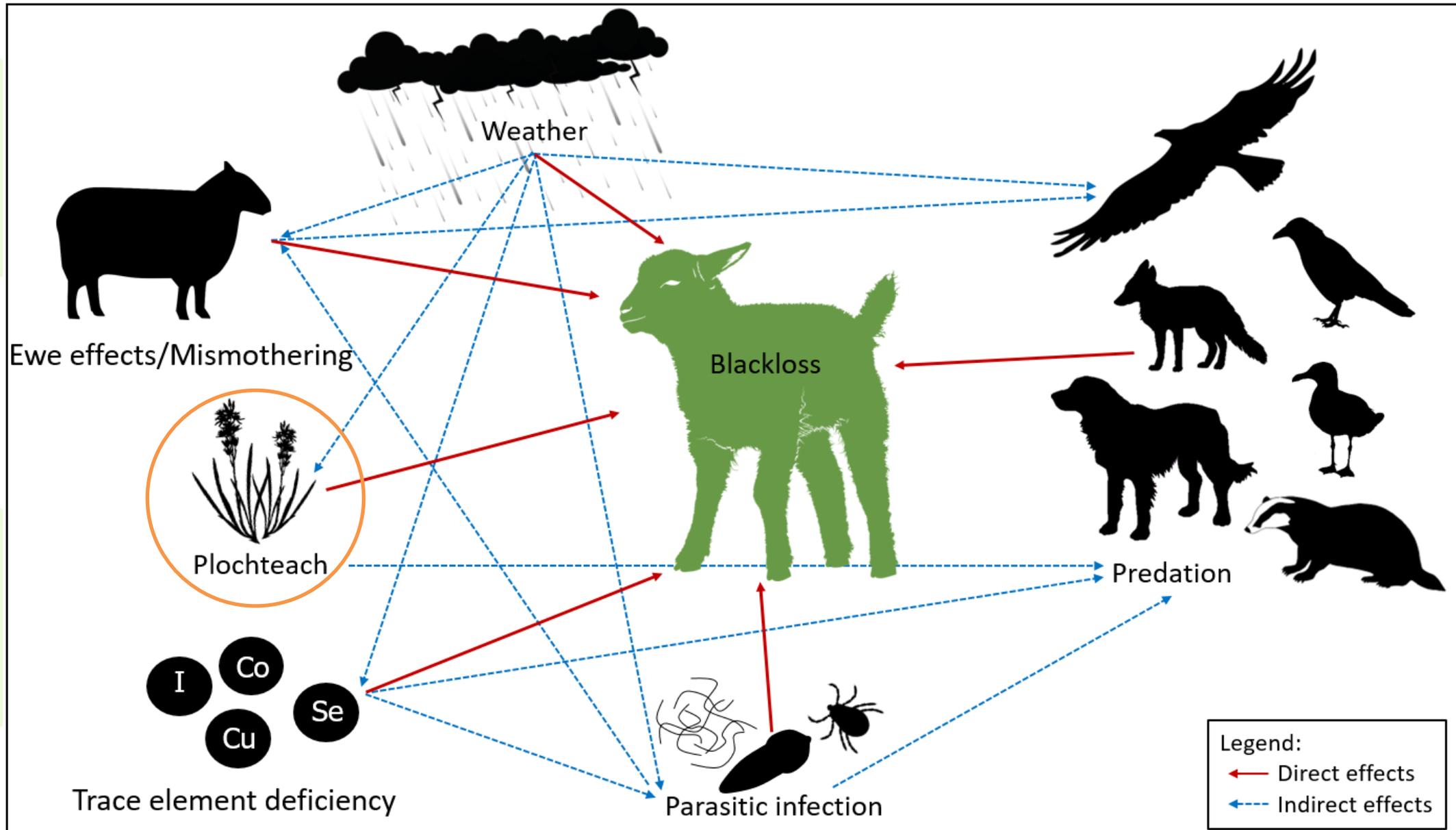


A longitudinal study into predisposing factors for lamb loss and photosensitisation on a Scottish hill sheep farm



