



Joint International  
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# The welfare of housed and grazing beef cattle assessed by hormones levels and physical check scores

Jordana Rivero, Andrew Cooke



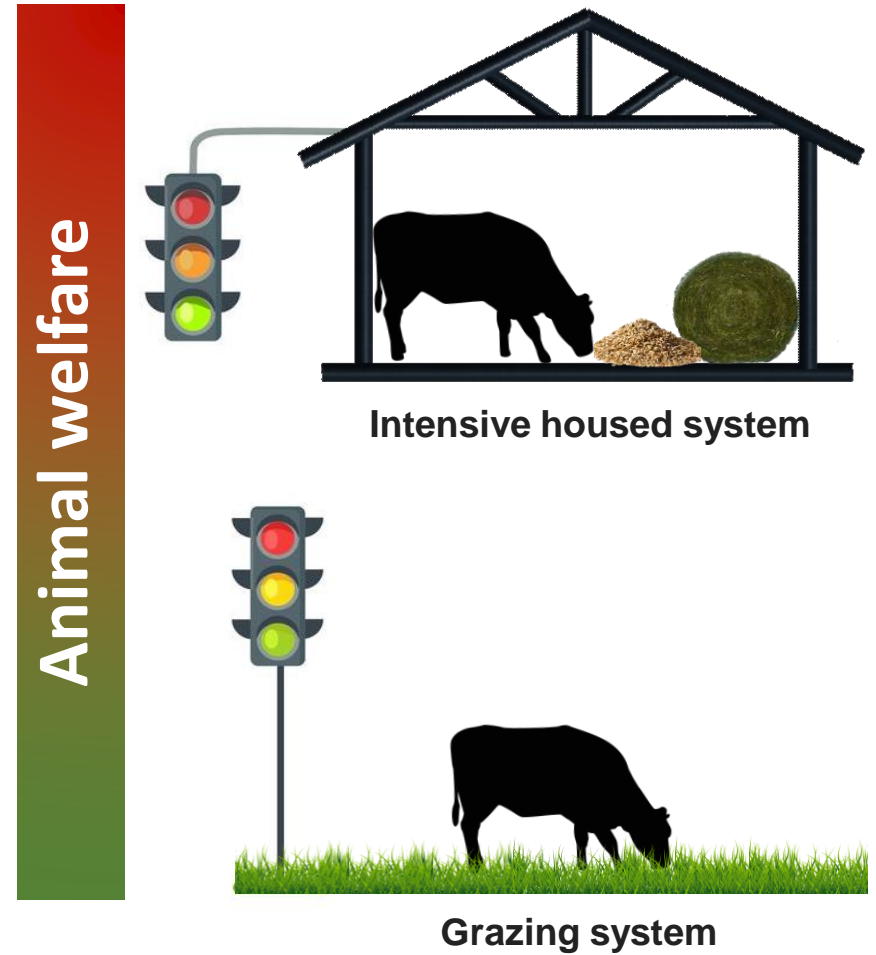
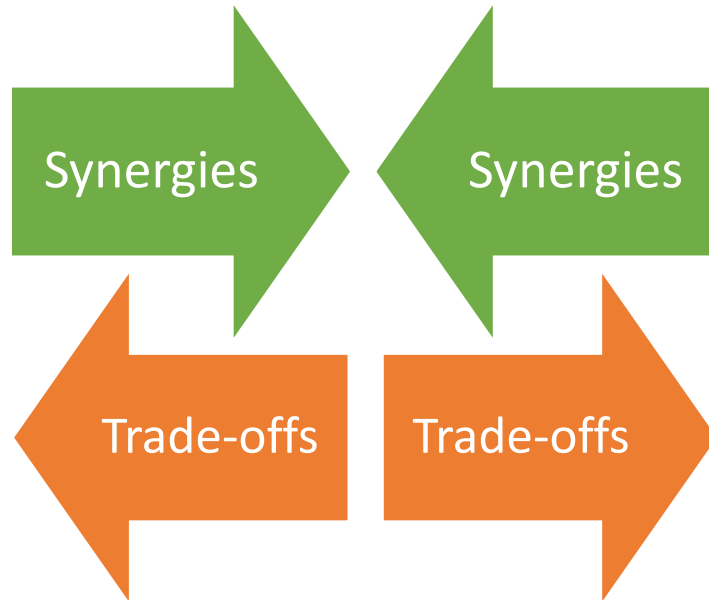
ROTHAMSTED  
RESEARCH





