

How many pigs within a group  
need to be sick to lead to a  
diagnostic change in the group's  
behaviour?

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# Background

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- Disease is a leading cause of diminished health & welfare in pig production, but its spread can be limited by early detection
- Identifying specific behavioural changes at disease onset has a high diagnostic value:
  - Faster & improved treatment success
  - Limiting disease spread
  - Refinement of early warning systems

# Aims & Objectives

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**Aim:** To identify key behaviours that visibly change at the group level when only a few individuals are acutely sick

**Objective 1:** To quantify the behavioural changes during an acute health challenge in groups of pigs

**Objective 2:** To quantify the minimum proportion of individuals required to detect these behavioural changes at the group level

# Predictions

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- Pigs experiencing acute sickness perform  $\uparrow$  lying, but  $\downarrow$  feeding, drinking, non-nutritive visits (NNV), standing & enrichment interaction than pigs of good health



# Materials & Methods – Trial 1

**Trial 1:** To quantify the behavioural changes during an acute health challenge in groups of pigs

- Thirty-five 9-10 week old pigs in 2 pens
- Artificial sickness created using Porcilis Glässer vaccine
- **Two day trial:** vaccination & sham saline injections on opposite days
- Pens acted as own controls
- Rectal temperatures measured for 10 pigs/pen to confirm fever



# Materials & Methods – Trial 2

**Trial 2:** To quantify the minimum proportion of individuals required to detect behavioural changes at disease onset at the group level

- Sixty-one 9-10 week old pigs in 3 pens (20-21 pigs/pen)

## **3 Treatments:**

- **Control (Con):** 0% vaccinated
- **Low Subset (Low):** ~20% pigs vaccinated
- **High Subset (High):** ~50% pigs vaccinated

# Behavioural Observations

- 2 Cameras recorded each pen, observations completed using Elan Software

Behaviour	Description
Standing	Pig only has feet (and possibly snout) in contact with pen floor
Lying	Trunk of the pig is in contact with the floor
Feeding	Pig has head inside a food trough
Drinking	The pig's snout is in contact with a nipple drinker
NNV	Pig enters the black mat of the feeding area with two or more feet (one must be a front foot) then leaves the area without putting head in food trough
Enrichment Interaction	Pig uses its head to bite, nose, or knock the plastic pipe and chain suspended from the ceiling

# Behavioural Observations

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## **Trial 1 – Total Vaccination**

- 1 control (Con) & 1 total vaccination (Total Vacc) day per pen
- Observations completed continuously 8:00-13:00

## **Trial 2 – Proportional Vaccination**

- 2 Con, 1 Low, and 1 High day per pen
- 10 mins observations from 9:00-14:00 every 20 mins
- *e.g.*, 10:00-10:10, 10:20-10:30, etc.



