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A comparison of the current anthelmintic protocols used to control gastrointestinal nematodes in UK lowland sheep flocks and associated professional advice provided to farmers.

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THE UNIVERSITY of EDINBURGH
Royal (Dick) School of
Veterinary Studies



Current anthelmintic protocols and associated professional advice provided to control gastrointestinal nematodes in **UK lowland sheep flocks.**

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Ruminant GIN:

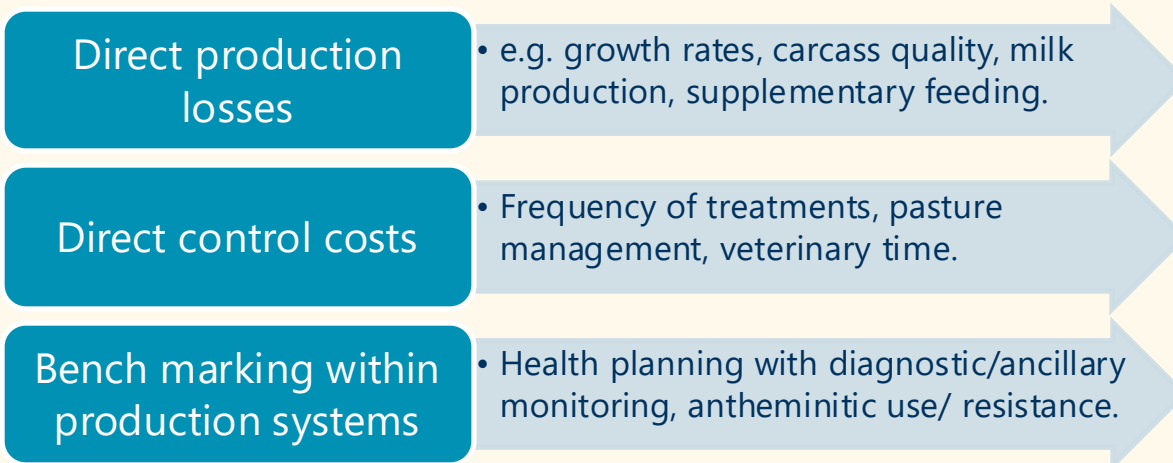
Impact on health, welfare and production



Industry

- Estimated costs of helminths, including gastrointestinal nematodes (GIN), to the UK livestock industry estimated in 2020:
 - Treatment costs: ~£80 million per annum.
 - Production costs: ~£223 million per annum.

Herd and flock level



The effects on production and mortality in animals with production-limiting helminth infections used in cost calculations.

Host species and production parameter for which costs were accounted	Gastrointestinal nematodes	Fasciola hepatica	Dicrocoelium viviparum
Young dairy cattle	10 ^a	25 ^a	5 ^h
Delayed puberty (days)	331 ^a	159 ^a	166 ^b
Decreased milk production first lactation (kg)	3.8 ^a	3 ^a	1.9 ^a
Mortality (%)	NA	0.75 ^f	NA
Adult dairy cattle	NA	NA	1 ^h
Reduced milk production (%)	1.9 ^f	0.5 ^f	NA
Intercalving interval (days)	NA	13 ^f	NA
Additional inseminations	NA	0.75 ^f	1 ^h
Mortality (%)	0.78 ^g	0.78 ^h	NA
Beef cattle	NA	6.4 ^b	NA
Reduced carcass weight (%)	1 ^b	1 ^b	NA
Intercalving interval (days)	0.57 ^g	0.57 ^h	NA
Additional inseminations	NA	6.4 ^b	NA
Mortality (%)	1 ^b	1 ^b	NA
Dairy sheep	0.85 ^d	0.96 ⁱ	NA
Milk production (production ratio infected over control)	1 ^b	1 ^b	NA
Intestambing interval (days)	NA	NA	NA
Mortality (%)	NA	NA	NA
Meat sheep	NA	NA	NA
Carcass weight (production ratio infected over control)	NA	NA	NA
Mortality (%)	NA	NA	NA
Dairy goats	NA	NA	NA
Milk production (production ratio infected over control)	NA	NA	NA
Interkidding interval (days)	NA	NA	NA
Mortality (%)	NA	NA	NA