F. McAuliffe, A. McLaren, S. Brocklehurst, F. Brülisauer, N. Sargison, D. McCracken

Project Background- Lamb health issues and blackloss



Lamb Health Issues- Plochteach

- 'yellowses', 'saut' and 'alveld'
- Outbreaks: June and July in wet upland habitats
- A suspected cause is ingestion of saponins found within bog asphodel (*Narthecium ossifragum*)
- Prevalence of 10.8% and 20.4% in lambs from SRUC's Auchtertyre flock during 2013 and 2014

(G.V. Cuthill, unpublished data- Pollock *et al.*, 2015)



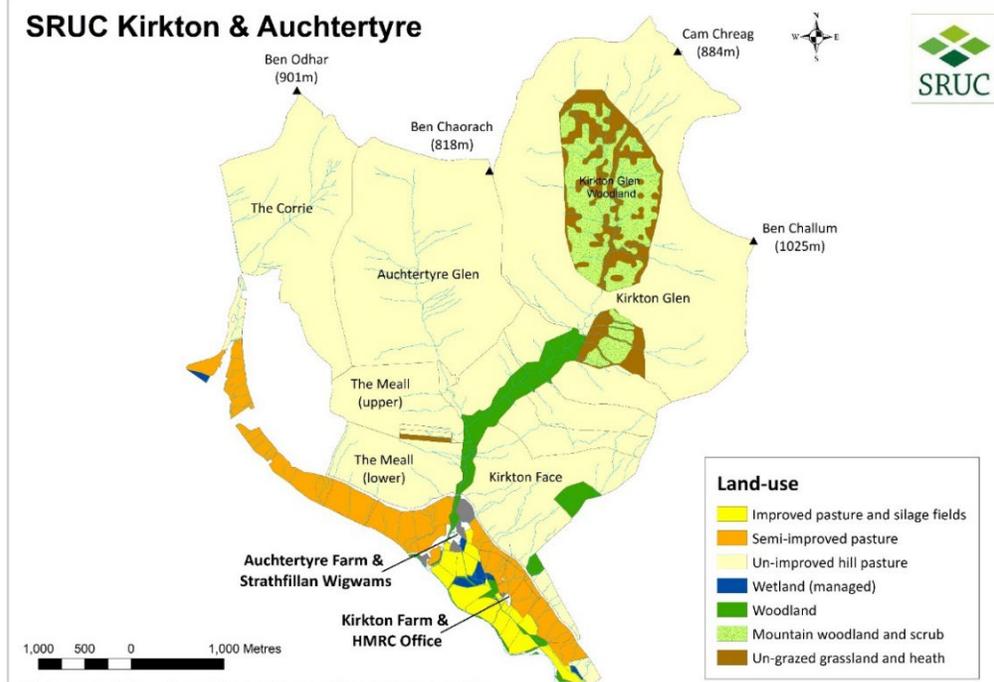
Lamb Health Issues- Plochteach

- A disease which damages the liver
- Photosensitisation on exposed skin
- Lambs become dull, cease eating, seek shade and can damage the skin further by scratching
- Lambs may also die of shock or secondary infection
- There is no specific treatment, however providing shade can prevent further photosensitisation