“the ability of an ecosystem to maintain ecological processes, functions, biodiversity and productivity into the future”  
(Thompson 2009).

**+ Animal welfare**




*The Journal of Agricultural  
Science*

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**Animal Research Paper**

# Comparison of the welfare of beef cattle in housed and grazing systems: hormones, health and behaviour

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PUBLISHING

PERSPECTIVE

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ANIMAL PRODUCTION SCIENCE

## A perspective on animal welfare of grazing ruminants and its relationship with sustainability

M. Jordana Rivero<sup>A,\*</sup>  and Michael R. F. Lee<sup>B</sup>



# Objective of the project

***How do the health and welfare of beef cattle differ between housed systems and conventional systems?***

For that purpose, we assessed two beef cattle herds, with and without access to pasture after winter housing, by applying animal welfare protocols and determining the level of relevant hormones.

# Methodology

## Two herds (30 heads each):

- HH – housed all year (intensive finishing system)
- HG – grazing in spring-summer (forage-based finishing system)



- **Compared over winter & spring-summer**
- **Compared across multiple measures:**
  - 1. Physical health – Body condition and health inspections conducted on an individual animal basis (four timepoints), veterinary records.**
  2. Behavioural – QBA was conducted at a group level (weekly).
  - 3. Hormones – Concentrations of cortisol and serotonin in both hair and nasal mucus on an individual animal basis (four timepoints).**
  4. Performance – Analysis of monthly liveweight data.

