

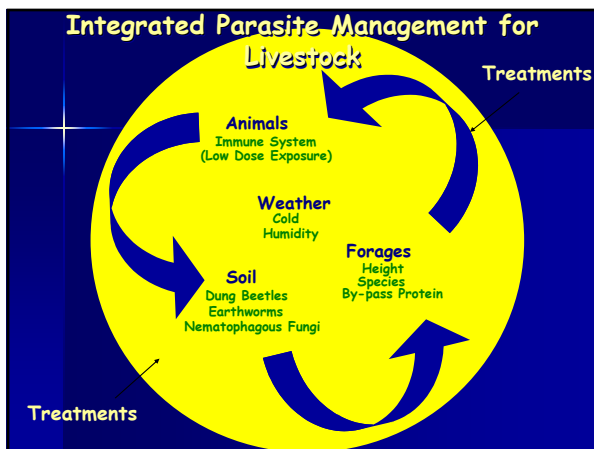
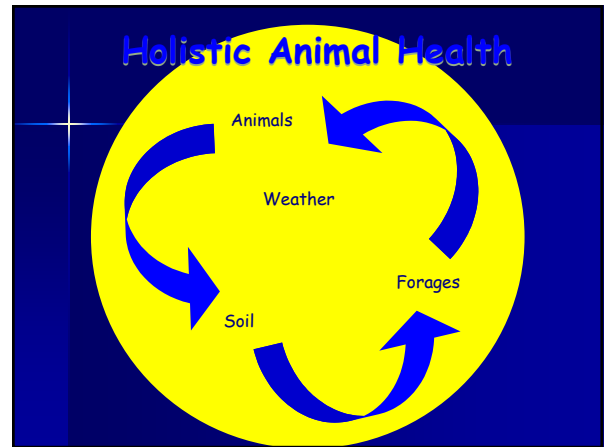


Severity of Parasitism

Goats ≥ Sheep ≥ Dairy Cattle ≥ Beef Cattle

Parasites

- Disease & Symptom



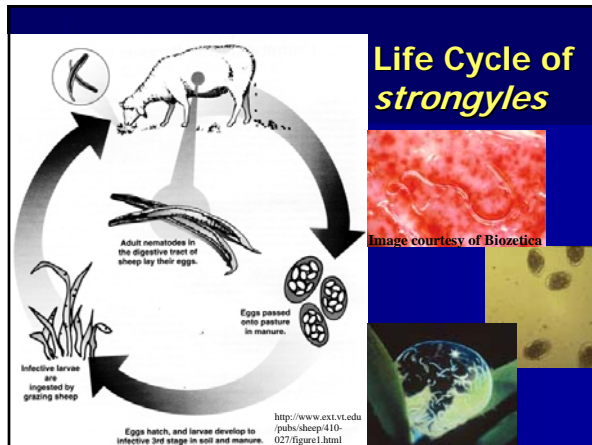
Dung Beetle Activity

Synthetics allowed

- (13) Paraciticides, Ivermectin - prohibited in slaughter stock, allowed in emergency treatment for dairy and breeder stock when organic system plan-approved preventive management does not prevent infestation. Milk or milk products from a treated animal cannot be labeled as provided for in subpart D of this part for 90 days following treatment. In breeder stock, treatment cannot occur during the last third of gestation if the progeny will be sold as organic and must not be used during the lactation period for breeding stock.

Ivermectin

- Dung Beetle Effects
- Moxidectin (Cydectin)



Gastrointestinal Nematodes of Cattle

Major pathogens:

Ostertagia ostertagi
Haemonchus placei
Trichostrongylus axei

Less important genera:

Cooperia
Oesophagostomum
Nematodirus
Trichuris

Gastrointestinal Nematodes of Small Ruminants

Major pathogens:

Haemonchus contortus
Trichostrongylus colubriformis
Teladorsagia (Ostertagia) circumcincta
Trichostrongylus axei

Less important genera:

Cooperia
Oesophagostomum
Nematodirus
Trichuris

Ostertagiasis

- Most important parasitic disease in cattle
- Type I
 - Primarily young cattle
 - First season of grazing from immature adults
 - Diarrhea, anorexia, dehydration
 - Late summer, early fall
- Type II
 - Hypobiosis
 - Spring time highest incidence