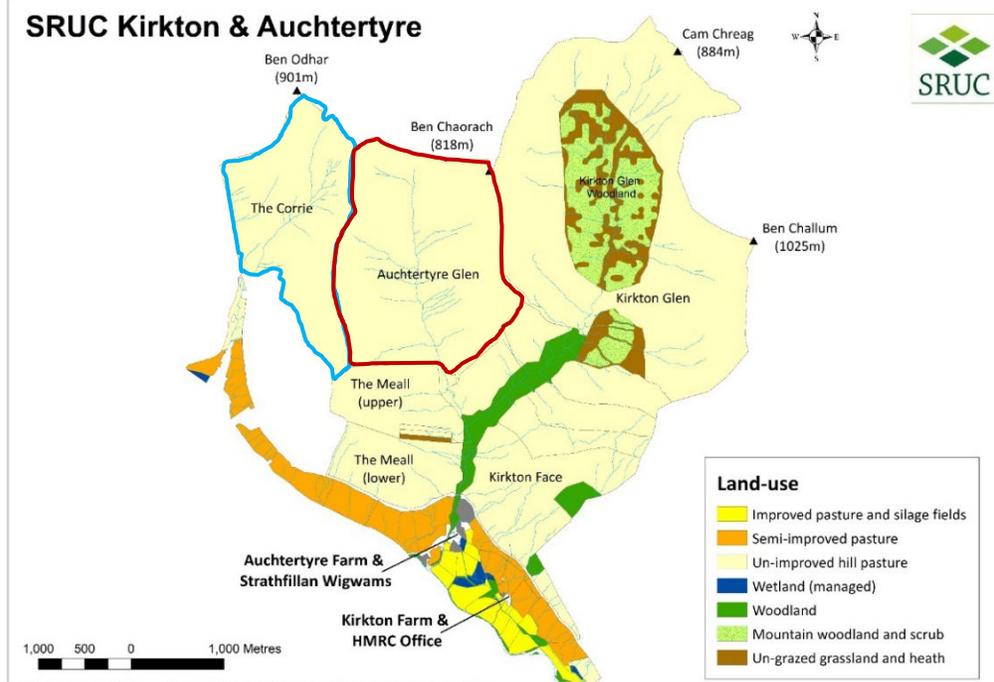
Methods- Study Site

- SRUC's high hill flocks: Auchtertyre and the Corrie
- Managed as three groups:
 - AT: Auchtertyre hill singles
 - AC: Corrie hill singles
 - TW: Ewes from both hills with twins, reared in-bye and in parks
- Anecdotal observations suggest that there is a greater abundance of bog asphodel in the Auchtertyre glen than in the Corrie grazing area, semi-improved parks and improved fields.



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Methods- Data Collection

- AT: 2014-2021, 1629 lambs
- AC: 2017-2021, 353 lambs
- TW: 2014-2021, 1092 lambs

- Recording events: lambing (May), marking (June), shearing (July) and weaning (August).

- DNA samples to determine dam and sire

- Presence/absence was recorded using EID tags

- Individual lamb weights recorded using EID weigh crate

- Plochteach was diagnosed through clinical signs of photosensitisation on the ears and/or back