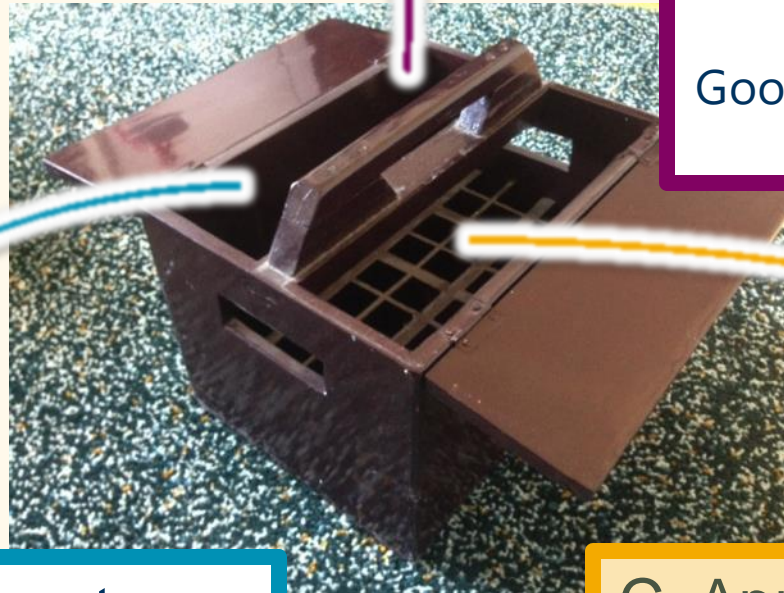


Charlier J, et al. **Initial assessment of the economic burden of major parasitic helminth infections to the ruminant livestock industry in Europe.** *Prev. Vet. Med.* 182, 105103, 2020

Ruminant GIN:

Tool kit for integrated and sustainable control

Individual flock
or herd health
plans



A. Develop and
maintain
Immunity:
Good health and genetic
selection.

B. Exposure to
Infection:
Pasture management.

C. Apply sustainable
Interventions:
Targeted use of
anthelmintics through
diagnostic monitoring.

Ruminant GIN:

Anthelmintic resistance

Percentage of sheep farms with AR

**Survey data previously compiled by Zoetis (2013).*

Ireland

- All farms **91%**
- BZ: **64%**
- LV: 27%
- BZ & LV: 27%

Scotland

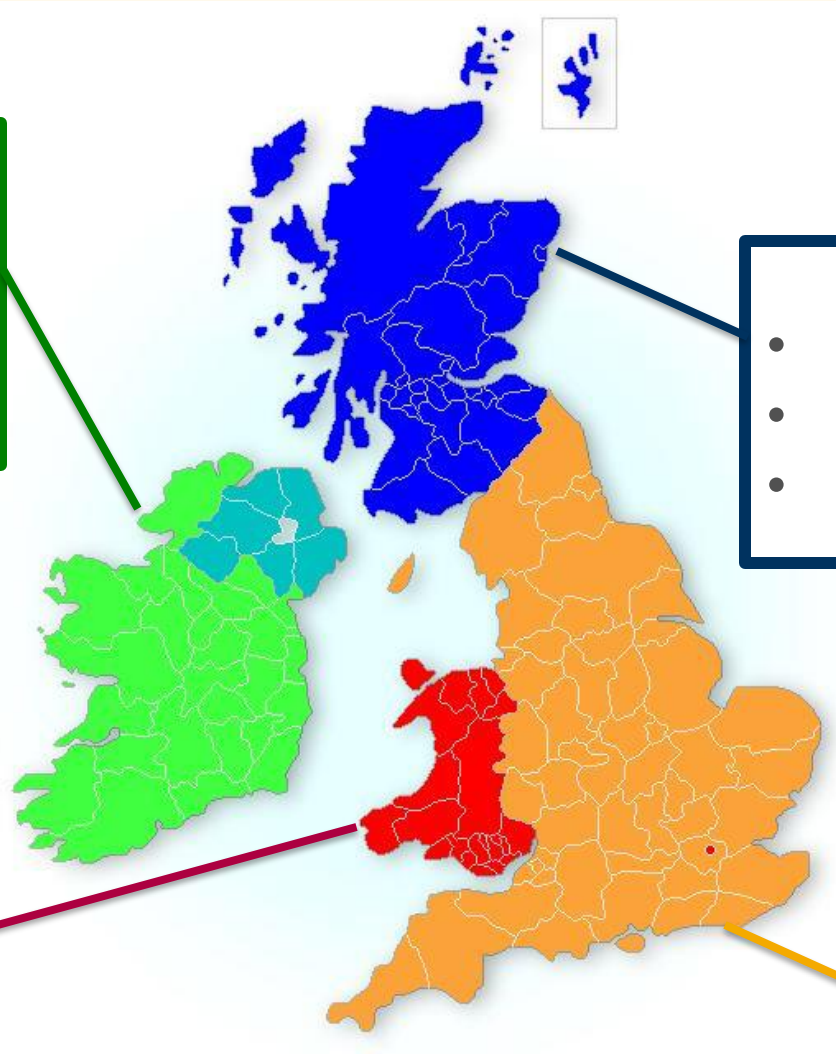
- BZ: **80%**
- LV: 30%
- BZ, LV & IM: 8%

