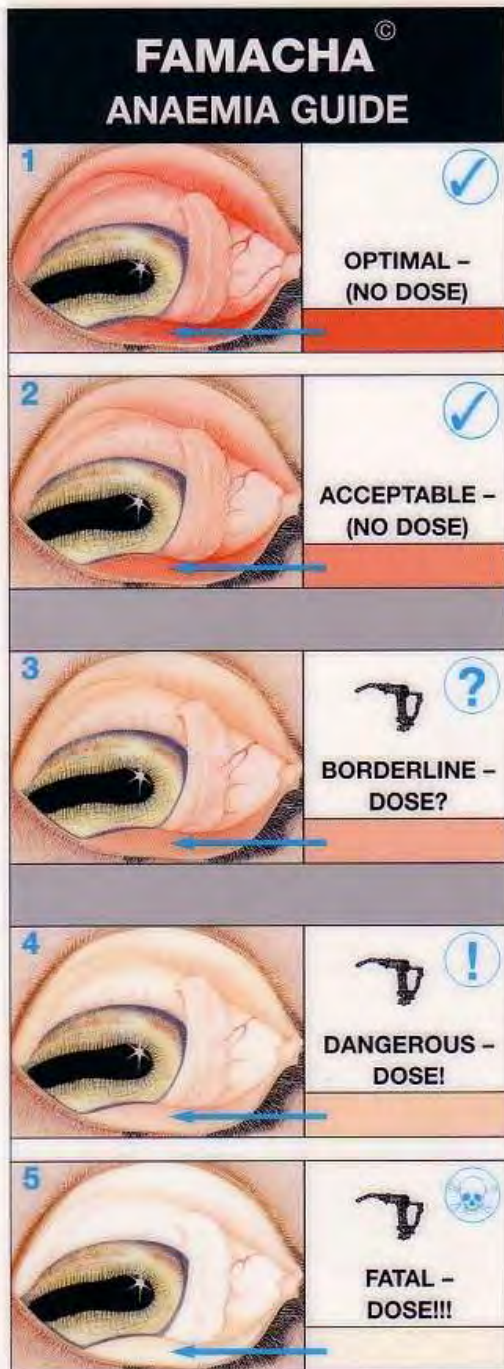
# How Does FAMACHA Work ???

- Since primary impact of *Barber pole worm* is anemia, one can indirectly measure parasite burden (and need for treatment) by measuring anemia
- Only useful where *the Barber pole worm* is the primary parasite species



# FAMACHA

- **Use as guide to determine which animals to treat**
  - Significantly reduces number of treatments given when compared with conventional drenching practices
  - Should significantly decrease the rate of development of anthelmintic resistance



