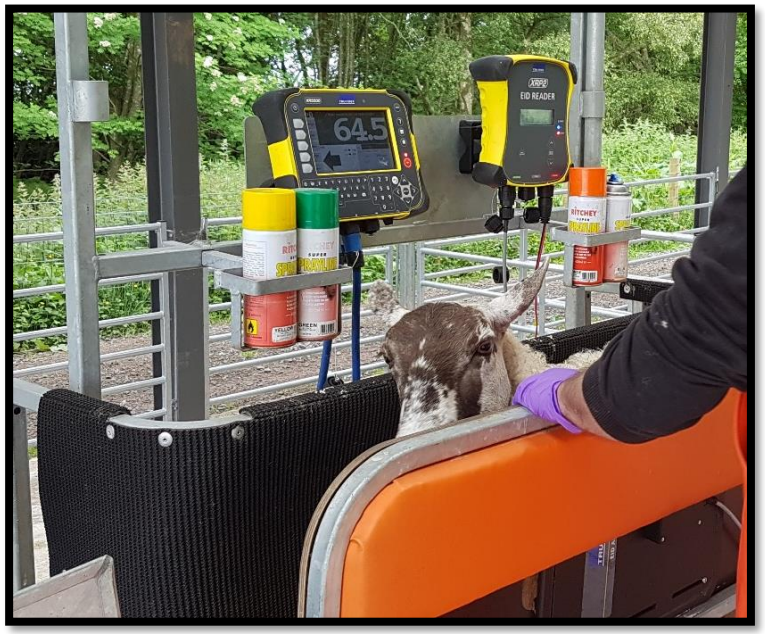
Weight based precision livestock farming approach for targeting wormer use in grazing lambs

Fiona Kenyon
Adam Hayward, Dave McBean, Eric Morgan, Leigh Andrews, Alison Morrison, Lynsey Melville



