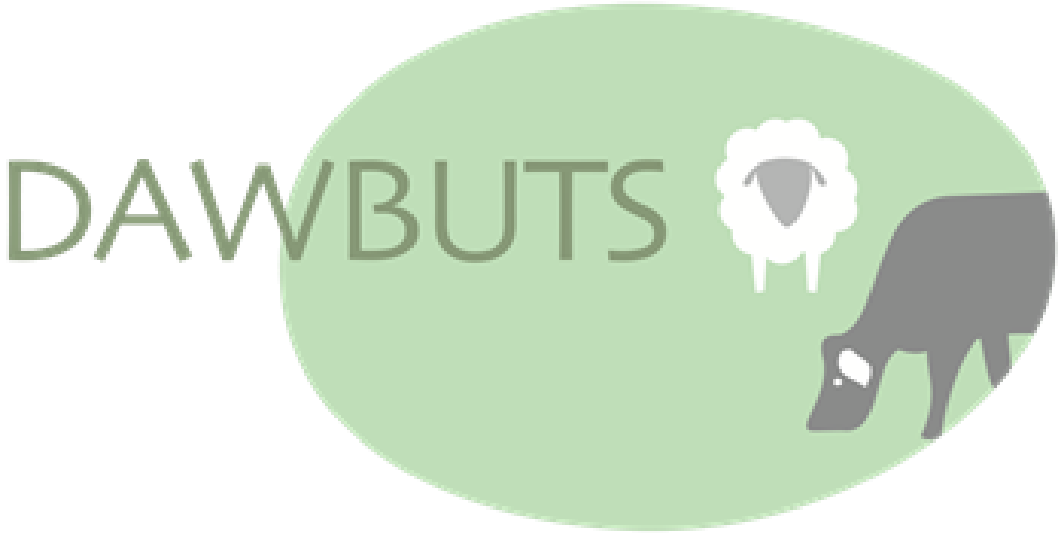
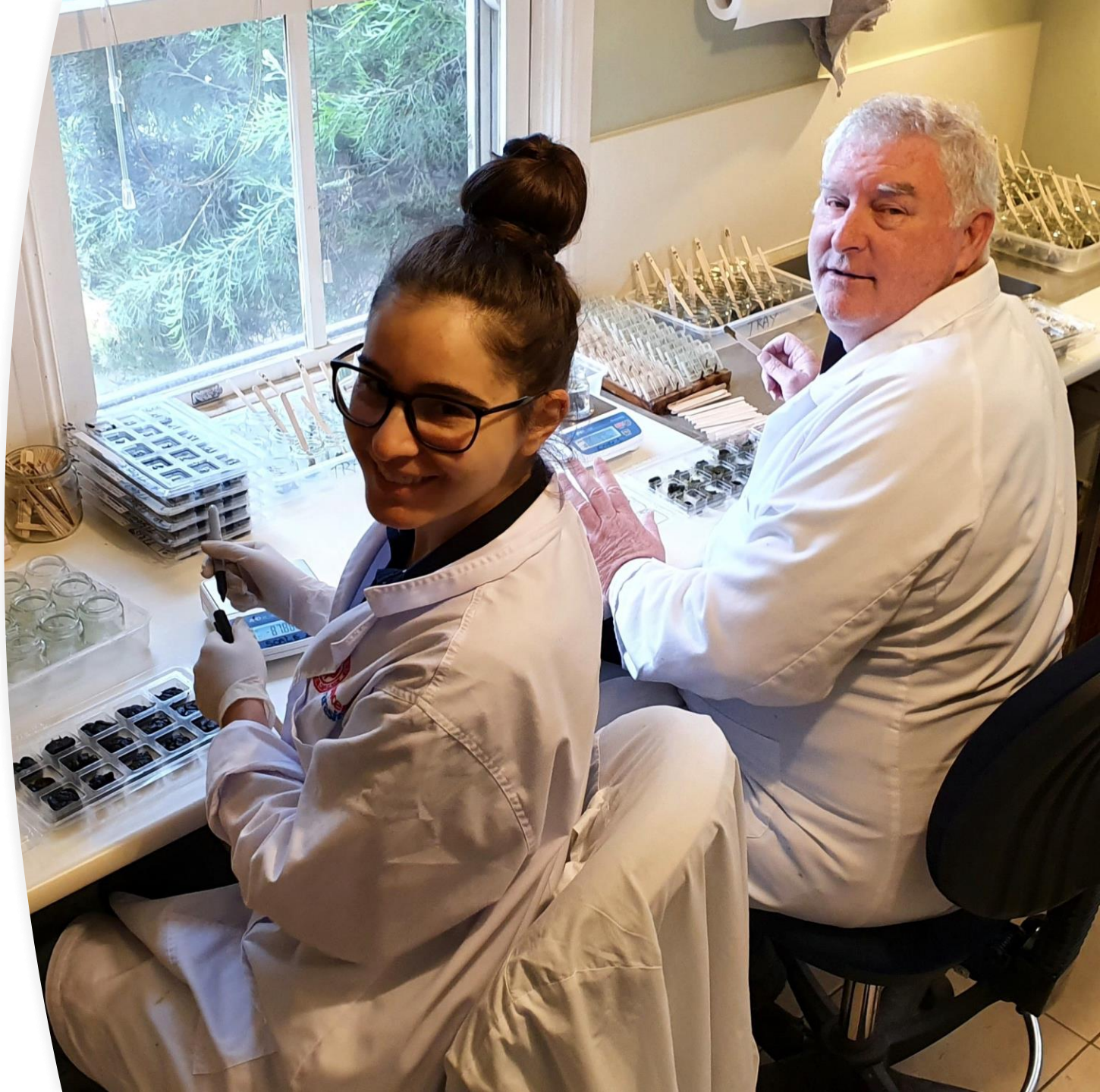
30 SEPT 2020 Update- managing worms and resistance in Monaro sheep flocks