Parasite Management

- **Resistance:** The ability of an animal to prevent establishment and maintenance of a parasite population in the GI tract
- **Resilience:** The ability of the host to maintain a relatively undepressed level of production during a parasite challenge
- Major part of parasite live cycle is outside animal

Tests

- **Fecal Samples and what they tell us**
 - Simple fecal sample- not much
 - Fecal egg count- same animal or time of year
 - Cattle 200-300 epg
 - Sheep/goats 5000+ epg
- **FAMACHA test**
 - Veterinarians can purchase FAMACHA® cards by making requests to famacha@vet.uga.edu

McMaster Fecal Egg Count

- Quick, easy to perform
- Should be part of routine parasite control program monitoring
- Easy means to determine efficacy of



McMasters slides

Chalex Corporation
5004-228th Ave SE
Issaquah, WA. 98029
Phone 425-391-1169; Fax 541-886-3300
<http://www.vetslides.com/>

Selective Treatment FAMACHA



FAMACHA

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

Effect of a constant temperature on egg and larval survival of *Ostertagia ostertagia*

Temperature	Egg Survival	L ₃ Survival
14° F	6 weeks	6 weeks
34	46 weeks	>52 weeks
39	50 weeks	>52 weeks
68	No data	30 weeks
77	No data	42 weeks
86	No data	18 weeks
95	No data	10 weeks
104	24 hours	2 days
113	12 hours	8 hours
122	4 hours	1 hour

Grazing Management for Parasite Control

- Rotate pastures
- Stock density
- Height of forage
- Frequency of rotations
- Grazing with multiple species



Herbal Leys

- Mixtures of grasses, legumes, forbs
 - Nutritional
 - Medicinal
- Persistence of forbs requires long rest periods
- Important compounds
 - Phenols--eugenol, condensed tannins
 - Terpenes--sesquiterpene lactones



Mineral Contribution by Forbs

Compared to perennial ryegrass

Dock	P, K, Mg
Chickweed	P, K, Mg, Na
Stinging Nettle	P, K, Ca, Mg, Cu
Buttercup	P, K, Ca, Na, Cu
Dandelion	K, Ca, Mg, Na, Cu
Chicory	P, K, Ca, Mg, Na, Cu, Co
Plantain	K, Ca, Mg, Na, Cu
Burnet	Ca, Mg
Yarrow	P, K, Ca, Mg, Cu
White Clover	Ca, Mg, Na, Cu, Co

Younie, 2003



Research Trial

- A 3-year field evaluation of pasture rotation and supplementary feeding to control parasite infection in first-season grazing cattle— Effects on animal performance
 - Veterinary Parasitology 142 (2006) 197–206
- Compared cattle rotated one time from pasture to aftermath to cattle fed supplemental feed to cattle continuously grazed and dewormed monthly

Results

- Cattle rotated once had similar weight gains to cattle dewormed monthly

High Tannin Forages

- **Birdsfoot trefoil, *Serecea lespedeza*, Dock**
- **Chicory (sesquiterpenes)**
 - Affect the survival/migration of infective larvae in the sward.
 - Tannin content has a direct toxic effect on the parasite and/or parasite egg production.
 - Improve the protein and/or mineral status of grazed sheep thereby enhancing their growth and potentially the immune response corresponding to an improve 'resilience'.

Plant compounds and effects

In vitro, larval migration was inhibited most by
Dorycnium pentaphyllum (not in US)
Sainfoin
Lotus pedunculatus (CT high MW)
D. rectum
Dock
L. corniculatus

Older larvae (7 mo) were more affected than 1 month old larvae CT paralyzed larvae

Raspberry canes and roots (Taylor, Murant, 1966)
Molan, Waghorn, Min, McNabb, 2000

In vivo

Lambs grazing birdsfoot trefoil

lower FEC & nematodes than chicory, ryegrass/white clover

Lambs grazing the chicory

similar fecal egg counts as ryegrass/white clover
fewer nematodes

Marley, Cook, Keatinge, Barrett, Lampkin, 2003.

Lambs grazing sulla and maku had lower FEC & higher wt gains compared with 4 other forages
Higher worm burdens

Robertson, Niezen, Waghorn, Charleston, Jinlong, 1995

Condensed tannins may enhance the immune response

Niezen, Charleston, Robertson, et al, 2002

FECs goats grazing sericea lespedeza, (*Lespedeza cuneata*)
dropped dramatically, in as little as five days,
Rebounded when the goats were grazed on non-tannin forages

Affecting worms w/o killing them?

