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GENETIC PARAMETERS FOR LAMB MORTALITY, BIRTH COAT SCORE AND GROWTH IN DIVERGENTLY SELECTED MERINOS

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Introduction

Lamb mortality

- Lamb mortality has obvious economic impacts in livestock operations
- It is also scrutinised from an ethical perspective
- Evidently impacts on welfare of free-ranging ewes and their offspring
- Important to consider methods to reduce LM
- Composite trait selection (number of lambs weaned per mating: NLW) considered

Materials & Methods

● Resource population:

- Divergently selected Merino genetic resource flock
- Divergent selection for and against NLW (1986-2015)
- Selected on maternal ranking values (Turner, 1978) for NLW initially
- Selection decisions augmented with single-trait repeatability model breeding values from 2002
- H line linked to industry flocks by introducing commercial rams since 2008

● Records:

- Birth weight within 24 hours of birth
- Birth coat score (hairy – 1; woolly – 5) at the same time
- Lamb mortality from before birth to weaning
- Weaning weight at 101 ± 12 days of age
- Weaning age of individual lambs
- Sire and dam ID linking back to genetic line

Materials & Methods

● Husbandry:

- Two lines in the same flock except at mating
- Ewe numbers ranged from 240-260
- Mated in January-February to lamb in June-July
- Lambing took place on 10-18 small kikuyu pastures
- Ewe-lamb combinations moved to lucern within 3-10 days of birth
- Flock maintained on lucern, oat fodder crops and kikuyu through year

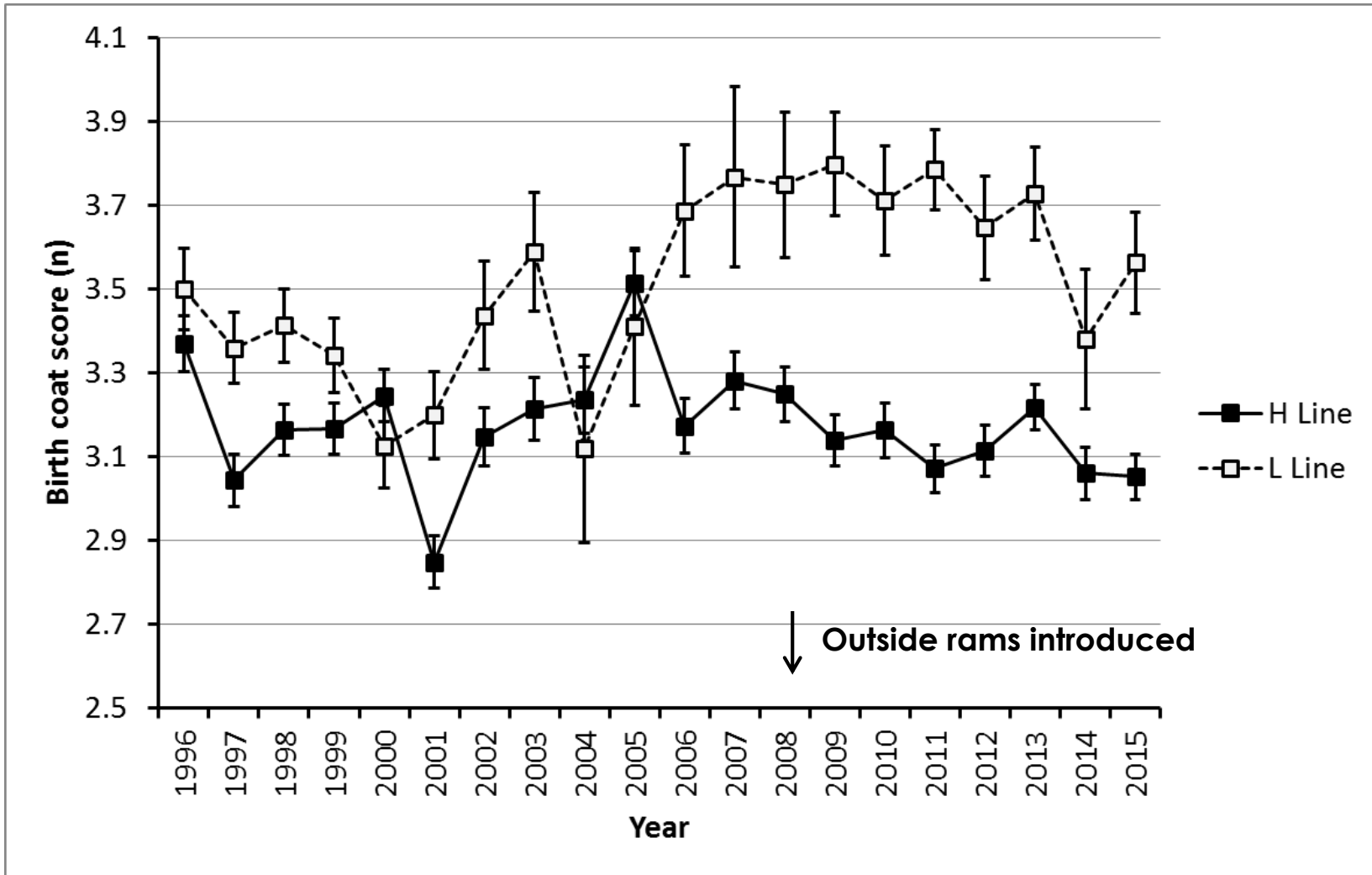
● Statistical analyses:

- Initially single-trait analyses using ASREML4 (Gilmour *et al.*, 2016)
- Fixed effects: selection line, year, sex, dam age, birth type
- Regression on weaning age for weaning weight
- Random effects added to operational model: animal, dam, dam PE and r_{AM}
- Significant random effects used in two-trait analyses to obtain genetic correlations

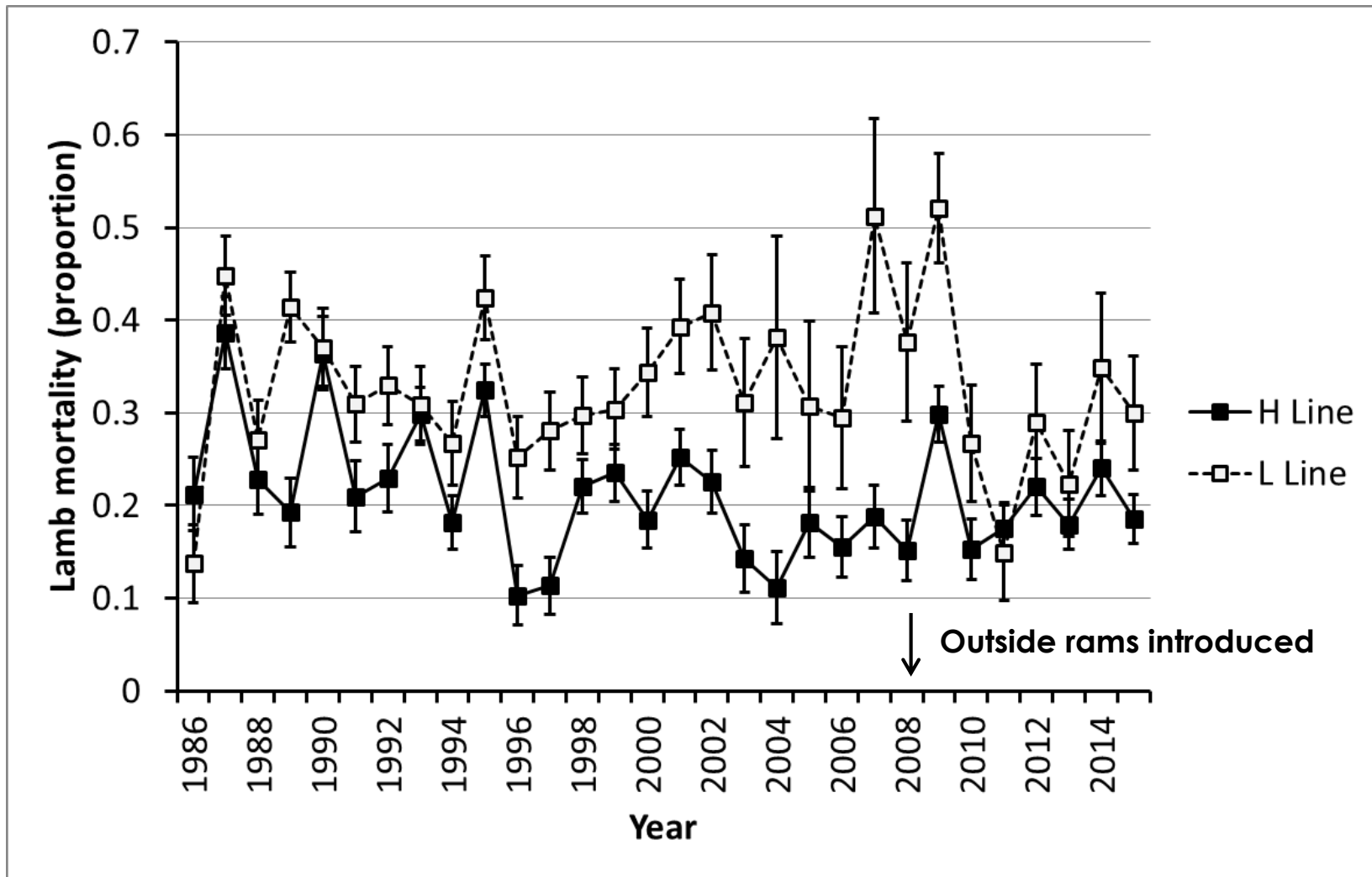
Results: Descriptive statistics

Trait	# of observations	Mean \pm SE	Range
Birth weight (kg)	6997	3.81 \pm 0.85	1 – 7
Birth coat score (n)	4769	3.24 \pm 0.85	1 – 5
Lamb mortality	7021	0.234 \pm 0.424	0 – 1
Weaning weight (kg)	5325	21.3 \pm 5.1	7 – 38

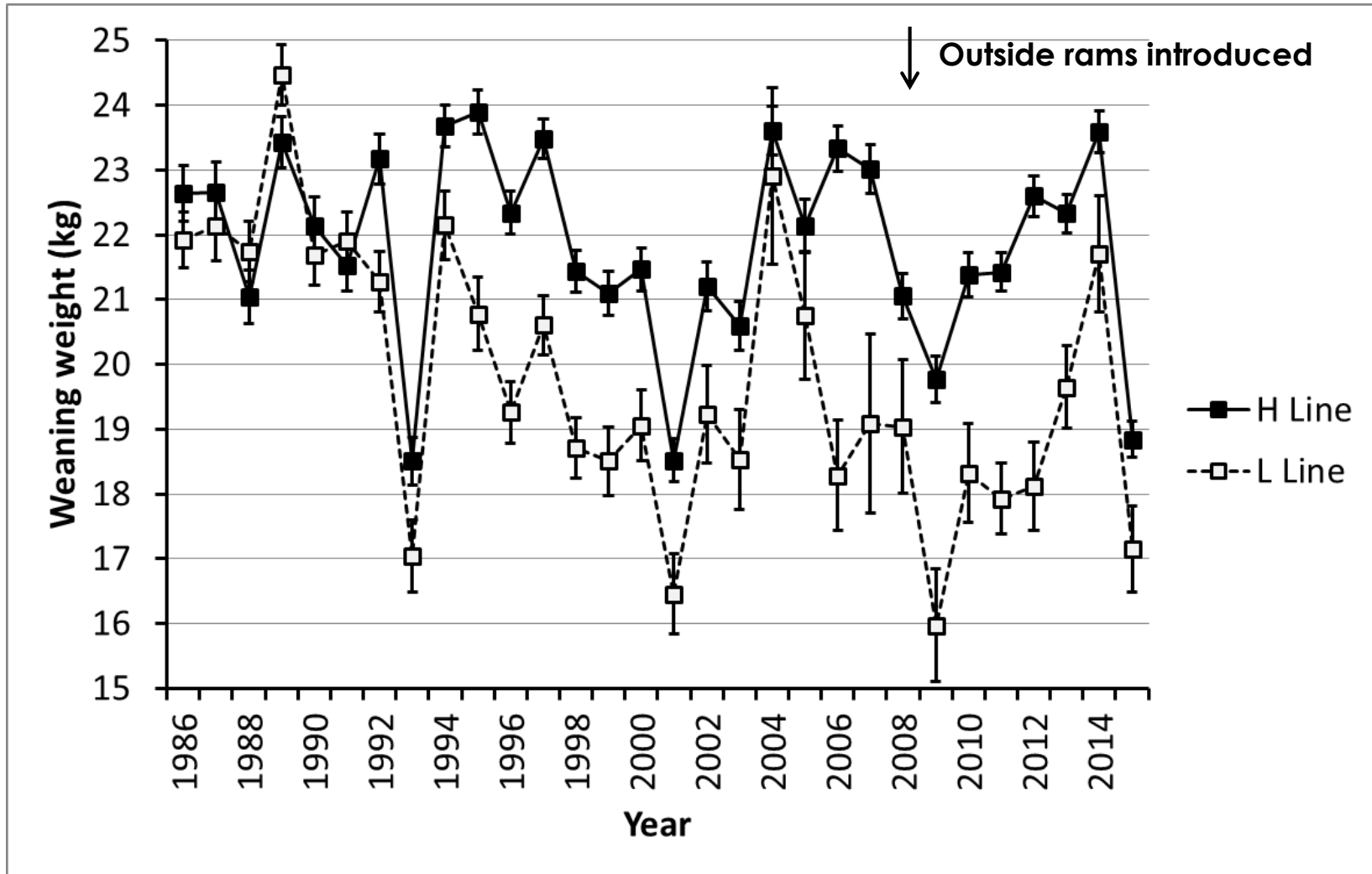
Results: Least-squares means for birth coat score



