

# Management Strategies to Control *Haemonchus contortus* in Sheep (*Belfast parasite management workshop*)



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***NE SARE: Control of *Haemonchus contortus* in Northern New England  
Sheep and Goats through Manipulation of its Winter Ecology***



**University of Maine – Animal and Veterinary Sciences B.S. program**  
**Animal Science, Pre-Veterinary Concentrations**  
Hands-on training with horses, cattle and small ruminants

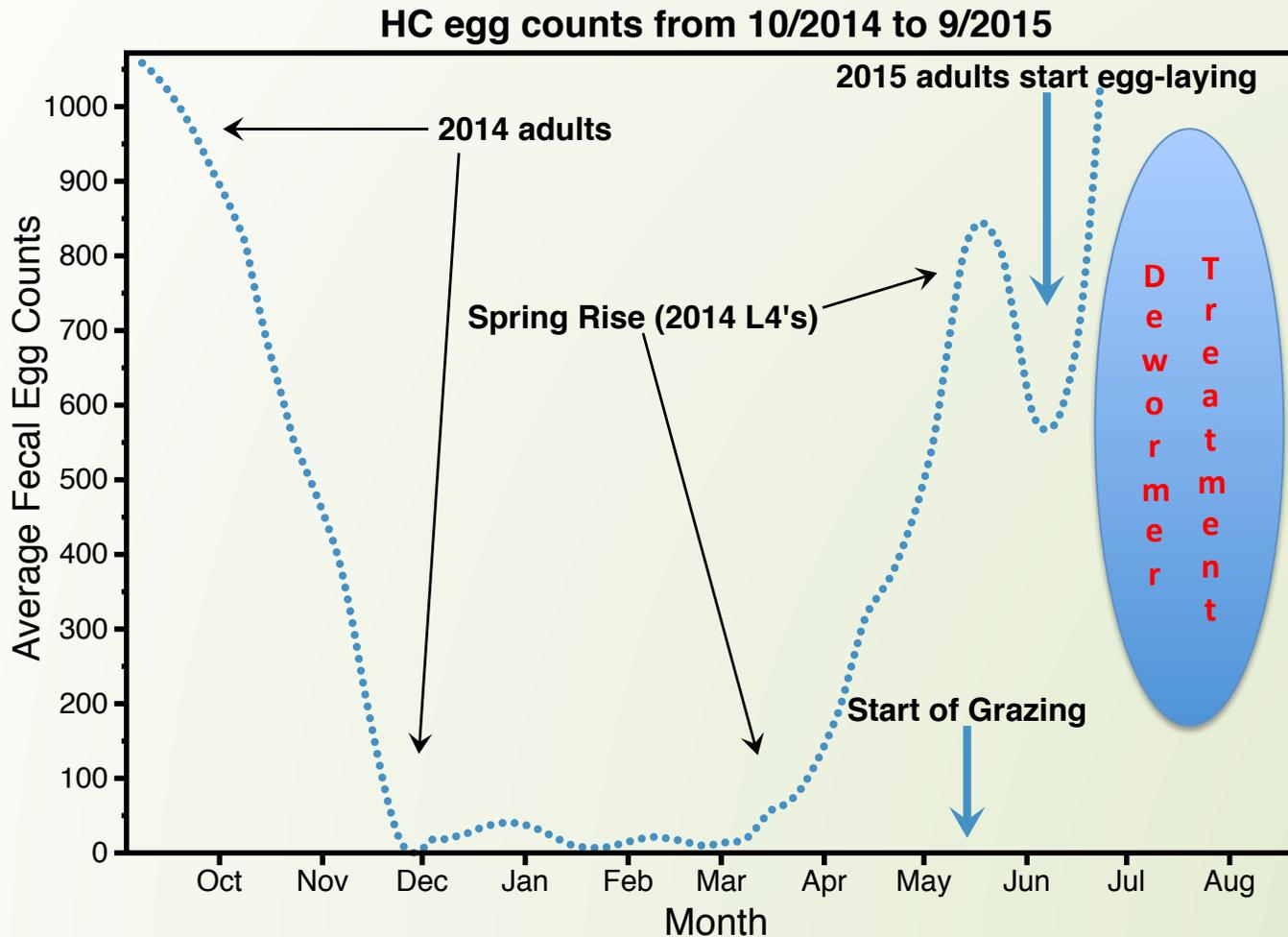
# Integrated Pest Management (IPM)