Wales

- All farms **82%**
- BZ: 46%
- LV: 5%
- BZ & LV: 31%

England

- BZ: **83+%**
- BZ & LV: 17-47%
- ML: **55%**



Practicalities of sustainable approaches

Control in UK lowland flocks

Low resource systems



1. Is there variation in approach to GIN control within systems in the UK?



High resource systems

Practicalities of sustainable approaches

Advice on control



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The Royal (Dick) School of Veterinary Studies
Newsletter
Happy New Year to most out of favor!

Rob Kelly @_RobKelly_
Fantastic use of modelling techniques to predict risk & improve control of **#haemonchus** in **#sheep**. Thus **#targetedControl** to limit the impact of **#anthelmintic #resistance**, maintain **#livestock #productivity & #foodsecurity**. **#UK #agriculture #parasitology #epidemiology #innovation**

BUG Consortium @BUGConsortium
Replying to @BUGConsortium
With map showing the predicted percentage of **#Haemonchus** eggs that will successfully develop and migrate onto grass as infective larvae at different times of year in the UK:

Rules:
- Sample individually in containers and then we will pool (this is because if you only take dung from the top which has been produced by one animal with a low worm burden, you will get a falsely low result. This would mean missing treating animals with high worm burdens (Photo 1).
- When placing individual samples in a larger container, always label with the group ID. To keep group samples together a top tip is using a couple of rectal gloves to tie samples together (Photo 2).

10

Practicalities of sustainable approaches

Advice on anthelmintic use

- Who can prescribe in UK?
 - Initially all anthelmintics POM-V now **all POM-VPS**.
 - Vet, pharmacist or suitably qualified person (SQPs).
- Vets advice on anthelmintic use is most influential when compared to other types of prescriber (n=~300 UK farmers).
 - Also most influential on sustainable practices.



Easton, S., et al. (2018).
A survey of experiences of UK cattle and sheep farmers with anthelmintic prescribers; Are best practice principles being deployed at farm level? *Preventive Veterinary Medicine*, 155, 27-37.

2. Is there a relationship between farmers source of advice and their approach to GIN control?



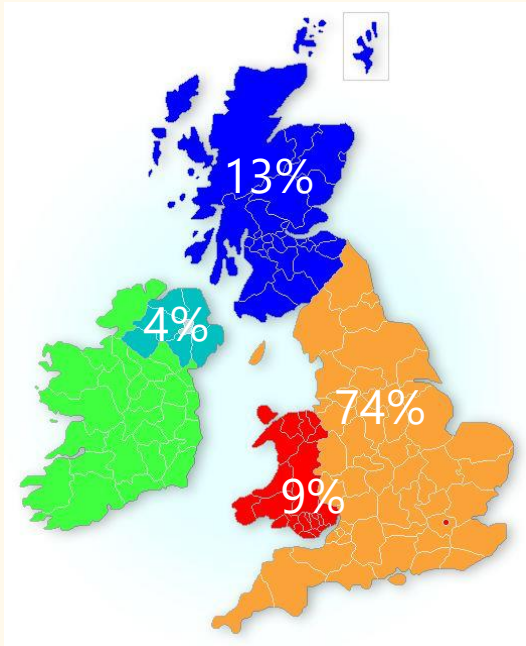
Study design

- **Summer 21:** online survey developed:
 1. Farm system descriptors
 2. GIN control protocols: ewes and lambs
 3. Source of advice on GIN control
 - Focus on 2021 season & anthelmintic use.
- **Sept 21:** Ethics approval
- **Oct 21-Feb 22:** Survey circulated to farmers
 - Sheep Vet Society
 - National Sheep Association
 - Opportunistically through vet practice newsletters and facebook pages.



