

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

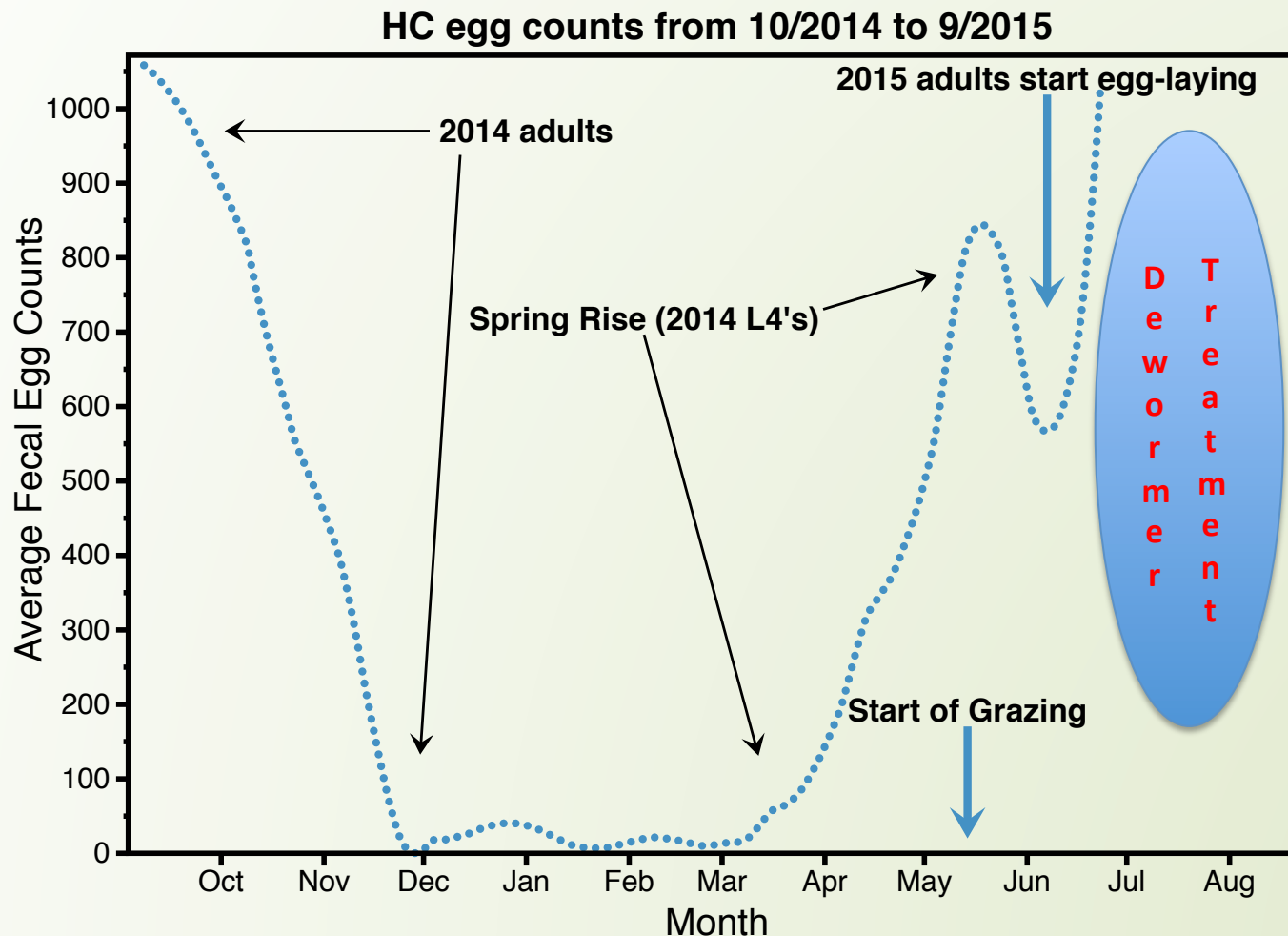
Integrated Pest Management (IPM)