Moredun Research Institute

Scottish Government
Riaghaltas na h-Alba
gov.scot

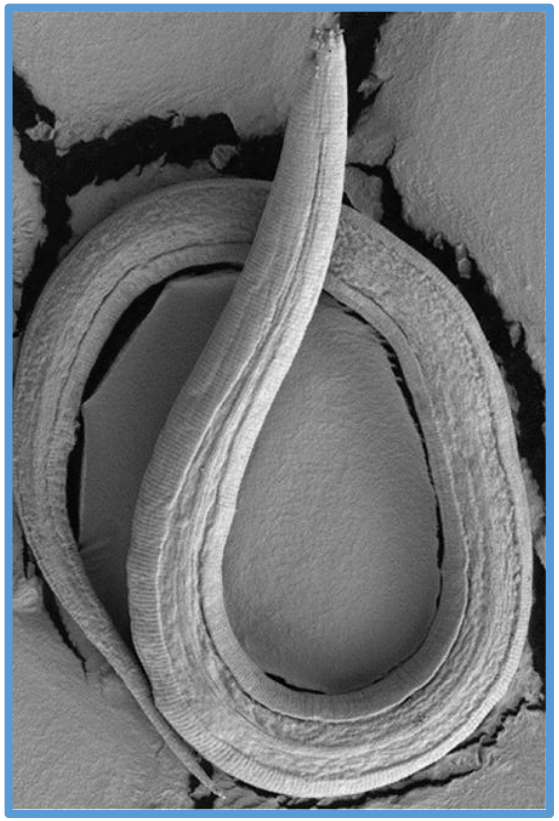
Queen's University Belfast

Roundworm parasites reduce lamb productivity

Gastrointestinal worms present in all grazing animals

Clinical signs reduced growth rate, scouring

Main cause of lost productivity

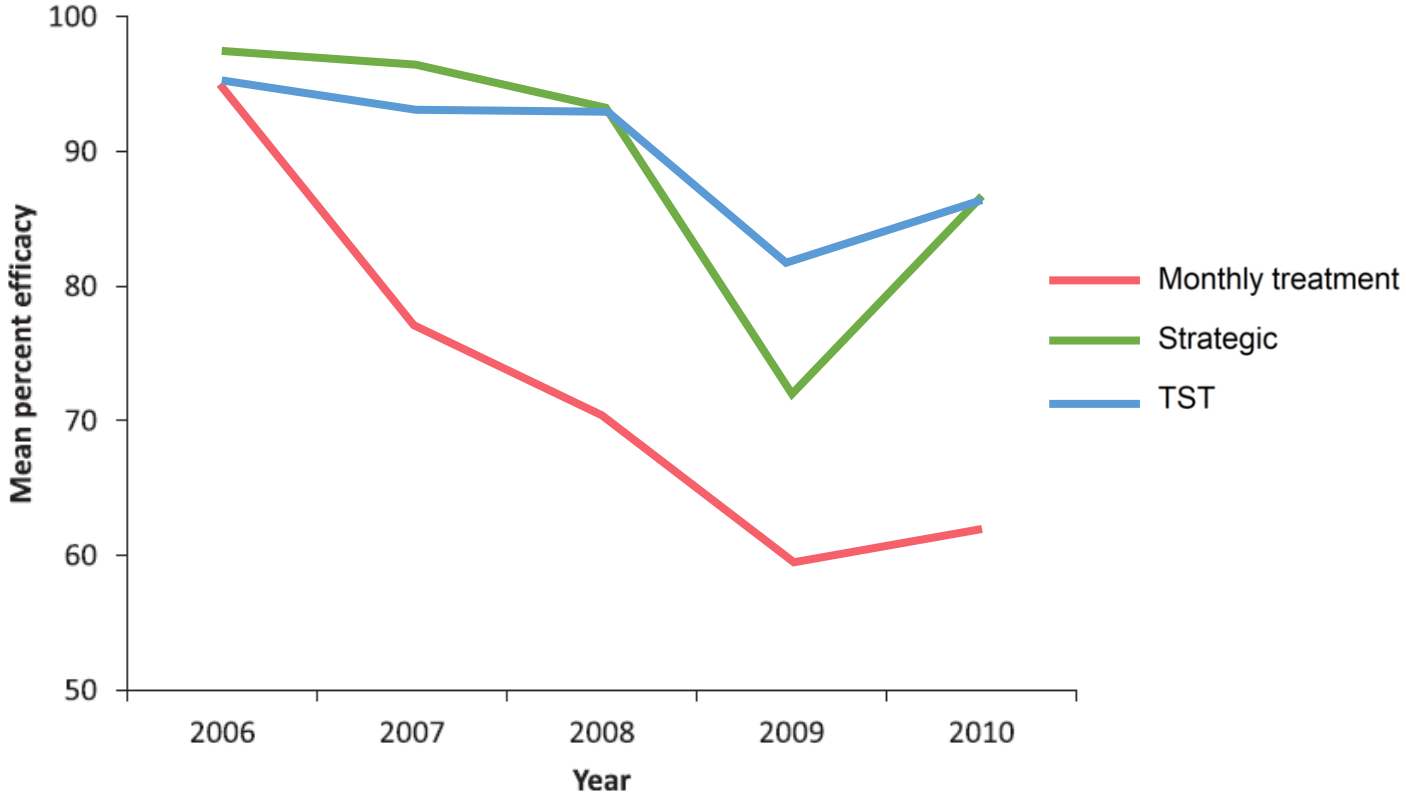


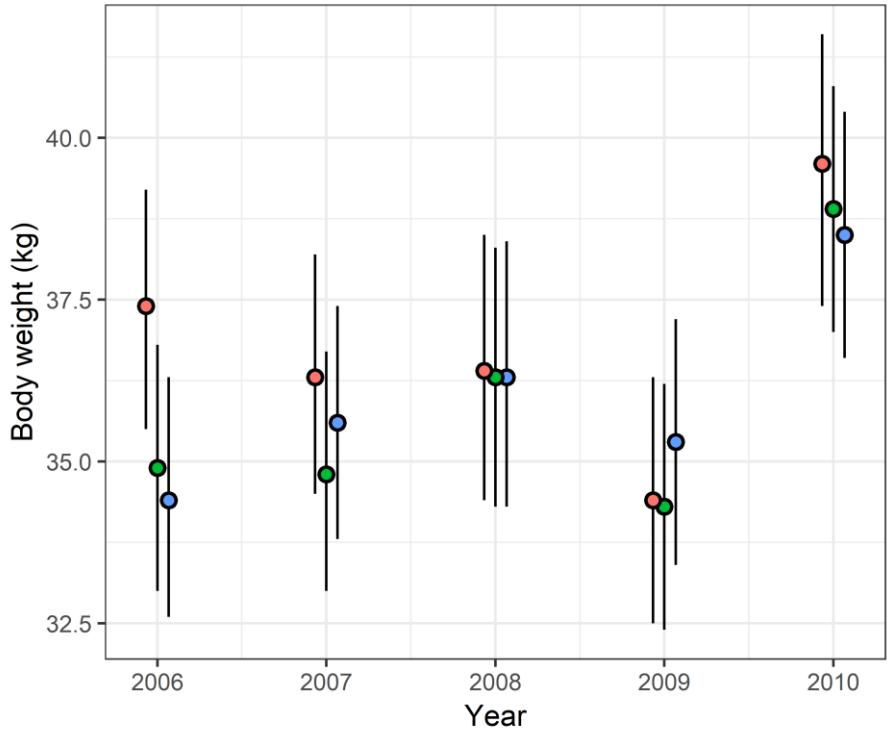
Controlled by chemical intervention

- 5 classes of drug available for sheep
- But resistance to wormers is widespread across Europe (and elsewhere)
- Responsible use of anthelmintics
  - Reduce drug use
  - Maintain performance

Wormer use can be reduced by treating only individual animals within a group

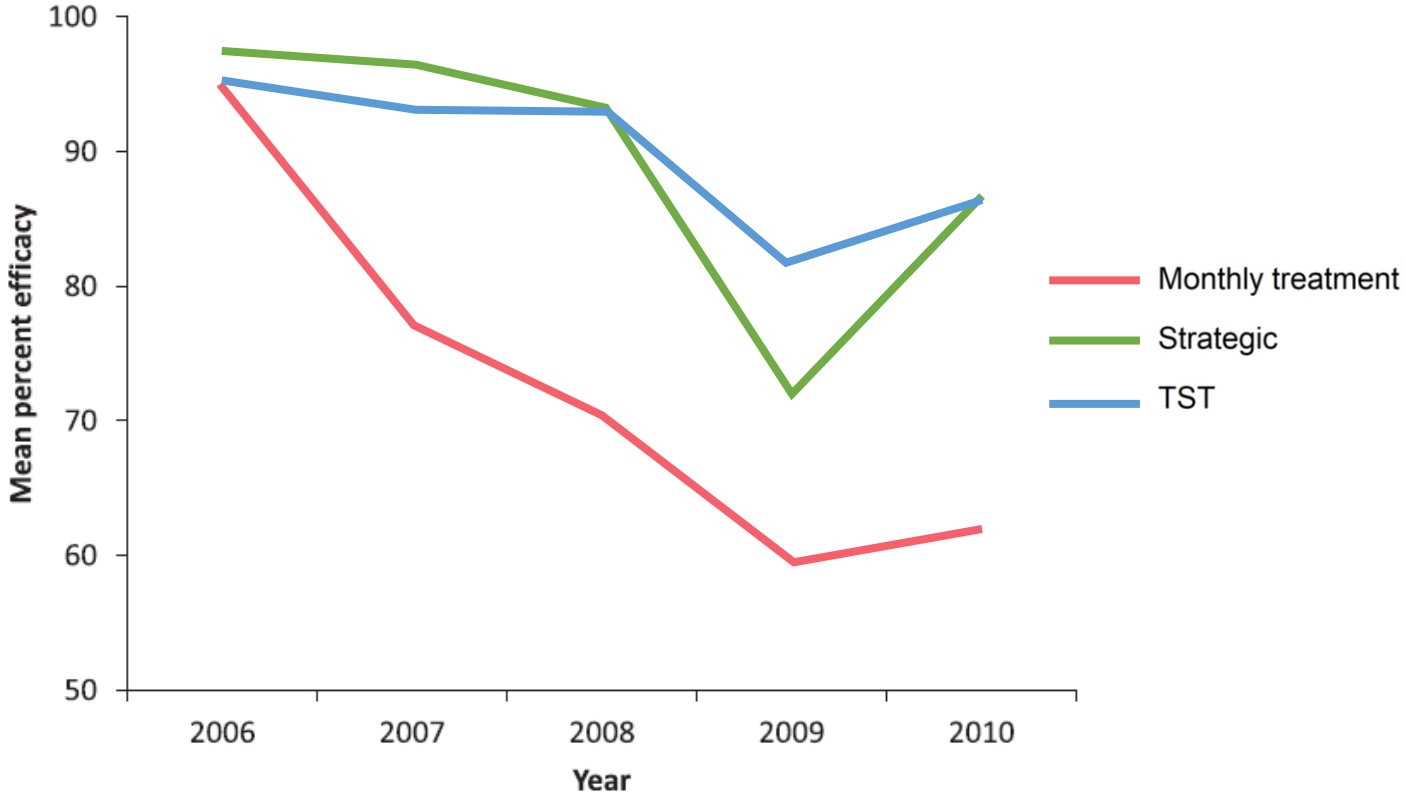
Targeted selective treatment (TST) regimes use less anthelmintic and maintains drug and animal performance

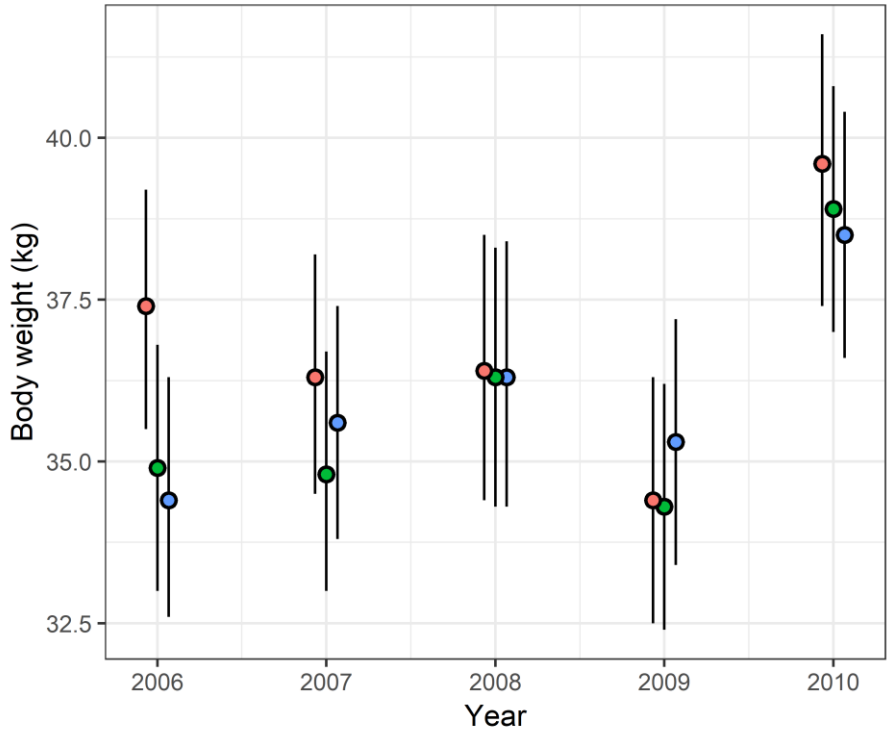




Van Wyk & Bath (2002) *Vet. Res.*; Greer et al (2009) *Vet. Para.*; Kenyon et al (2013) *Int. J. Parasitol.*