# Statistical Analysis

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- SPSS and SAS

## **Trial 1 – Rectal Temperatures**

- Independent t-test grouped by treatment

## **Trials 1 & 2 – Behavioural Data**

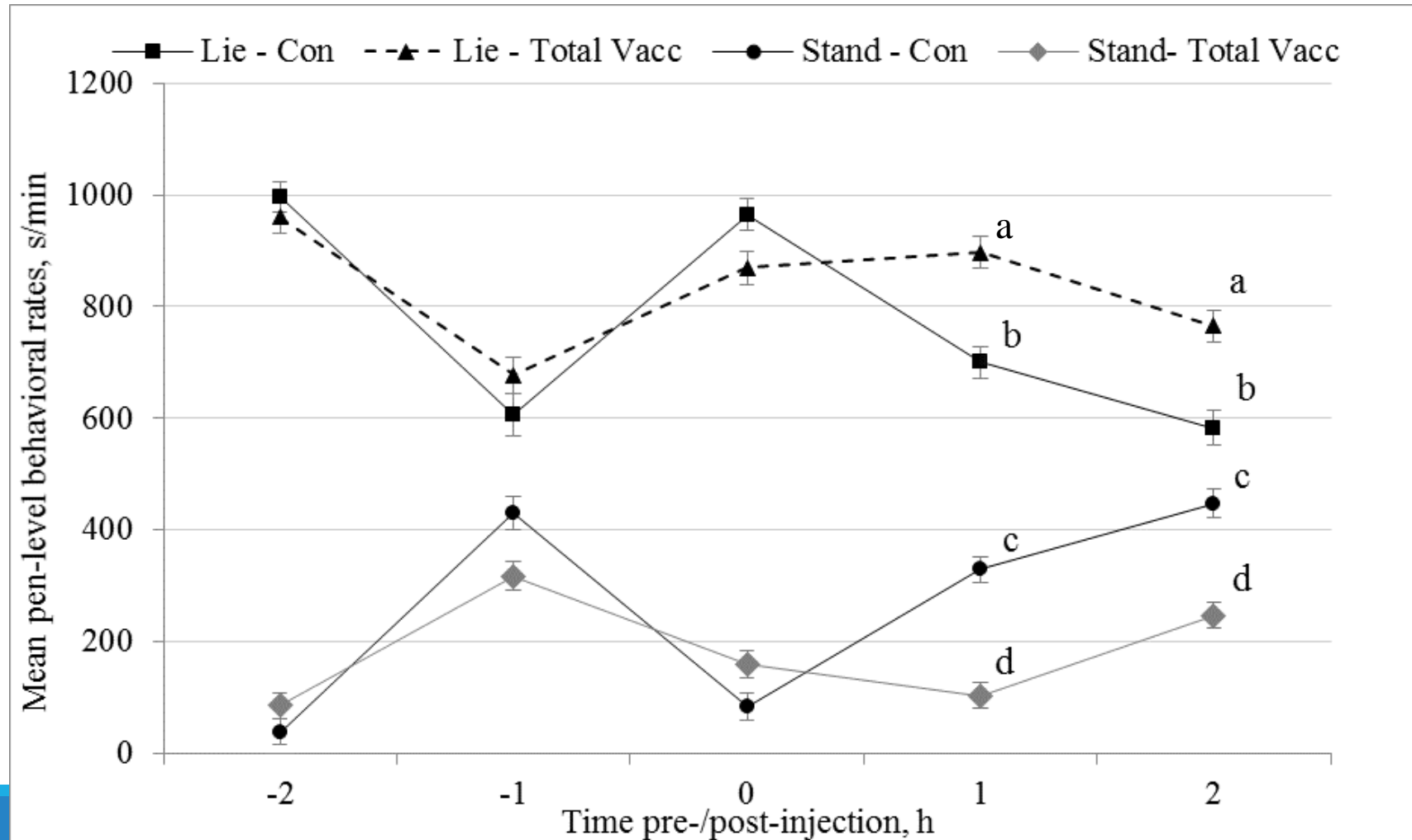
- Proc Glimmix for each group level behavioural rate (s/min)
- *Fixed effects*: treatment, time of day, treatment × time of day
- *Random effects*: repeated measures of each pen