Matt Playford

Dawbuts lab

1. Reference laboratory
2. Support for FECPAK^{G2}
3. Research trials



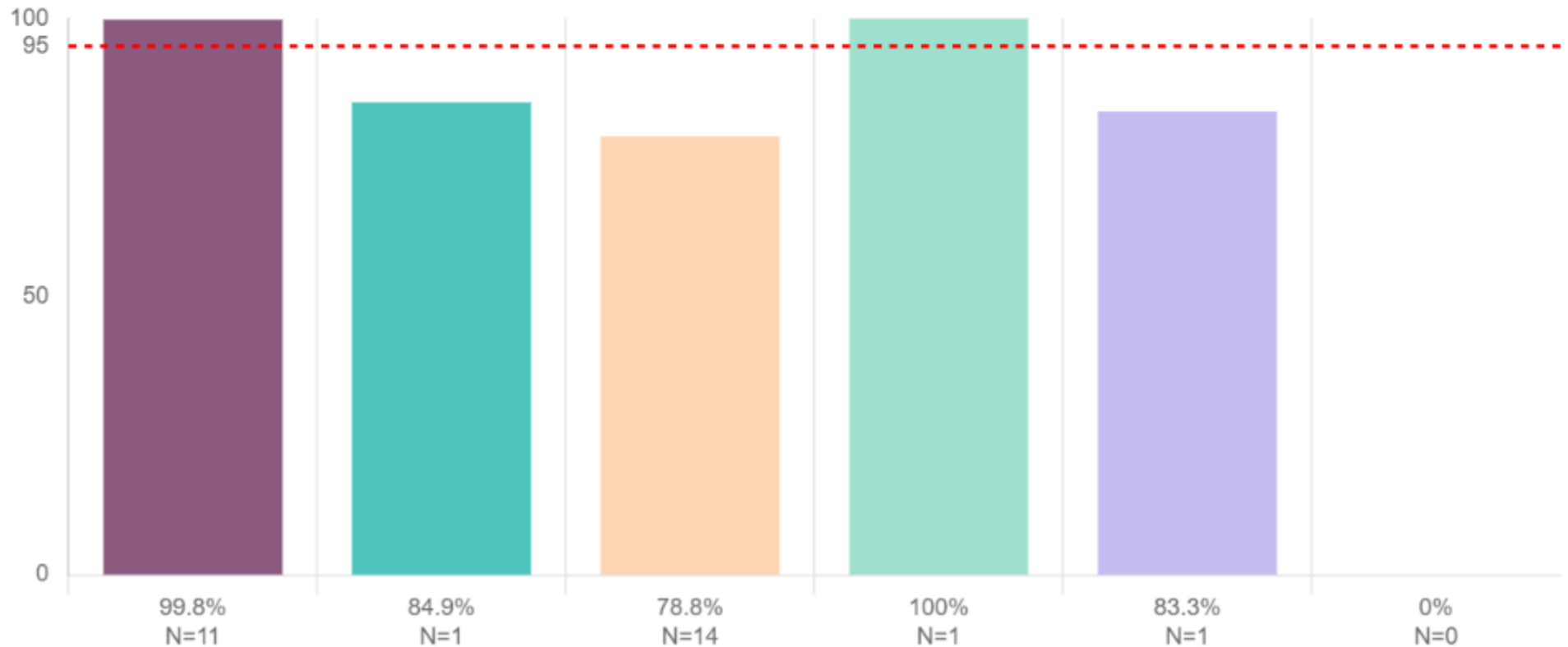
UNE national sheep worm control survey (n=354)