Results

Flock descriptors

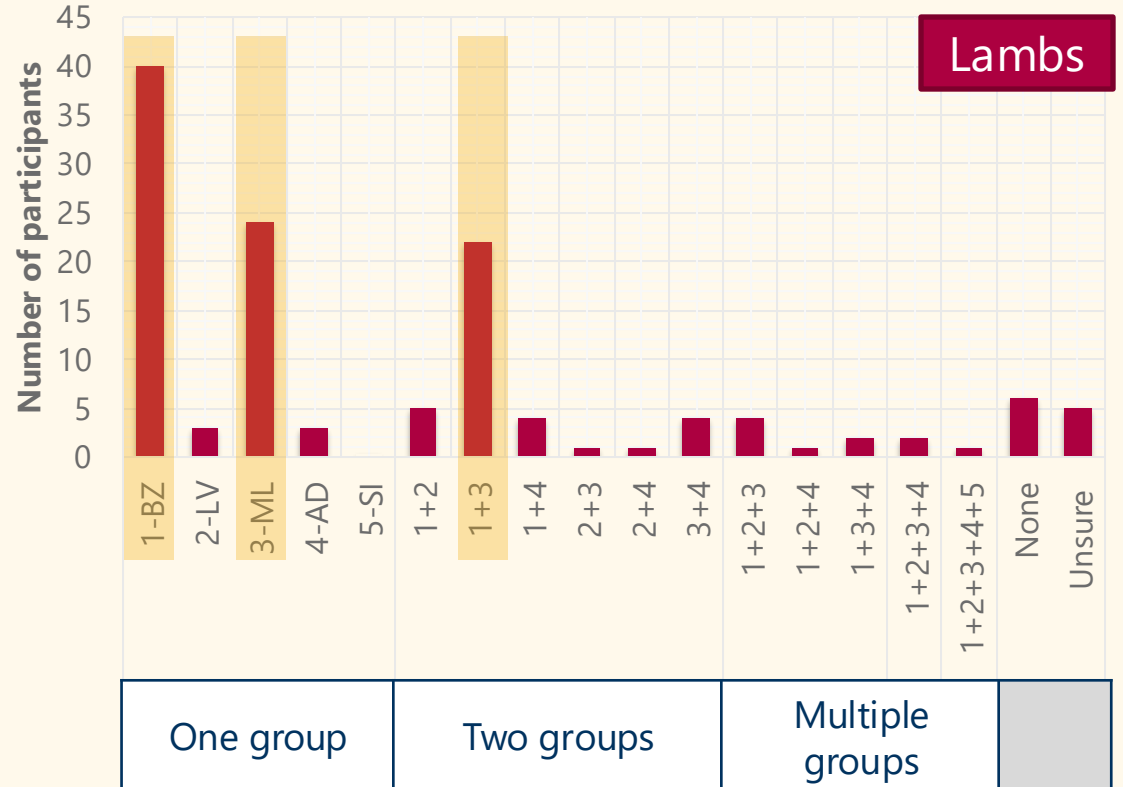