Targeted selective treatment (TST) regimes use less anthelmintic and maintains drug and animal performance



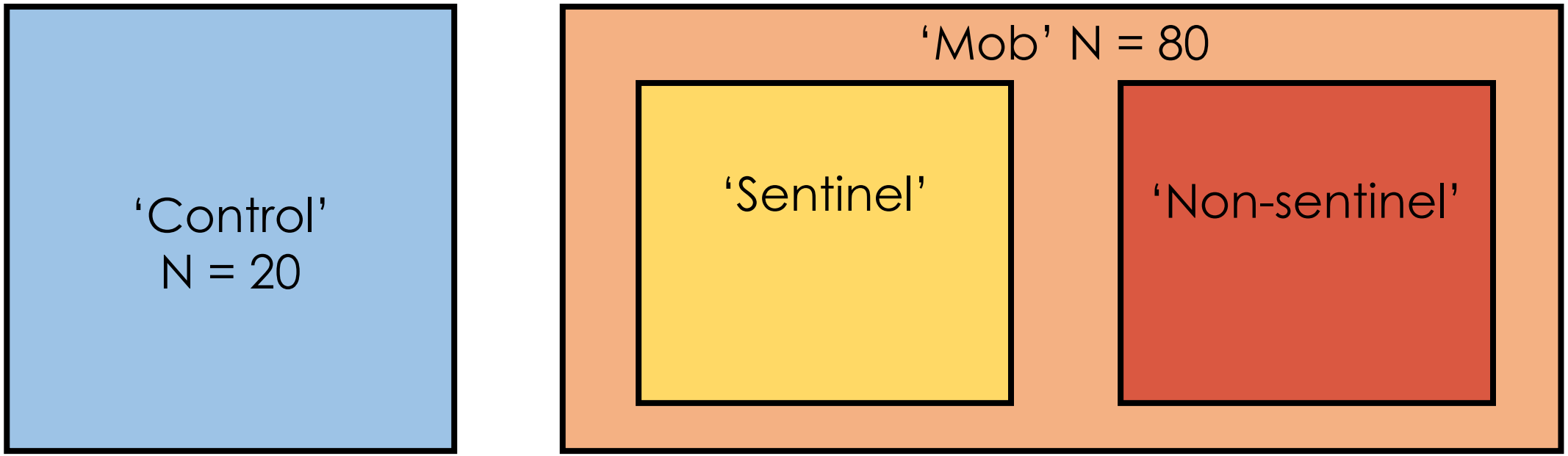


But: TST requires equipment

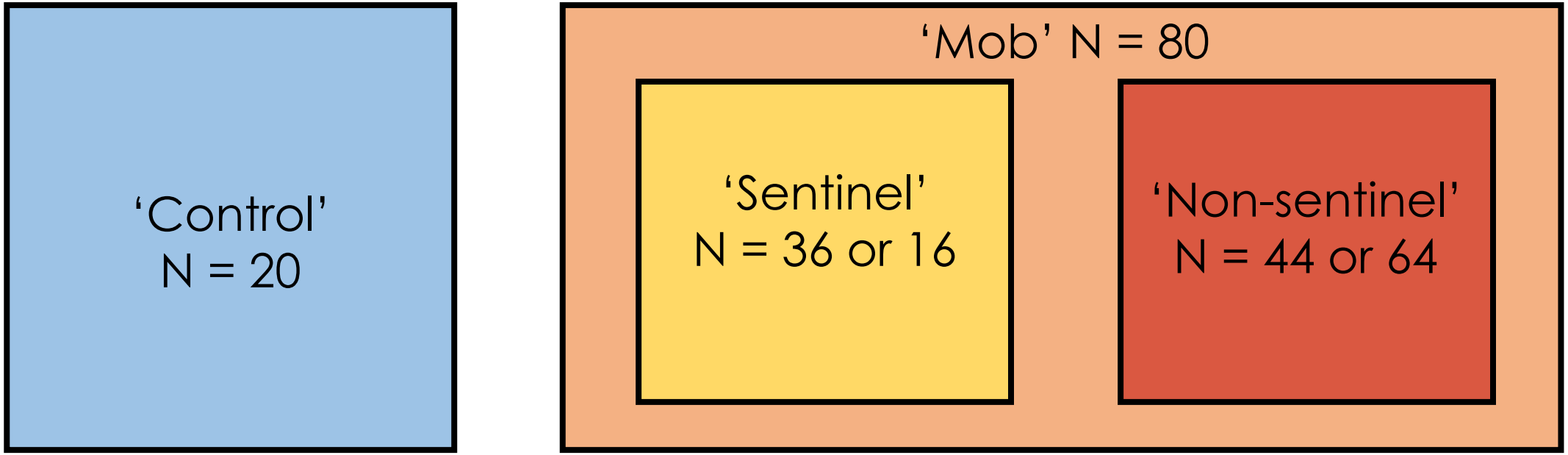
Van Wyk & Bath (2002) *Vet. Res.*; Greer et al (2009) *Vet. Para.*; Kenyon et al (2013) *Int. J. Parasitol.*

Can we optimise treatment by monitoring a proportion of lambs?

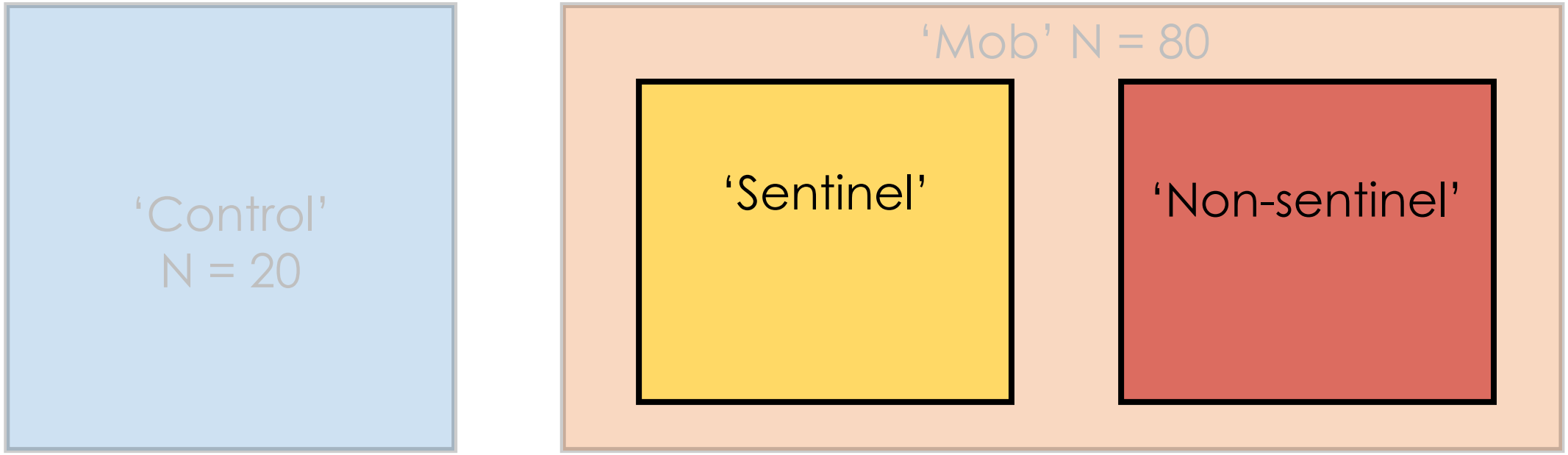
Two experimental trials examined different treatment approaches in 100 lambs



