NEW DEVELOPMENTS IN PARASITE MANAGEMENT AND SHEEP HEALTH

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Presented to the Alberta Lamb Producers meeting, November 2018

University of Guelph
Ontario Veterinary College
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A bit of a potpourri of topics

- Recent gastrointestinal nematode parasite findings
  - New anthelmintics – how should we use them?
  - Targeted selective treatment of ewes at lambing with closantel
  - Do you need to do FAMACHA scoring in the sunlight?
  - Validation of parasite species identification using PCR (collaborative work with Dr. John Gilleard at University of Calgary)
  - Using CarLA salivary antibody to detect immunity to GIN parasites
- Update on the Ontario maedi visna program
- Draxxin and foot rot of sheep

WHAT IS NEW IN ANTHELMINTICS?

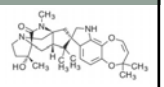
Broad Spectrum Anthelmintics - Canada

- Benzimidazoles (BZ)
  - Fenbendazole drench (Safeguard, Merck)
  - Albendazole drench (Valbazen, Zoetis)
- Imidazolthiazoles (LV)
  - Levamisole – only as a compounded drug – should we be using it?
- Macrocyclic lactones (ML)
  - *Ivermectin drench /injectable (several) licensed for sheep
  - Moxidectin (Cydectin, Boehringer) – only pour-on in Canada
- Amino-acetonitrile derivatives (AAD)
  - Monepantel (Zolvix, Novartis) – not in Canada
- Combination
  - *Derquantel (spiroindoles) + abamectin (Startect, Zoetis)
- * Licensed for sheep in Canada

Combination Drenches?

- Combination dewormers are used commonly outside North America
- Startect is the first combination drench licensed for livestock in Canada
- Evidence that dewormer resistance will develop more slowly if a new drug is used in combination

Startect™



- Derquantel is the novel anthelmintic in the combination and is a spiroindole
  - Flaccid paralysis & death of the parasites leading to their expulsion
  - Nicotinic cholinergic antagonist
  - Mid-spectrum anthelmintic
- Abamectin is a macrocyclic lactone
  - Stimulates gamma-aminobutyric acid (GABA) which inhibits communication between nerves and muscles
  - Same class as ivermectin
- Dose is 2 mg derquantel and 0.2 mg abamectin / kg bw
  - = 1 mL of Startect per 5 kg bw (0.2 mL/kg bw)
- Available in 1 L and 5 L sizes

Startect™ Label

- Indications:
  - Treatment and control of gastrointestinal nematode and lungworm infections and their associated diseases
- Efficacy against
  - *H. contortus* and inhibited larval stages
  - *Teladorsagia circumcincta* and inhibited larval stages
  - *Trichostrongylus colubriformis*
  - As well as many other GIN and *Dictyocaulus filaria* (lungworm) adults
- Efficacy as reported but higher based on field trials
  - > 95% against adults and L4 of Trichostrongylus and Nematodirus and adult Haemonchus
  - < 95% against adult and L4 Teladorsagia and L4 Haemonchus
- > 95% efficacy against GIN known to be resistant to other dewormers including abamectin and derquantel when given independently

Startect™ Label

- Contraindications
  - Extremely toxic to horses
  - Do not use in other species as severe reactions, including deaths, will occur
  - Do not use in GOATS
- Cautions
  - Do not treat lambs < 6 weeks of age or < 10 kg bw
  - Care not to damage mouth or pharynx when treating
  - Do not retreat for 28 days after last treatment
- Warnings
  - 14 day meat withdrawal
  - Do not use in lactating ewes producing milk for human consumption

Startect™ Label

- Adverse reactions
  - Mild transient coughing occurs commonly after drenching
- Overdose:
  - Adverse events at dosing 4.5 X dose on label (0.9 mL/kg bw)
  - Up to 3X the dose is not considered toxic
  - Toxicity includes dullness, depression, incoordination, weakness, decreased GI motility, abnormal breathing, recumbency and death
  - Non-fatal resolve spontaneously

When should we use Startect?

- When anthelmintic resistance is known or strongly suspected in a group of sheep
- E.g. as a quarantine drench
  - Buy in sheep that may have resistant parasites
  - Isolate and treat with Startect and let them "poop out" the resistant eggs
  - Then put on contaminated pasture so they get infected with the "farm" parasites that aren't resistant
- If AR present on the farm, can be used to selectively treat infected sheep
  - Don't treat everybody unless good refugia or eventually resistance will develop

Narrow Spectrum

- Only kills specific types of parasites
- *Closantel (Flukiver, Elanco)
  - Only blood consuming parasites
  - Haemonchus**
  - Liver flukes
  - Nasal bots
  - Some external parasites
- Praziquantel – tapeworms
  - Not available in a food animal formulation