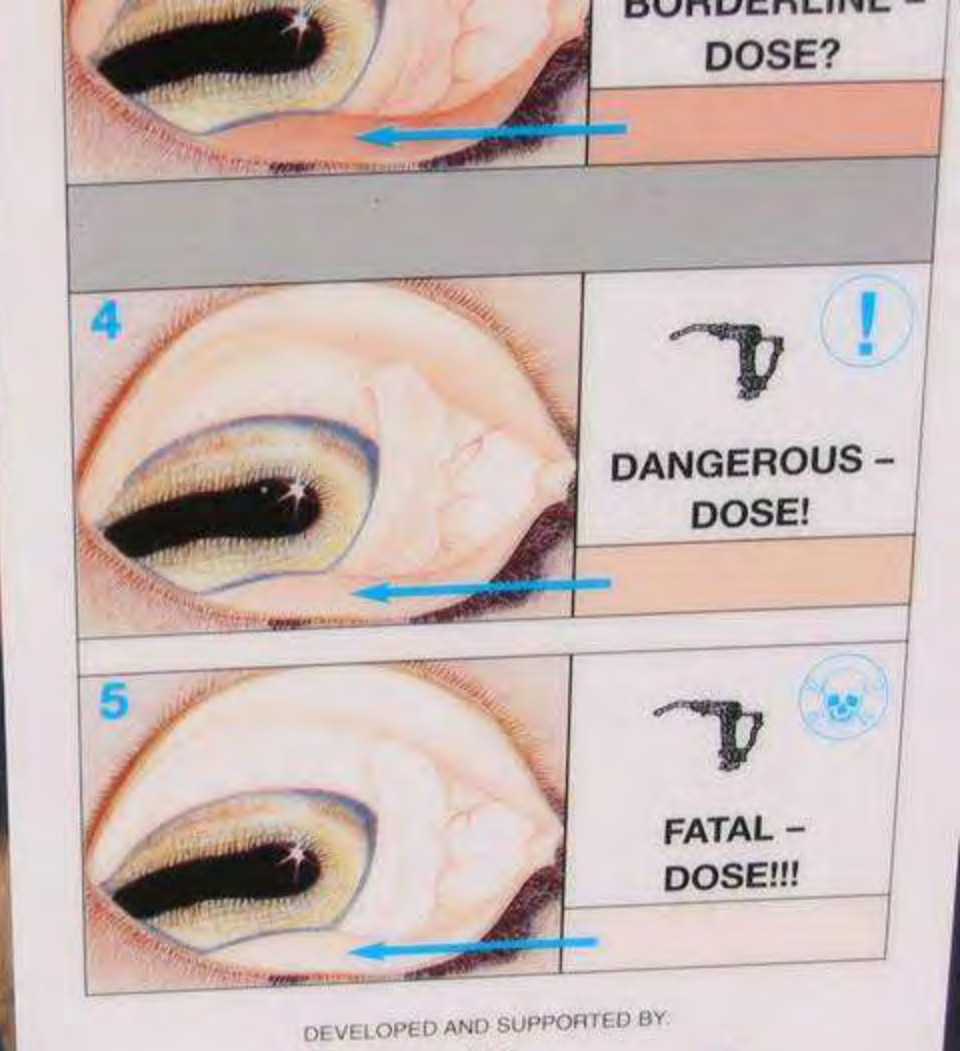
# The FAMACHA<sup>®</sup> System

- Eye color chart with five color categories
- Compare chart with color of mucous membranes of sheep or goat
- Classification into one of five color categories:
  - 1 – not anemic
  - 5 -- severely anemic





- **Examine in sunlight**
- **Open as shown - for a short time only**
- **Look at color inside lower eyelid**



**Always Use Card !!!  
Compare eye color to chart**



# Other Recommendations for Proper Use

- **Check both eyes**
  - Score animal based on highest eye score
- **No ½ scores**
  - Assign higher whole number score if unsure
- **Do not hold eye open more than few seconds**
  - Wait and retry in other eye

# Other Recommendations for Proper Use

- **Keep records !!!!**
  - Record numbers of animals in each category on the block histogram score sheet provided
    - An easy visual record of situation in herd/flock
  - On large farms animals can be tagged in a variety of ways

# FAMACHA ANEMIA RECORD

Group ID: \_\_\_\_\_

Category						Totals				
	1	2	3	4	5	1	2	3	4	5
Date: 5/1 Treatment:						15	27	12	1	0
Date: 5/15 Treatment:						5	22	20	8	0
Date: 6/1 Treatment:						0	18	25	11	1
Date: Treatment:										
Date: Treatment:										

● Counted

✓ Counted and Treated

✗ Bottle Jaw - Treated

# General Treatment Guidelines When Using FAMACHA

- Treat goats and sheep in categories 4 and 5 with an effective anthelmintic
  - You must know what drugs are effective on your farm.
- If in doubt, score at paler category
- Do not use in isolation – use FECs, rotational grazing, strategic or tactical treatments

# Integrating the FAMACHA<sup>©</sup> System

- **If there are none in categories 4 or 5, then safe**
- **Re-examine two weeks later if weather is warm**
- **In dry or cool times of year every 4 -6 weeks may be sufficient**
  - Gain experience
  - Be careful

# Integrating the FAMACHA<sup>©</sup> System

- **If there are < 10% in categories 4 or 5, then safe but remember to treat categories 4 and 5**
- **Re-examine two weeks later**