Feature	Survey (2018)	Wormboss recommends
Worm egg counts (>1/year)	40% of farmers	100% of farmers
Drench tests	4% per year	50% per year
Rams selected for resistance	23%	100%
Quarantine drench	60.6%	100%
Combination products	45%	100%

SELECTED DRENCHES

- Startect
- Abamectin (ML)
- Moxidectin (ML)
- Levamisole (LV)
- White Drench (BZ)
- Closantel (SA)

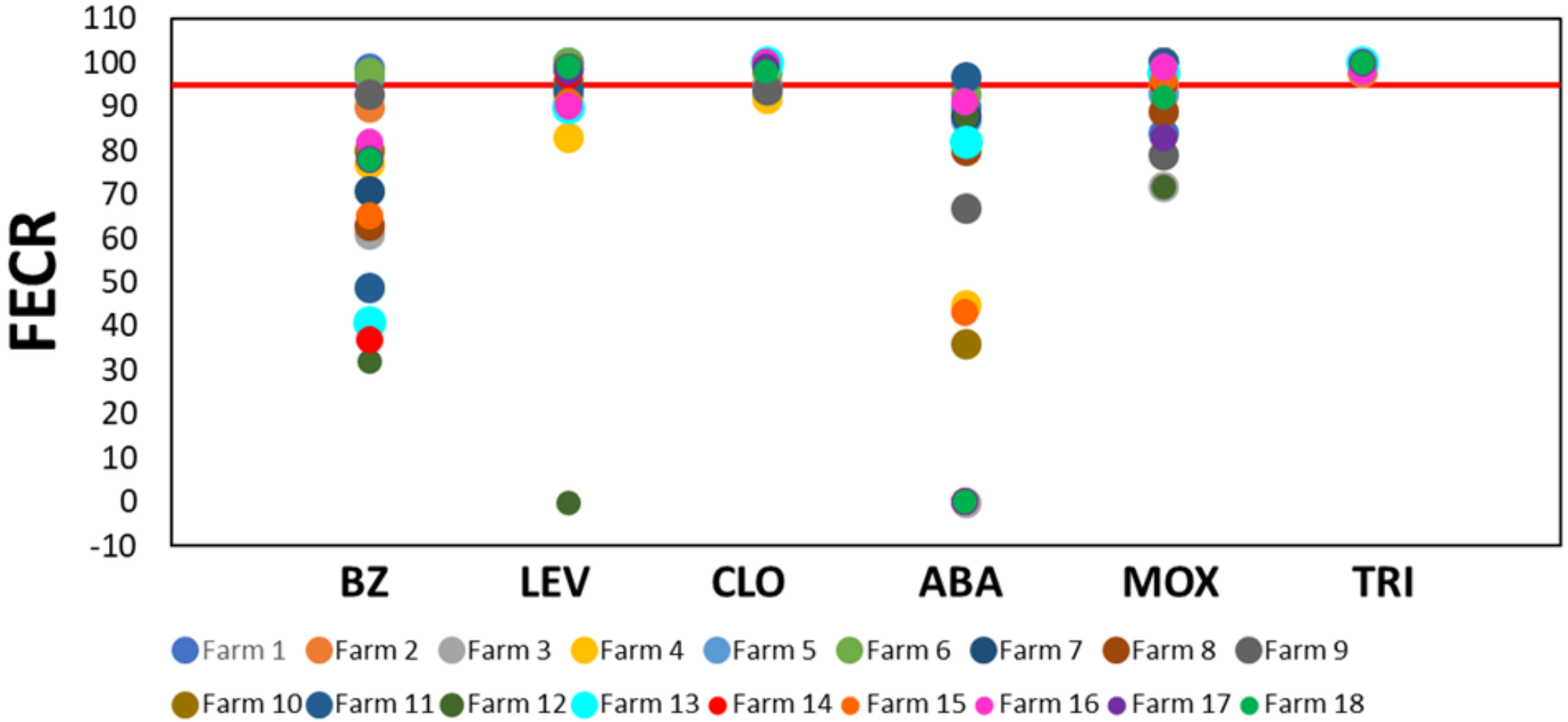
BARBER'S POLE WORM EFFICACY (Haemonchus contortus) AM MEAN