Two experimental trials examined different treatment approaches in 100 lambs



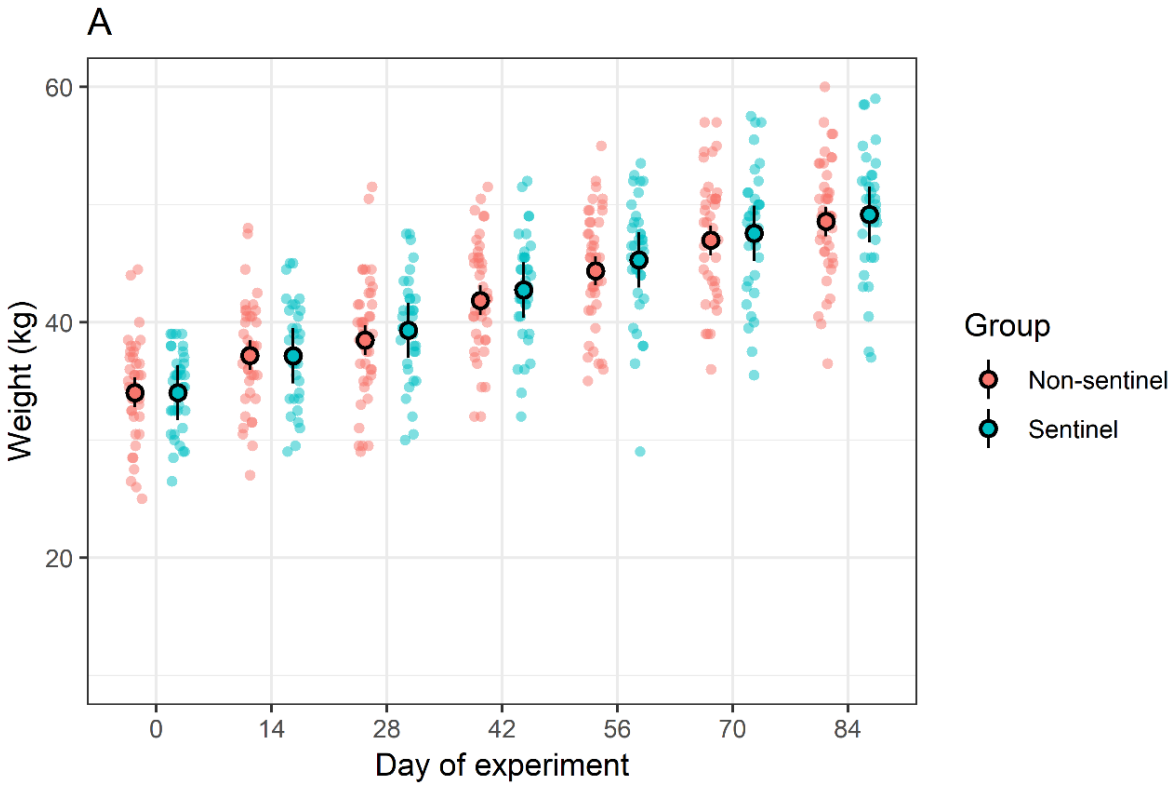
	Breed	Sentinels	Control animal treated	Mob animals treated	Every 2 weeks
Experiment 1	Mule x Texel	**45%** of Mob	If fail to make weight target (TST)	If 40% of Sentinels fail weight target	Weight Egg counts Happy Factor
Experiment 2	Mule x Lleyn	**20%** of Mob	Weaning & 4 weeks post-weaning (SPT)		



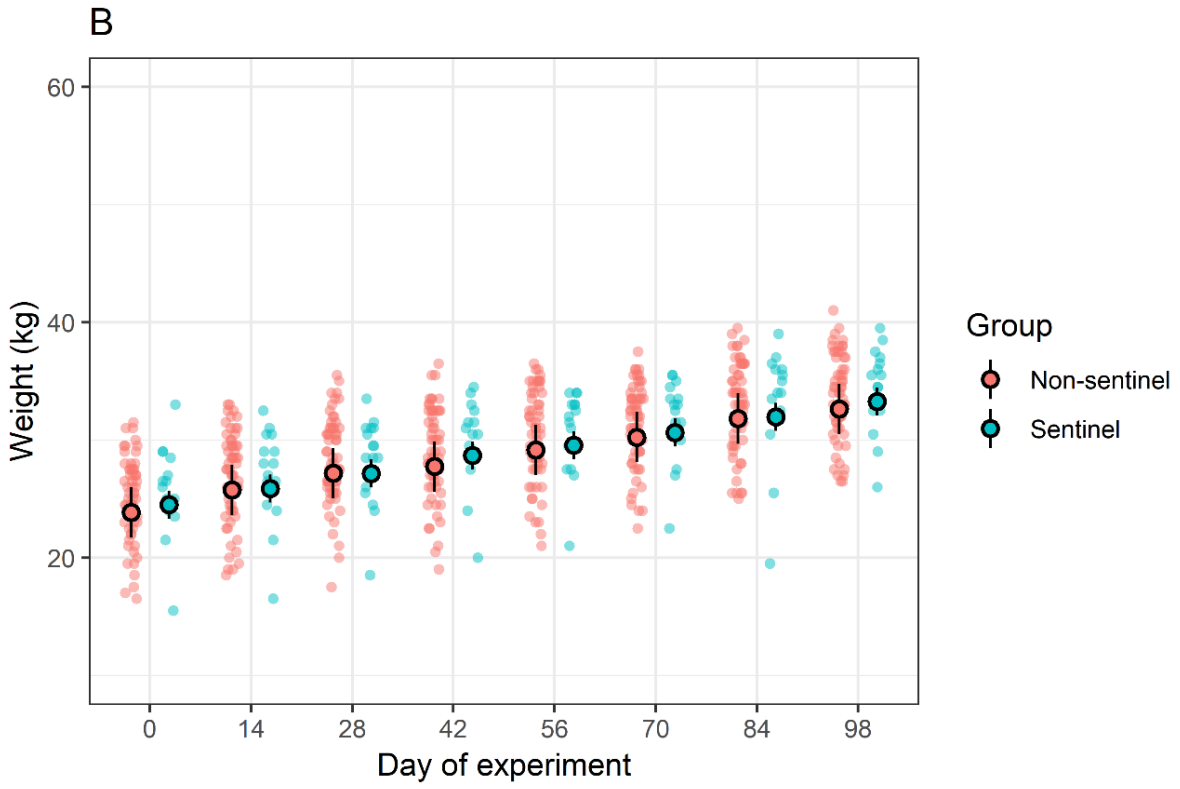
To what extent are the 'Sentinel' animals representative of the 'Non-sentinels'?

