

A stochastic model to investigate control strategies of gastrointestinal parasitism of calves

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The Problem

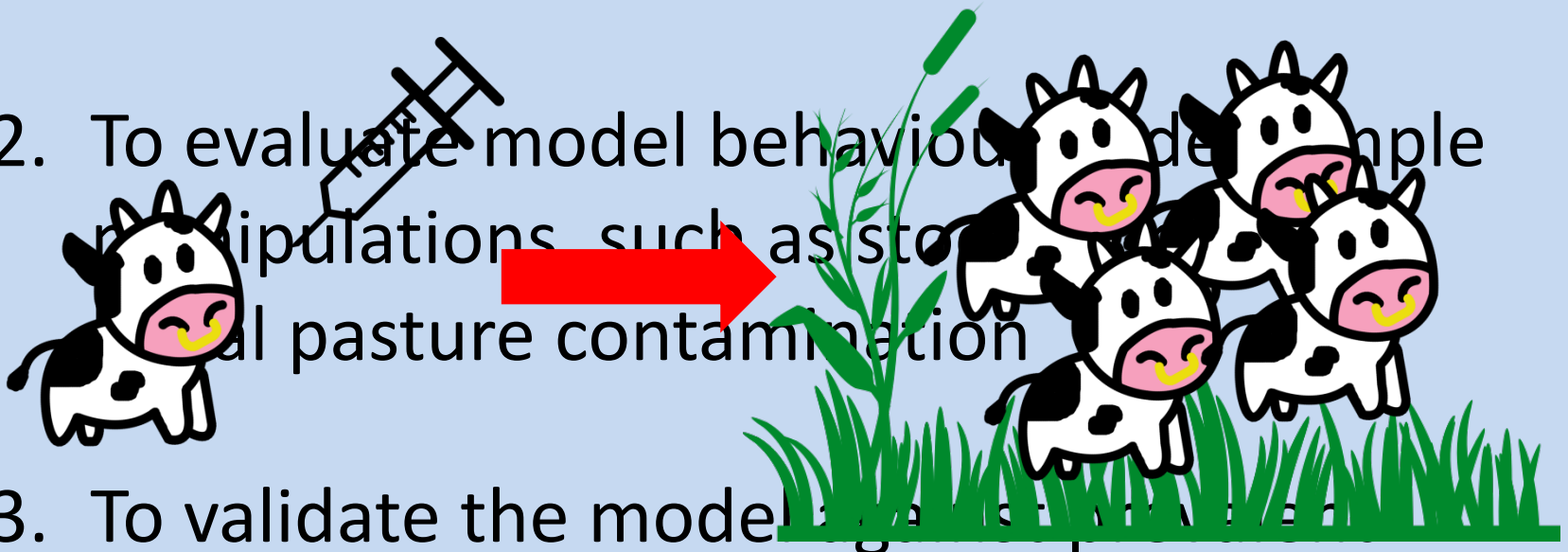
- GI parasitism is a ubiquitous challenge to grazing livestock
- *Ostertagia ostertagi* is the most pathogenic and economically significant parasite in temperate regions
- Sub-clinical disease causes reductions in calf bodyweight gains