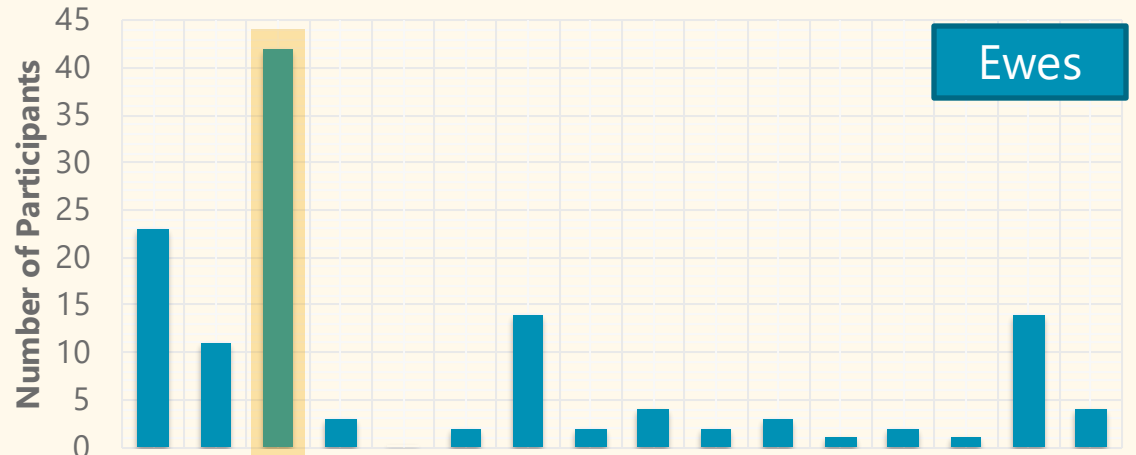
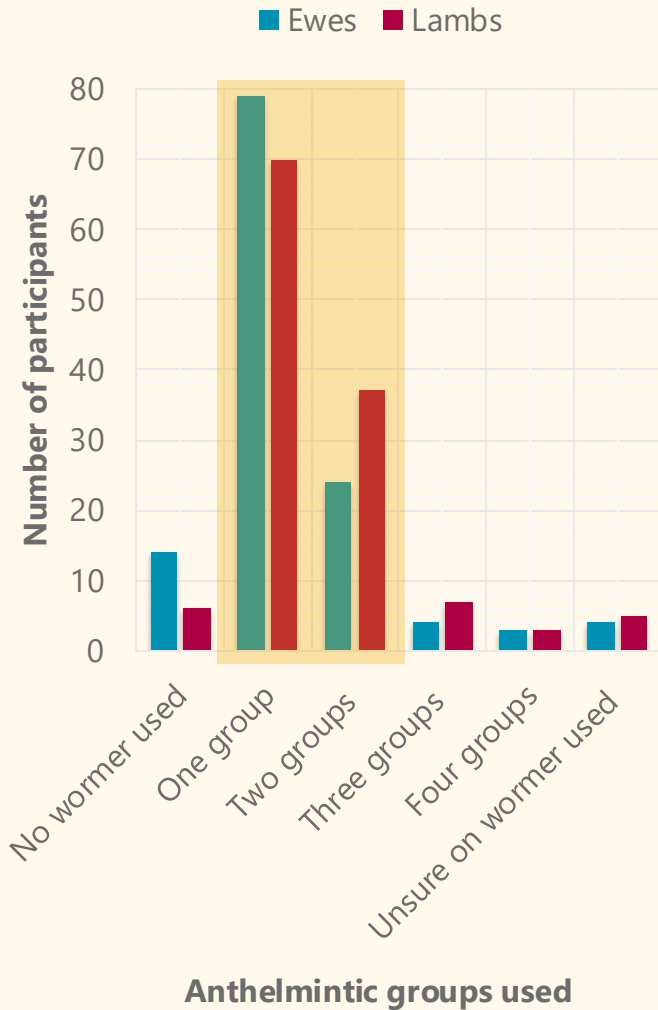