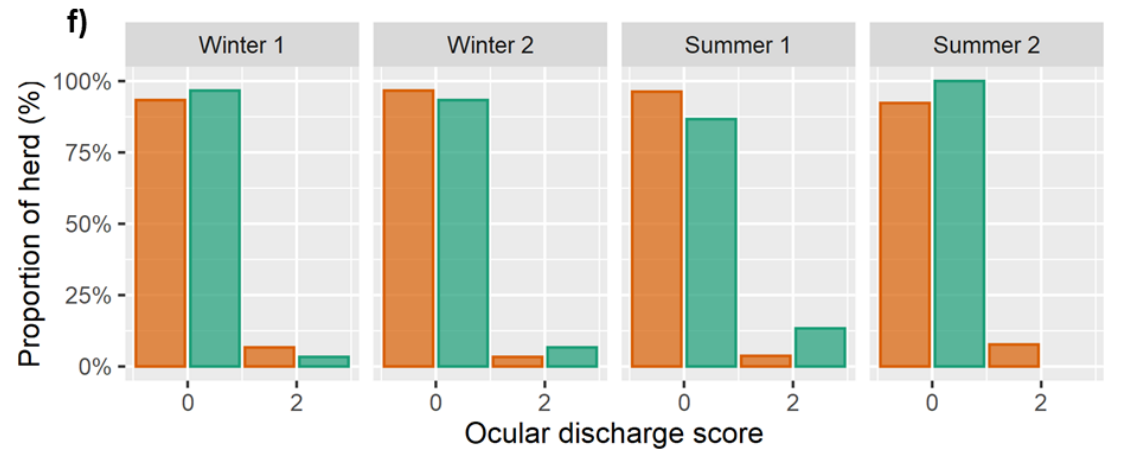
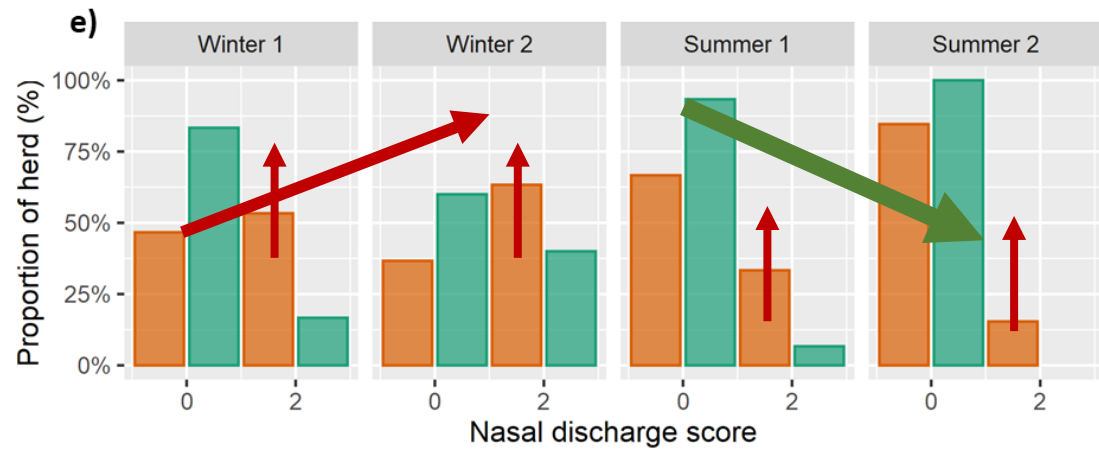
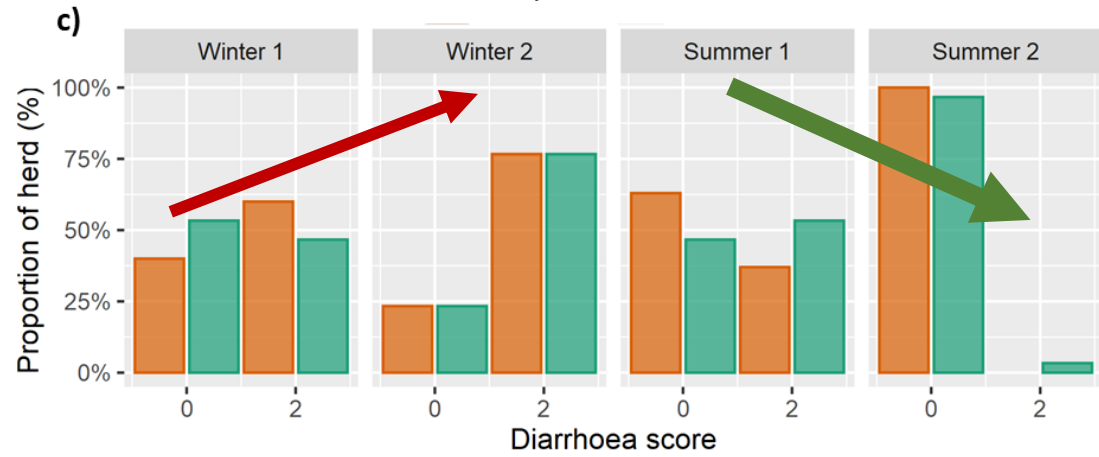
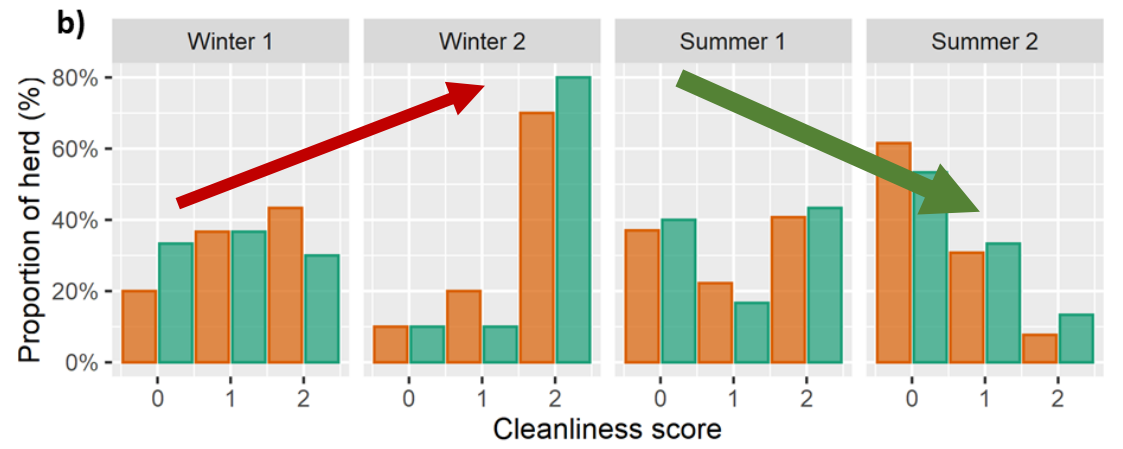
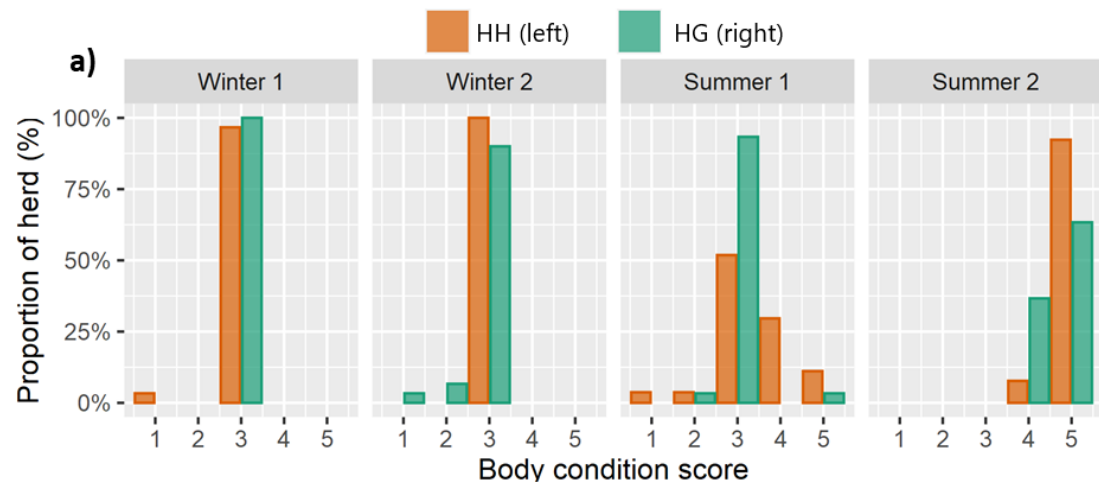
Indicator	Physical indicator scores		
	0	1	2
Cleanliness	No dirt patches larger than a hand	Dirt patches equating to greater than a hand size but shorter than a forearm	Dirt patches of forearm size or greater
Diarrhoea	No diarrhoea	n/a	Signs of diarrhoea
Hairlessness	No hairless patches >2 cm diameter	n/a	Hairless patches >2 cm
Lameness	No lameness	Impaired mobility or uneven weight bearing, immediately identifiable	Severely impaired mobility, unable to meet normal walking pace
Lesions	No lesions >2 cm	n/a	Lesions >2 cm evident
Nasal discharge	No discharge >3 cm	n/a	Discharge >3 cm present
Ocular discharge	No discharge >3 cm	n/a	Discharge >3 cm present
Swelling	No swelling >2 cm	Mild swelling such that normal anatomy of area is enlarged. Poorly defined.	Substantial abnormal swelling that is prominent away from the body