- Traditionally used to control pests that damage fruits and vegetables
- Requires an understanding of the pest's ecology within the local environment
- Takes advantage of critical life cycle stages or specific seasons
- Interventions occur BEFORE the time of expected damage to crops

**IPM can also be an effective tool for parasite management**

# Pattern of HC egg counts on a flock in central Maine (45° N) (Start of grazing on May 15<sup>th</sup>)

Start of grazing  
during  
mud season:



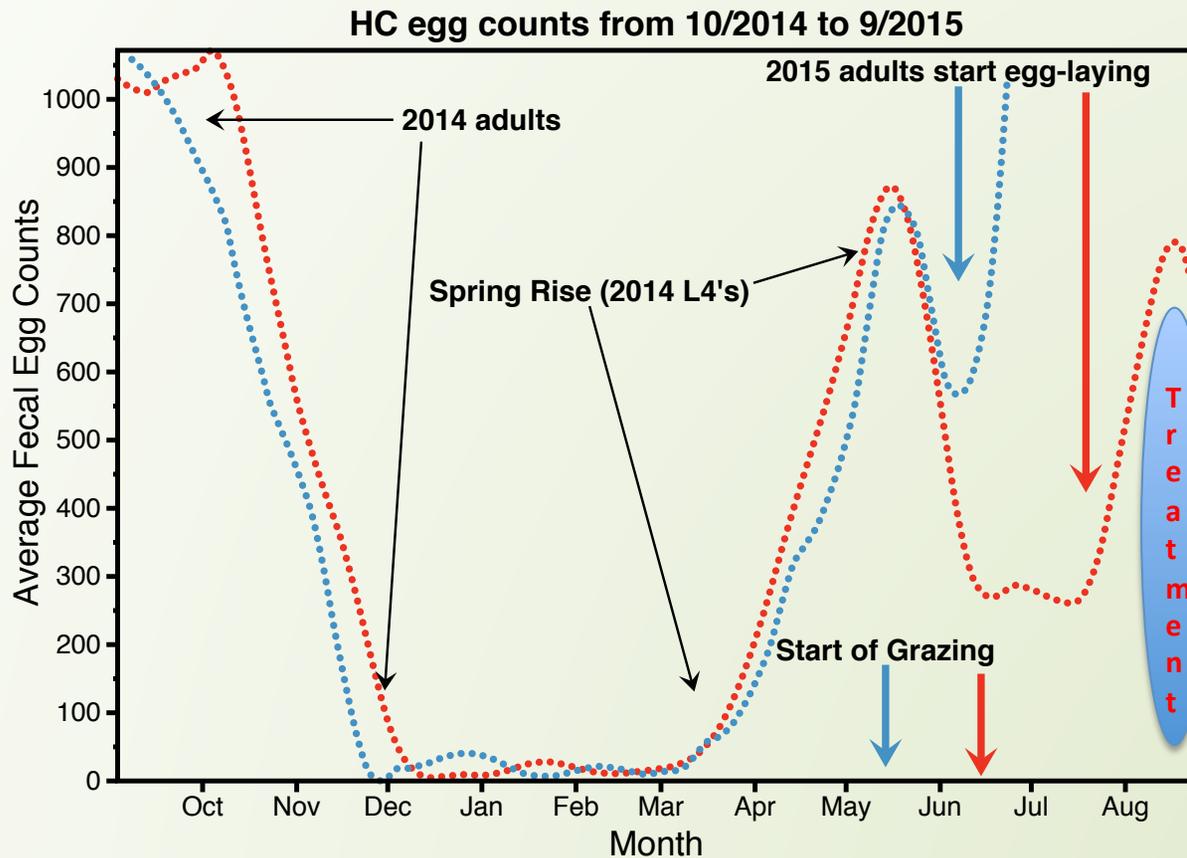
HC ova  
accumulate on  
pasture

Synchronous  
larval  
development  
in early June.

Egg counts spike  
in July

Anemic animals  
in July, August

# Pattern of HC egg counts on a flock in central Maine (45° N) (May 15 vs. June 15 grazing start)



**Delayed onset  
of Grazing:**

Slower rise in egg  
counts.

Fewer anemic  
animals.

Reduced  
deworming.