Total (n = 128)		Number of Breeding Ewes			
		<50	51-200	201-500	>500
		54	38	15	21
1 Lambing Period	Total	51	32	9	16
	Indoor	45.1%	53.1%	44.4%	56.3%
	Outdoor	23.5%	12.5%	22.2%	12.5%
	Both	31.4%	31.3%	33.3%	31.3%
2+ Lambing Periods	Total	3	7	6	5
	Indoor	33.3%	57.1%	83.3%	40.0%
	Outdoor	0.0%	14.3%	0.0%	20.0%
	Both	66.7%	28.6%	16.7%	40.0%

- Participants mainly lambed indoors with just one lambing period, and the majority (42%) owned <50 breeding ewes.
 - Mainly smallholder/ pedigree flocks.
- Lambing mainly took place in March and April (65.6-68.0%).
 - Every month of the year except July-August.

Results

Anthelmintic use

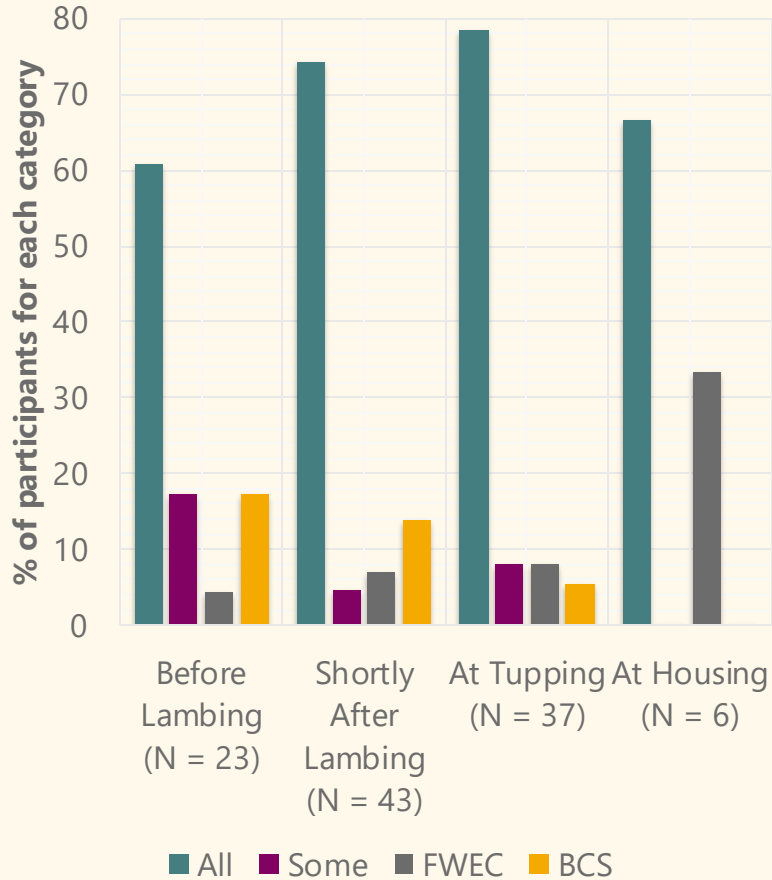


One group	Two groups	Multiple groups	
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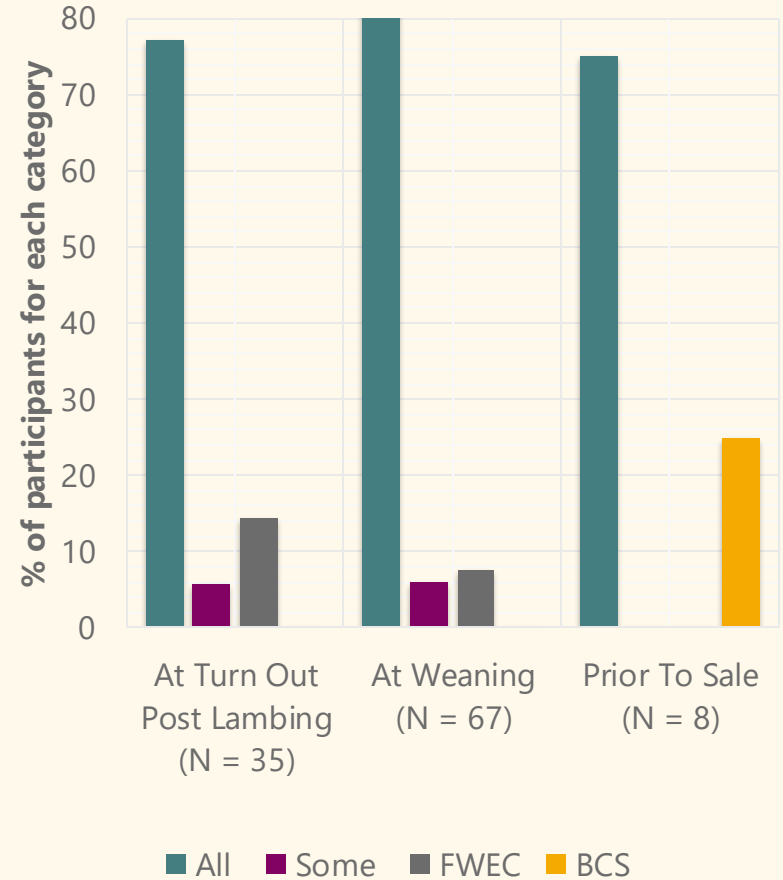
Results

