

Brief Outline

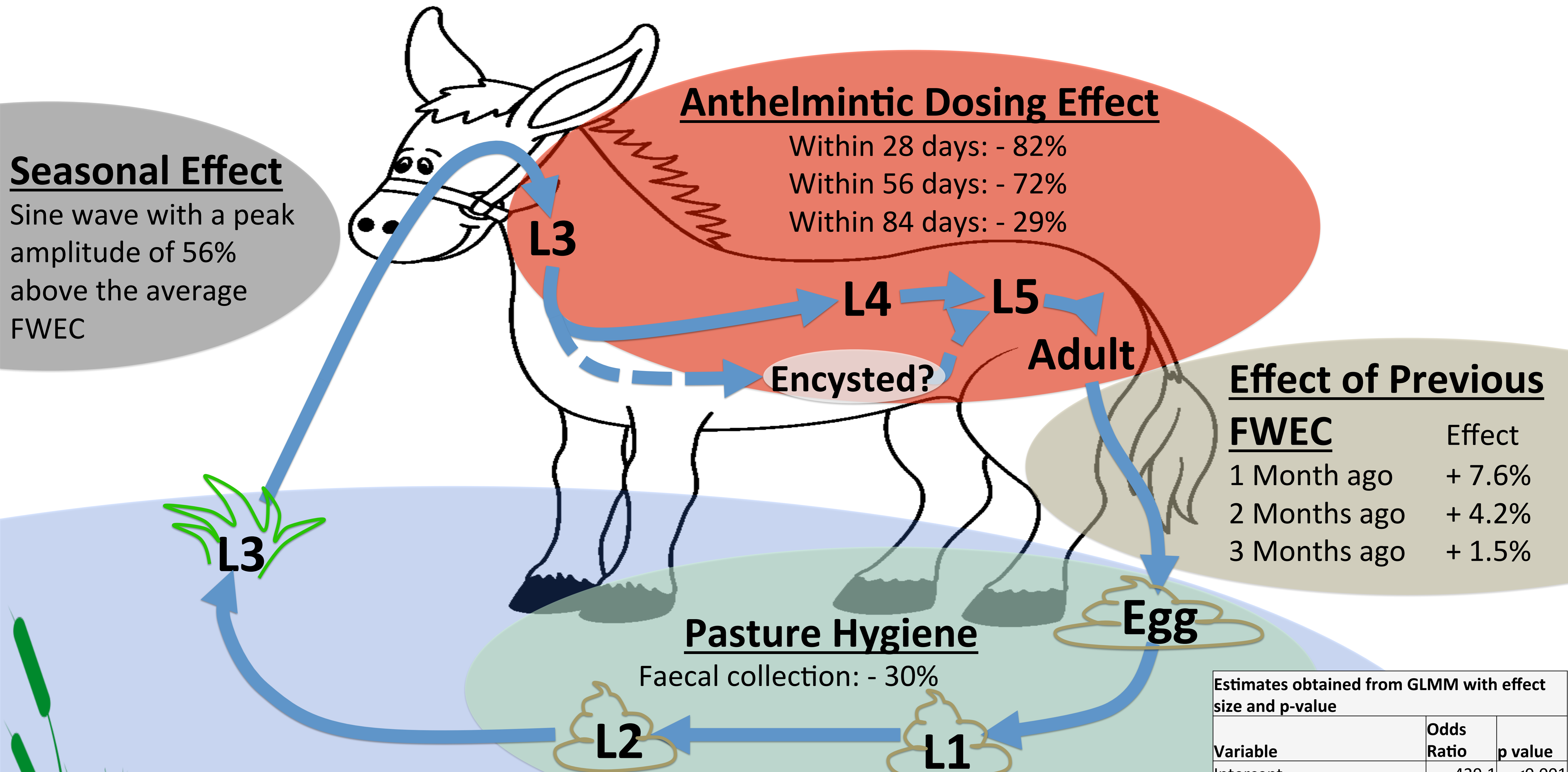
- Anthelmintic resistance is a developing problem within nematodes (specifically cyathostomins) in equids
- A reduction in the amount of anthelmintic used to control them would slow this development
- Using field average FWEC as a proxy for field infectivity would allow group based treatment
- Dosing high egg shedding animals would decrease field infectivity
- Lower re-infections rates would result in less anthelmintic required to control cyathostomins

Current Study

- It is important to quantify the relationship between explanatory variables and parasite transmission as measured by FWEC
- From data supplied by The Donkey Sanctuary (Devon, UK) a generalised linear mixed model (GLMM) was used to assess associations between several variables and each individual observed monthly FWEC
- The preferred model was identified using a model selection algorithm based on penalised likelihoods and is displayed in the table below

Cyathostomin Life Cycle

The effects of variables on the faecal worm egg count (FWEC) of donkeys at The Donkey Sanctuary (Devon, UK) using an illustrative diagram



Seasonal Effect

Sine wave with a peak amplitude of 56% above the average FWEC

Anthelmintic Dosing Effect

Within 28 days: - 82%
 Within 56 days: - 72%
 Within 84 days: - 29%

Effect of Previous FWEC

FWEC	Effect
1 Month ago	+ 7.6%
2 Months ago	+ 4.2%
3 Months ago	+ 1.5%

Weather & Field Effects

	1 Month ago Effect	2 Months ago Effect	3 Months ago Effect
Field Average (FWEC)	+ 1.1%	+ 1.5%	-1.4%
Rain (mm)	- 0.1%	+ 0.8%	- 0.3%
Min. Temp. (°c)	---	+ 4.4%	+ 0.6%
Max. Temp. (°c)	---	---	+ 2.1%
Air Frost (days)	---	- 1.8%	---

Estimates obtained from GLMM with effect size and p-value

Variable	Odds Ratio	p value
Intercept	429.1	<0.001
Date Max Amplitude	155.7	
Date Phase	30.6	<0.001
FWEC -28	11.5	<0.001
FWEC -56	7.2	<0.001
FWEC -84	2.3	0.02
Treated -28	-74.7	<0.001
Treated -56	-69.8	<0.001
Treated : FWEC -28	-9.2	<0.001
Treated : FWEC -56	-5.3	<0.001
Treated : FWEC -84	-2.4	0.04
Pasture Hygiene		
Automated	-13.8	0.21
Automated/Manual	-36.9	<0.001
Automated/None	24.4	0.10
Manual	-38.2	<0.001
Weather & Field Effects		
Avg FWEC : Rain -28	0.2	0.12
Avg FWEC : Air Frost -56	0.9	<0.001
Avg FWEC : Min -84	-1.8	<0.001
Avg FWEC : Max -84	1.1	0.05
Air Frost -56	-2.1	<0.001
Min Temp -56	6.2	<0.001
Rain -56	0.6	0.05
Rain -84	-0.9	<0.001

- A simplified model is used in the life cycle to highlight the size of the effects individually, it is the same as the full model but without the interaction terms (which is shown alongside p values)
- An amplitude of 55% in date suggests a large amount of weather data is unaccounted for and thus explained by general yearly trends in the model
- Weather and pasture hygiene effects modeled as interactions with average field FWECs improve model fit implying an association between these factors and the development of egg and larval stages of the parasite on pasture