There's nothing special about the Sentinels: weight gain is identical in Sentinels and Non-sentinels

45% of the Mob are Sentinels

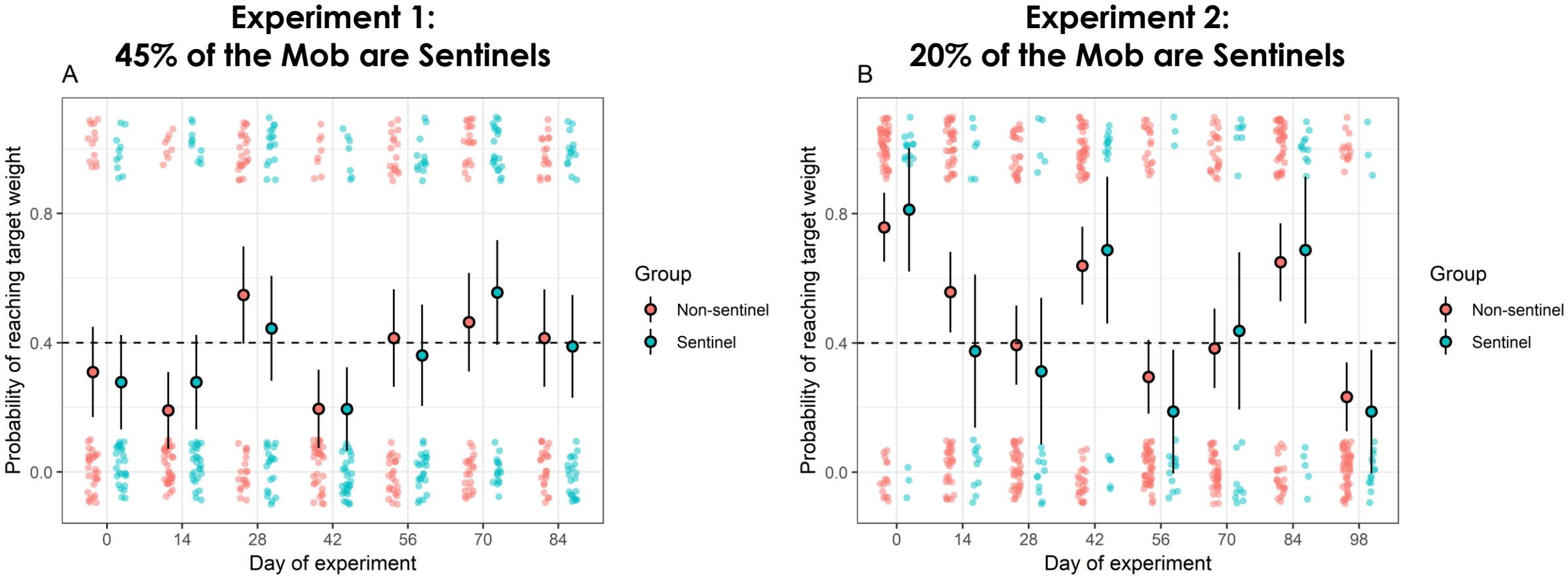


20% of the Mob are Sentinels

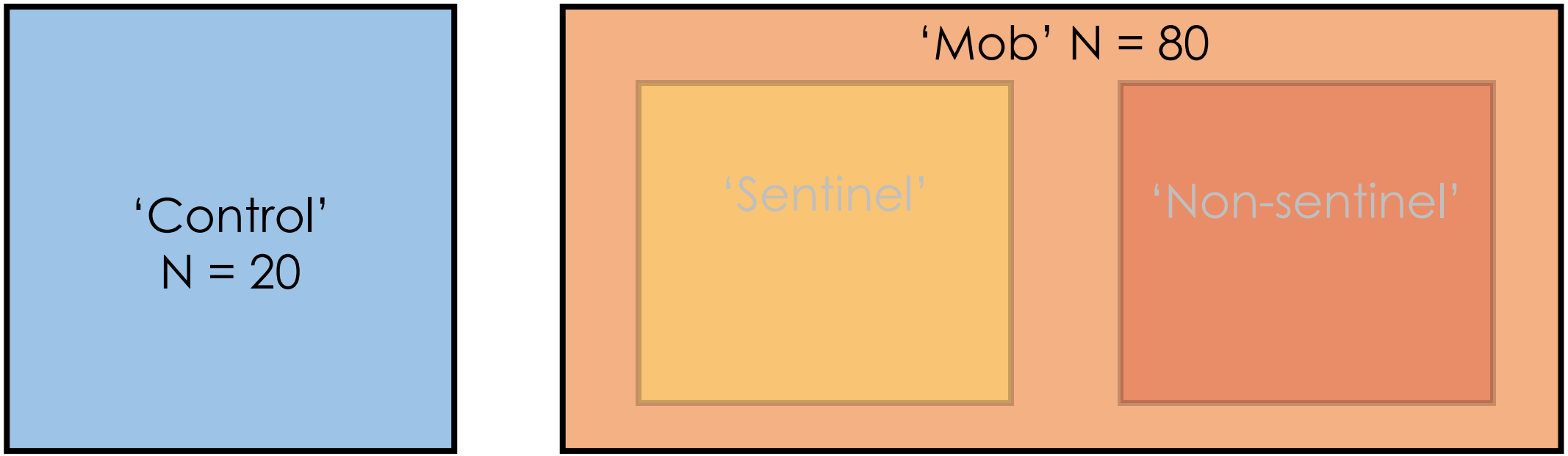


Linear mixed-effects models of body weight

Probability of reaching weight gain target is the same in Sentinels and Non-sentinels



Generalized linear mixed-effects models of probability of reaching weight gain target at each time point