Flukiver - Label

- Indication
  - For the treatment of *Haemonchus contortus* (Barberpole worm) in sheep and lambs
  - It is <u>not effective</u> against other GIN parasites
- Dosage
  - 10 mg per kg body weight / 1 mL per 5 kg body weight
- How does it work?
  - After drenching, it is absorbed into the blood stream with peak levels 24-48 h later.
  - It is bound to albumin – the major protein in blood
    - Not much closantel in the tissues
  - Blood sucking parasites ingest the closantel when drinking blood – the drug then kills the parasite

Flukiver - Label

- Flukiver only kills stages of *Haemonchus* that are feeding
  - Not effective against hypobiotic L4 stage that occurs in the winter
- But Flukiver is very slowly excreted from the animal
  - Half-life of the drug is 2 to 4 weeks
  - So it is persistent
- Do not treat more frequently than every 49 days
- Withdrawal for meat is 49 days
- Never use in lactating dairy sheep
- Overdosing can cause signs of toxicity – blindness, incoordination, weakness
  - In our study, we saw no adverse signs

When should we use Flukiver?

- When Haemonchus is the primary parasite in the flock
- Use when active infections, i.e. not the middle of winter
- As with all anthelmintics
  - Don't deworm everybody unless a good level of refugia – use selectively
  - Monitor treated animals using FAMACHA as well as fecal egg counts

Range of Activity

	Benzimidazole	Ivermectin	Startect	Closantel
Hypobiotic Larvae	+	++	++	-**
Persistent Activity	-	+/-	+	+
Tapeworms	+/-	-	-	-
External Parasites	-	+	+	+/-
Liver Flukes	+/- *	-	-	+

Activity of Anthelmintics against the Different Parasite Classes

+ = good activity; ++ = much activity; - = no activity; +/- = slight or variable activity

- = albendazole has activity against adult flukes but only at double-dose (10 mg/kg bw sheep)

** = because closantel is persistent, it may kill emerging and feeding L5 but its not effective against hypobiotic larvae

Suggested dosages of anthelmintics

(bw = body weight; 1 kg = 2.2 lb)

	Benzimida-zoles	Ivermectin	Startect	Closantel
Sheep mg/kg bw	5	0.2	0.2 mL[t]	10
Goat mg/kg bw	10	0.3	**NO**	10**

[t] Equivalent to 0.2 mg abamectin/kg and 2 mg derquantel/kg

- In Australia, Startect is not recommended for use in goats;
- In Canada, Startect is not recommended for lambs < 6 weeks of age and < 10 kg bw; nor in dairy ewes

** Although 10 mg/kg is effective in goats, there is less persistency of action

Why Don't Anthelmintic Treatments Work?

- Drench failure
- Re-exposing to very high load of parasites
  - Drench and turn to heavily contaminated pasture
- Chronic damage to abomasum
- Anthelmintic resistance

Drench Failure

- Using a drug against a parasite where it has no efficacy
- E.g. ivermectin doesn't work against tapeworms

Drench Failure: Did Not Give an Effective Dose

- Underestimated weight
  - "eye ball"
  - Dosed to average rather than heaviest
- Incorrect drench technique
- Drug from a suspect source or expired

Anthelmintic Resistance

- If can rule out reasons for drench failure, it may be that parasites are resistant to the drench
- All populations of parasites have some naturally genetically resistant parasites
- Difference is proportion
- Our job is to make sure the proportion of resistant parasites on a farm remains small
  - Keep an effective refugia when deworming
  - Only deworm when it is needed and ideally only those animals that need it

Some recent parasite research from the University of Guelph

COMPARISON OF TARGETED SELECTIVE AND WHOLE FLOCK TREATMENT OF PERIPARTURIENT EWES FOR CONTROLLING *HAEMONCHUS* SP. ON SHEEP FARMS IN ONTARIO, CANADA

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T. Westers[1], A. Jones-Bitton[1],, J. Vanleeuwen[2], Z. Poljak[1], A. Peregrine[3].
[1] Dept Population Medicine, University of Guelph; [2]University of Prince Edward Island, [3] Dept Pathobiology, University of Guelph

Haemonchosis is the most important parasitic disease in Ontario flocks

- Lambs in summer during grazing
  - Type 1
  - Ewes and then lambs contaminate pasture
- Ewes in spring during lambing
  - Type 2
  - L4 stage overwinters in ewes
- Anthelmintic resistance is widespread
- Why when we only deworm a few times a year???

Deworming all ewes at lambing?

If deworming all ewes at lambing is a risk for anthelmintic resistance…

How can we prevent clinical disease due to *Haemonchus contortus* but still maintain refugia in the flock?