Objectives

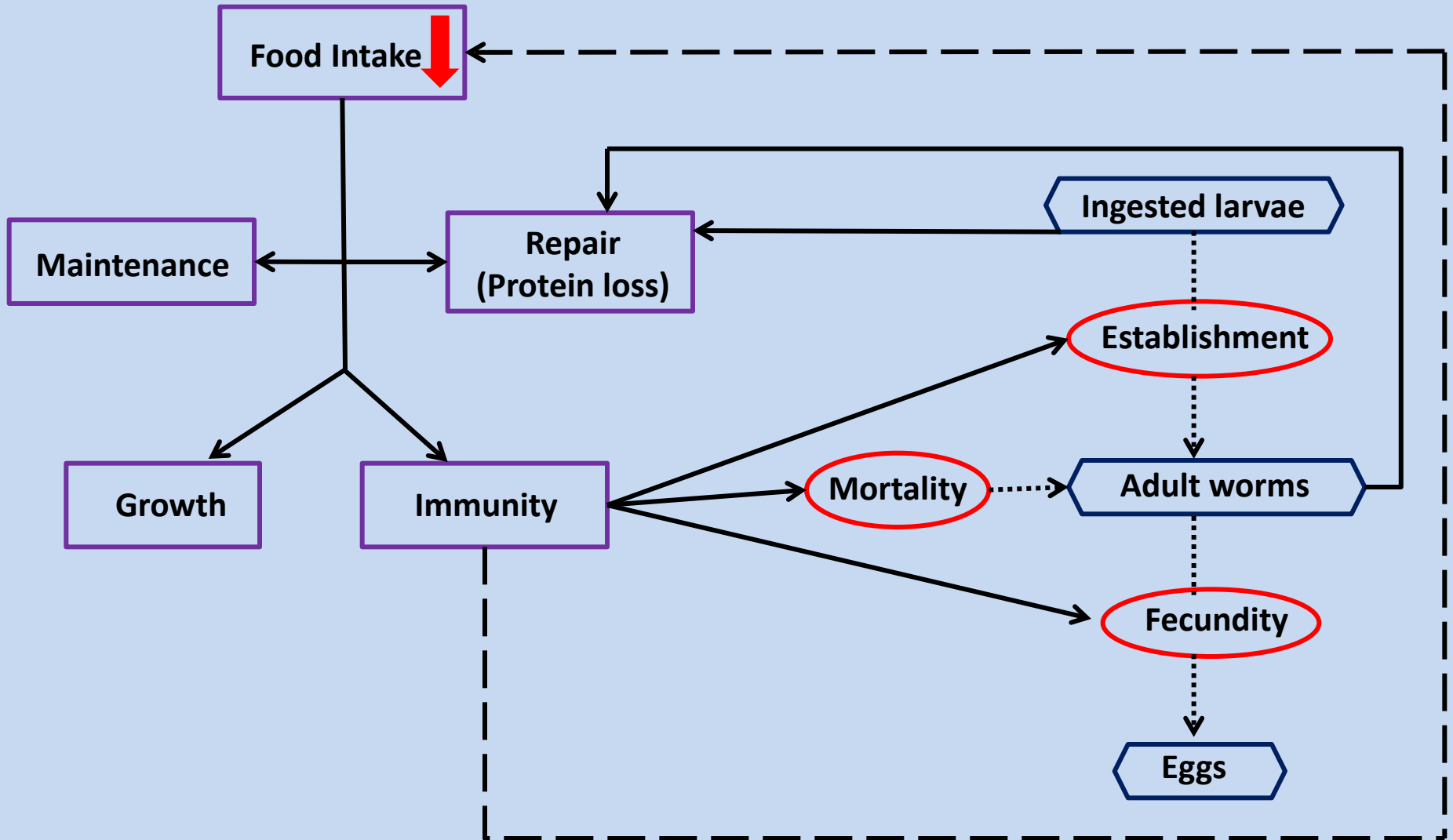
1. To develop a stochastic model that considers *calf-Ostertagia ostertagi* interactions along with epidemiological effects