Anthelmintic use

Ewes

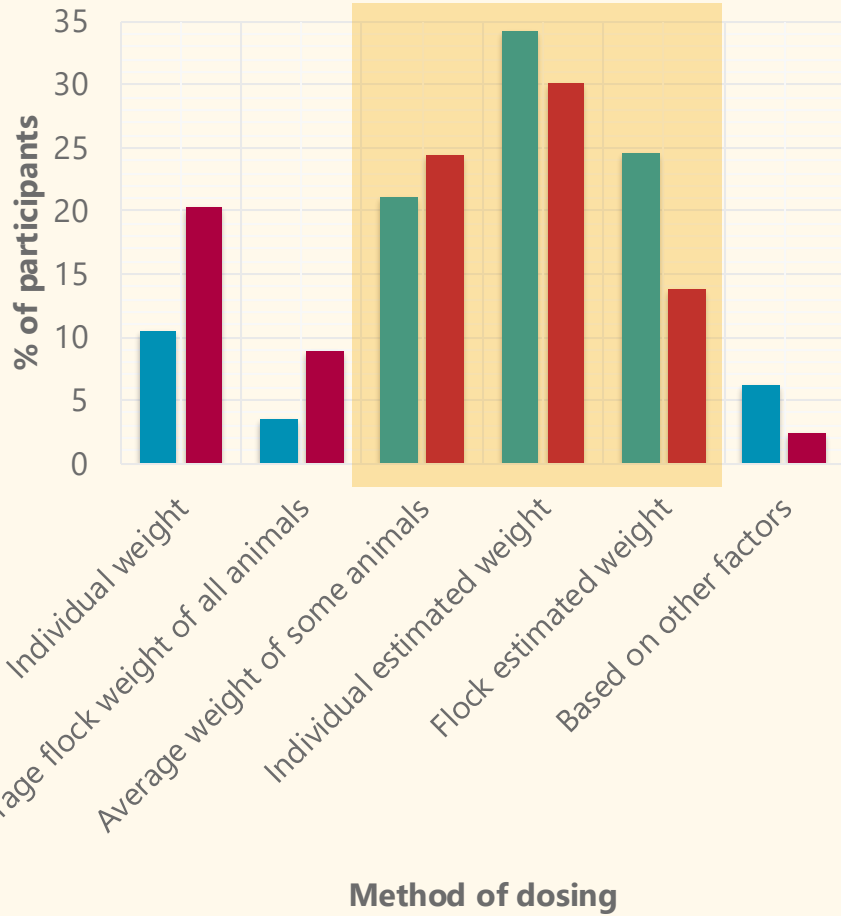


Lambs



Results

Anthelmintic use



Ewes Lambs

		Do you routinely perform faecal egg counts?					
		Ewes			Lambs		
		Yes	No	Some times	Yes	No	Some times
Number of breeding ewes	<50	41%	39%	20%	43%	37%	20%
	50-200	37%	45%	18%	37%	37%	26%
	200-500	13%	47%	40%	20%	53%	27%
	>500	5%	67%	28%	10%	67%	23%

Risk based approaches:

- Larger flocks (>200) tended to not perform FWECS.
- Little difference between ewes and lambs.
- 5.5% of farmers used SCOPs nematodiosis forecast.

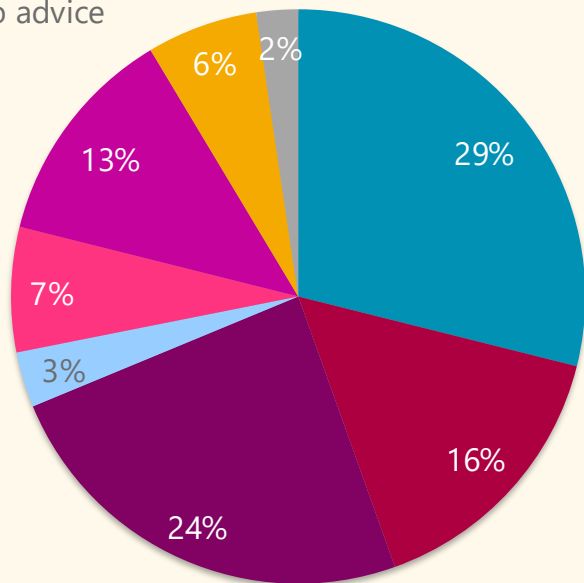
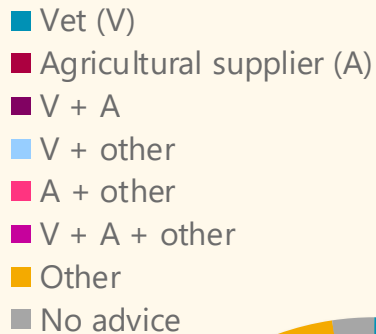
Results