Objectives

1. Can we accurately identify those individuals that require treatment?
2. Does selective treatment of ewes with closantel at lambing control *Haemonchus* on farms as effectively as whole flock treatment?

Study Design

- Longitudinal study 2013 & 2014
- Six sheep farms
  - Documented anthelmintic resistance in *Haemonchus contortus*
    - Not to closantel as novel anthelmintic in Canada
  - Pasture ewes with nursing lambs

Treatment of Ewes at Lambing

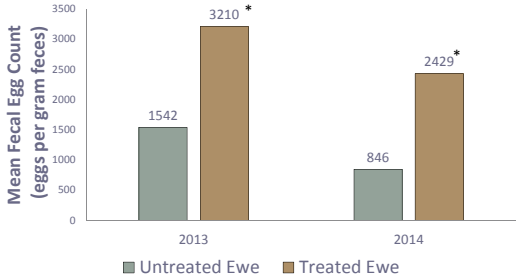
- 3 farms – all ewes treated
- 3 farms – targeted selective treatment of ewes
- Closantel given orally based on individual body weight (10mg/kg)
- Fecal egg counts, clinical parameters and pasture larval contamination levels

Treatment Criteria for TST Ewes

- One or more of:
- Raising three or more lambs
- Previous grazing season was first grazing season
- Body condition score <= 2.0
- FAMACHA score 4 or 5 (pale)

Results:

Pre-treatment Haemonchus-specific fecal egg counts for treated and untreated ewes at lambing on TST sheep farms



* Denotes significance at p<0.05

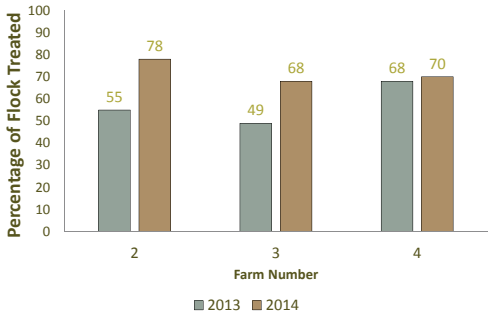
Multivariable analysis associated with *Haemonchus* fecal egg counts in 239 periparturient ewes

- FAMACHA© score is the most predictive of Haemonchus-specific fecal egg counts (p=0.002)
  - 4 & 5 compared to 1 & 2 – 232% higher FEC
  - Deterministic modeling suggests treating ewes 3, 4 & 5 for optimal detection
- Body condition score not significant (p=0.132)
  - Significant in univariable; likely may be important

Objectives

1. Can we accurately identify those individuals that require treatment?
2. Does selective treatment of ewes with closantel at lambing control *Haemonchus* on farms as effectively as whole flock treatment?

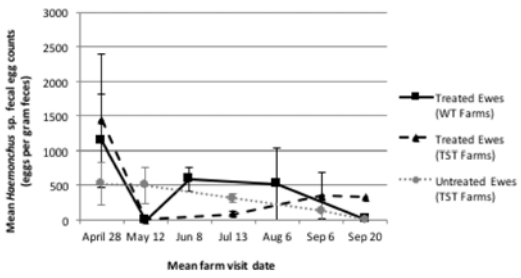
Results – Percentage of Ewes Treated on TST Farms



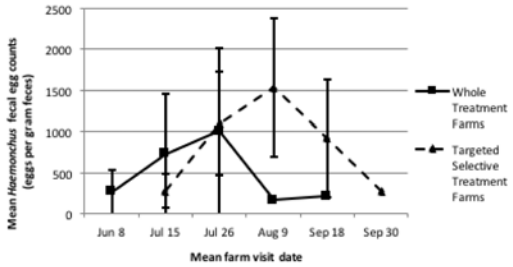
Targeted Selective Treatment (TST) versus Whole Flock Treatment (WT)

- Mean number of additional treatments of ewes and lambs
  - Whole flock 1.1 (2013) and 1 (2014)
  - Targeted selective treatment 1 (2013) and 1 (2014)
- Number of deaths attributed to parasitism
  - 2013 – WF 5 & TST 6
  - 2014 – WF 0 & TST 0

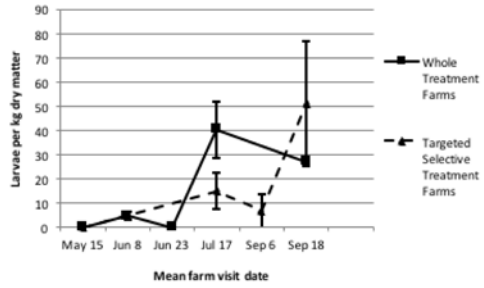
Comparison of Haemonchus FEC from Ewes from WT and TST Flocks - 2014