2. To evaluate model behaviour under simple manipulations such as storage of pasture contamination

3. To validate the model against experimental data and management control strategies.

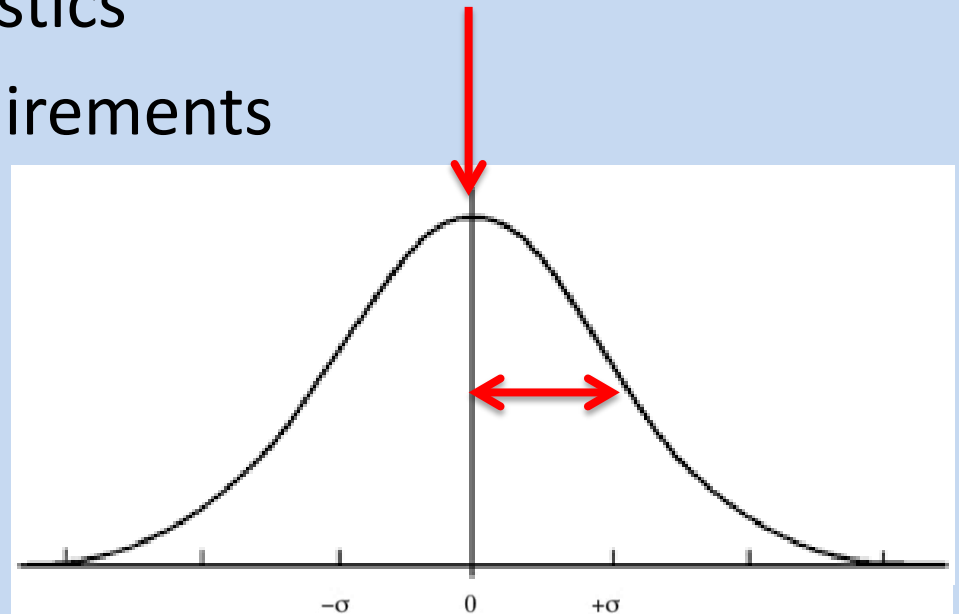


Calf Model



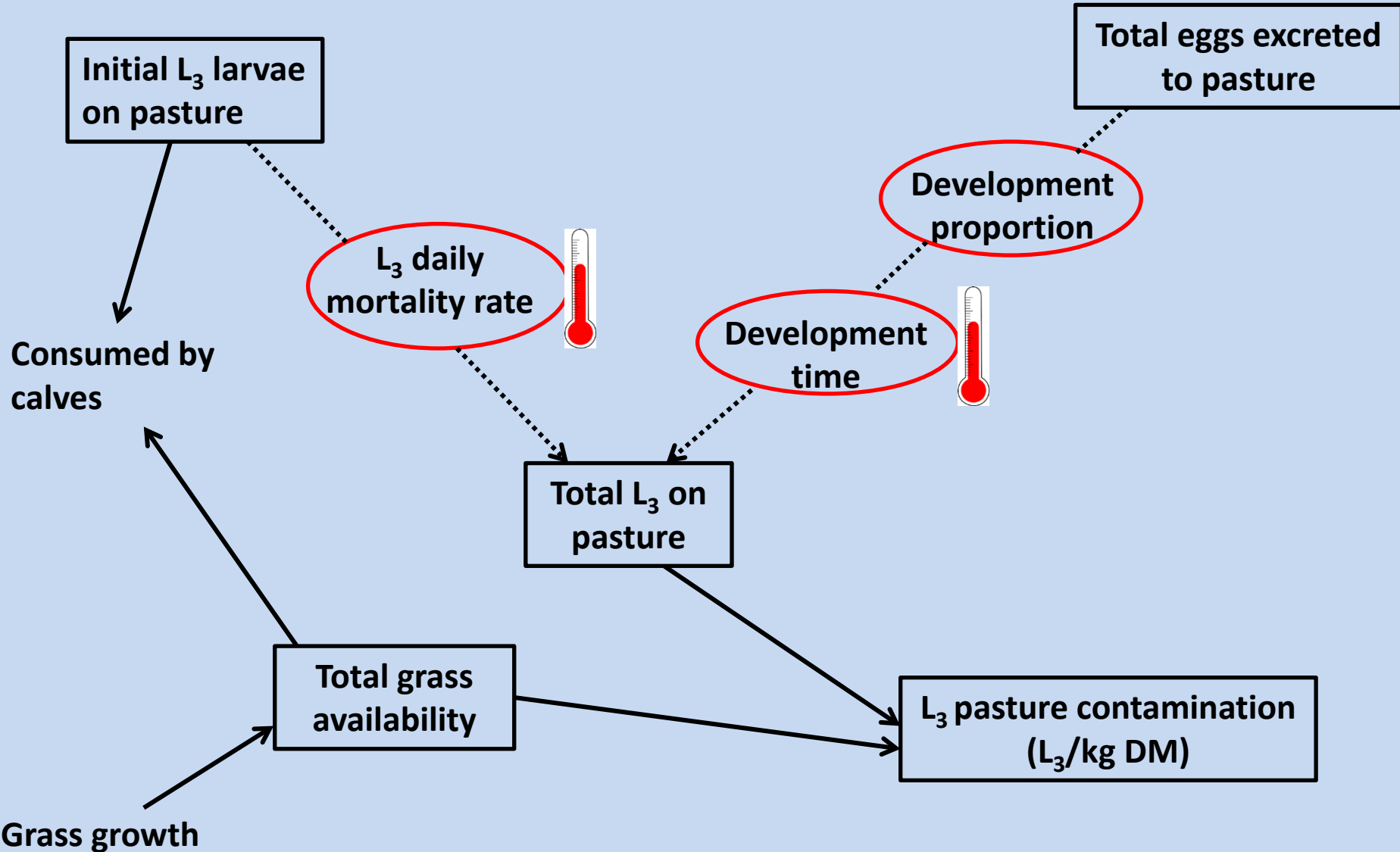
Between-animal Variation

- Variation between calves was assumed in:
 - Growth characteristics
 - Maintenance requirements
 - Host immunity



- Correlations were assumed between rates of immune acquisition for parasite establishment, mortality and fecundity