Min, Pomroy, Hart, Sahl, 2004

Quebracho

- **Citation:** Wildeus, S., Zajac, A.M., Turner, K.E., Collins, J.R. 2004. The effect of quebracho tannin supplementation on growth and parasitism in young goats and hair sheep grazing parasite-infected pasture. Journal of Animal Science Abstracts. 2004 ASAS Southern Meeting. 82(Supplement 1):29.
- Results indicate that a commercial form of condensed tannin fed at 5% of DM intake had no effect on gastrointestinal parasitism.
- Mucosal thickening of the large intestine

Echinacea

- Cichoric acid, caffeic acid content (Pellati, Benvenuti, et al, 2004)
- Cell-mediated immune responses (Mishima, Saito, et al, 2004)
- Animals response to parasites:
 - Increased IgG
 - Increased Eosinophils
 - Antigen/antibody response

Herbal Dewormers

Wormwood	<i>Artemisia absinthium</i>
Epazote	<i>Chenopodium ambrosioides</i>
African basil	<i>Ocimum gratissimum</i>
Holy basil	<i>O. sanctum</i>
Garlic Barrier	www.garlicbarrier.com/SARE_2002_Report.html

Commercial Herbal Deworming Products

- Hoeggers
 - wormwood, gentian, fennel, psyllium, quassia
- Molly's Herbal Formula
 - wormwood, garlic, fennel, black walnut, stevia
- Molly's Weekly Formula & Tonic
 - garlic, pumpkin seed, mugwort, fennel, elecampane, hyssop, thyme, stevia
- Farmstead Health Restore
 - wormwood, garlic, gentian, fennel, psyllium, centaury
- Farmstead Health Sustain (tonic)
 - coltsfoot, coriander seed, fennel seed, Irish moss, juniper berry, yarrow, rosehips, rhubarb root, sea kelp

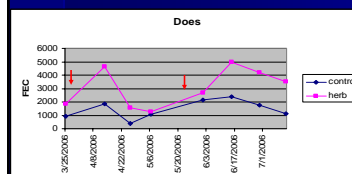
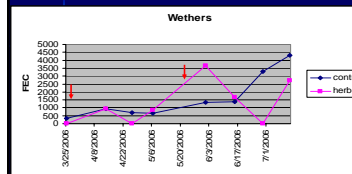
Herbal Dewormer Research

- Virginia Tech
 - Molly's Finest, Hoeggers
- NE SARE
 - Garlic, Ground wormwood capsules
 - SBM, nicotine snuff, Nature's Finest
 - Pumpkin seed extract, nematophagous fungi
- OFRF
 - Hoeggers, garlic, DE, Pyrethrum
- Cornell
 - Oil of chenopodium
- Heifer South America program
 - Deworming tincture of epazote, pumpkin seeds, African marigold in alcohol

Herbal Dewormer Suppliers

- Garlic Barrier
 - www.garlicbarrier.com
- Molly's Herbals
 - <http://fiascofarm.com/herbs/wormer.htm>
- Farmstead Health Supply
 - 919-643-0300
 - <http://www.farmsteadhealth.com/>
- Hoegger Supply Company
 - 1-800-221-4628 (orders only)
 - <http://www.hoeggergoatsupply.com/>

Herbal Dewormer Results



- Molly's Finest
- Quickly showed family lines predisposed to parasites
- 2 does died, 4 others were treated
- Labor a big factor
- Paddock size too small
 - 19,128 sq ft
 - 10,796 sq ft
 - 43,560 sq ft/ac

Diatomaceous Earth

- Research IA, MN, VA, TX
- Mineral content?
- Larval effect?