# Trial 1 - Results

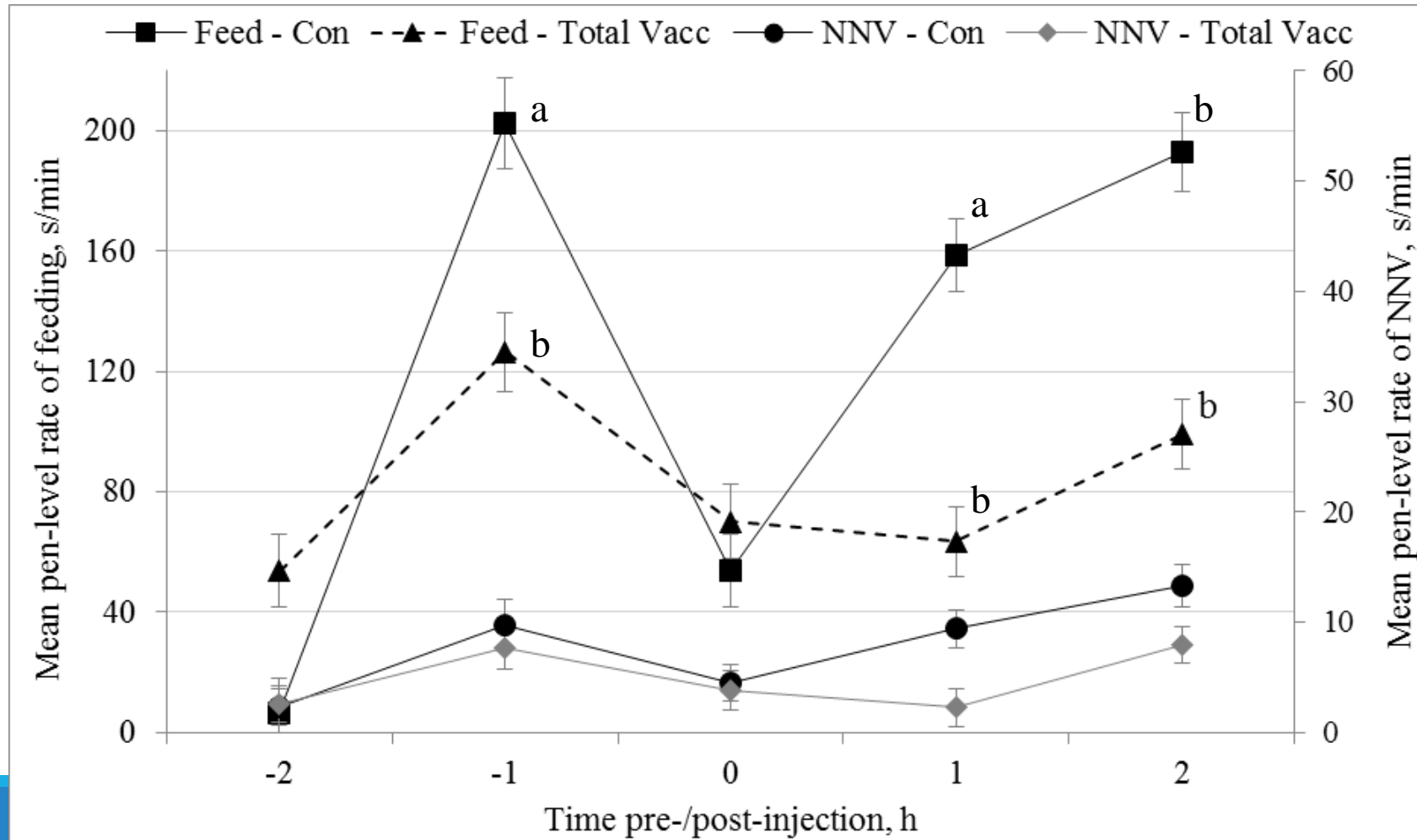
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- Rectal temperatures ↑ for Total Vacc ( $41.1 \pm 0.2^{\circ}\text{C}$ ) than Con pigs ( $39.9 \pm 0.1^{\circ}\text{C}$ ;  $P < 0.001$ )
- Total Vacc ↑ pen level lying ( $P < 0.002$ ), but ↓ rates of standing ( $P < 0.001$ ), feeding ( $P < 0.001$ ), NNV ( $P < 0.010$ ), drinking ( $P < 0.001$ ), and enrichment interaction ( $P < 0.001$ )