Ears

Back

1



A



2



B



3



C



4



D



5



E



6

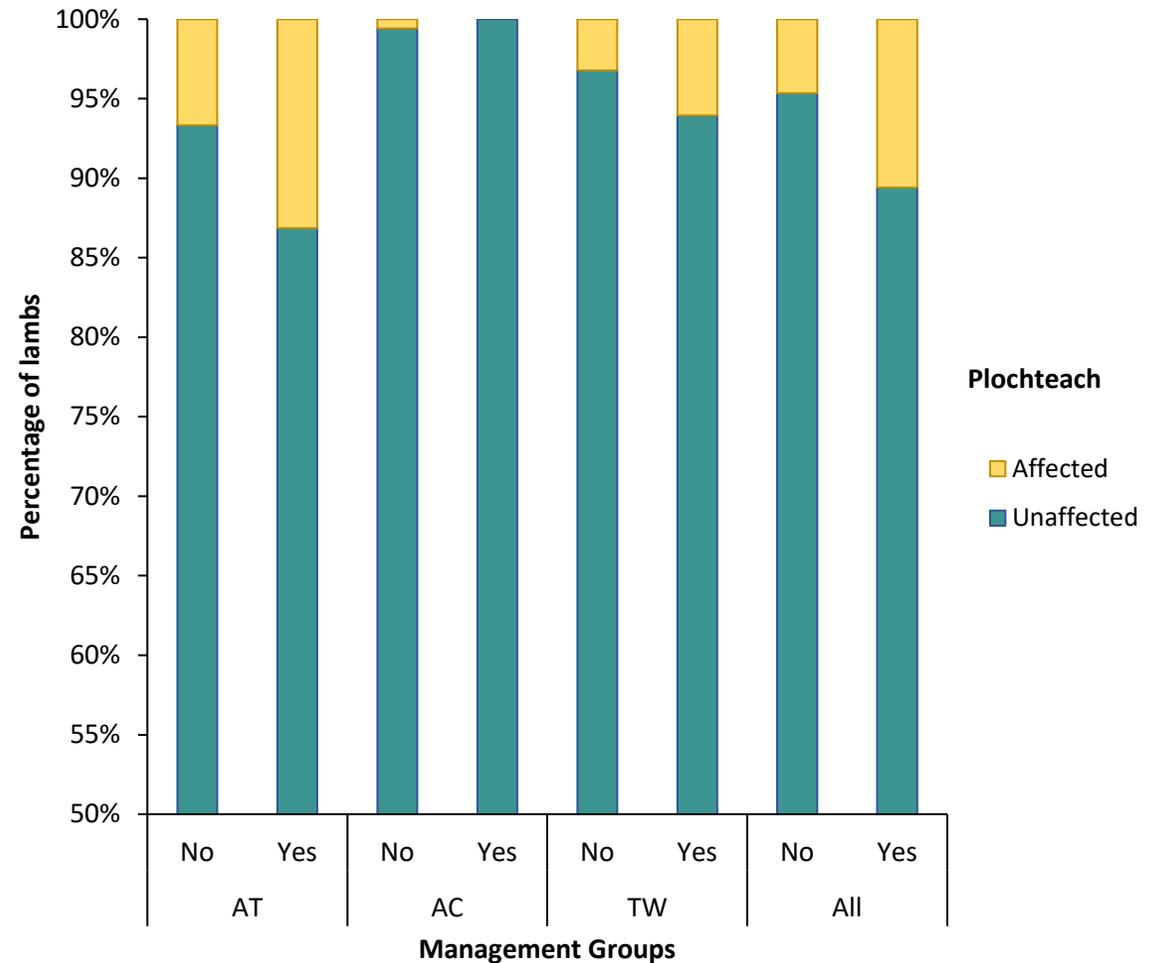


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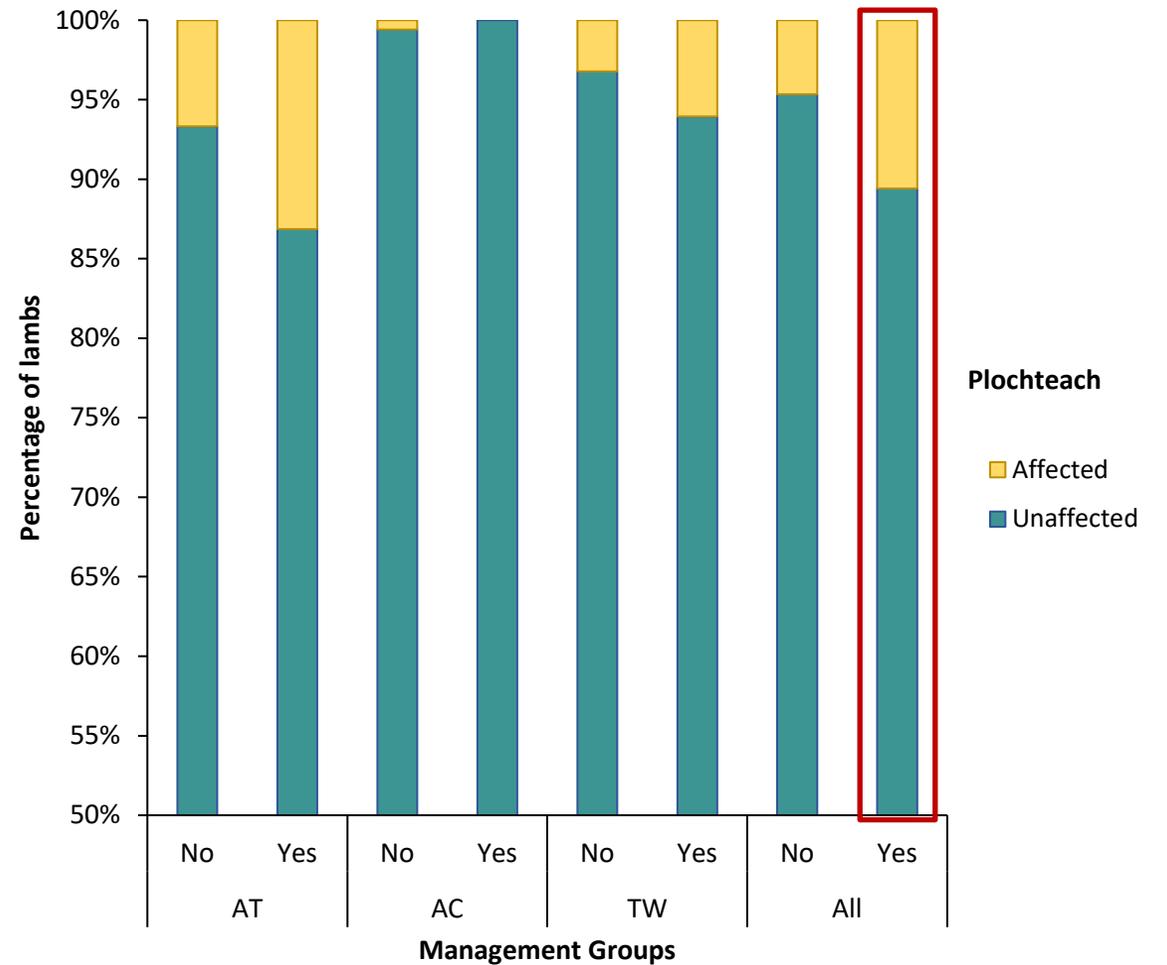
Plochteach and Blackloss