- 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 15th)

Start of grazing
during
mud season:



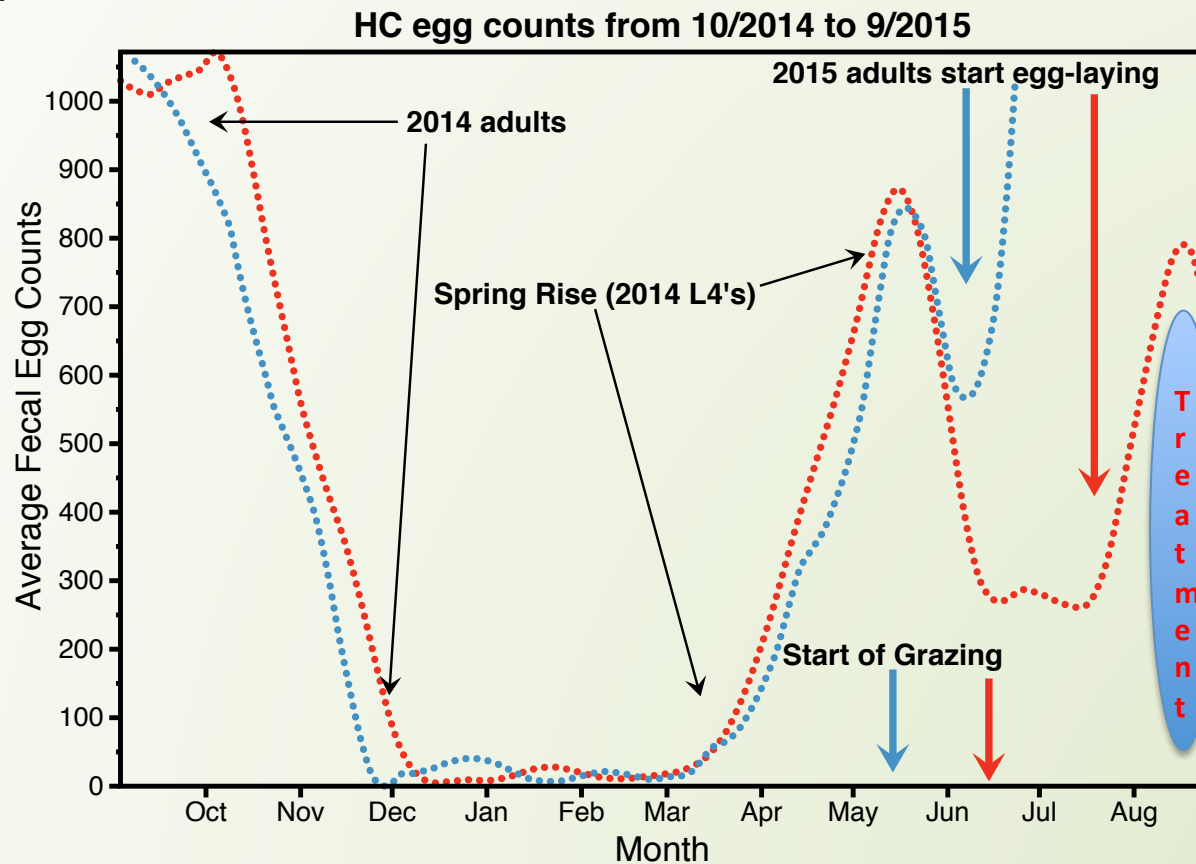
HC ova
accumulate on
pasture

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 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)