Results: Least-squares means for lamb mortality



Results: Least-squares means for weaning weight



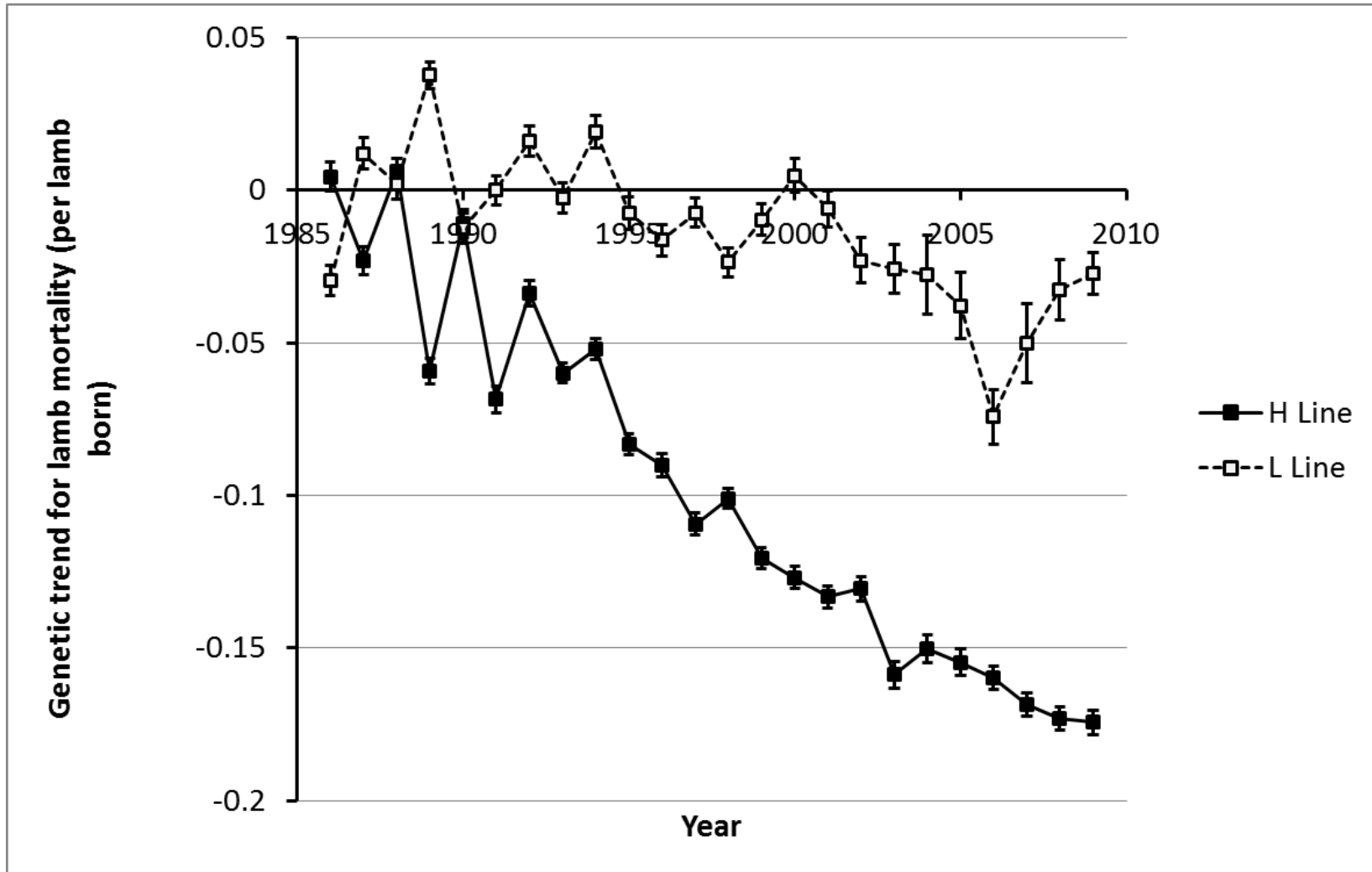
Results: Phenotypic variances (σ^2_p) and ratios (single-trait)