Comparison of Haemonchus FEC from Lambs from WT and TST Flocks - 2014



Haemonchus-Specific Pasture Larval Counts - 2014

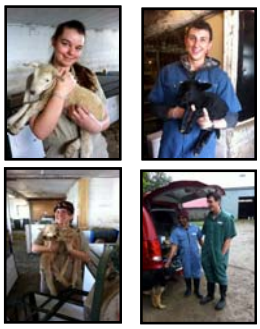


Conclusions

- TST using FAMACHA© scoring of ewes at lambing can be used to select animals for treatment of Haemonchus infection
  - Body condition scoring may be used as well
- TST provided parasitic loads similar to WT with slightly higher pasture levels
- Lambs on either TST or WT farms will need to be treated during the grazing season
- It is likely that TST provides sufficient refugia to slow the development of anthelmintic resistance
  - No AR detected at end of study

Acknowledgments

ONTARIO Sheep
NSERC CRSNG
Elanco
Ontario Ministry of Agriculture, Food and Rural Affairs



EVALUATING THE ACCURACY AND RELIABILITY OF THE FAMACHA© EYE COLOUR CHART USING DIFFERENT LIGHT SOURCES ON SHEEP FARMS IN SOUTHERN ONTARIO

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[2]Trisha Westers, [1]Andrew S Peregrine, [2]Paula Menzies

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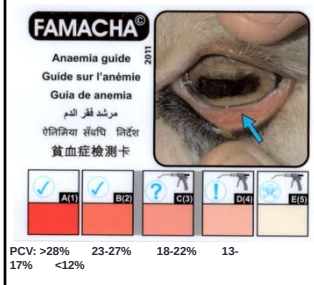
[2]Department of Population Medicine, Ontario Veterinary College, Guelph, Canada

What is the FAMACHA© chart?



Developed in South Africa based on an idea by Dr. **Fa**ffa **Ma**lan [**Cha**rt].

Colours on chart are correlated to hematocrit ranges and compared to the conjunctiva.

Goal is to detect anemia levels caused by *Haemonchus contortus* infections in small ruminants.

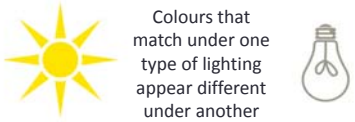
Useful for selecting animals that require anthelmintic (dewormer) treatments.

So, what's the *problem*?

South African Farms

Southern Ontario Farms

Illuminant Metameric Failure



Colours that match under one type of lighting appear different under another

Light sources being tested:

- Ambient indoor barn light
- Natural sunlight
- 60 lumen LED light
- 6 lumen flashlight

Objectives

1. Determine if the accuracy of scoring using the FAMACHA© chart changes when different light sources are used.
2. Evaluate the reliability of FAMACHA© scoring by different readers.

Goal:

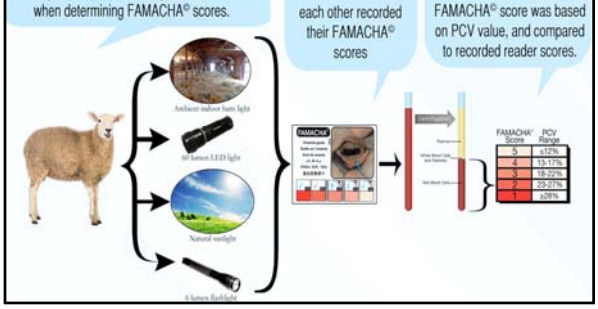
Make ***practical*** recommendations to sheep producers regarding the ideal use and reliability of the FAMACHA© chart as a health management tool.

Methods

1. Animals were randomly allocated into one of four groups based on the light source used when determining FAMACHA© scores.

2. Two readers blinded to PCV status and each other recorded their FAMACHA© scores

3. PCV was determined for each animal. Expected FAMACHA© score was based on PCV value, and compared to recorded reader scores.



Statistical Analyses

Sample size was 193 animals distributed over six farms;

- Natural light – 21 sheep
- Barn light – 63 sheep
- LED light – 59 sheep
- Flashlight – 50 sheep

FAMACHA© categories were collapsed to anemic (scores 3-5) and non-anemic (scores 1, 2) for statistical analyses.

Results

Table 1. Combined results for the logistic regression analyses evaluating the accuracy of anemia detection for both readers (independently) for each light source.