Pasture contamination

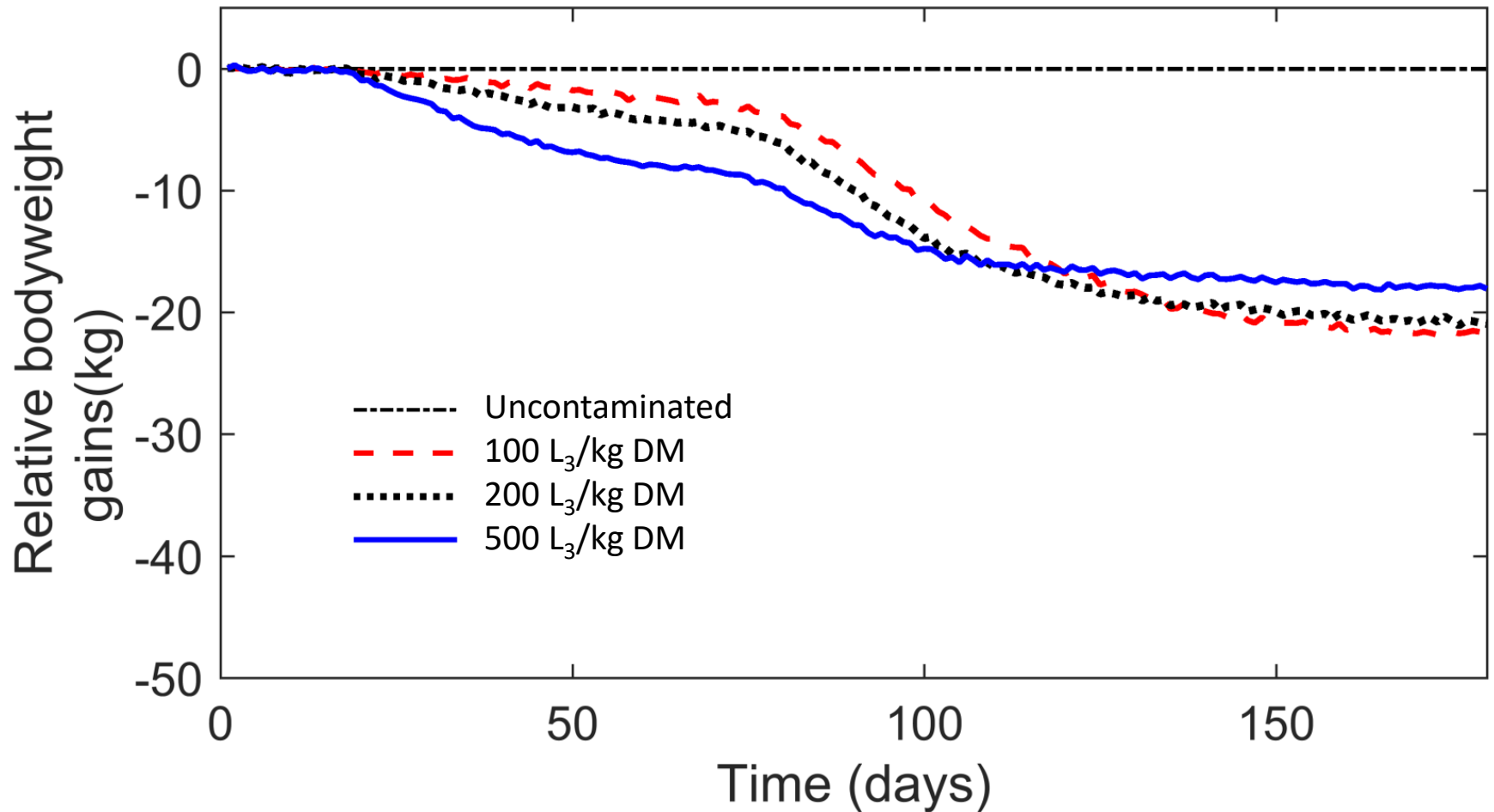


Model Inputs/Outputs

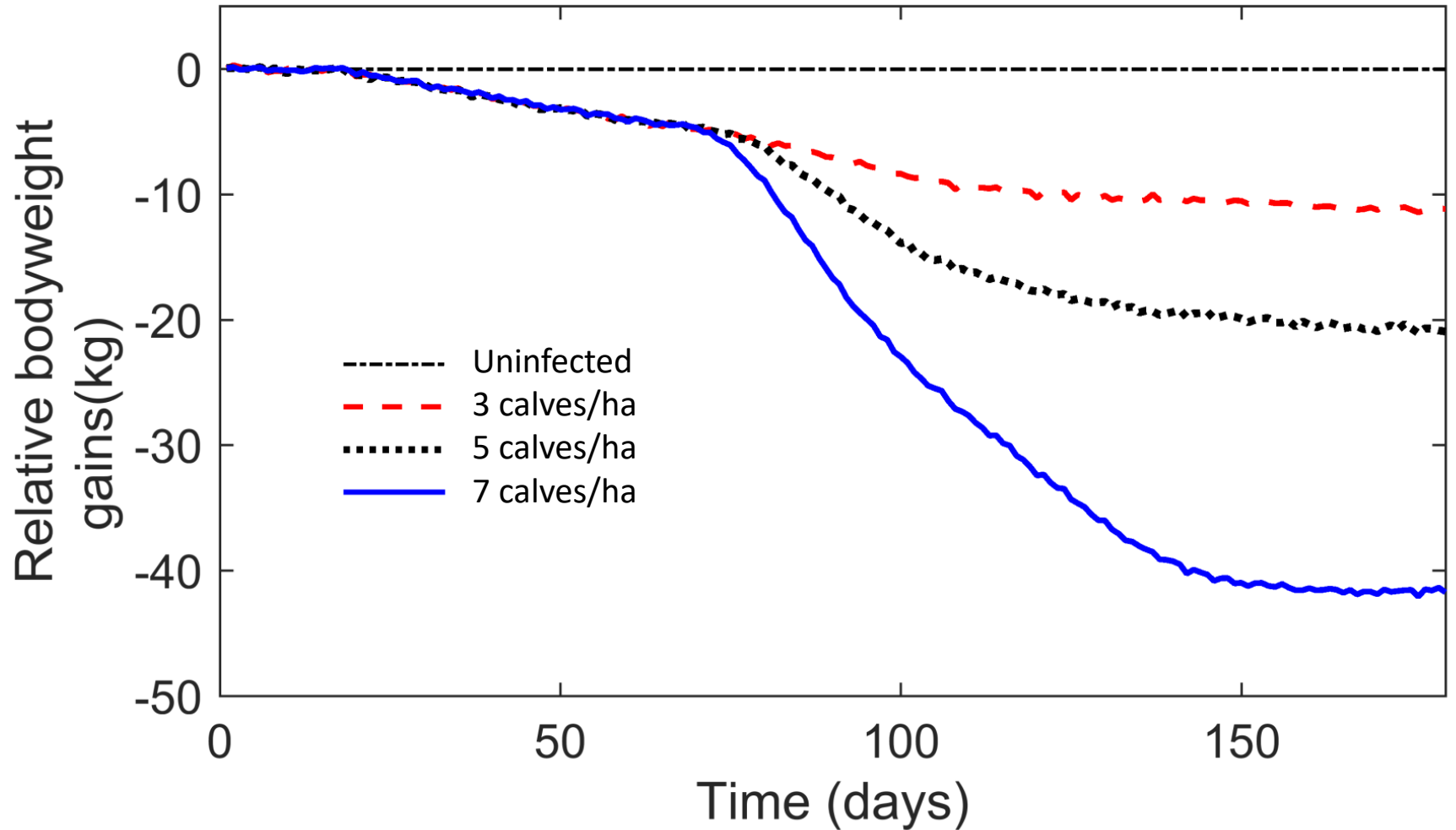
Inputs	Outputs
Initial pasture contamination	Worm burden
Stocking rate	Faecal egg count
	Pasture contamination
	Feed intake
	Bodyweight gain

A population of 500 Limousin x Holstein-Friesian, August born calves were simulated over one grazing season