- The eight-year average blackloss: 8.3%.
- Total lambs affected by plochteach: 5.1%.
- Prevalence of plochteach in the blackloss populations was 10.6%



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Methods- Analysis

- Blackloss determined between marking and weaning using presence/absence

Lamb ID	Lambing	Marking	Shearing	Weaning
1	✓	✗	✓	✓
2	✓	✓	✓	✓
3	✓	✓	✓	✗
4	✓	✓	✗	✗

Binary GLMM: **Blackloss** ~

Fixed effects model: **Ewe Crop** (5 levels; 1, 2, 3, 4 & >5) + **Litter** (2 levels; single and multiple) + **Sex** (2 levels; male & female) + **Plochteach** (2 levels; affected or unaffected) + marking **weight**

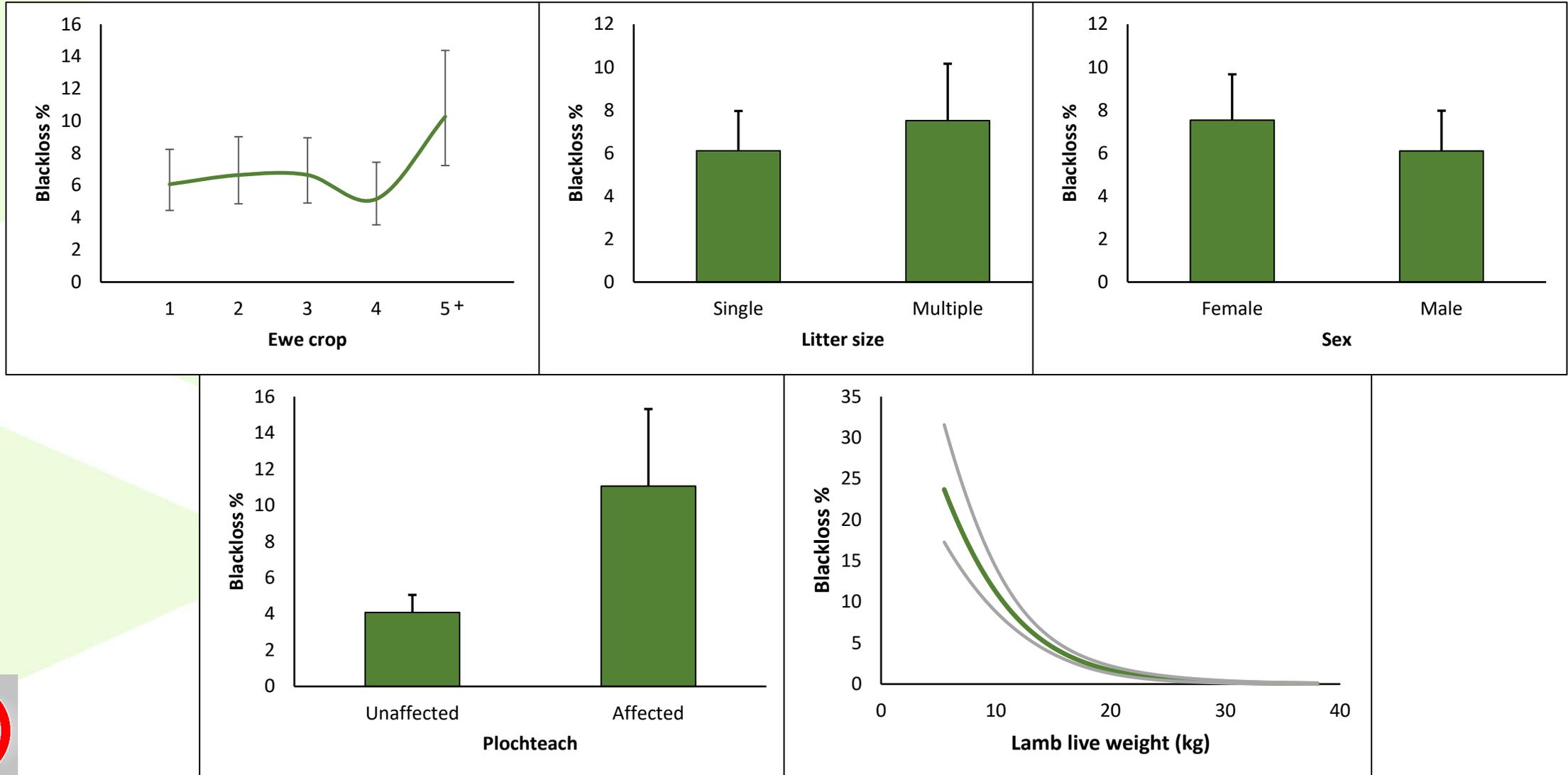
Random effects model: **Year** (8 levels; 2014 to 2021) x **Management Group** (3 levels; AT, AC & TW) + **sire** + **ewe** + **ewe x group x year**



Results- Blackloss



	Blackloss			
Fixed effects ⁺	ndf	ddf	F stat	P
Crop	3.4	4	0.85	0.495
Litter	0.4	1	0.43	0.511
Sex	2.8	1	2.76	0.097
Plochteach	12.9	1	12.87	<0.001
Marking weight	21.8	1	21.83	<0.001