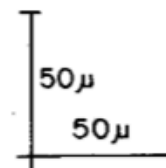
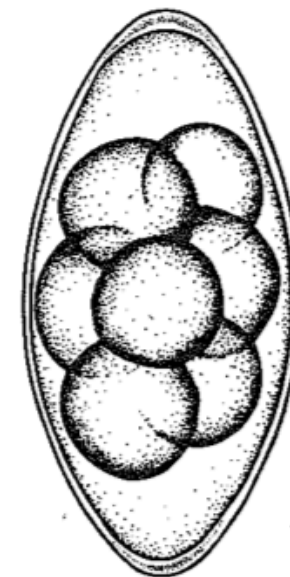
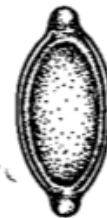
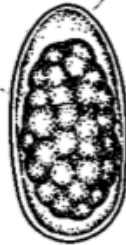
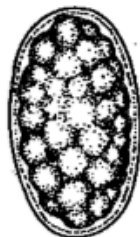
RELATIVE SIZES OF
SHEEP PARASITE EGGS

Eimeria species:



Trichostrongylids

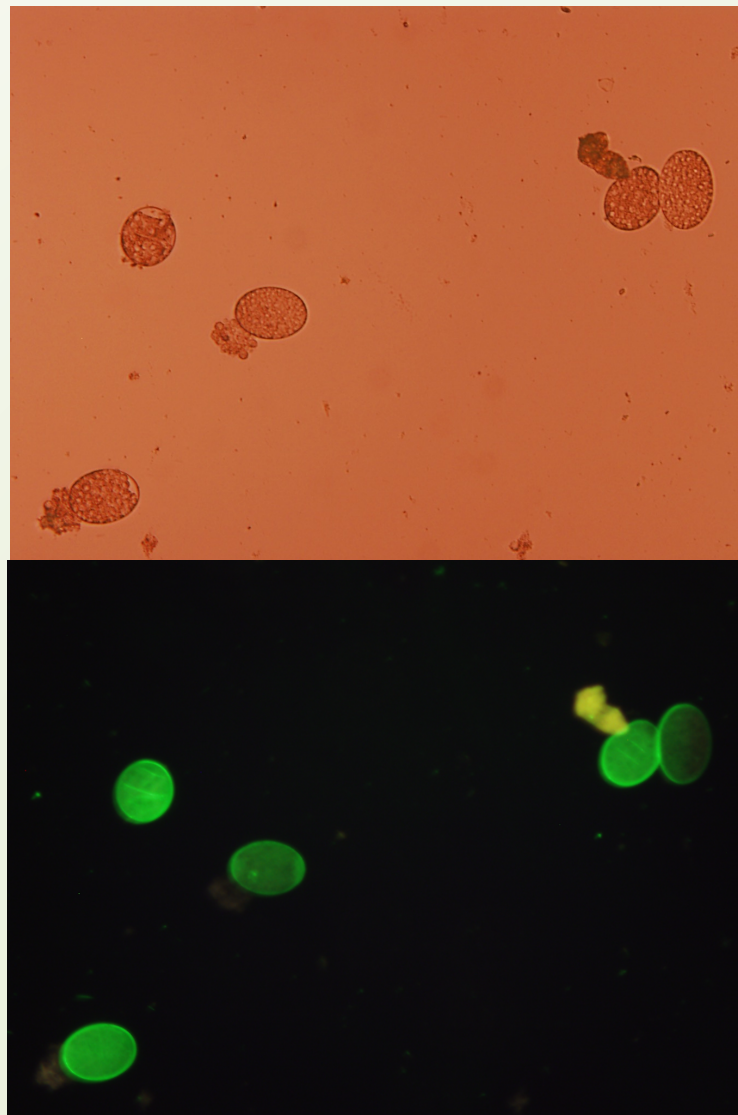
Abomasal
Worms →



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

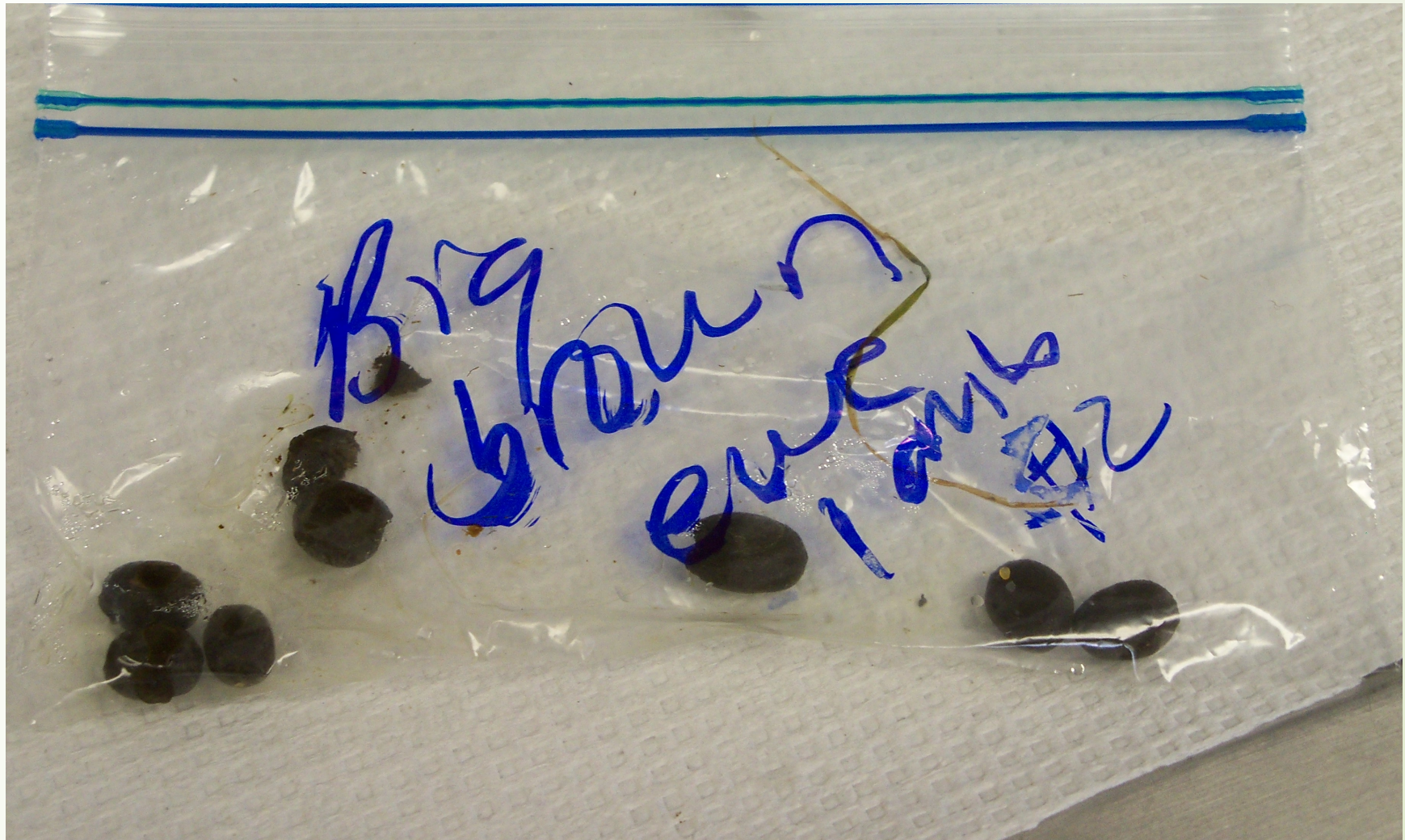
Equipment

- 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!