TFS 2020 trials Summary

- 18 drench tests April-June 2020
- No resistance seen in *Nematodirus* or *Chabertia*
- Multi-resistant brown stomach worm
- Multi-resistant barber's pole worm (BPW)
- Closantel and levamisole have overall good efficacy against BPW
- Tridectin fully-effective on most properties

Overall Drug Efficacy



Worst case

Drench Efficacy (% of worms killed)

	Treatment groups							
	BZ	**LVS**	**ABA**	**MOX**	**STA**	**TRIG**	**TRID**	**MON+**
Overall Efficacy	**0**	**40**	**0**	**0**	**88**	**68**	**0**	**12**
Haemonchus	0	40	0	0	88	68	0	12

2018-2019 MFS-AWI FECRT trial

- Compare untreated day 14 control with day 0 control
- Compare standard McMaster worm egg count method (50epg) with sensitive Mini-FLOTAC method (5epg)
- 24 farms in MFS

Summary results of 24 drench trials

Farm 2, 2630, Dec 2017

Sp. Haemonchus:

Drench	Control	Moxidectin	Levamisole	Monepantel	Closantel	Albendazole	0
Number	3	3	3	3	3	3	0
% Total	67%	0%	0%	0%	0%	0%	0%
Arith. Mean	83	0	0	0	0	0	
Var (FEC)	677	0	0	0	0	0	
% Reduction		**100**	**100**	**100**	**100**	**100**	
Var (Reduction)							
Upper 95% CL		100	100	100	100	100	
Lower 95% CL		**90**	**90**	**90**	**90**	**90**	

Drench effectiveness	Susceptible	Susceptible	Susceptible	Susceptible	Susceptible

Farm 44, 2633, Mar 2019

Sp. Haemonchus:

Drench	Con	BZ	LVS	Clos	ABA	MOX	STA
Number	15	15	15	15	14	13	14
% Total	98%	93%	0%	89%	100%	100%	98%
Arith. Mean	1839	701	0	368	4379	2392	21
Var (FEC)	4085770	1624303	0	99993	15805275	2686186	2111
% Reduction		**62**	**100**	**80**	**-138**	**-30**	**99**
Var (Reduction)		0.30		0.13	0.14	0.12	0.42
Upper 95% CL		88	100	91	-9	37	100
Lower 95% CL		**-21**	**99**	**57**	**-421**	**-166**	**96**

Drench effectiveness	Resistant	Susceptible	Resistant	Resistant	Resistant	Susceptible

Farm 45, 2630, Mar 2019

Sp. Haemonchus:

Drench	Con	BZ	LVS	Clos	ABA	TRI	TRIO
Number	15	14	15	15	15	14	15
% Total	96%	99%	17%	21%	100%	100%	0%
Arith. Mean	982	290	11	13	1410	0	0
Var (FEC)	1448185	159401	387	318	1682929	0	0
% Reduction		**70**	**99**	**99**	**-44**	**100**	**100**
Var (Reduction)		0.24	0.32	0.23	0.16		
Upper 95% CL		89	100	100	37	100	100
Lower 95% CL		**18**	**96**	**96**	**-229**	**98**	**98**

Drench effectiveness		Resistant	Susceptible	Susceptible	Resistant	Susceptible	Susceptible