Methods- Analysis

- Plochteach determined between marking and weaning using clinical signs

Binary GLMM: **Plochteach** ~

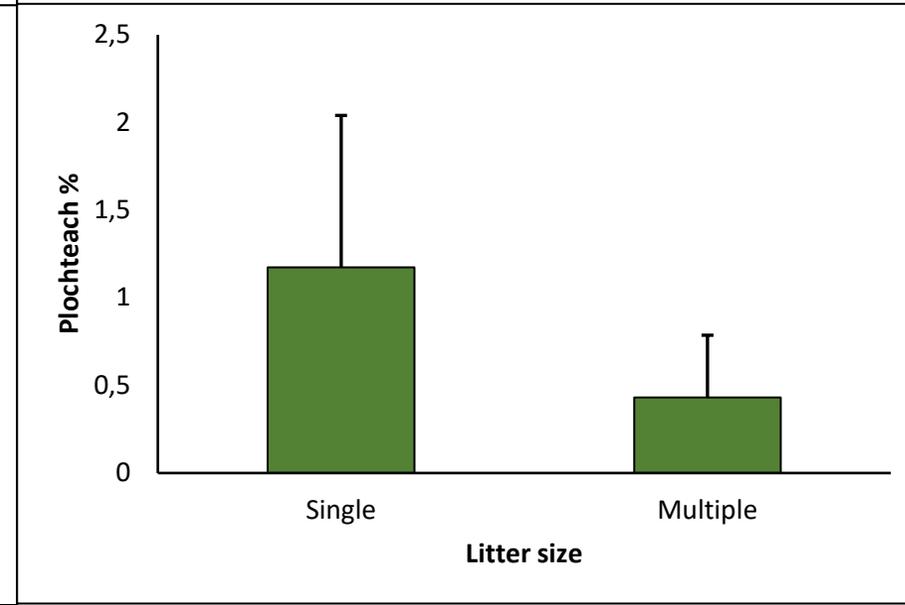
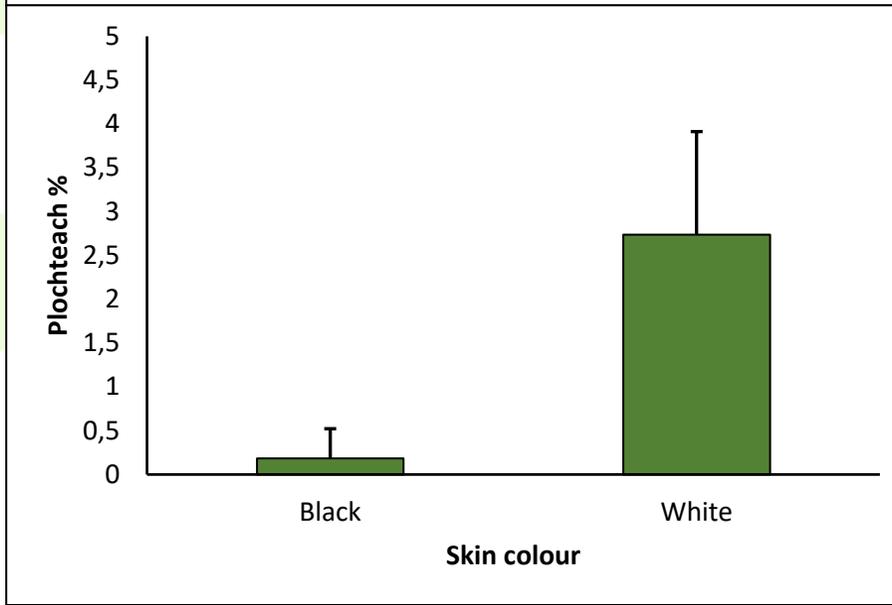
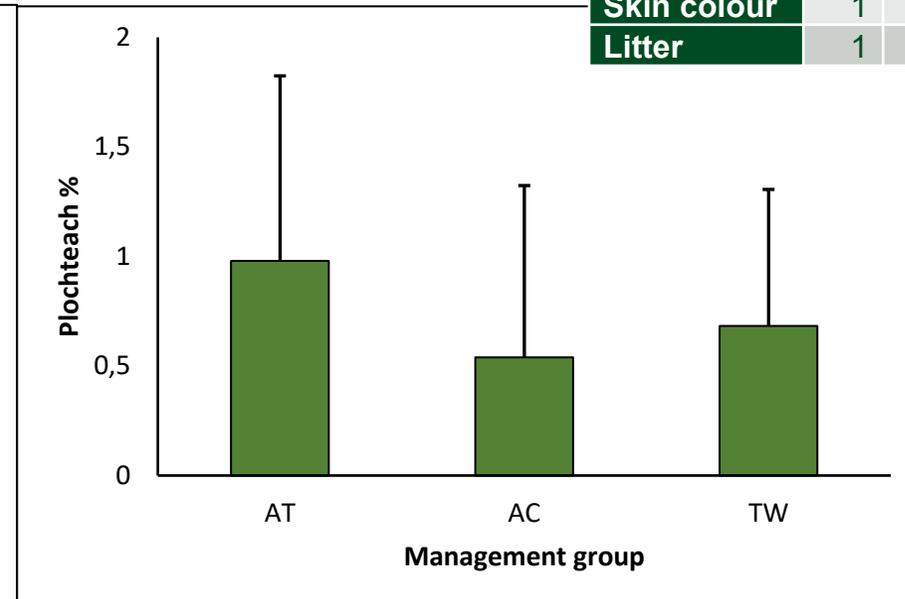
