



Genetic parameters of faecal egg and oocyst counts, dag scores, live weight and immunological traits in Scottish Blackface sheep

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Background

- **Selecting for resistance sustainable solution to control gastrointestinal parasitic infections**
- **Breeding programmes allow faster rates of genetic gain in traits of interest**
 - **Coinfection** studies on nematodes and coccidia are **lacking**

Background

Type 1 helper cells (Th1)

- Important **role** in **eradicating intracellular** pathogens
- Produces Interferon gamma (**IFN γ**), further **inducing** Th1 **responses**

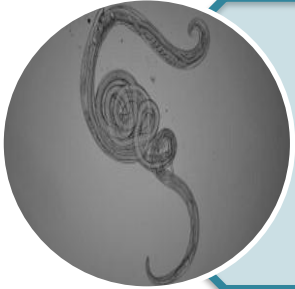
Type 2 helper cells (Th2)

- Involved in immune **responses against nematodes**
- Interleukin 4 (**IL-4**) cytokines produced, **upregulates** Th2 **responses**

Regulatory T cells (Treg)

- **Role** in **regulating** both Th1 and Th2 immune **responses**
- Interleukin 10 (**IL-10**) **producing cells**

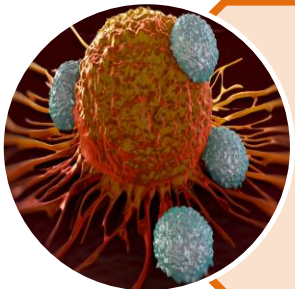
Objectives



Investigate whether or not resistance to one parasite confers resistance to others



Assess the relationship between productivity and disease resistance



Assess the genetic relationship between disease traits and immune function in sheep

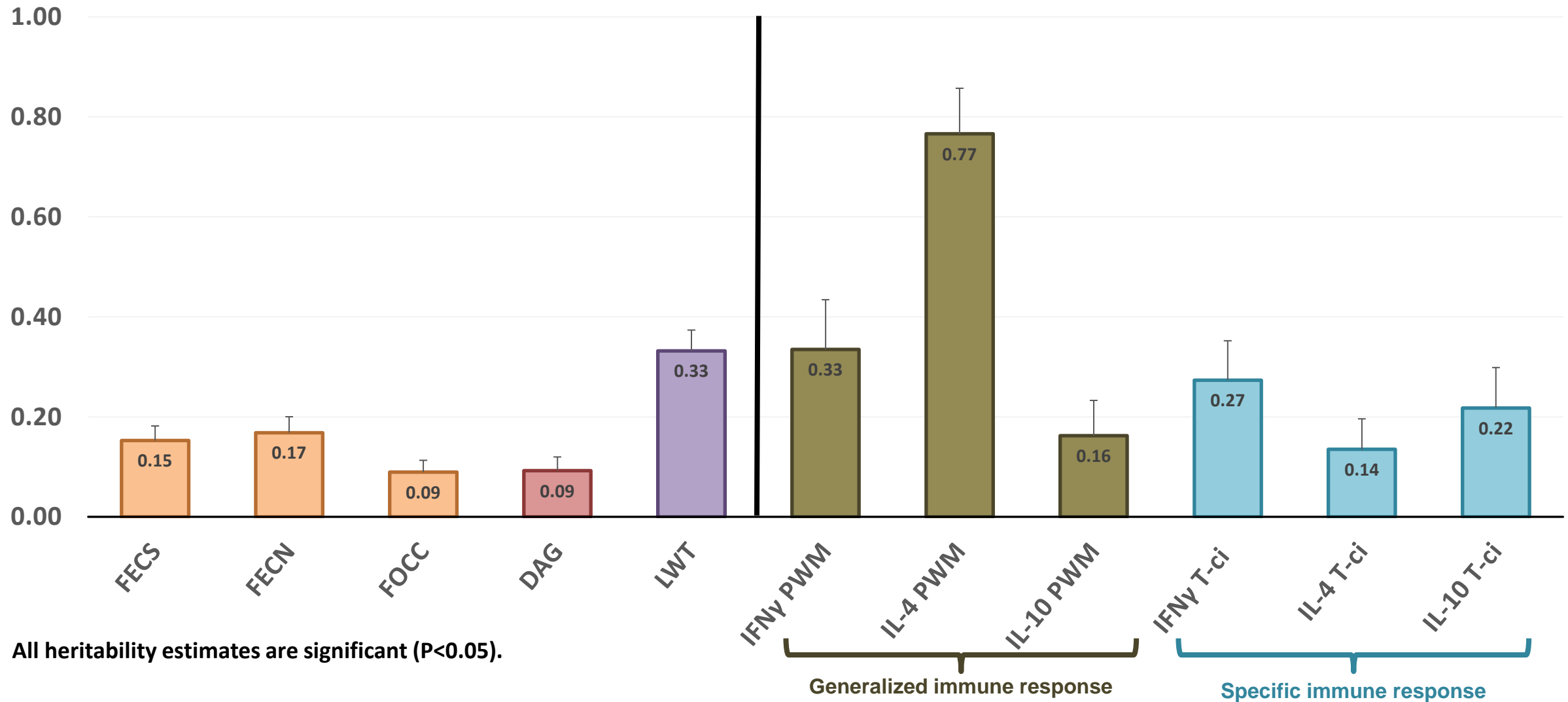
- Genetic analysis (univariate and bivariate)
 - ASReml (Gilmour *et al.*, 2009)

$$y = X\beta + Za + e$$

- FEC, FOC, DAG and all immunological traits Log transformed prior to analysis (Log + 1)

Results:

Trait heritabilities



Results:

Genetic correlations

Genetic correlations between traits ($P < 0.05$).

	FEC_N	FOC_C	LWT	IL-4 _{PWM}	IL-4 _{T-ci}
FEC_S	0.74 (0.09)	0.39 (0.15)			
DAG			-0.33 (0.15)		
IFN γ _{PWM}		0.67 (0.30)	-0.54 (0.18)	0.57 (0.15)	0.74 (0.21)
IL-10 _{PWM}		-0.84 (0.31)			-0.53 (0.23)
IFN γ _{T-ci}			-0.51 (0.20)	0.50 (0.15)	

Phenotypic correlations generally lower than their genetic counterparts.

Conclusions

- Genetic **selection** of sheep for resistance against GI parasites is **feasible**.
 - Will not compromise productivity.
- **Selection for high Th1 will not improve resistance to coccidian parasites**
 - Likely to compromise productivity.

Conclusions

- **Th1 and Th2 responses positively correlated;**
 - **Selection** for one will **boost** the other.
- **Higher IL-10 may improve resistance to coccidian infection.**

Acknowledgements:

- Joanne Conington
- Georgios Banos
- Tom McNeilly
- Banos Team
- Maureen Steel
- David Frew
- Yolanda Corripio-Miyar
- Ann McLaren

Thank you!