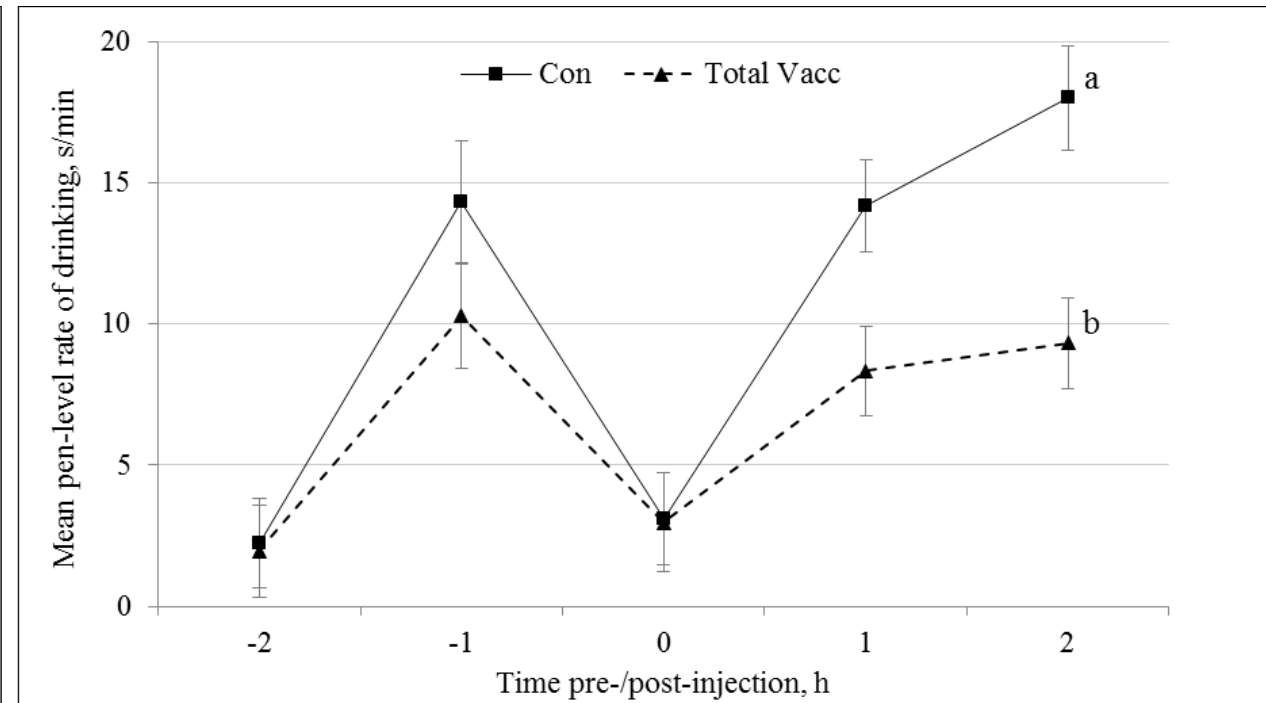
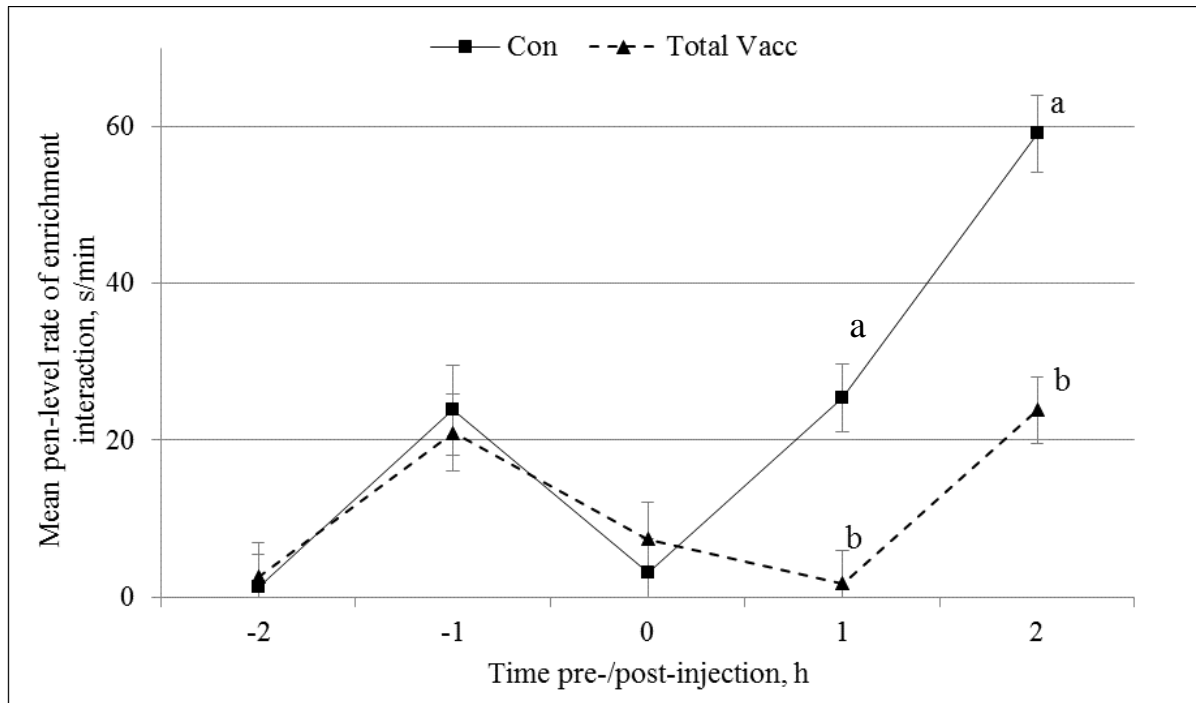
# Trial 1 – Lying & Standing