**BCS = 1 to 5**



# Results

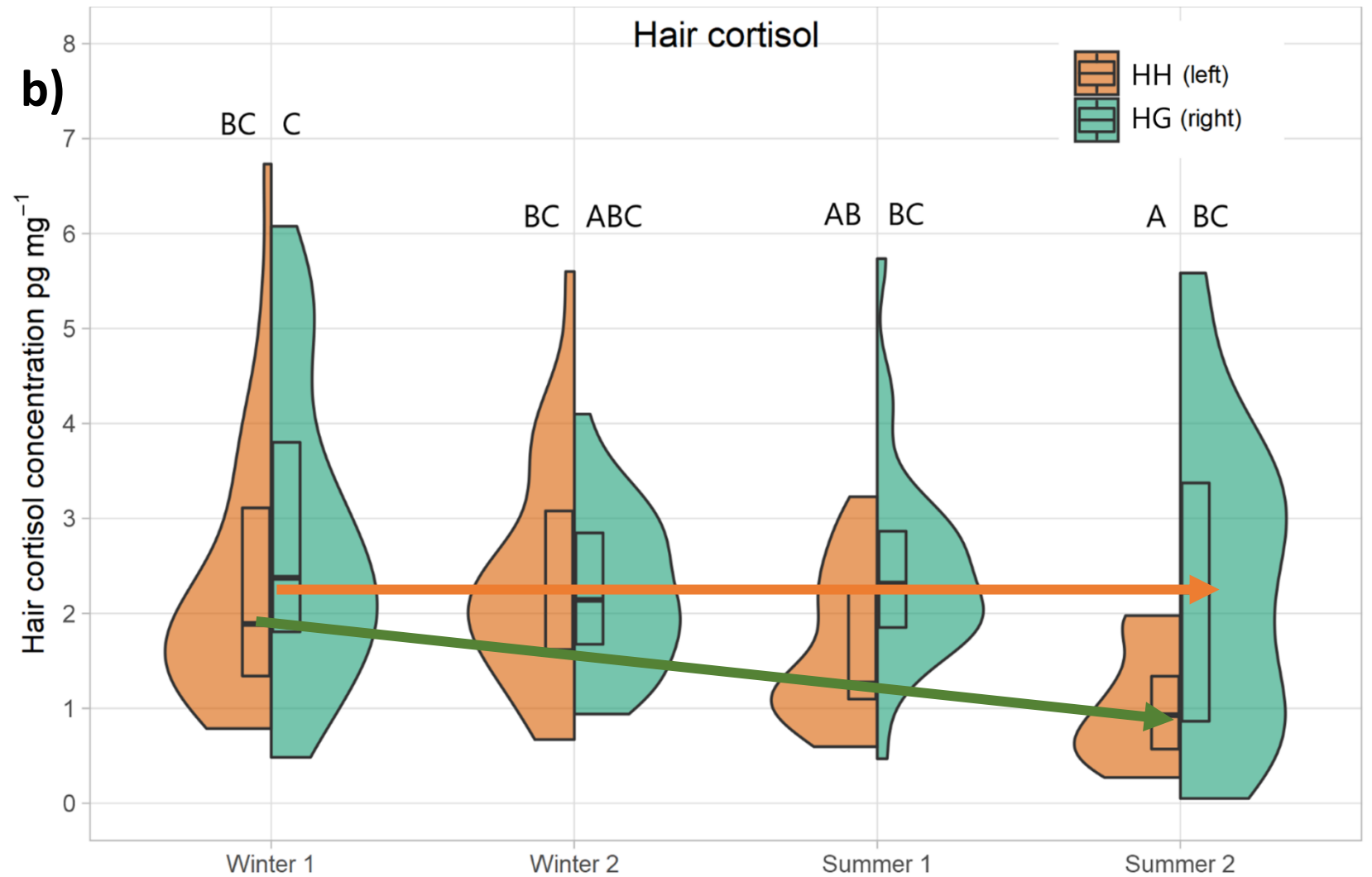
- ✓ Lameness: no incidences were observed over the study period.
- ✓ Swelling: one swelling was observed on the head/neck of an animal in the HH herd at timepoint Summer 1, which was scored as 2 ( $\geq 2$  cm diameter).
- ✓ Lesions: one lesion was observed on the head/neck of an animal in the HH herd at timepoint Summer 1.