**No dewormings  
until late August,  
with 0 to 1  
treatment per  
animal.**

## **Worms eaten after Summer Solstice are programmed to overwinter in the gut**

- ❑ Ingested L3's "arrest" as L4's before becoming adults  
(do not lay eggs during their first grazing season).  
Important to realize when doing egg counts in late summer  
**as existing adults die off**
- ❑ L4's overwinter in abomasal lining (**Hypobiosis**)
- ❑ Stimulated to mature into adults by signals related to lambing  
and increasing Spring day length

**Result: Huge numbers of *H contortus* adults begin  
to lay eggs during mud season**

# BOTTOM LINE

- Nearly all HC larvae on Maine pastures are **winter-killed**, but larvae survive winter by camping out in the sheeps' stomachs (*Haemonchus* may be adapting to our northern winters.....)
- Early Spring pastures are re-infected thru **Spring Rise** of hypobiotic larvae that lived all winter in the abomasum
- Eggs laid from April through May (Mud Season) are preserved in cold storage until June
- Conditions for **synchronous development of infective larvae** occur in early- to mid-June, when we get our first stretch where Average Daily Temperature exceeds 55° F.

**Short, intense period of HC-induced anemia in July, August**

**Parasitism will be worse if pastures were**

**heavily manure-contaminated during Mud Season**

# Northern Climates – What can we do to reduce accumulation of eggs on pastures during Mud Season?

1. Preventative deworming outside of grazing season (just before Fall breeding seems to be a good time)
2. Keep animals off of pasture until later in the spring, when the grass is 4 inches high (results in lower parasitism during grazing season)  
**When does the grass really start growing in Maine?**
3. Decrease density of animals on pasture (<4 / acre)
4. Pastures: Rotate, Rotate, Rotate...

# Dewormer Resistance in Maine

- We ran many drug resistance tests (Fecal Egg Count Reduction Tests) on local farms during 2015 - 2016
- HC in many flocks were **resistant** to Ivermectin and Safeguard-type dewormers
- Ivermectin resistance was also present in several of our producer flocks
- Many producers with dewormer resistance were directed to change dewormer classes
- Remember that you are purchasing a farm's deworming history when you import stock!!!

**Monitor FAMACHA scores and FEC's in anemic animals before and after after a round of deworming. If they don't improve within 10 days, SUSPECT RESISTANCE!**

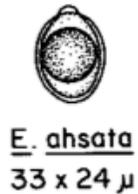
## How effective is FAMACHA scoring for predicting anemia?

- FAMACHA score of 3: Loss of  $\frac{1}{3}$  of blood cells  
4: Loss of  $\frac{1}{2}$  of blood cells!!!!!!
- Italian study: Positive predictive value of FAMACHA for detecting anemic individuals was only 54%
- South African Study – animals should be evaluated **weekly** during periods with highest HC challenge (May, July and August in Maine)
- UMaine data: At times of high HC exposure, the rise in FAMACHA scores seemed to lag behind rising egg counts by several weeks
- Best uses of FAMACHA –
  - “Ranking” flock mates according to HC parasite resistance, then culling the low end! Even practiced by Katahdin breeders!
  - Choosing the most anemic animals for deworming

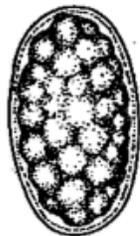
# Sheep and Goat Parasites (from Foreyt, 1990)

RELATIVE SIZES OF SHEEP PARASITE EGGS

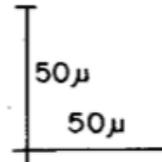
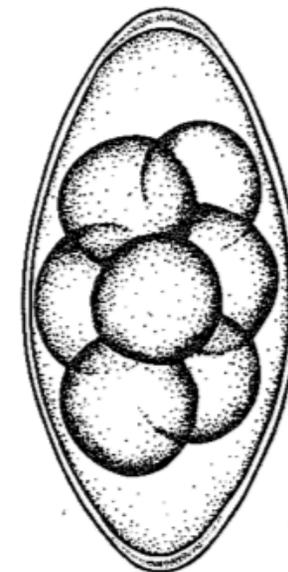
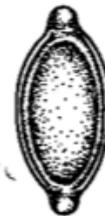
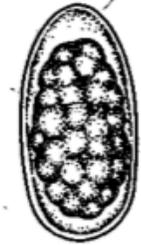
Eimeria species:



Abomasal  
Worms →



Trichostrongylids

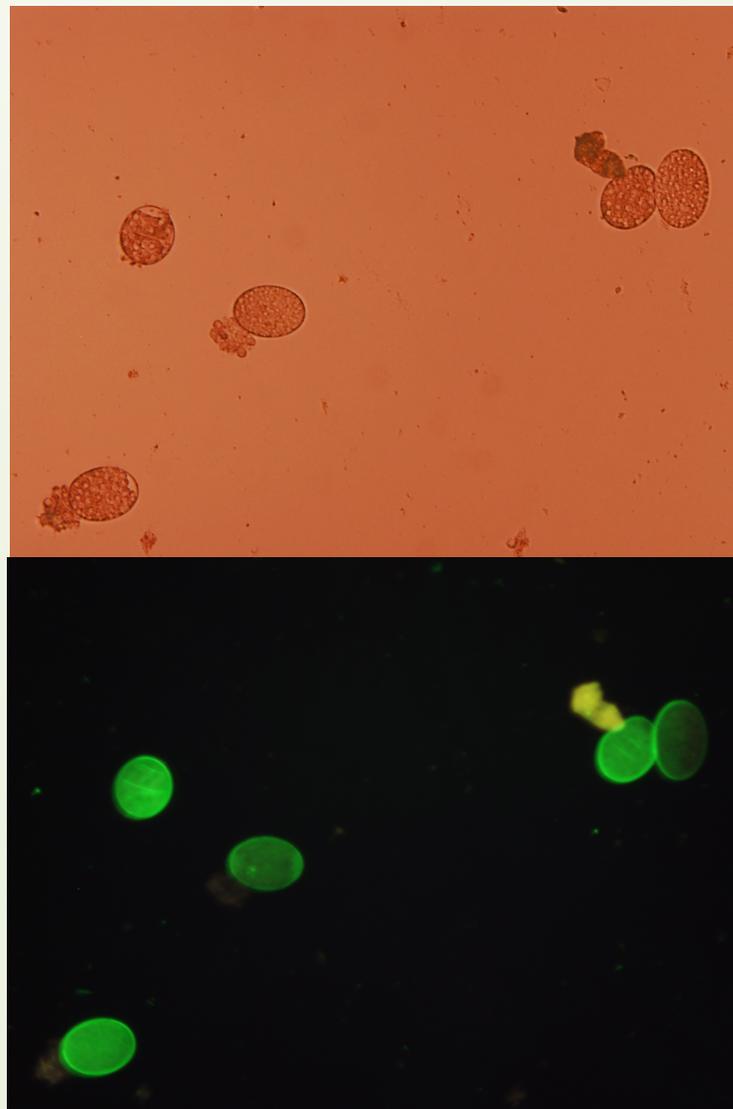


Teladorsagia

# Distinguishing Among the Abomasal Worms

- Abomasal worms =  
*Haemonchus*,  
*Trichostrongylus*, *Teladorsagia*
- Eggs are nearly identical
- Larval culture – grow egg to third larval stage.  
Easy to do, but requires training to identify to species. Also takes over a week to get results.
- New test at Umaine stains only *Haemonchus* eggs