Farm 51, 2632, Apr 2019

Sp. Haemonchus:

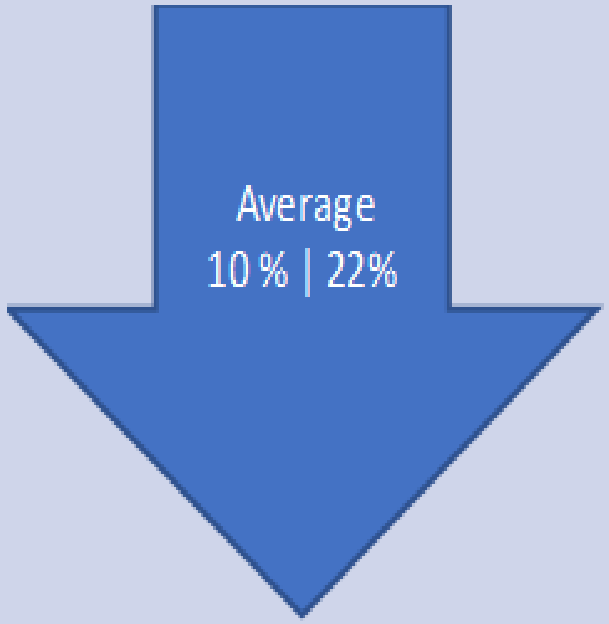
Drench	Con	BZ	LVS	Clos	ABA	MOX	STA
Number	15	15	15	15	15	15	15
% Total	100%	100%	100%	98%	100%	100%	100%
Arith. Mean	4847	1583	37	219	4113	2010	0
Var (FEC)	10514810	1043810	20167	37341	25413738	2158643	0
% Reduction		**67**	**99**	**95**	**15**	**59**	**100**
Var (Reduction)		0.06	1.03	0.08	0.13	0.07	
Upper 95% CL		80	100	98	60	76	100
Lower 95% CL		**46**	**94**	**92**	**-81**	**29**	**100**