Trait	σ^2_p	$h^2 \pm SE$	$m^2 \pm SE$	$c^2 \pm SE$
Birth weight (kg)	0.501	0.14 ± 0.02	0.20 ± 0.03	0.10 ± 0.02
Birth coat score (n)	0.857	0.49 ± 0.02	n.a.	0.08 ± 0.01
Lamb mortality	0.168	0.08 ± 0.02	n.a.	0.05 ± 0.01
Weaning weight (kg)	15.3	0.13 ± 0.03	0.07 ± 0.02	0.12 ± 0.02

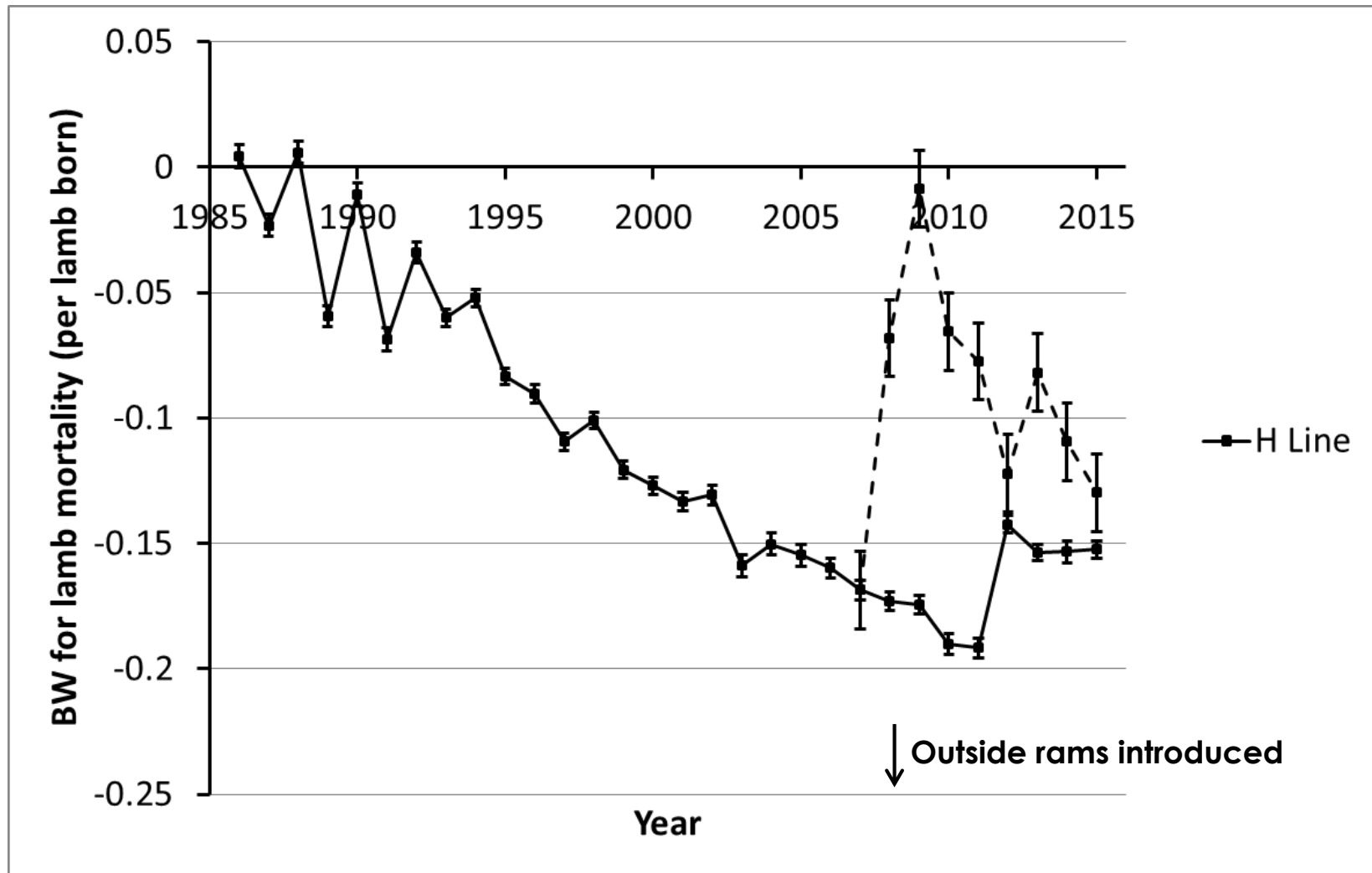
Results: Genetic correlations among traits

Trait	Birth weight (kg)	Birth coat score (n)	Lamb mortality	Weaning weight (kg)
σ^2_P	0.490	0.741	0.168	16.9
Birth weight (kg)	0.13 ± 0.02	-0.06 ± 02	-0.16 ± 01	0.37 ± 01
Birth coat score (n)	0.00 ± 0.10	0.54 ± 0.03	0.05 ± 02	-0.03 ± 0.02
Lamb survival	0.13 ± 0.16	0.15 ± 0.12	0.08 ± 0.02	n.a.
Weaning weight kg)	0.47 ± 0.12	0.02 ± 0.11	n.a.	0.12 ± 0.03

Results: Genetic trends for lamb mortality



Results: Genetic trends for lamb mortality



Discussion and conclusions

- Genetic parameters:
 - Heritability estimates consistent with expectations
 - No trait genetically correlated with lamb mortality
 - The dam PE correlation with birth weight amounted to -0.36 ± 0.12
 - Indirect selection unlikely to be successful unless at the maternal genetic level
- Genetic trends to selection for an improved number of lambs weaned per mating:
 - H Line became more hairy and the L line more woolly (not shown)
 - H line became heavier at weaning and the L line lighter (not shown)
 - Lamb survival improved by 0.0078 ± 0.0002 per annum until 2009 in the H line (before the impact of outside genetics became apparent)
 - Selection against NLW did not yield a unfavourable genetic trend for lamb survival
 - The introduction of outside genetics slowed genetic progress in lamb mortality in the high line
 - Further studies needed to better understand how lamb mortality can be improved by breeding

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Thank you

Contact Us



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