**Can't be done at home, and gives essential information!!!**



***Haemonchus* identification to species by Lectin binding**

# McMaster's Fecal Egg Count Assay

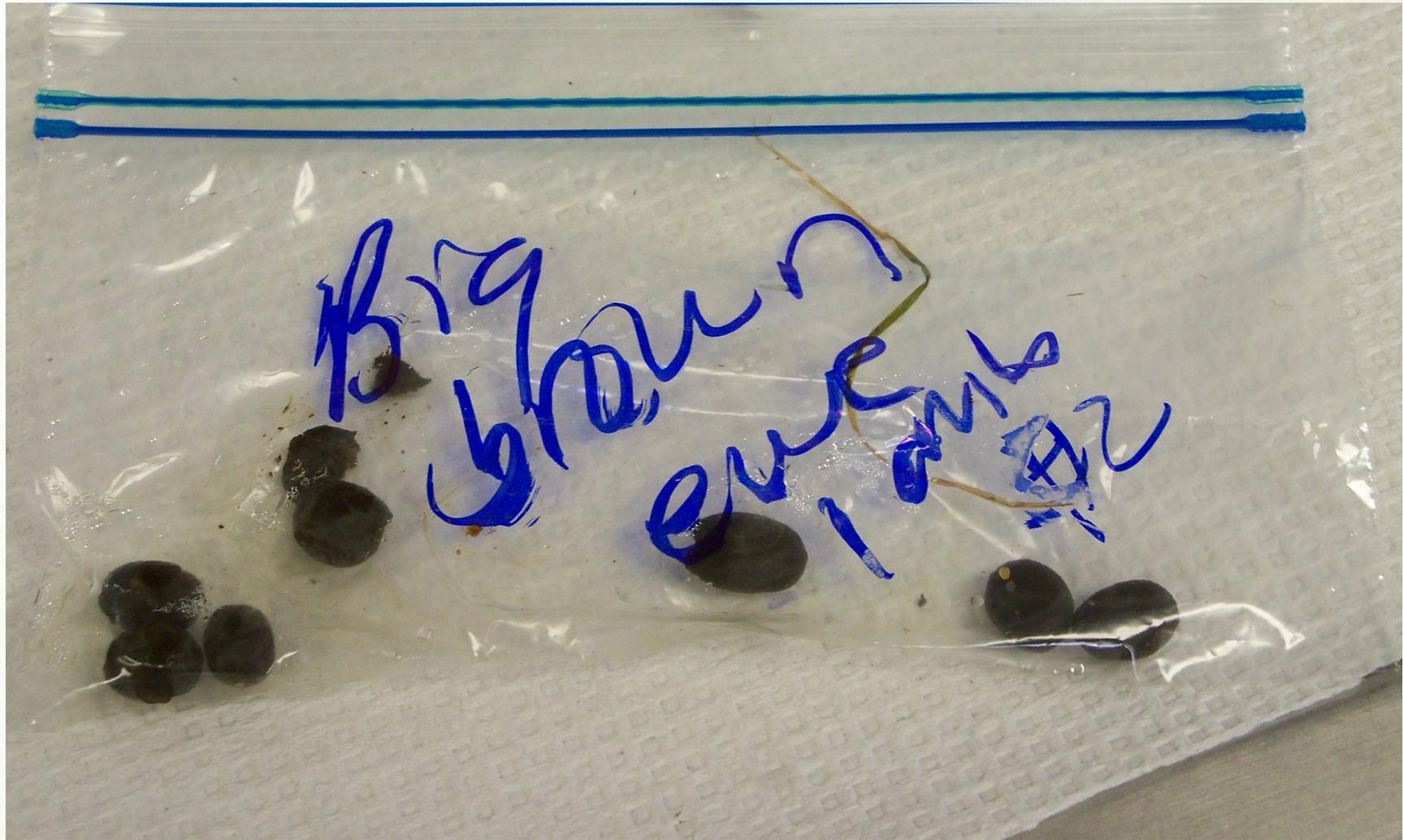
## Equipment

- Compound microscope
- Digital camera and screen (?)
- McMaster's slide(s)
- Electronic gram scale accurate to 0.1 grams
- Pipette or syringe that can accurately measure 28 mL
- Funnels
- Sink and table where your family won't mind you mixing sheep manure!