Initial Pasture Contamination



Stocking Rate Effects



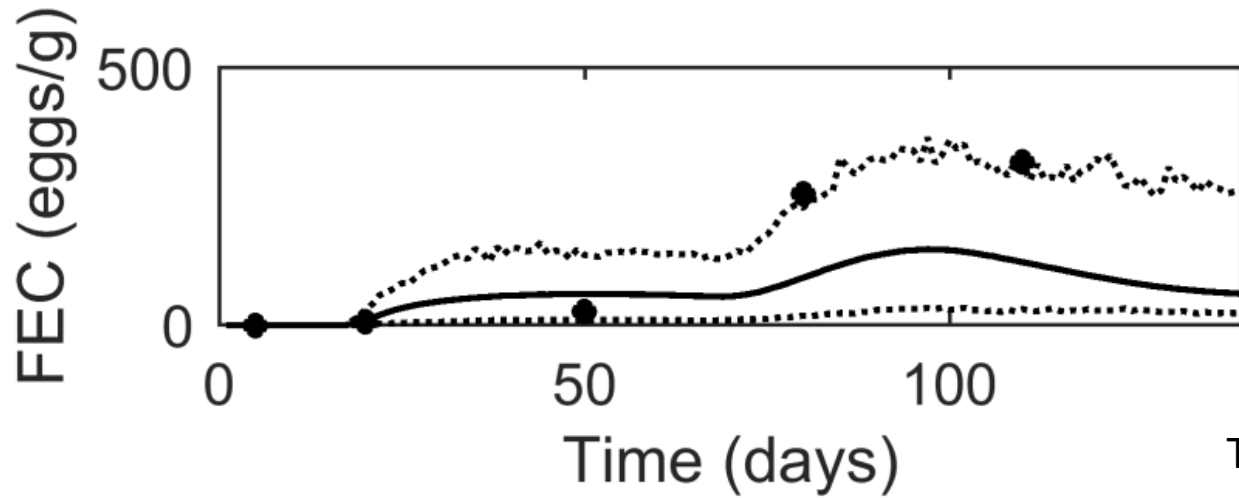
Validation

The model was validated against FEC and pasture contamination for 8 studies over 3 control strategies:

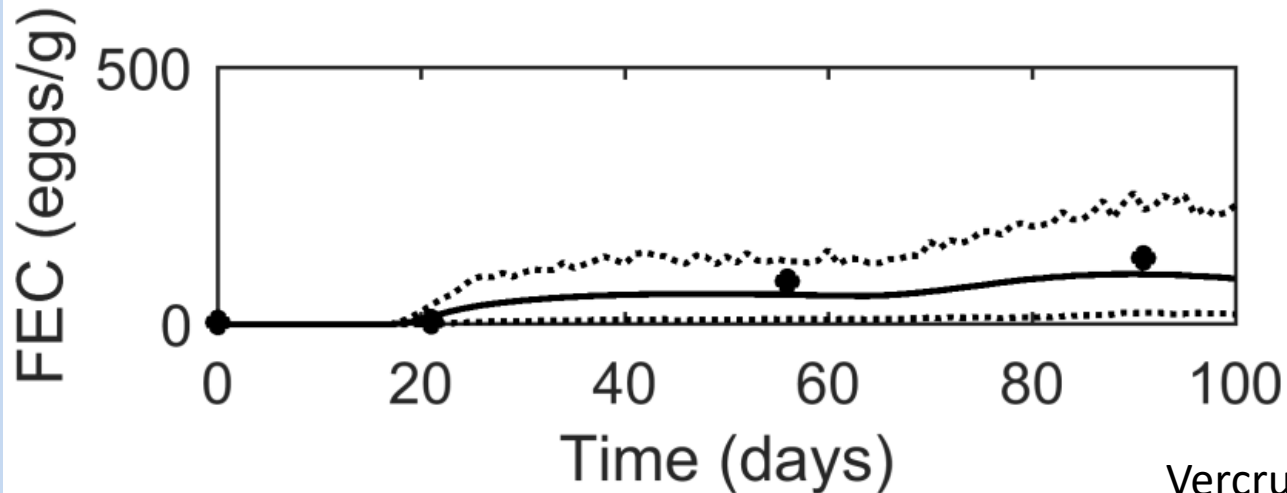
- Stocking rates
- Dose and move
- Strategic anthelmintic treatments

Berk *et al.* (2016). A stochastic model to investigate the effects of control strategies on calves exposed to *Ostertagia ostertagi*. Parasitology (in press).