# Integrating the FAMACHA<sup>®</sup> System

- **If >10% of flock/herd in categories 4 and 5, consider treating 3s as well**
- **Change pastures if possible**
  - Do not treat all animals before move
- **Consider checking more frequently**
  - 1X per week

# **Recommended To Treat 3s**

## **When:**

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

# **Integrating the FAMACHA<sup>®</sup> System**

- **Examine especially animals which lag behind the flock/herd**
- **Check for animals with “bottle jaw” and treat these, regardless of whether they look anemic or not**
  - This may indicate large numbers of other roundworms that do not consume blood.

# Other Advantage of Selective Treatment (FAMACHA)

- **Identify animals that need treatment most often**
  - These are the ones contaminating the pasture for others in the herd/flock
  - **Cull all animals that were treated, along with their offspring**
  - Improves genetics of resistance of the herd/flock
  - Significantly cuts down on need of anthelmintics in subsequent years

# Precautions

- Paleness or reddening of the eyes may have other causes
  - Other causes of anemia:
    - Other parasites
    - Nutritional deficiencies
    - Other diseases
  - Other causes of redness:
    - Environmental conditions
    - Other diseases
    - Infectious eye diseases

# Precautions

- Only properly trained persons should apply the FAMACHA<sup>©</sup> system
- The card is an **AID** in the control of *Haemonchus* **ONLY**
- Maintain an integrated management-based worm control program
- The system is best used by producers where back-up assistance is available from a veterinarian

# Precautions

- **Lambs/kids and pregnant or lactating ewes/does need special attention**
- **Always score animals with the help of the chart, not from memory**
- **Replace card after 12 months' use**

# Precautions

- **FAMACHA is part of a total worm control program – not a replacement**
- **Maintain standard worm control measures:**
  - Monitoring of fecal egg counts
  - Rotational grazing
  - Resting pastures (2 or more months)
  - Alternation of goats with cattle or horses



# Precautions

- **System Sounds Simple**
- **If used improperly death of animals is a possibility**
  - Cannot be used in a vacuum
    - Must take other factors into consideration in making treatment decisions
  - Must know if anthelmintic used is effective

# Where Do I Get FAMACHA Cards ???

- **By request of Professor Bath in South Africa, only properly trained lay individuals can purchase the cards**
  - Sanctioned Training Workshop
- **Through a veterinarian**
  - Vets expected to train themselves before training others
- **Through extension agents who have received training**
- **Information at [famacha@vet.uga.edu](mailto:famacha@vet.uga.edu)**

# Management to Reduce Parasite Problems

- **Stocking rates < 2 hd/ acre**
- **Grazing cattle or horses with goats**
- **Don't graze close to ground**
- **Haymaking or tillage**
- **Pasture rotation with 6 or more weeks rest**
- **Browse or animals eating off ground**

# Future prospects

- **New Dewormers**
  - at least 10 years away so plan for making do with the existing ones
  - not likely new dewormers will be licensed for use in goats?
- **Vaccines**
  - at least 5-10 years away
  - first one likely to be only for *Haemonchus*
  - won't be 100% effective like drenches
- **Fungi**
  - currently being researched
  - feed spores to stock → fungi grow in faeces → fungi kill worm larvae in faeces
  - no slow delivery system at present

- **Use of specialized crops**
  - mainly those with tannins
  - not sure how they work
  - looking for other crops with anthelmintic activity
  - would be worth investigating with goats
- **Breeding for enhanced immunity**
  - possible but slow - similar heritability of about 0.3 as in sheep
  - some research in Scotland has shown progress over some years (5-6 generations) at a similar rate to improvements in sheep
  - are differences in mature immunity between breeds ?
  - Angoras < Boer < Spanish? Kiko?

# Near Future

- Dewormer resistance will have a major impact on the goat industry in the next few years
- We are going to have to use more management and a minimum of dewormer
- We are going to have to monitor parasites whether by FAMACHA or FEC