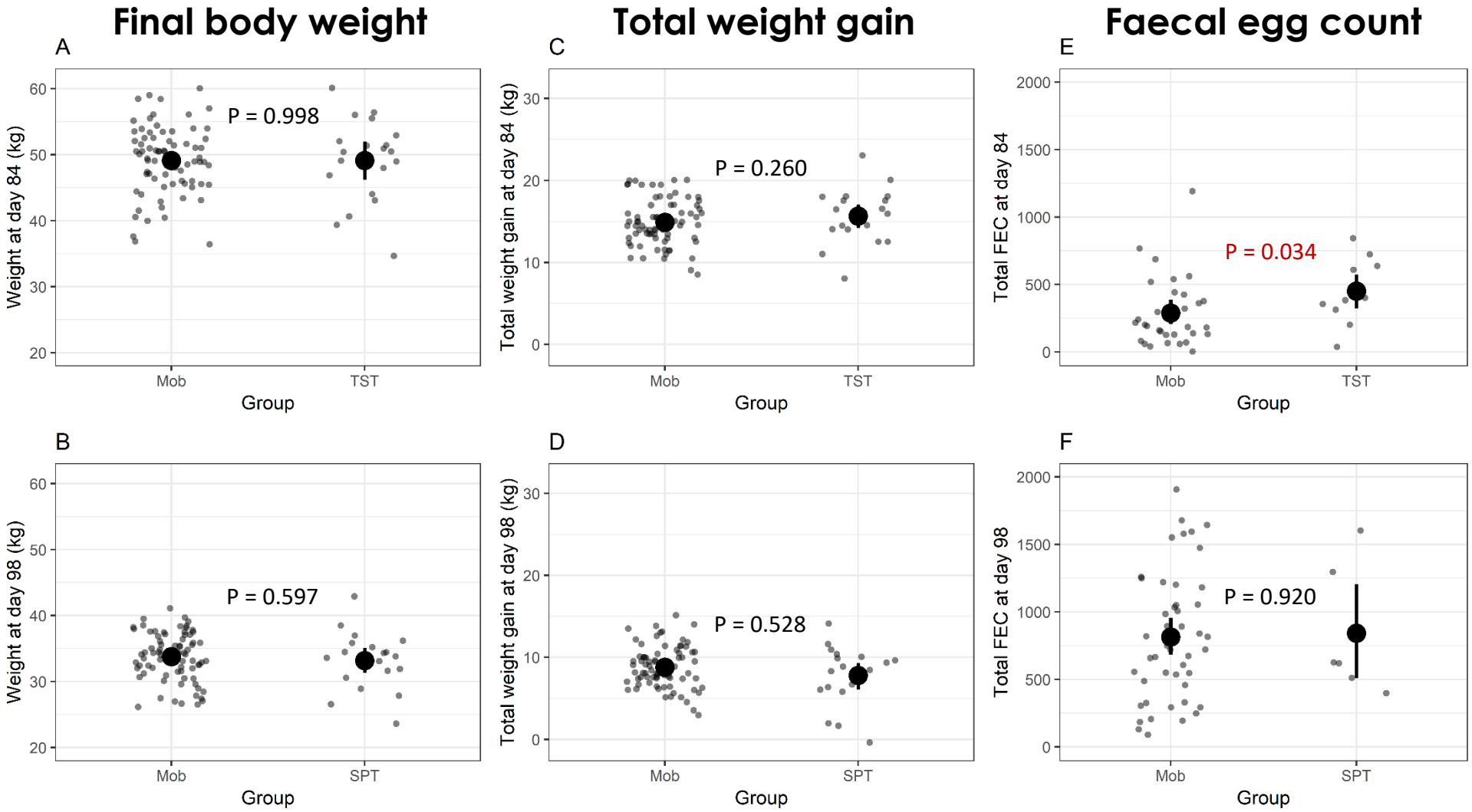


Is the performance of the 'Mob' animals comparable to that of the 'Control' group?

Final performance is comparable between Mob and Control animals in both experiments

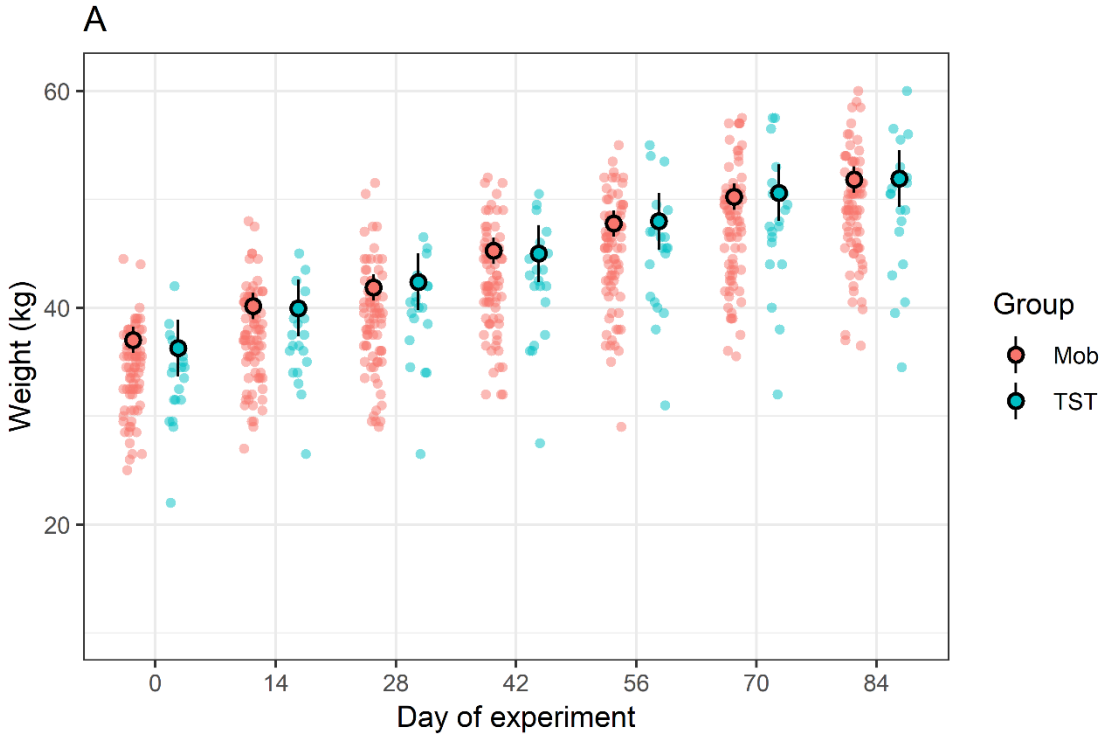
Experiment 1: 45% of the Mob are Sentinels