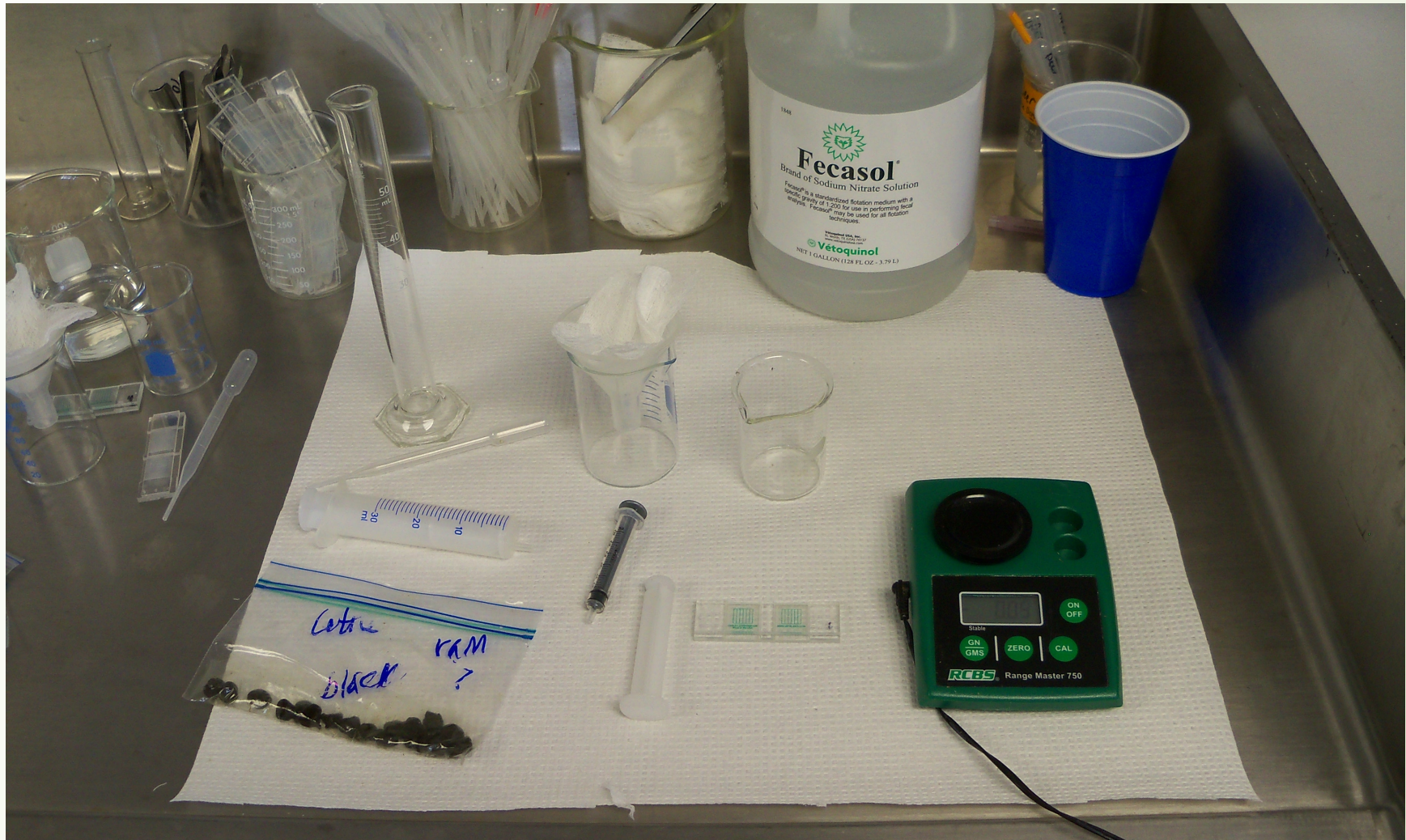
Supplies

- 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

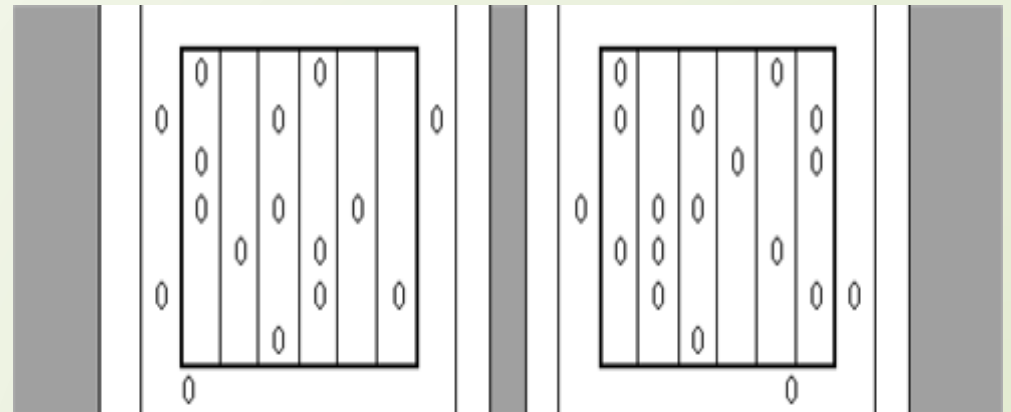
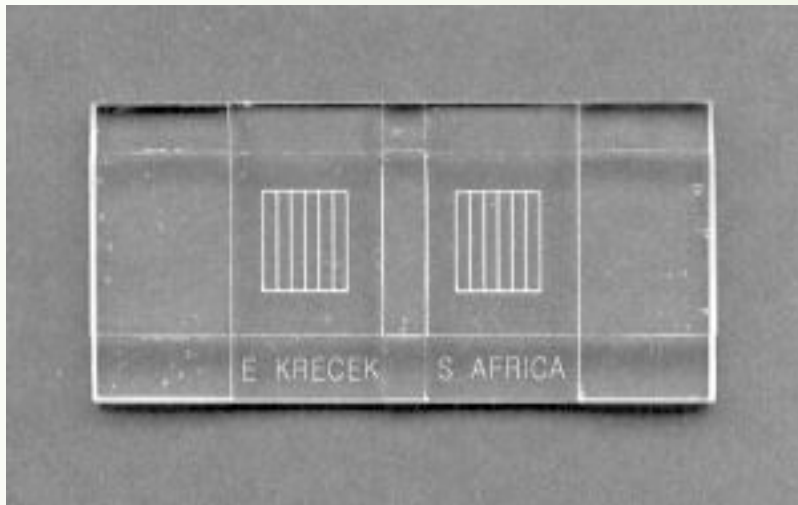


Placing the McMaster's slide on the
microscope stage



Egg count: How many, which species?

- McMaster's Fecal Egg Count Technique



Sheep and Goat Parasites (from Foreyt, 1990)

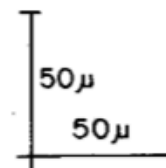
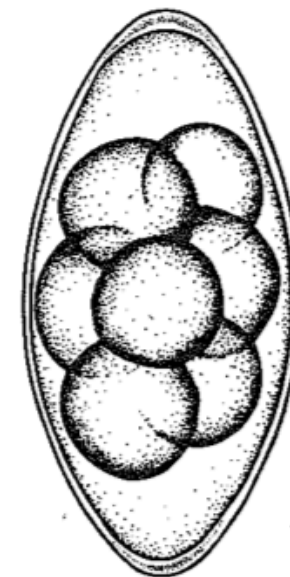
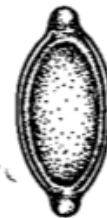
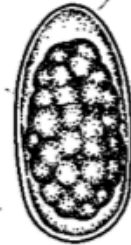
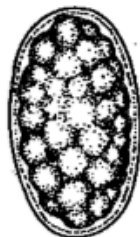
RELATIVE SIZES OF
SHEEP PARASITE EGGS

Eimeria species:



Trichostrongylids

Abomasal
Worms →



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***