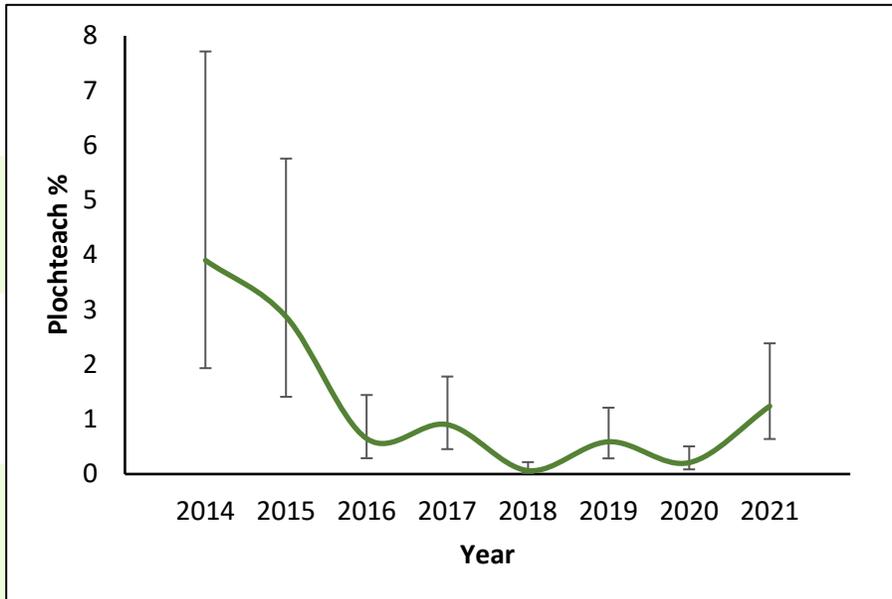
Fixed effects model: **Year** (8 levels; 2014 to 2021) + **Management Group** (3 levels; AT, AC & TW)
+ **Skin Colour** (2 levels; black or white) + **Litter** (2 levels; single and multiple)