Light Source	Odds Ratio (95% CI)	p-value
Barn	*Reference category*	
LED		
Reader 1	0.24 (0.08-0.72)	**0.011**
Reader 2	0.44 (0.19-0.98)	**0.046**
Natural		
Reader 1	0.97 (0.17-5.43)	0.972
Reader 2	0.70 (0.23-2.09)	0.522
Flashlight		
Reader 1	0.70 (0.20-2.45)	0.574
Reader 2	0.83 (0.34-1.97)	0.666

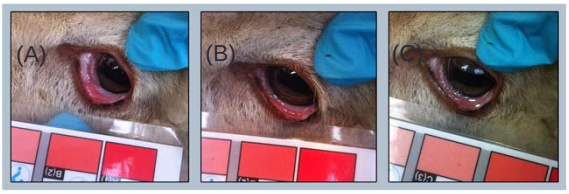
The odds of correctly differentiating anemic vs. non-anemic animals were significantly lower for both readers when using LED light, as compared to using ambient barn light.

Neither natural light nor the flashlight had a significant effect on the ability of the readers to correctly differentiate anemic vs. non-anemic animals.

Case Example – Lamb with PCV 23%

The animal was scored a '2' when both (A) barn light and the (B) flashlight were used, and a '3' when the (C) LED light was used.

The PCV was determined to be 23%, which places the animal in a category '2'.



Recommendations

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- Amanda McCutcheon
- Josh de Vos
- Chris Pinard
- Dr. Jacob Avula

NSERC CRSNG
OVC Ontario Veterinary College
Elanco
Bayer HealthCare Animal Health
ONTARIO Sheep MARKETING AGENCY
Ontario Ministry of Agriculture, Food and Rural Affairs

COMPARISON OF DIFFERENT METHODS FOR DETERMINING THE PARASITE SPECIES COMPOSITION OF GASTROINTESTINAL NEMATODE TYPE EGGS IN THE FECES OF SMALL RUMINANT FECES

Emma Borkowski[1], Elizabeth Redman[2], Russell Avramenko[2], Rebecca Chant[1], Jacob Avula[1], Niel Karrow[3],Paula Menzies[4], Brandon Lillie[1], Andrew Peregrine[1], John Gilleard[2]

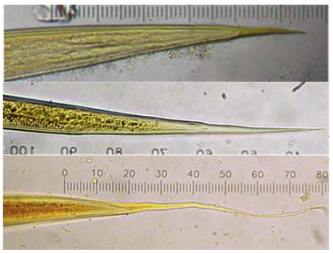
Department of [1]Pathobiology, Ontario Veterinary College, University of Guelph, [2] Comparative Biology and Experimental Medicine, Faculty of Veterinary Medicine, University of Calgary, [3]Animal Biosciences, Ontario Agricultural College, University of Guelph, [4]Population Medicine, Ontario Veterinary College, University of Guelph

How can we tell which parasites are infecting our sheep?

- The eggs of *Haemonchus, Teladorsagia* and *Trichostrongylus* appear the same under a microscope
- Strongyle-type eggs
- To differentiate, we need to hatch the eggs and allow development to third stage (L3)
- Difficult, labour and time intensive

Differences can be subtle

Square head of Teladorsagia (l) and tapered head of Trichostrongylus (r)



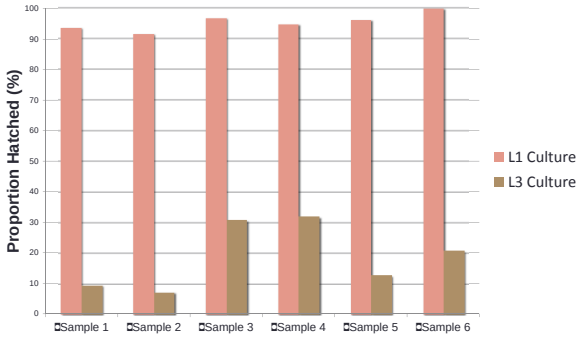
Short tail – top
Medium tail – middle
Long tail - bottom

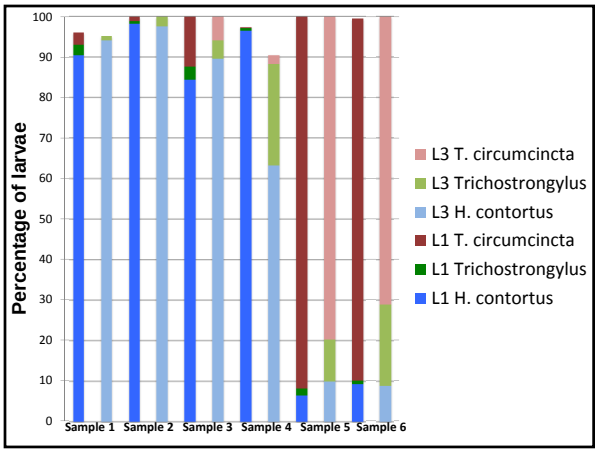
New method differentiates species by DNA