Nematode-trapping fungi

- *Duddingtonia flagrans*
- Bolus fed to sheep
- Decimates eggs in manure
- LSU research
- In limbo
- Fungi found in healthy soils

Copper oxide wire particles

- Fed to Katahdins
 - Reduced FEC
 - No liver toxicity observed
 - Research continuing
- Effectiveness in goats?
- Copper levels for cattle

Garlic Barrier

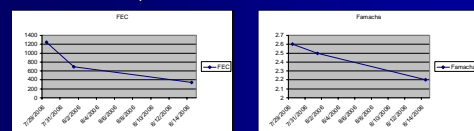
- Third year of use
- Antibacterial (Medline)
- Used as drench
- 30 cc 1:2 dilution
 - 150 cc of same dilution
- Clinical improvement, FEC not significantly changed but famacha scores do improve
- May aid animal, not a substitute for good mgmt
- www.garlicbarrier.com
- OMRI listed for crop use not livestock use

Papaya/Alternative/Ethnoveterinary Research

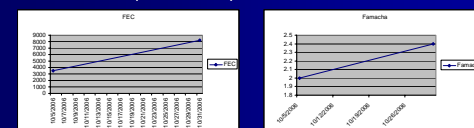
- L.F. Le Jambre, ed. 2006. 4th International Conference - Novel Approaches to the Control of Helminth Parasites of Livestock. *Veterinary Parasitology*. Volume 139, Issue 4
- Fajimi, A.K. & A. A. Taiwo. 2005. Herbal remedies in animal parasitic diseases in Nigeria: a review. *African Journal of Biotechnology*. Volume 4. April. p. 303-307
- G. Stepek, et al. 2007. Anthelmintic action of plant cysteine proteinases against the rodent stomach nematode, *Protospirura muricola*, *in vitro* and *in vivo*. *Parasitology*. January. p. 103-112.

Papaya seeds vs whole fruit

3 T seeds for 3 days



250 cc whole fruit puree for 3 days



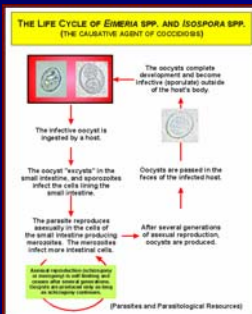
Parasite Management

What is producer giving credit to?

Management strategies to reduce risk

- Don't graze forage height below 2 inches
- Don't force animals to graze close to manure piles
- Use weather to help decrease larval survival times
- Keep pasture diversity high
- Use multiple animal species & different classes of animals
- Rotation of pastures is a MUST!

Coccidia



Joe Rook, DVM
<http://cvm.msu.edu/extension/Rook/ROOKpdf/coccidia.PDF>

Coccidia

- Management disease
- Sanitation
- Crowding
- Ipecacuanha



Other parasites

- Lungworms
 - Dictyocaulus viviparus (cattle)
 - Dictyocaulus filaria (sheep and goats)
- Disease most severe cattle
 - Bronchitis, pneumonia
 - Immunity
- Baermann technique required for diagnosis

Other Parasites

- Liver Flukes
 - Fasciola hepatica
- Snail intermediate host
- Control measures include removal from snail infested areas
- Immunity

Multi-faceted approach

- Each farm will be different
- What is getting the credit?
- Breeding -- Nutrition -- Management

If you have a parasite problem...

- The first question to ask yourself is how many animals do you have on your farm?
 - how small of an area are they in?
 - For how long have they been in that area?
 - Are you rotationally grazing at all?
 - If goats, are they browsing or grazing?
 - If grazing, what are they grazing?

■ You could have a really sick pasture

- Have to figure out how to get your animals off that pasture.
 - It may mean closing gates and getting animals in one smaller area and feeding them up off the ground til the rest of the farm can heal and be clearer of worms.
- Use FEC and Famacha to select out animals who are high egg shedders and who do not do well on your farm.
 - Cull their offspring also.

■ Rotate daily

- Have pastures at least 4-6 inches tall that animals are grazing.
- If goats, make sure they are pasture plants they will eat.
- Use garlic as a supportive treatment

Management is Vital

- Must take time
- Look at records
 - Grazing decisions
 - Culling decisions
- Plan
 - For next season
 - For next year
- Monitor the plan
 - Observations important
 - As season, weather, animals change
- Make adjustments
 - Change grazing frequency
 - Change paddock size
 - Change treatment strategies

Management is Vital

- Parasites in cattle not as severe a problem as in small ruminants
- Immunity wanes during winter months
- Calves most susceptible
 - Density in pens
 - Sanitation