# Trial 1 – Feeding & NNV



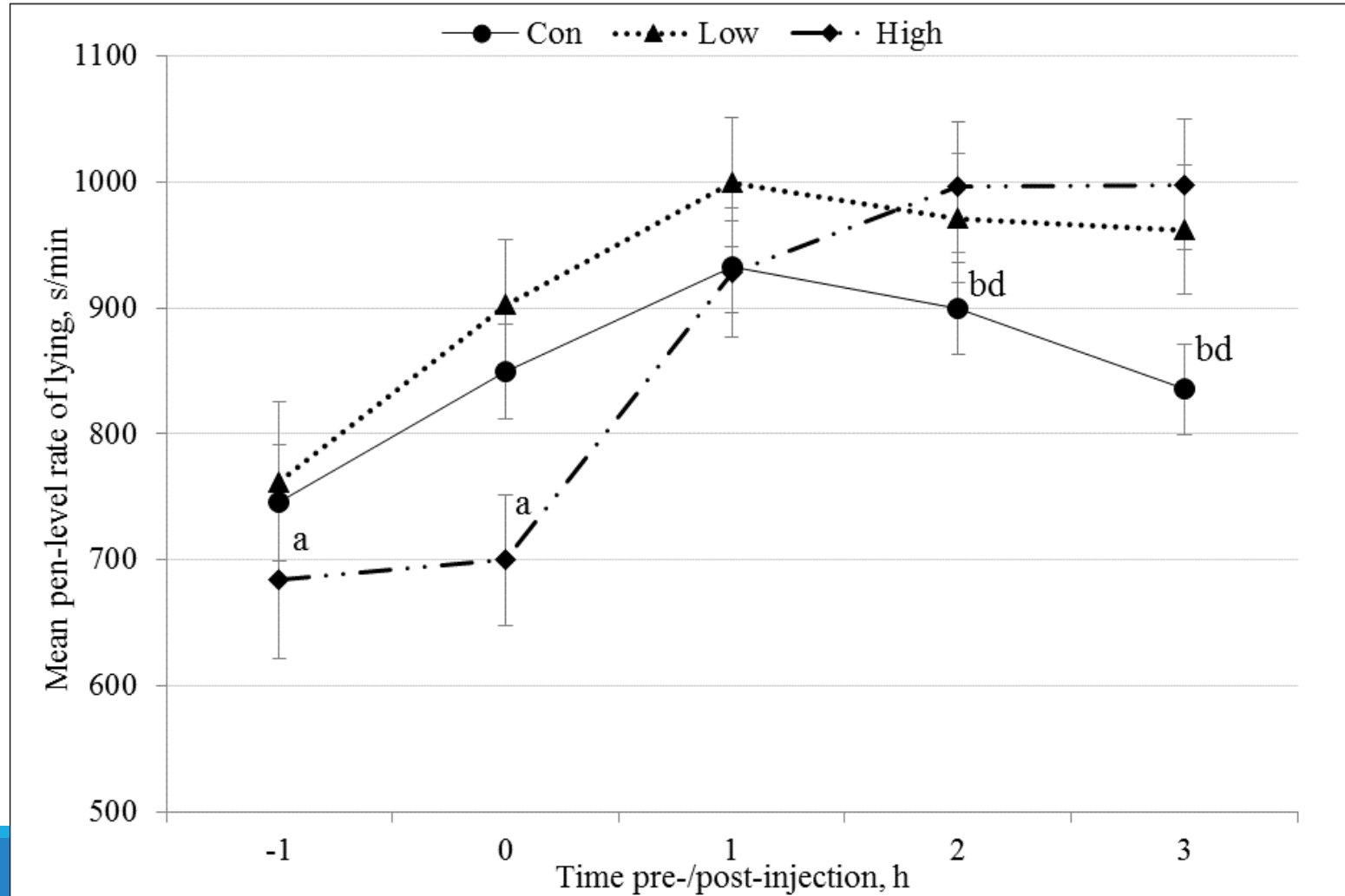
# Trial 1 – Drinking & Enrichment Use



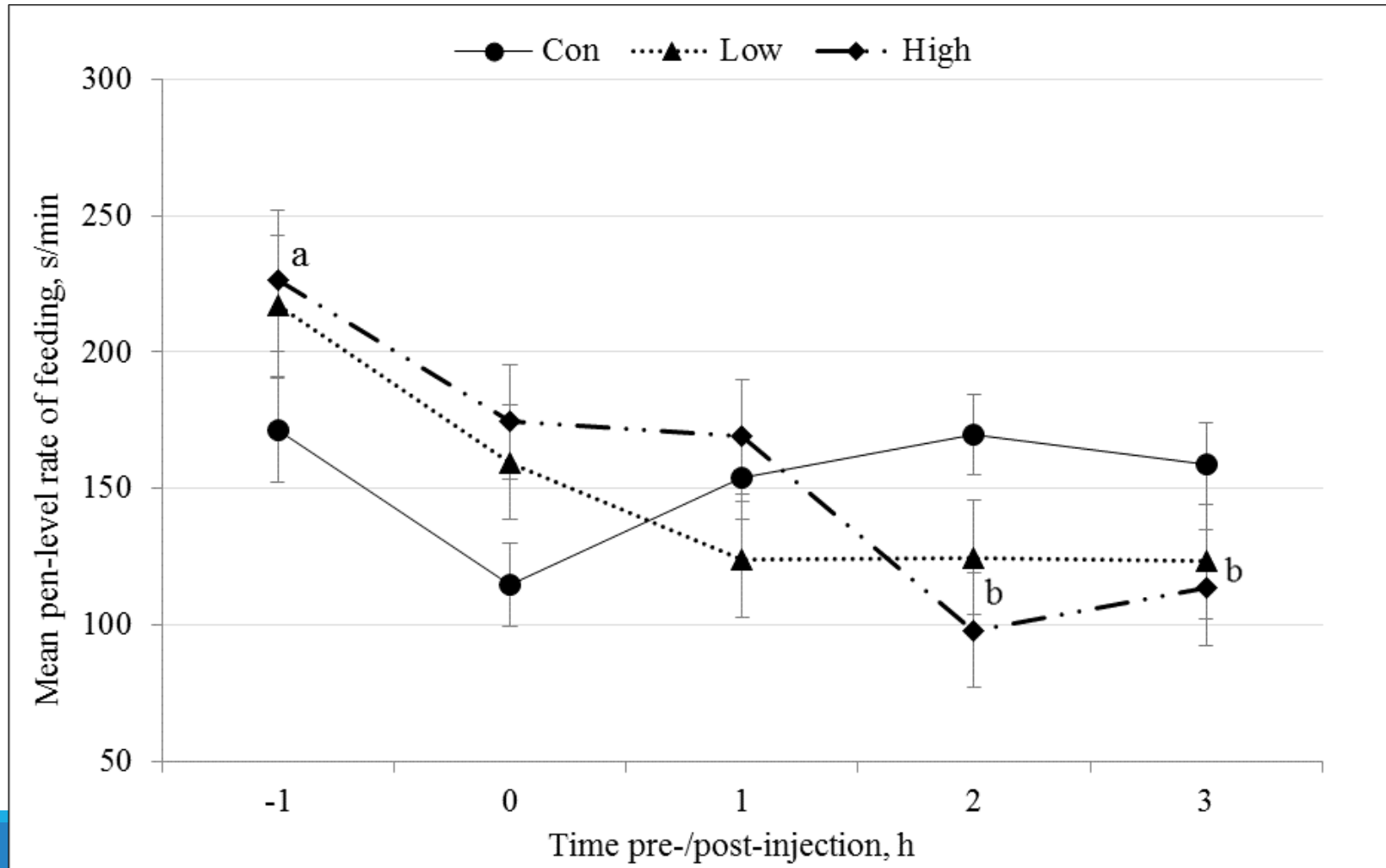
# Trial 2 – Results

Behaviour	Treatment		
	Con	Low	High
Lying	852.46 ± 17.33 <sup>a</sup>	919.60 ± 24.10 <sup>b</sup>	861.38 ± 24.10
Standing	327.35 ± 13.98 <sup>a</sup>	276.91 ± 19.42 <sup>b</sup>	293.79 ± 19.42
Feeding	153.74 ± 7.12	149.72 ± 9.90	156.31 ± 9.90
NNV	13.31 ± 1.52	11.71 ± 1.87	15.90 ± 2.42
Drinking	17.69 ± 1.38 <sup>a</sup>	16.42 ± 1.40	13.53 ± 1.27 <sup>b</sup>
Enrichment Interaction	26.53 ± 3.35 <sup>a</sup>	10.92 ± 2.35 <sup>b</sup>	14.77 ± 2.63 <sup>b</sup>

# Trial 2 - Lying



# Trial 2 - Feeding





# Findings – Trial 1

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- Total Vacc lead to ↓ pen level standing, enrichment interaction, drinking, feeding, and non-nutritive visits, but ↑ rates of lying
- Rectal temperatures ↑ in Total Vacc treatment meaning pigs were experiencing a febrile response
- Vaccination is an acceptable artificial model of acute illness

# Findings – Trial 2

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Group level changes in key behaviours are apparent when only a few individuals are acutely sick in a pen

- ↓ standing & enrichment interaction, but ↑ time spent lying
- Focus of early warning systems for disease detection

Pen level feeding and drinking only ↓ in the High treatment

- Better suited for confirming disease spread within a herd

# Questions?

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