Drench effectiveness	Resistant	Susceptible	Susceptible	Resistant	Resistant	Susceptible

2019 MFS drench resistance summary

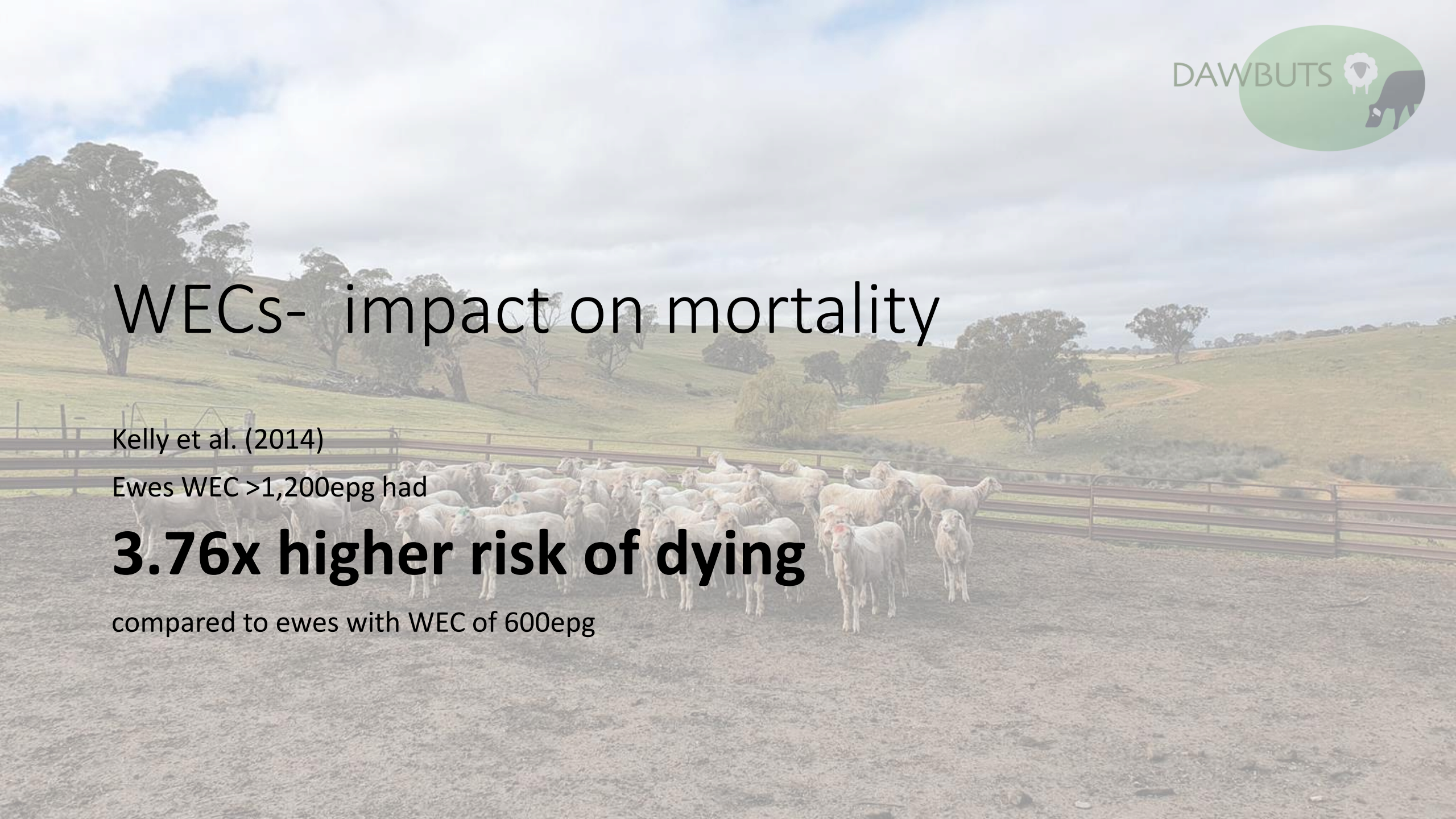
Drench class	Efficacy range (median)
Single active MLs	0-100% (Aba 45%, MOX 60%)
White drenches (albendazole)	0-100 % (75%)
Levamisole	90-100% (98%)
Closantel	0-100% (90-95%)
Triple active combination	99-100%
Startect (derquantel + aba)	99-100%
Zolvix (monepantel)	99-100%