Anthelmintic use: *FWEC use thematic analysis*

Theme	Highlighted examples	Participant ID:
Targeting the anthelmintic product used	'To target wormers for what is required'	2
	'So we know which type of worm and which wormer to use if any'	41
Confirmation of clinical cases	'If one is poorly to see if she's a high worm burden'	20
	'If I am concerned about health / condition of the ewes'	44
	'if any individual lambs look as though they're losing condition or otherwise not thriving'	84
Only treating animals if necessary	'to check worm burden and see if necessary to worm'	16
	'No point in worming if no worms'	36
	'Avoids using unnecessary wormer'	103
Awareness of anthelmintic resistance	'to avoid worming where possible to avoid anthelmintic resistance'	2
	'So we don't over use wormers and create a resistance'	60
Concerns regarding cost	'more cost effective not to worm when not required'	2
	'don't want to have to buy wormer unnecessary'	74

Results

Source of advice



- Most farmers had some advice from a vet (V~70%) or a SQP (A~60%):
 - Nearly half receiving from multiple sources.
 - Few solely relied on other sources (e.g. other individuals, websites or social media).
- Farmers with a flock health plan (39%):
 - advice mostly from a vet (70%) rather than an SQP (54%).
- Only 2% stated had no external advice or a flock health plan.

Results

Source of advice

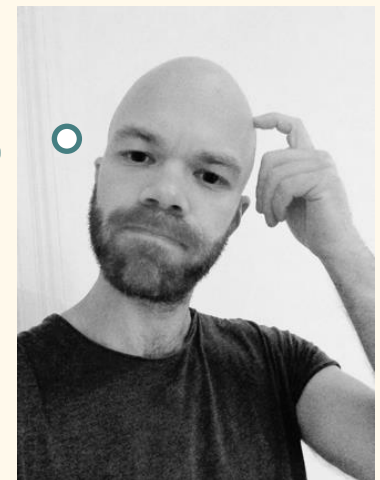
	1. Strongly disagree	2. Disagree	3. Indifferent	4. Agree	5. Strongly agree	Not sure / No answer	Mean score
1: Influenced by vet	21.9%	12.5%	16.4%	10.2%	37.5%	1.6%	3.3
2: Influenced by other SQP	14.1%	16.4%	25.8%	21.1%	17.2%	4.7%	3.1
3: Good product knowledge	6.3%	13.3%	25.8%	32.0%	18.8%	3.9%	3.5
4: Good resistance knowledge	7.8%	15.6%	22.7%	28.1%	21.1%	4.7%	3.4
5: Kept up-to-date by vet	28.1%	18.8%	21.9%	10.9%	15.6%	4.7%	2.7

- Vets and SQPs had an influence on GIN control, although more strongly with vets.
- When split by source of advice:
 - Farmers perceived they had good knowledge of anthelmintic choices but less knowledge around their application towards control.
 - Is there a disconnect between contemporary guidance & GIN control in health plans ?

Conclusion

- Lowland sheep farmers still use GIN control strategies that may promote the development of anthelmintic resistance.
- Although some farmers are adopting sustainable risk-based approaches to GIN control, drivers for undertaking these practices is unclear.
 - *Further analysis to link farmer GIN control behaviors to source of advice.*
- Farmers still value advice from vets and SQPs on GIN control, yet the nature of advice may be focused on treatments rather than routine monitoring.

Opportunities: promotion of farm level data collection to encourage dynamic monitoring and health planning to control of GIN-related disease?



Contributions

- **Emily Horbury[^]**

Study conducted as part of BVM&S student research component (2020-22).

- **Amy Jennings***

Senior Lecturer and co-supervisor.

- Thanks to all the **farmers** involved in the survey.



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