- Developed by Dr. John Gilleard's laboratory at the University of Calgary
  - Specific PCR for each genus of parasites
  - Called L1 nemabiome deep amplicon sequencing
  - Only need to culture to L1 stage versus L3 stage
- Our team collaborated with him using samples from our study
- Objectives
  - Compare larvae recovery rates from traditional L3 incubation with L1 culture method
  - Compare species identification using cultured L3 and visual identification to cultured L1 and PCR

Traditional L3 larvae method	New L1 larvae method
1 week to culture	48 hours to culture
Culture feces with eggs in ramekin	Fecal float in petri dish
Incubate feces/eggs, stir and mist daily	Recover eggs in sieve and centrifuge
Baermannize feces, collect L3 larvae 24hrs later	Culture eggs in petri dish at room temperature.
ID first 100 under microscope	Count hatched larvae, preserve in ethanol, send for PCR

Proportion of Eggs that Hatched





Conclusions

- L1 deep amplicon sequencing to identify sheep parasite species in a fecal sample
- Comparable results to L3 culture and morphological identification
- Turn-around time is faster
- Much, much better larvae recovery
- Removes possible human error
- Thank you to Dr. Gilleard's lab!

Agriculture et Agroalimentaire Canada / Agriculture and Agri-Food Canada
Canada
Ontario Ministry of Agriculture, Food and Rural Affairs
ONTARIO Sheep MARKETING AGENCY
AAC agricultural adaptation council

Correlation of carbohydrate larval antigen (CarLA®) antibody response with parasitism in Ontario sheep

Emma Borkowski DVM*, Niel A. Karrow, PhD; Paula Menzies, DVM, MPVM; Jacob Avula, Brandon N. Lillie, DVM, PhD; Andrew S. Peregrine, BVMS, PhD, DVM
Department of Pathobiology, Ontario Veterinary College

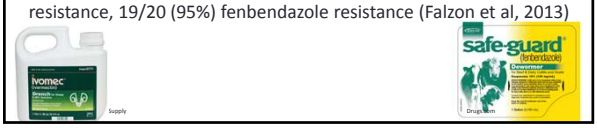
Introduction

- Gastrointestinal nematodes are ubiquitous on Ontario sheep farms

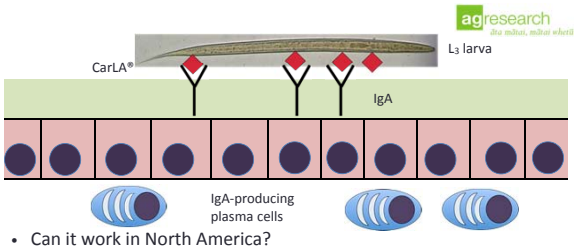
Haemonchus contortus, *Trichostrongylus colubriformis* *Teladorsagia circumcincta*

- Anthelmintic resistance is widespread and increasingly common

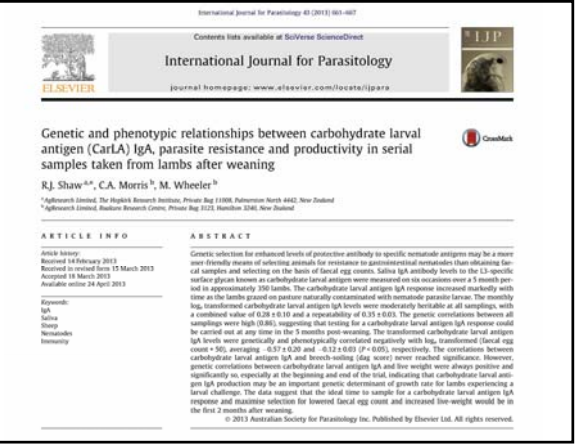
Ontario sheep farms with drench failure: 28/29 (97%) ivermectin resistance, 19/20 (95%) fenbendazole resistance (Falzon et al, 2013)



- Selection for immune response using salivary antibody to Carbohydrate Larval Antigen (CarLA®) has been used successfully as adjunct to anthelmintics in New Zealand
- Sheep with higher antibody levels have lower parasite burdens



- Can it work in North America?
  - Very different grazing conditions in Canada than New Zealand
  - In Ontario, no exposure to L_3 for several months during winter



International Journal for Parasitology

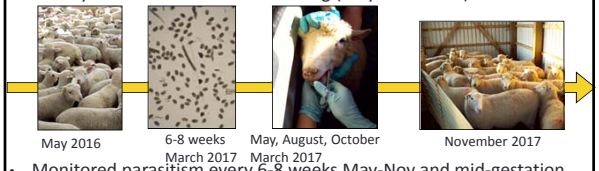
Genetic and phenotypic relationships between carbohydrate larval antigen (CarLA) IgA, parasite resistance and productivity in serial samples taken from lambs after weaning

R.J. Shaw [a,*], C.A. Morris [b], M. Wheeler [b]