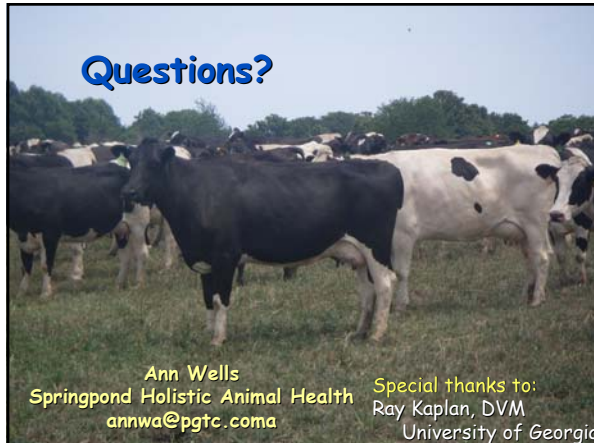
Future management strategies at Heifer Ranch

- The Use of Controlled Grazing and two Herbal Treatments to Prevent Parasitism in Sheep and Goats
 - Southern SARE On-Farm Research Grant
 - Three treatment groups and a control
 - Chicory pasture, garlic and papaya
 - Two farmer cooperators—goat and sheep
- FEC monthly on calves and stockers

References

- Southern Consortium for Small Ruminant Parasite Control
 - www.scsrpc.org
- Sustainable Control of Internal Parasites in Ruminants
 - Animal Industries Workshop Lincoln University 1997
- Sustainable Control of Internal Parasites of Sheep (SCIPS)
 - www.sheepwormcontrol.com

Questions?



Do Not Buy Resistant Worms

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



Use Proper Technique

- Proper technique when drenching ruminants is very important
 - critical that the full dose lodges in the rumen
 - drench should be delivered over the tongue into the pharynx/esophagus
 - if drench is delivered to the mouth the esophageal groove can be stimulated to close
 - significant drench bypasses the rumen
 - faster drug absorption, shorter duration
 - efficacy is reduced



The FAMACHA® system

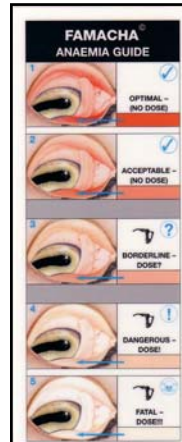
- Named for its originator
 - Dr Francois "Faffa" Malan
 - Faffa MALan CHArt
- Dr Jan van Wyk, Professor Gareth Bath
- Dr. Adriano Vatta, Dr. Tami Krecek
- Dr. Jørgen Hansen, FAO

How Does FAMACHA Work ???

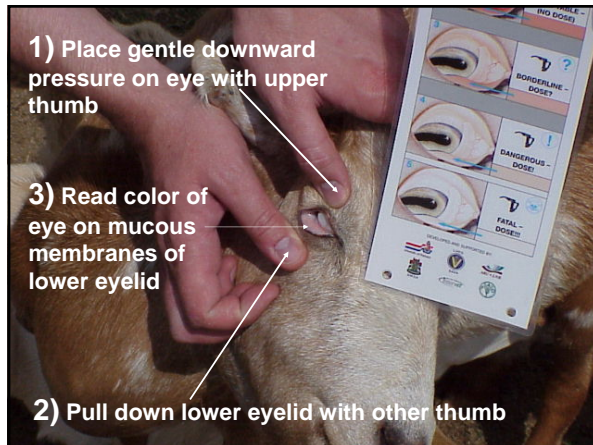
- Since primary impact of *H. contortus* is anemia, one can indirectly measure parasite burden (and need for treatment) by measuring anemia
- Only useful where *H. contortus* is the primary parasite species



The FAMACHA® 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

Other Recommendations for Proper Use

- Check both eyes
 - Score animal based on lowest eye score
- No ½ scores
 - Assign lower 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

Integrating the FAMACHA[®] System

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

Integrating the FAMACHA[®] 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[®] 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

Integrating the FAMACHA[®] 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

Other Advantage of Selective Treatment (FAMACHA)

- Identify animals that show anemia most often
 - These are the ones contaminating the pasture for others in the herd/flock
- Rec'd consider culling all animals that were given ≥ 2 treatments more than the average
 - Cull these and improve genetics of resistance of the herd/flock

Results

- Cattle rotated once had similar weight gains to cattle dewormed monthly