Recommendation Guide

Risk	Sheep (eggs per gram)	Decreased ADG (%)	Decreased wool growth /lactation
Low	50-150	7%	
Medium	150-300	10%	
High	300-1,000	15%	
Very high	>1,000	20%+	

BPW- Mortality risk

In a study on 6 farms in NNSW with BPW, risk of **mortality** of Merino ewes was 3.76x higher if they had WEC of 1,200epg compared to 600 epg



WECs- impact on mortality

Kelly et al. (2014)

Ewes WEC >1,200epg had

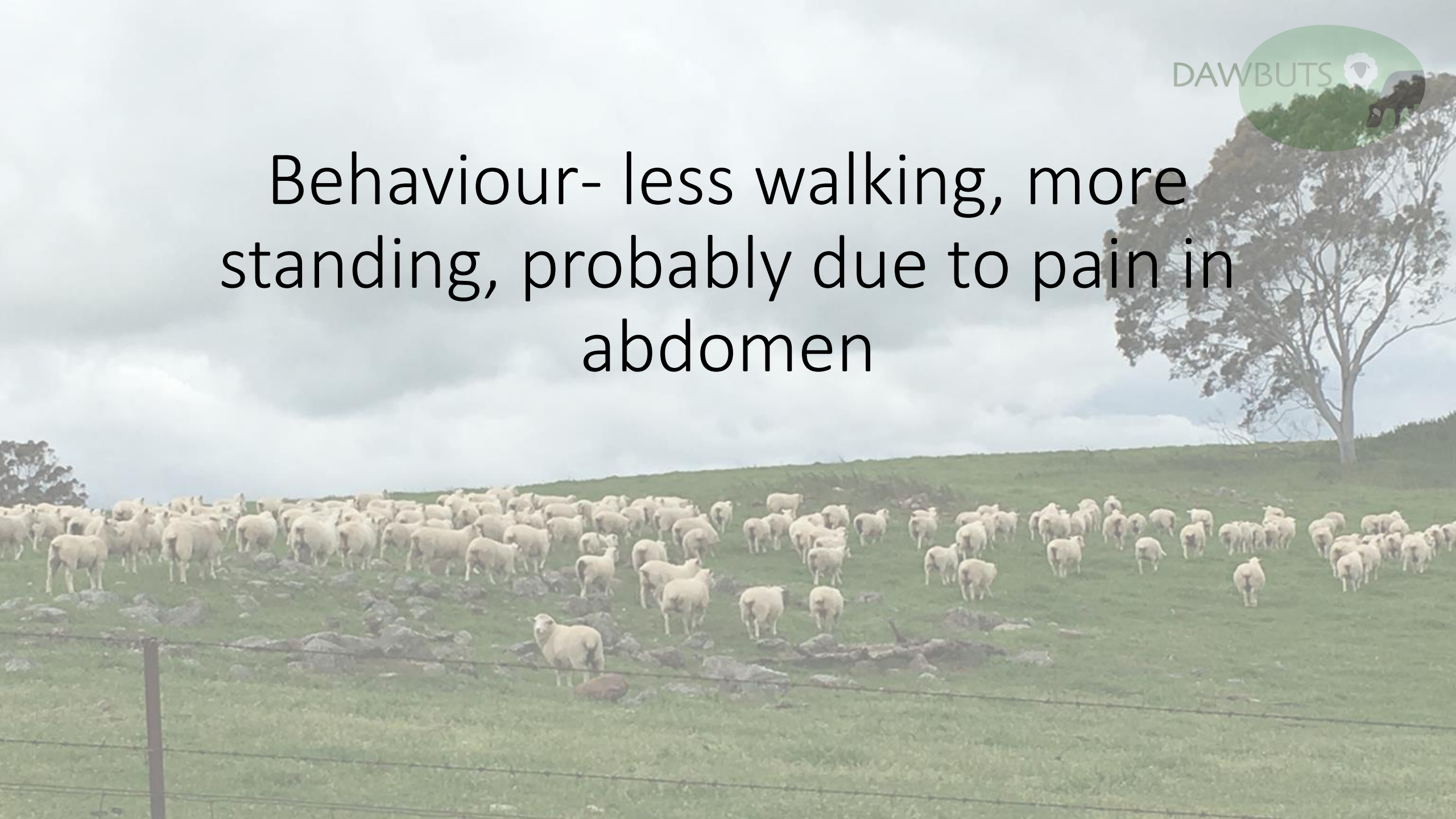
3.76x higher risk of dying

compared to ewes with WEC of 600epg

Wool growth- average decrease of 10%

Scour worms

Black scour worms and brown stomach worms can cause scours and affect appetite even at low WEC of 150epg



Behaviour- less walking, more standing, probably due to pain in abdomen

Reduced appetite- lower voluntary feed intake

Reduced fertility

Season

1. Rain and warm weather (>20^{o}C) prior to WEC will enhance worm survival on pasture and allow rapid development of larvae.
2. Cool weather will allow good survival of eggs (scour worms), while frosts and cold weather will kill barber's pole worm eggs.
3. Hot dry weather will kill worm eggs and larvae.

Nutrition

1. Sheep on good feed (>1,500 kg/DM/ha) with high palatability and protein will have some resilience against worms.
2. Sheep on low energy or protein ration or pastures with low palatability have high susceptibility.

Animal

1. Body condition score and clinical signs including pale colour and scours.
2. Most susceptible animals are: lambs, pregnant and lactating ewes, rams.
3. Most resilient animals are: wethers, dry or early pregnant ewes.
4. Activity (walking, eating) decreases with higher WECs.

Paddock

1. Permanent pastures with low sward & broad-leaf plants have highest larval contamination.
2. Lower survival of larvae with pasture rotation (following cattle or dry sheep), spelling, cropping or haymaking, high % upright plants.

Paddock contamination

Testing

Plan WEC tests 7-10d before lamb-marking, weaning, crutching, etc.

Treatments at the time of these events.

Summary

1. Monaro drench resistance status highly variable
2. National and regional database of drench resistance available at SheepTRAX
3. Check efficacy of closantel, levamisole to see which combination to use- DO NOT use any single-active drenches
4. LA treatments only with primer and exit drenches, consider Barbervax for long-term control
5. TEST sheep 7-10d prior to events (marking, weaning, vaccinations, joining)