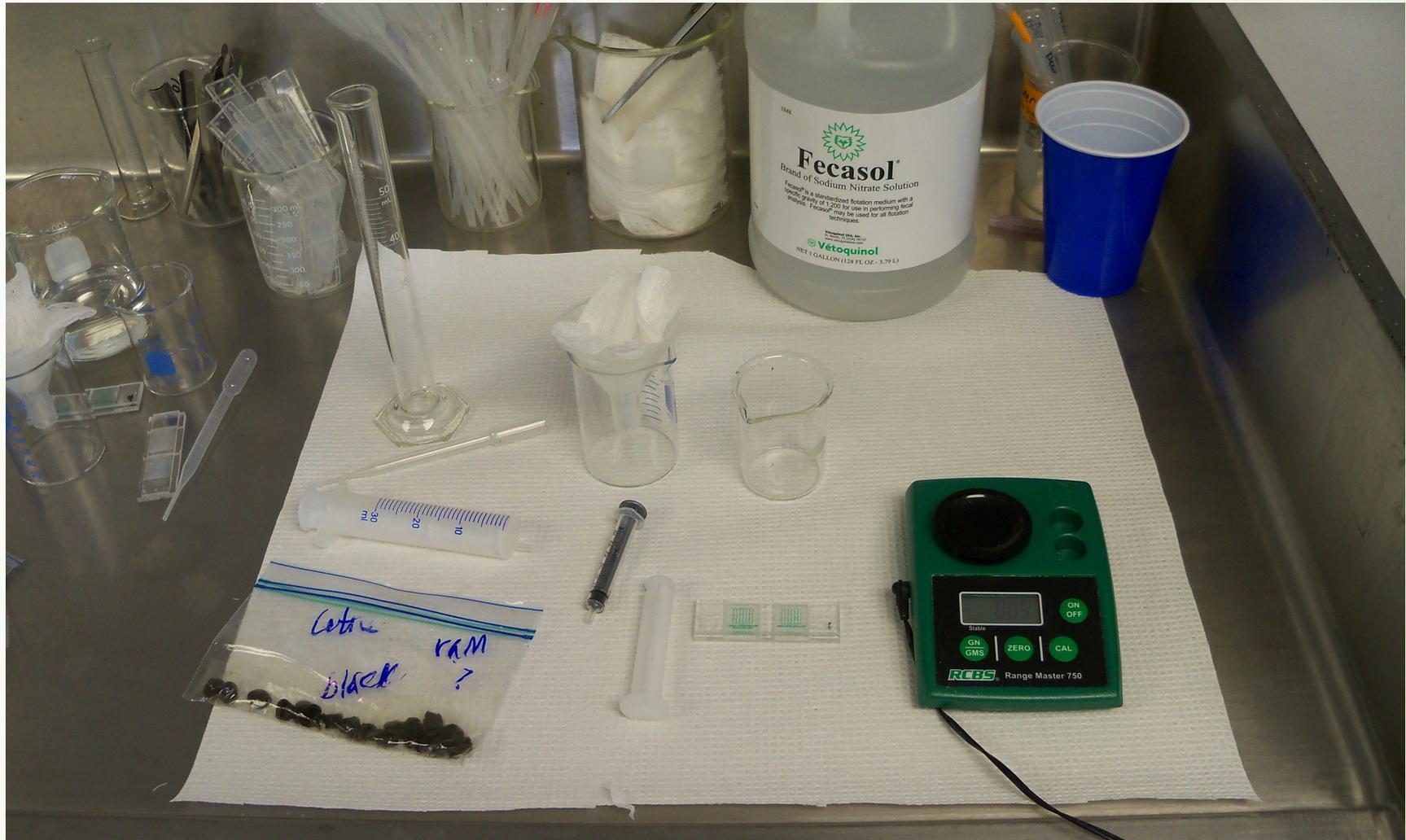
## Supplies

- Fecasol solution (available online, or from a local vet clinic)
- Squares of gauze cloth (i.e., cheesecloth)
- Mixing sticks (popsicle sticks)
- Pellet-squashing tools (syringe barrels)
- Eye dropper or small syringe (to move sample on to slide for analysis)
- Latex or nitrile gloves