Faecal Egg Outputs

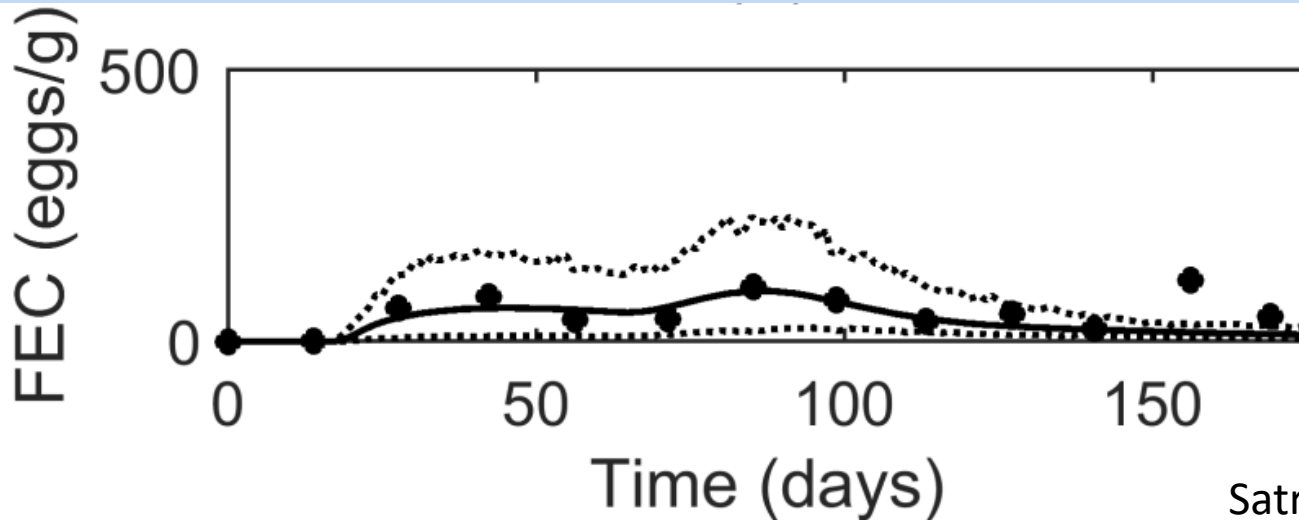


Taylor *et al.* (1995)

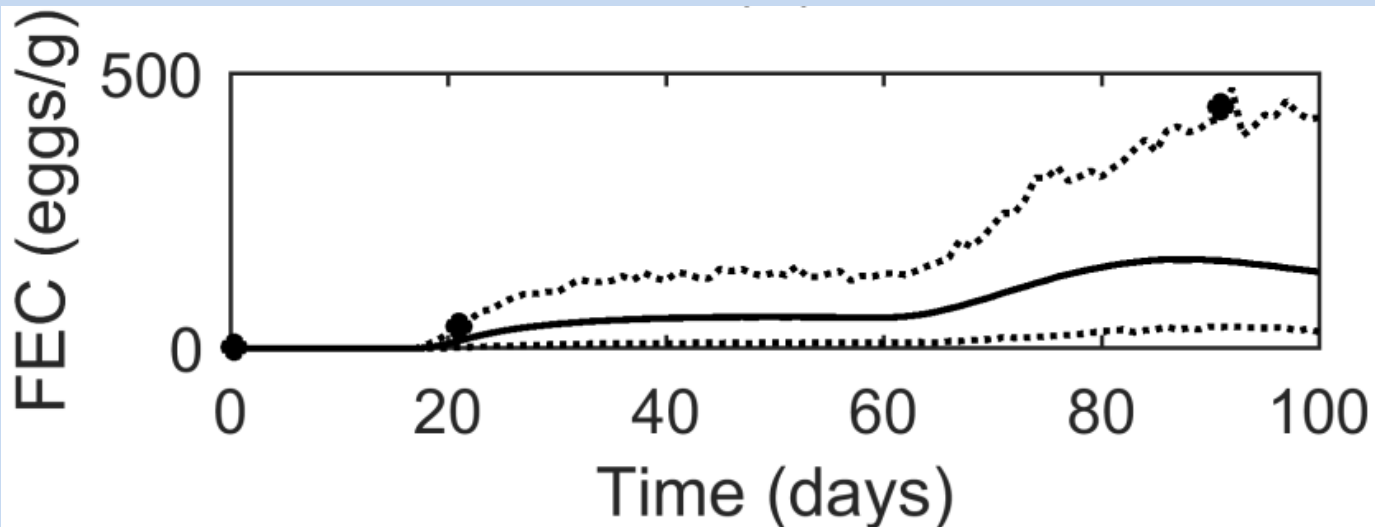


Vercruyssen *et al.* (1995)