Split violin plots of cortisol concentrations ( $\text{pg mg}^{-1}$ ) for both herds across all time points in hair.

The left half of each plot is the HH herd (coloured in orange) and the right half is the HG herd (coloured in green).

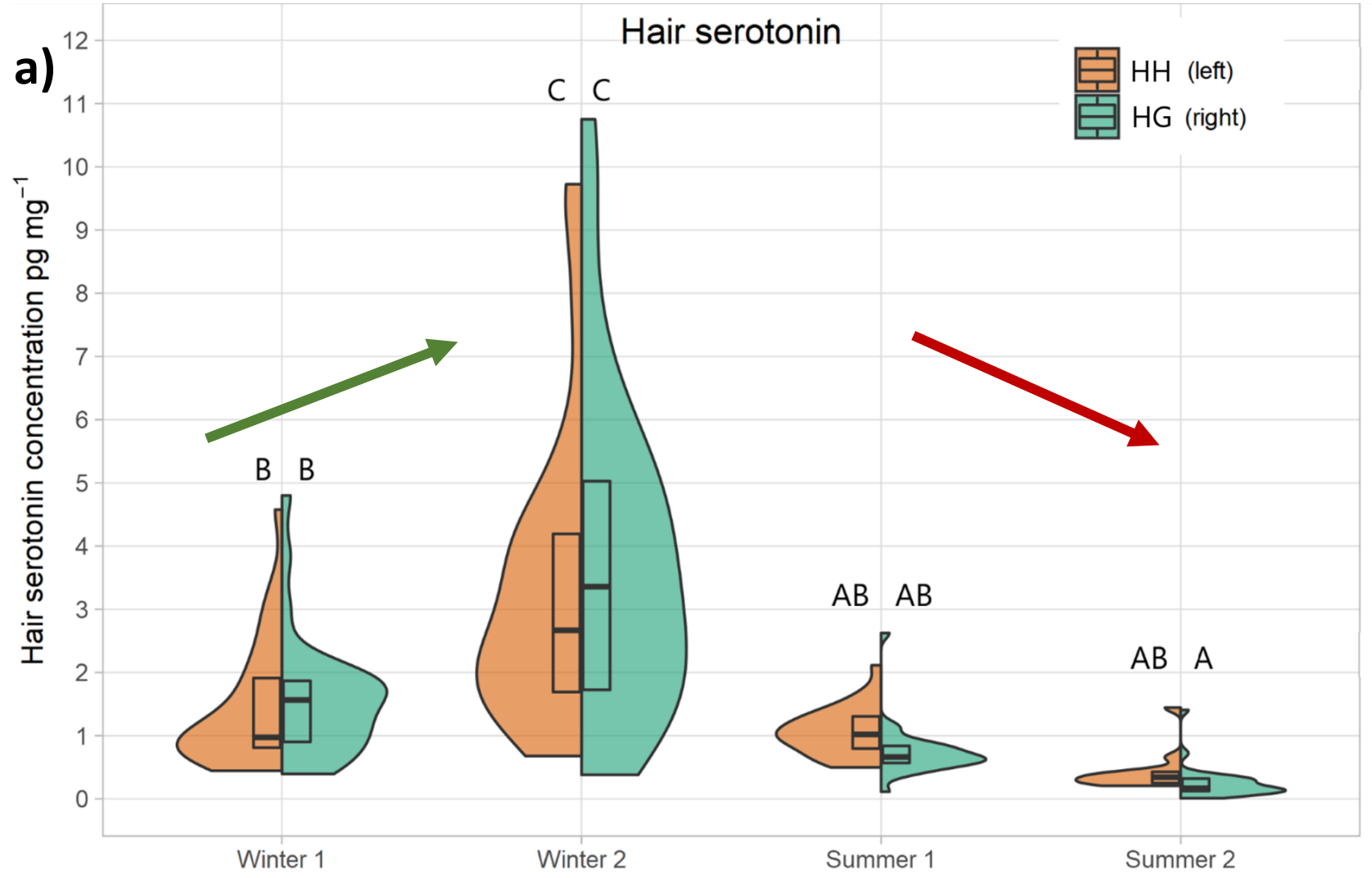
Boxes in the middle represent Q1, median and Q3. Plots that do not share a letter are different to one another.