Experiment 2: 20% of the Mob are Sentinels

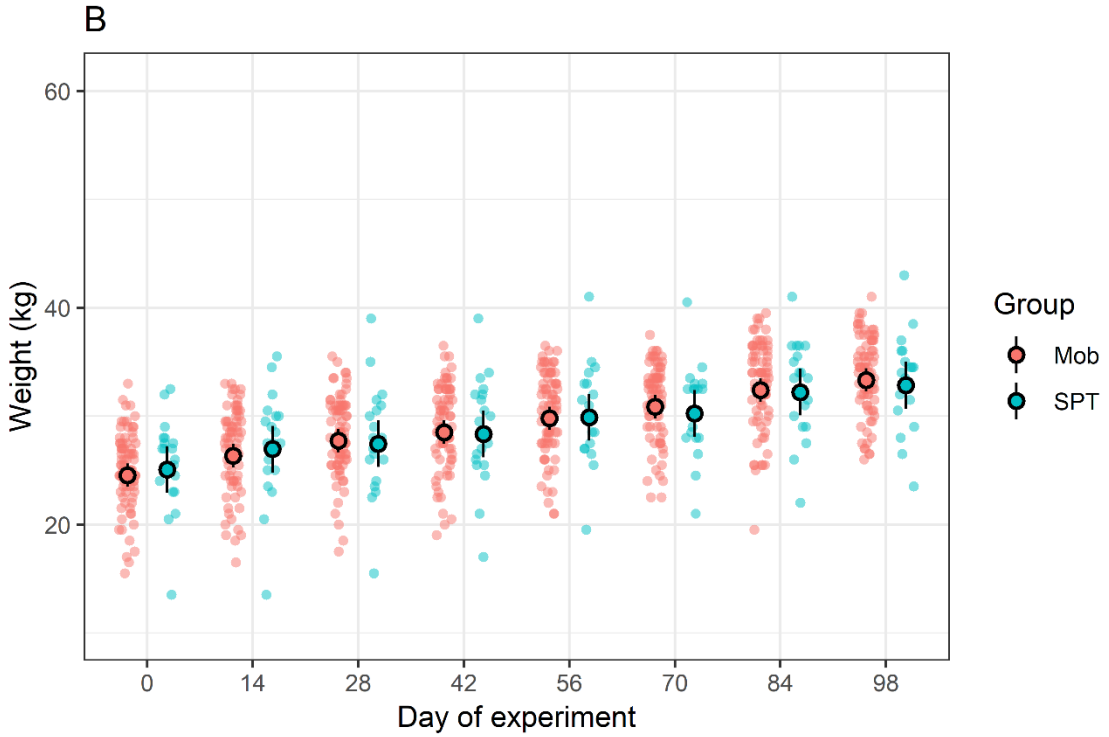


Weight gain in Mob animals is comparable to that of TST and SPT Controls

Experiment 1:
45% of the Mob are Sentinels



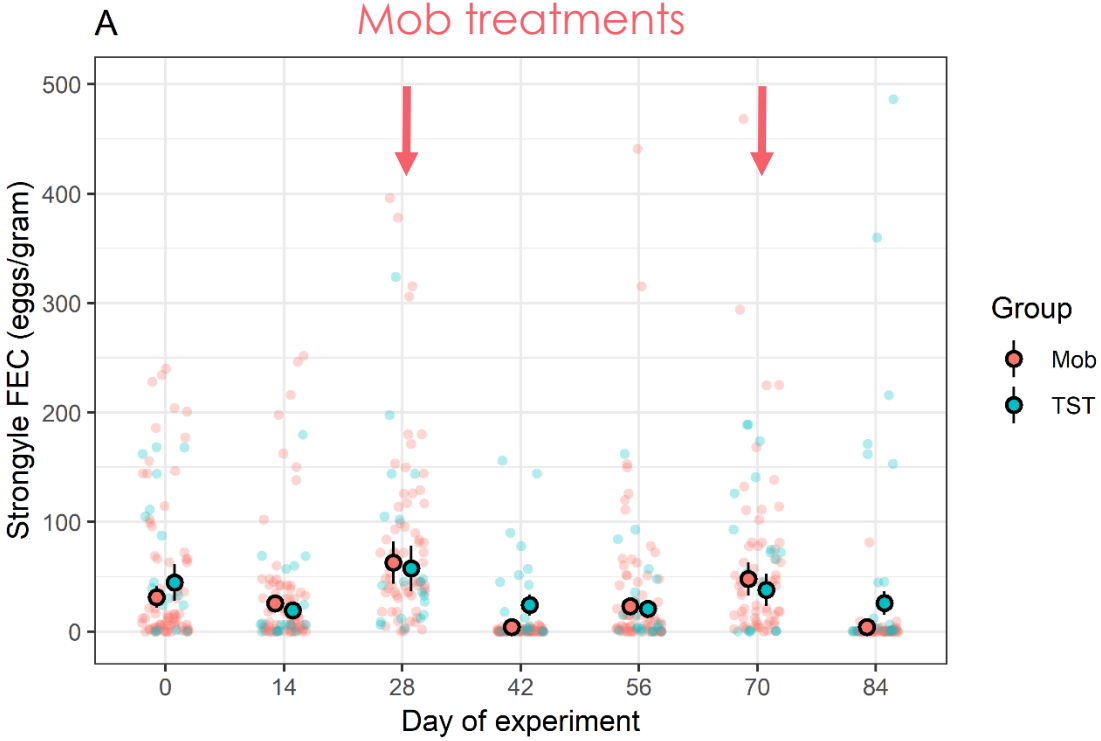
Experiment 2:
20% of the Mob are Sentinels



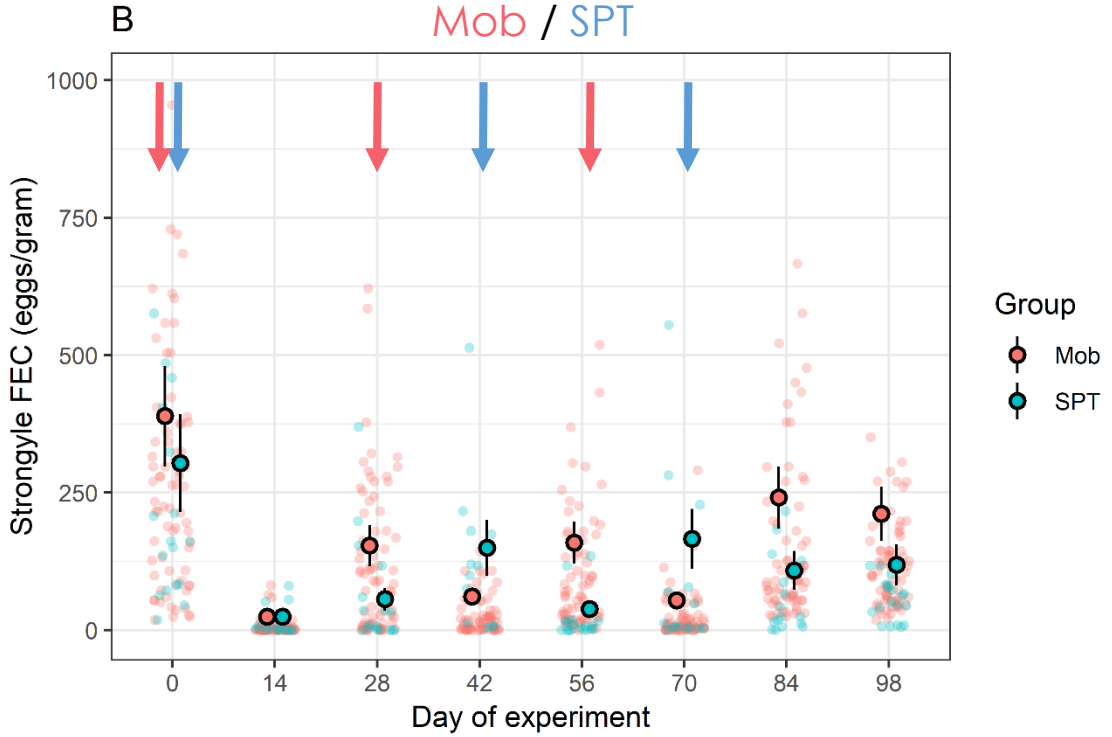
Linear mixed-effects models of body weight at each time point

Faecal egg count varies between the groups: this is a function of treatment timings

Experiment 1:
45% of the Mob are Sentinels



Experiment 2:
20% of the Mob are Sentinels



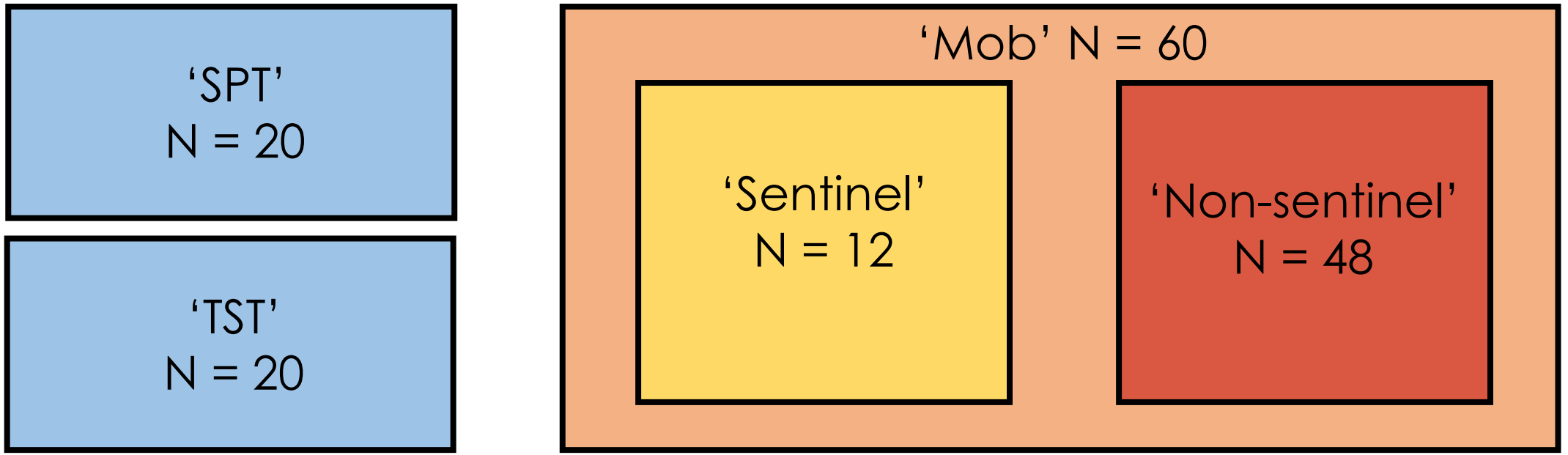
Generalized linear mixed-effects models of faecal egg count at each time point

Even selecting 20% of the Mob as Sentinel animals provides a fair representation of the whole Mob

Animals perform comparably well under Sentinel, TST and strategic approaches

Finding the same 20% of the Mob each time might be quite annoying…

In Experiments 3 & 4, the 'Sentinel' animals were the first 20% of the Mob to enter the weigh crate