Sampling – only use “fresh” manure



# Sample preparation - Overview



# Breaking up and mixing the sample



# Weighing 2 grams of mixed sample



Straining sample through two layers of cheesecloth, then wringing it out



# Loading McMaster's Slide with sample

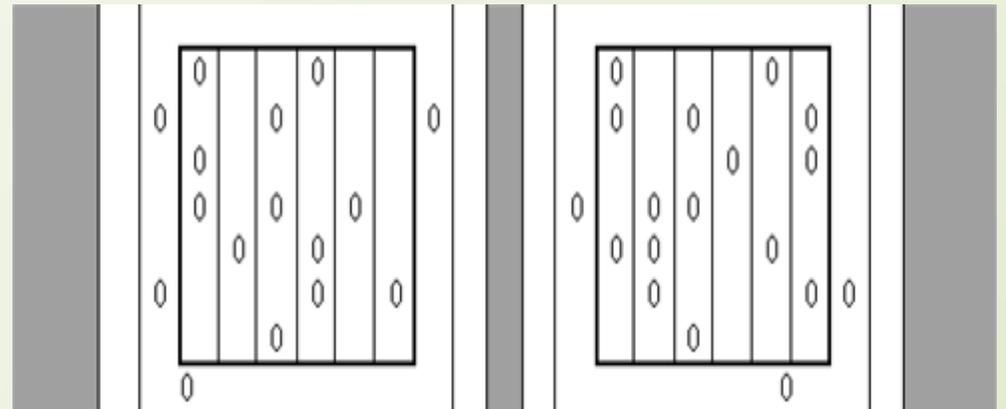
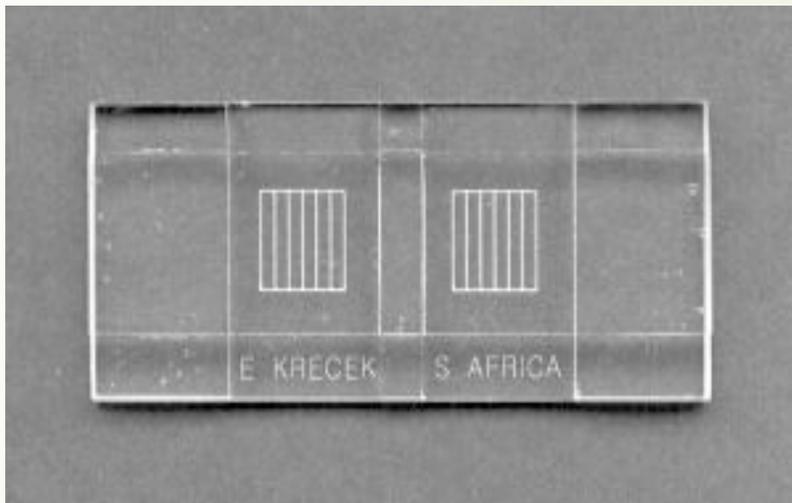


Placing the McMaster's slide on the  
microscope stage



# Egg count: How many, which species?

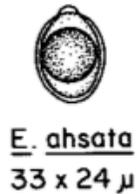
- McMaster's Fecal Egg Count Technique



# Sheep and Goat Parasites (from Foreyt, 1990)

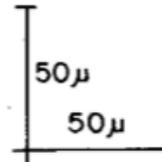
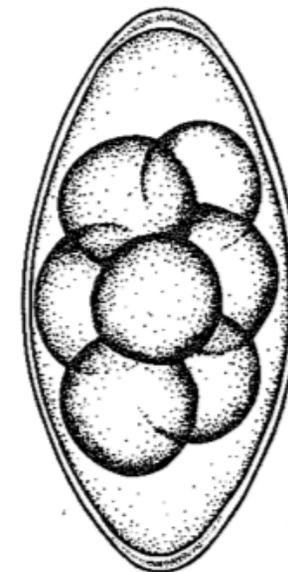
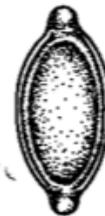
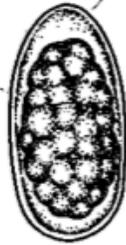
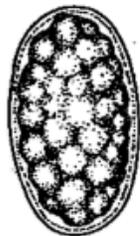
RELATIVE SIZES OF SHEEP PARASITE EGGS

Eimeria species:



Abomasal  
Worms →

Trichostrongylids



Teladorsagia

Identifying and counting eggs within  
the 12 vertical columns (6 left, 6 right)



# Calculating the actual concentration of eggs per gram

- With 2 grams of manure in 30 mL of Fecasol plus manure, the actual count should be multiplied by **50** to calculate the concentration per gram.
- A count of zero means that your concentration is <50 epg, not that your animal has zero worm eggs!

Separate counts should be done for all of the different types of ova:

- Abomasal worms (includes Haemonchus, Teladorsagia, Trichostrongylus)
- Strongyloides
- Tapeworms
- Nematodirus
- Coccidia (mostly a problem with lambs and kids)
- Several other species

# “Conclusions” of NE SARE Project

## Positive Results

- Many producers have increased their awareness of *Haemonchus contortus*
- Producers are better trained in parasite diagnostics / management
- Many farms benefitted from individual diagnostics and conversations with experts
- Several techniques are now available for reducing *Haemonchus*' effect without “salvage” deworming

## Techniques that work in Maine

- Delay grazing until after mud season (harvest first cut hay?)
- Be realistic about how many sheep your fields will support
- Have hay on hand for droughts
- Invest in a pasture rotation system, then use it aggressively
- Monitor egg counts closely during risky times of the year
- Do FECRT's every spring to see if your dewormers still work
- Invest in veterinary calls to have a parasitology expert on board

# Questions?



*If you want a pdf copy of this presentation, please email your request to  
Dr. Weber at [jaweber@maine.edu](mailto:jaweber@maine.edu)*