Random effects model: **Year** x **Group** + **sire** + **ewe** + **ewe** x **group** x **year**



Results- Plochteach

	Plochteach			
Fixed effects ⁺	ndf	ddf	F-stat	P
Year	7	6	3.43	0.071
Group	2	15	4.11	0.037
Skin colour	1	2481	6.08	0.014
Litter	1	577	10.34	0.001



Further Impacts of Plochteach

- Wool will grow back over affected areas
- Lambs affected by plochteach are typically **>4kg** lighter than unaffected lambs at weaning.
 - Impacts sale price
 - Longer time to finish lambs
 - Added feed costs
 - More methane



Plochteach

- This study method does not account for lambs that may be affected by plochteach but do not show external symptoms.
 - AC lambs
 - Tip of the iceberg



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 - AC lambs
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Conclusions



- The data shows that plochteach is a cause of blackloss within lambs.
- White skinned, single lambs raised in a hill environment were at a higher risk of photosensitisation
- Further investigation to improve our understanding of plochteach, to reduce the impact of the disease and identify appropriate treatment options, would be beneficial.



Project Impact



- Identifying the causes of blackloss may enable shepherds to prevent these losses.
- This might improve the productivity of hill sheep farming by reducing the financial and genetic losses to flocks, increasing the sustainability and welfare of hill sheep systems.
- Farmers and crofters are an integral part of rural life in the western Highlands and provide valuable ecosystem services.



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