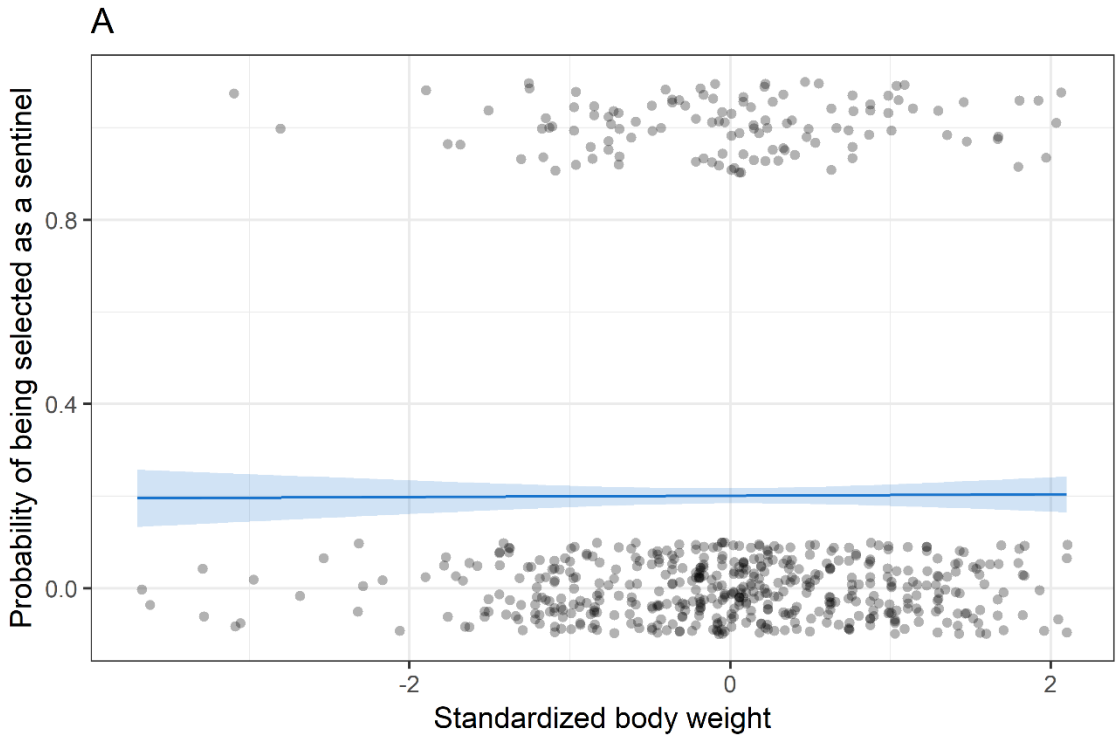


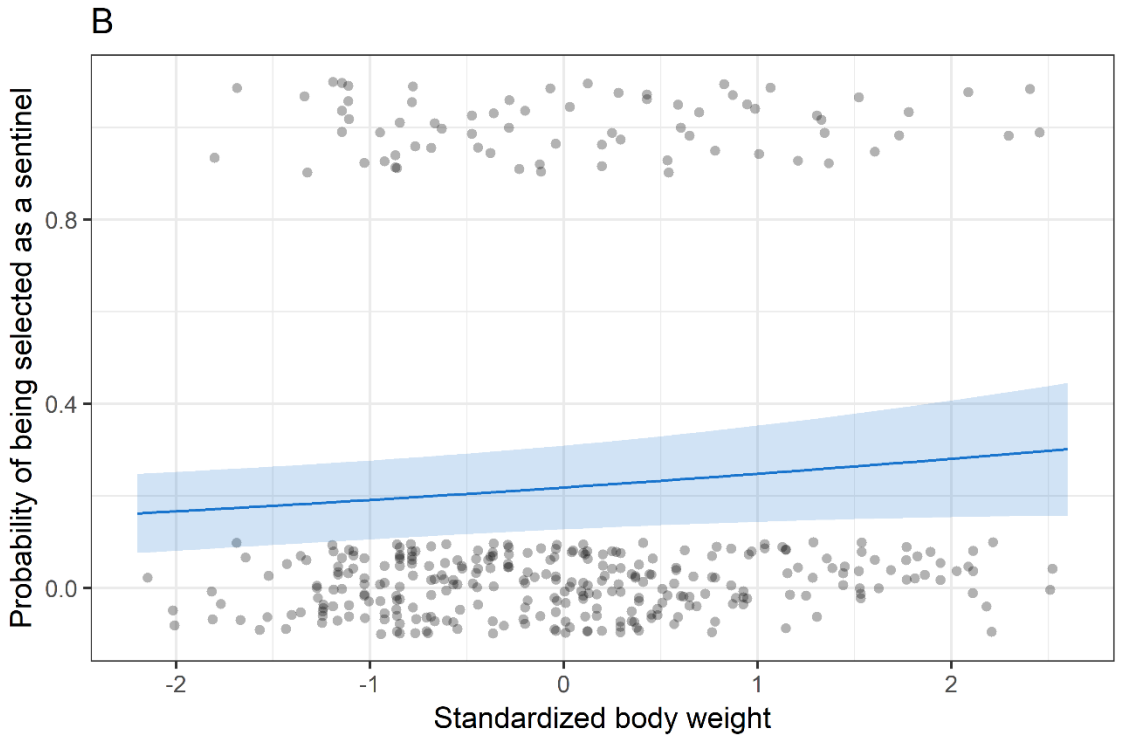
Do the results change if we select Sentinels 'randomly' at each time point?

Not really!

Are the Sentinels selected in this way truly 'random'?

The probability of an animal being selected as a Sentinel does not depend on body weight





Estimate = 0.01 ± 0.10, χ^2 = 0.01, P = 0.930

2013 individual variation = **0.00**

Estimate = 0.17 ± 0.16, χ^2 = 1.14, P = 0.287

2014 individual variation = **0.09**

Selecting a small proportion of animals (20%) can be representative of a wider mob and inform treatment decisions

This is true whether animals are pre-identified, or whether they are chosen at each weighing as the first animals that are grabbed

Animals under this treatment regime perform comparably (in terms of weight and FEC) to animals under SPT or TST approaches

Closely monitoring a small proportion of animals could have benefits in terms of treatment decisions, but also potentially other management issues

Session 20 ‘Parasites’; today 14.00

Anthelmintic resistance in ruminants in Europe: challenges and solutions

J. Charlier[1,*], E. Claerebout[2], D. Bartley[3], L. Rinaldi[4], G. von Samson-Himmelstjerna[5], E. Morgan[6], H. Hoste[7], S. Sotiraki[8]

COST Action COMBAR: combatting anthelmintic resistance in ruminants in Europe

S. Sotiraki[1,*], E. Claerebout[2], D. Bartley[3], L. Rinaldi[4], G. von Samson-Himmelstjerna[5], E. Morgan[6], H. Hoste[7], J. Charlier[8]

***In vivo* assessment of the anthelmintic effects of by-products (peels) from the chestnut industry.**

S Marchand [1], Ketavong S [1];, Barbier E.[2], Gay M.[3], Jean H.[3], Niderkorn V.[4] Sokrates S[5], Salminen JP[6]. and Hoste H.[1*]

COMBAR
combatting anthelmintic resistance in ruminants

Thanks to…

Animal work: Scott Roger, Moredun Bioservices

Field and lab studies: Dr Dave Bartley, Glen Lauder, Hannah Dunegan, Heather Laurie, Alex Fyfe, Ed Marr, Michelle Munro, Sara-Jane Ponting