Methods

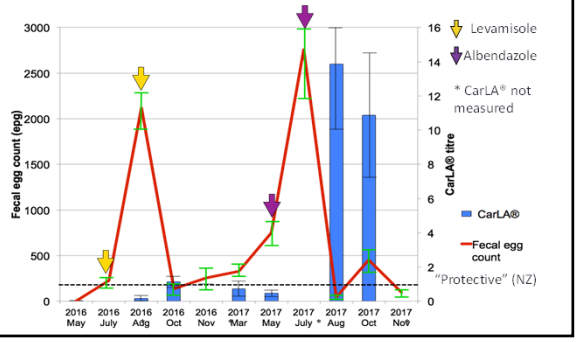
Followed a group of 107 Ontario ewe lambs for 2 grazing seasons
Recruited 4-6 week-old replacement ewe lambs from a commercial flock grazing May-Nov

- Study interval included one lambing (May-June 2017) and lactation



- Monitored parasitism every 6-8 weeks May-Nov and mid-gestation (March 2017) using fecal egg counts
- Lambs with FEC > 500 eggs per gram (epg) treated with anthelmintic
- Salivary CarLA® measured beginning, middle, end of each grazing season & mid-gestation

Results – CarLA levels & fecal egg counts



Is CarLA in Year 1 predictive of CarLA in Year 2?

No lambs had detectable CarLA® in May 2016 (prior to GIN exposure)

	CarLA® 2016 Oct	CarLA® 2017 Mar	CarLA® 2017 May	CarLA® 2017 Aug	CarLA® 2017 Oct
CarLA® 2016 Aug	0.18 p = 0.07	0.12 p = 0.23	0.10 p = 0.31	0.09 p = 0.37	0.12 p = 0.24
CarLA® 2016 Oct		0.23 p = 0.02	0.27 $p = 5.2\ e^{-3}$	0.19 p = 0.05	0.45 $p = 1.2\ e^{-6}$
CarLA® 2017 Mar			0.15 p = 0.12	0.25 $p = 9.4\ e^{-3}$	0.15 p = 0.14
CarLA® 2017 May				0.071 p = 0.47	0.38 $p = 7.5\ e^{-5}$
CarLA® 2017 Aug					0.46 $p = 6.5\ e^{-7}$

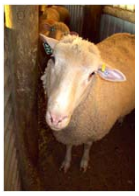
Is CarLA associated with fecal egg counts?

	FEC 2016 Aug	FEC 2016 Oct	FEC 2016 Nov	FEC 2017 Mar	FEC 2017 May	FEC 2017 July	FEC 2017 Aug	FEC 2017 Oct	FEC 2017 Nov
CarLA® 2016 Aug	-0.38 $p = 8.1\ e^{-5}$	0.20 p = 0.04	0.04 p = 0.65	0.06 p = 0.54	0.03 p = 0.74	0.09 p = 0.35	0.14 p = 0.14	-0.03 p = 0.79	0.16 p = 0.10
CarLA® 2016 Oct		0.14 p = 0.16	-0.03 p = 0.77	-0.13 p = 0.20	-0.07 p = 0.46	-0.04 p = 0.72	-0.13 p = 0.21	-0.07 p = 0.49	-0.09 p = 0.34
CarLA® 2017 Mar				-0.28 $p = 4.0\ e^{-3}$	-0.07 p = 0.46	$9.8\ e^{-4}$ p = 0.99	-0.04 p = 0.70	-0.15 p = 0.14	-0.13 p = 0.18
CarLA® 2017 May					-0.49 $p = 8.9\ e^{-6}$	-0.24 p = 0.01	0.11 p = 0.27	-0.23 p = 0.017	-0.11 p = 0.27
CarLA® 2017 Aug							0.15 p = 0.12	0.07 p = 0.46	-0.05 p = 0.60
CarLA® 2017 Oct								-0.06 p = 0.57	-0.10 p = 0.32

- CarLA® in May 2017 (periparturient) was significantly ($p < 0.05$) negatively correlated with FECs at lambing and two subsequent measurements (July and October 2017)
- CarLA® in August 2016 was significantly negatively correlated with FEC in the same month, but significantly positively correlated with FEC in October 2016
  - Lambs with low CarLA® in August had high FECs and required treatment
  - L_3 pasture contamination declined in fall, so treated lambs were not reinfected

Conclusions

- Sheep grazing under Ontario climate conditions developed detectable salivary CarLA® by the end of their first grazing season
- This response waned over winter (in the absence of L_3 exposure) but was greater and more rapid in the second grazing season
- CarLA® titres at the end of the first grazing season appeared predictive of subsequent titres
- High periparturient CarLA® titre was correlated with reduced FECs in the periparturient period and early summer
  - Selection of replacement ewes with elevated CarLA® may reduce pasture contamination



What's Next with Investigating Immunity to GIN Parasites?