Faecal Egg Outputs

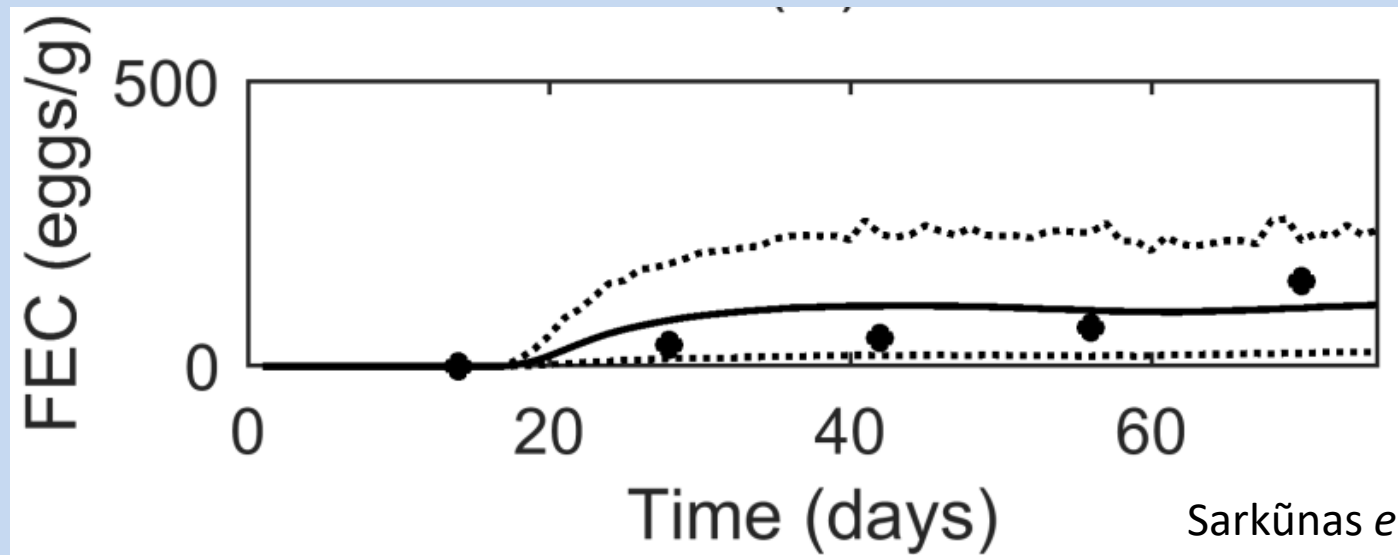
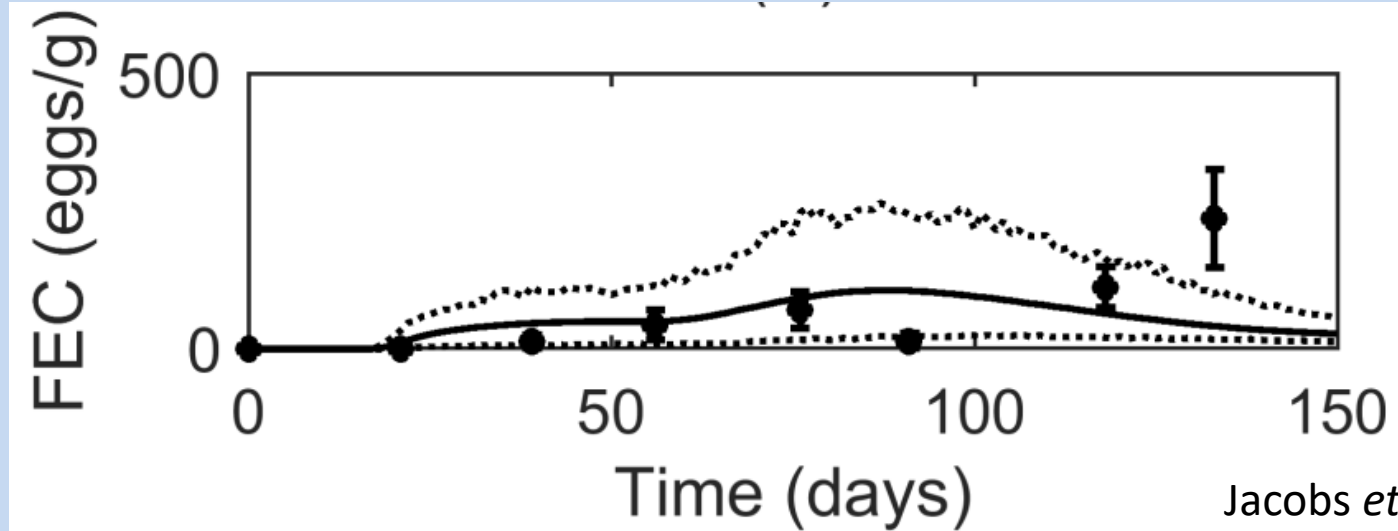


Satrija *et al.* (1996)



Fisher and Jacobs (1995)

Faecal Egg Outputs



Conclusions

- A stochastic model to explore calf- *Ostertagia ostertagi* interactions has been developed
- The model highlights the importance of stocking rates over initial pasture contamination on parasitism and calf performance
- In general the model is effective in simulating outcomes of existing experiments (for FEC and pasture contamination)
- The stochastic models enables us to address uncertainty and variability in factors believed to be important in the behaviour of the system, and enables future assessment of TST strategies by treating calves on individual characteristics

Thank you for listening.



Questions?