Split violin plots of serotonin concentrations ( $\text{pg mg}^{-1}$ ) for both herds across all time points in hair.

The left half of each plot is the HH herd (coloured in orange) and the right half is the HG herd (coloured in green).

Boxes in the middle represent Q1, median and Q3. Plots that do not share a letter are different to one another.



# Main findings

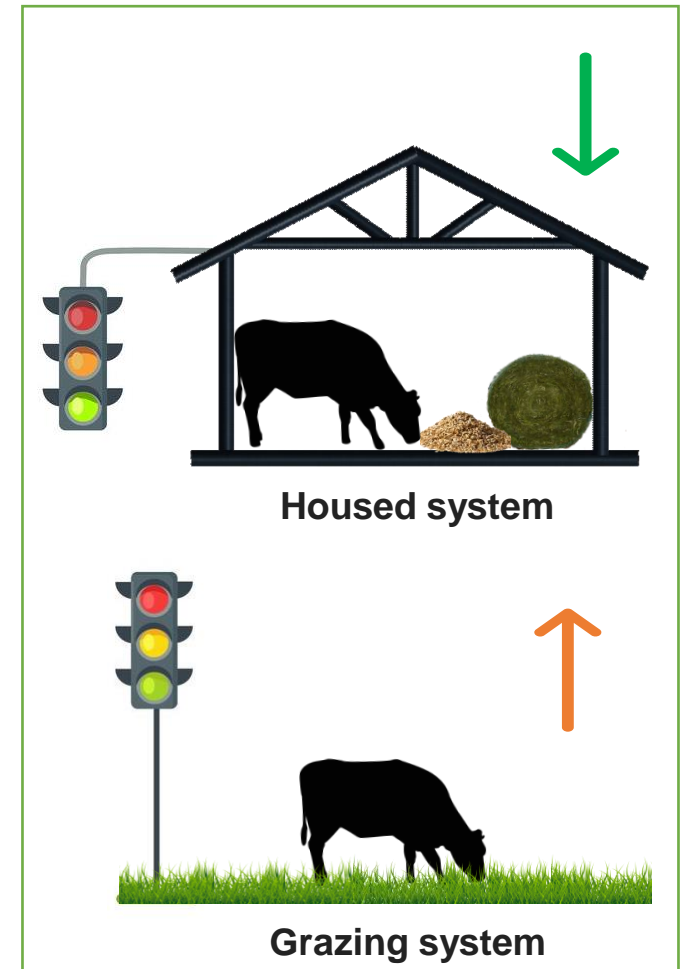
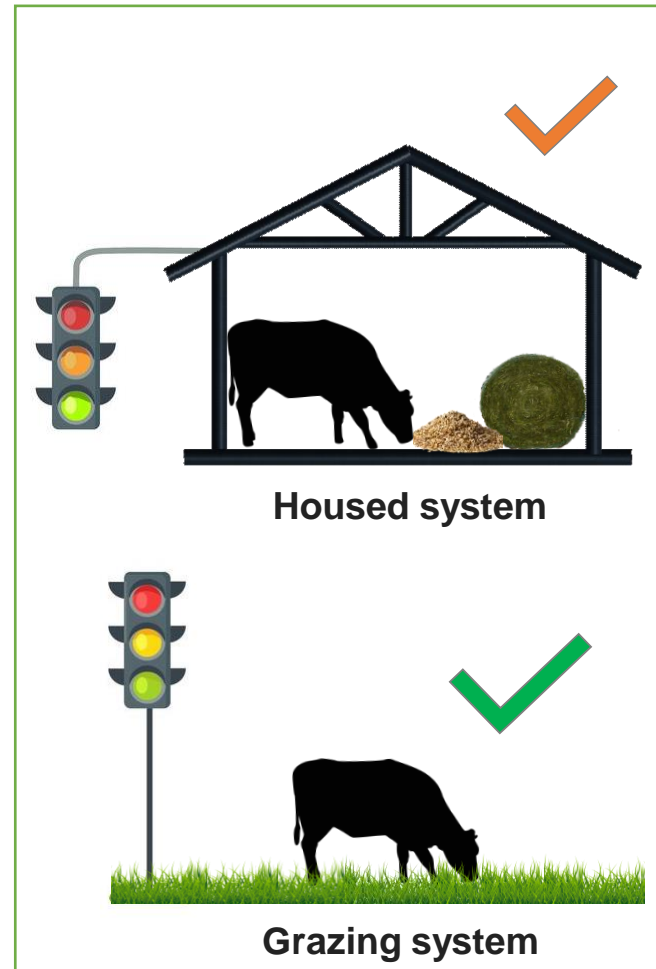
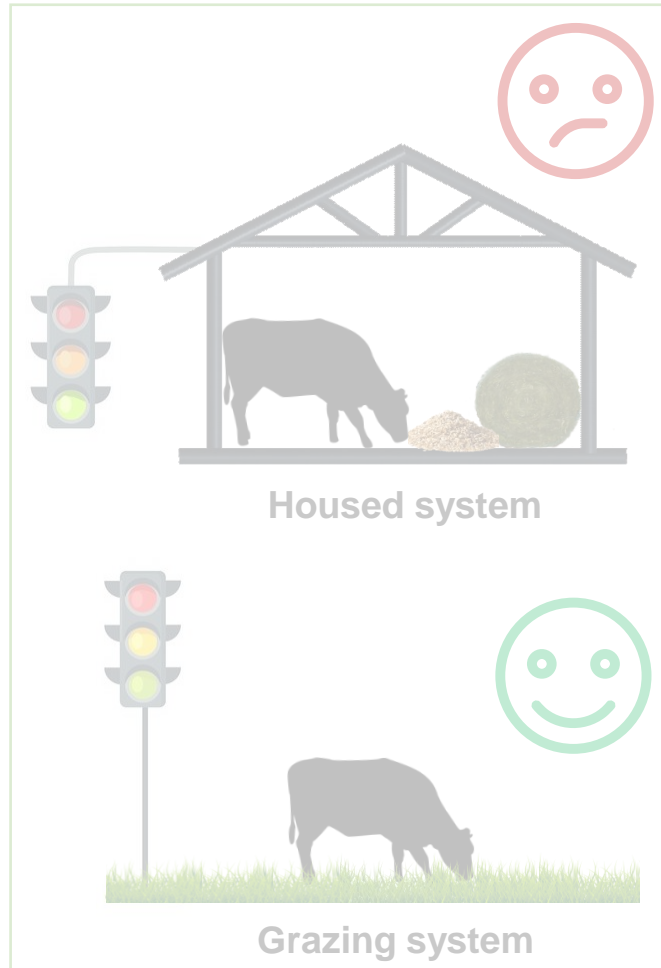
- Temporal trends were far stronger than inter-group trends, with negative trait scores being higher in late winter and improving over summer.
- Incidences of hairless patches were marginally more prevalent in cattle that were housed than grazing.
- Higher cortisol in HG: lower than other studies; exposure to weather events? Metabolic processes (energy-diet)?



# Behaviour (summer)

# Physical health

# Cortisol





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Soil to Nutrition (BBS/E/C/000I0320) and the North  
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