- Emma is continuing to analyze the data looking at productivity measures as well
- CarLA needs to be evaluated on more farms and more sheep
  - Can it be used to select breeding ewes whose offspring are more able to develop immunity to parasites?
- Dr. Angela Canovas, U of Guelph has collected tissue samples from the tracers also grazed with the ewe lambs / ewes
  - High and medium stress responders
  - High and low immune responders
- She is looking for protein expression at the tissue level indicative of genomics
  - Hoping that we can develop other ways to predict a sheep's ability to develop immunity to parasites
- Exciting stuff!!!

Acknowledgements

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  - Andrew Peregrine
  - Niel Karrow
  - Paula Menzies
  - Brandon Lillie
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  - Jacob Avula
  - Ziwei Li
- Summer students:
  - Rebecca Chant
  - Stéphanie Bourgon
- Our participating farm
- Funding agencies:
  - OMAFRA (Delma Kennedy)
  - Canadian Agricultural Adaptation Program
  - Ontario Sheep Farmers (Jenn McTavish)

What about vaccination?

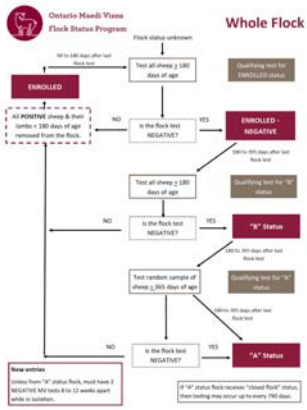
- Immunity to GIN parasites is short-lived; parasites are very completed creatures
- Barbervax (Moredun) is effective against *Haemonchus contortus*
  - Made from whole Haemonchus parasites obtained from specially infected lambs at slaughter
- Vaccinate lambs every 6 weeks for grazing season
  - Replaces drenching if Haemonchus is the parasite of concern
- Useful for Canada?

Ontario Maedi Visna Flock Status Program

- In existence for over 15 years
- This year we did some modifying of the protocols based on research and experience with the program
- Run by Ontario Sheep Farmers (not me!)
- It is open to any producer in Canada
- Only caveat is that the serological test must be acceptable to the program
  - At this point it doesn't accept results from the AGID or VMRD test because of sensitivity and specificity issues, i.e. false positives and false negatives.
  - My understanding is that the BC Abbotsford lab and Prairie Diagnostics use the VMRD kit

Is Maedi Visna Important?

- Lots of very good research to show that seropositive sheep are less productive than seronegative sheep
- Don't need to see lots of clinical disease to have economic losses



Changed retest time between positive flock tests from 4 to 8 months to 3 to 6 months

Changed retest time between "Enrolled Negative" to "B" and "B" to "A" from 12-13 months to 6-13 months

If a low prevalence of test positive sheep (< 5%), producer has option to resample the positive sheep up to 1 month later

Economic Costs?

- Work done in the early 2000s (Jim Fisher and Paula Menzies), showed that
- Purebred producers would make back cost of program within 2 years of reaching B status
  - Mostly through increased sales of breeding stock
- Commercial producers with 10% seroprevalence (low) would make back the cost of the program within 5 years of reaching B status
  - Much faster if seroprevalence is higher
  - Because of improved productivity
- Need to repeat this study using more scenarios
- Is it worth a large commercial flock to eradicate MV?

Draxxin, Zoetis

- Tulathromycin is a macrolide antibiotic
- It is traditionally used to treat respiratory disease in beef cattle
- It has recently been licensed for sheep
  - Treatment of ovine foot rot associated with *Dichelobacter nodosus* when systemic treatment is required due to presence of active lesions
  - Not assessed for treatment of other diseases such as pneumonia
- Single dose – subcutaneous injection in the neck
  - 2.5 mg/kg bw or ¼ mL per 10 kg bw
  - Use an automatic dosing syringe rather than repeated needle entries through the stopper
- A single dose has been shown to be effective in reducing lameness due to *D nodosus* (Europe)
- Meat withdrawal is 16 days for sheep – don't use in lactating dairy animals

What is the future for drug approvals for sheep?

- In a perfect world, all required veterinary drugs needed for common diseases would be approved for use in sheep
- We have had some great successes in last few years but need many more
- Veterinary Drug Directorate sees the need to facilitate veterinary drug approvals
  - Accepting drug data from other countries acceptable to Canada
  - Coordinating approvals in more than one country, e.g. Metacam in Canada, Australia and New Zealand
- Threats are still monetary – it costs money and costs are increasing
  - Push for a funding formula like Pesticide Management Regulatory Agency (PMRA)
- Sheep Value Chain Roundtable Health Strategies Working Group continues to work with the government and veterinary pharmaceutical companies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