

# Breeding for high natural antibodies reduces mortality after avian pathogenic *Escherichia coli* inoculation in chickens



Tom V.L. Berghof<sup>1,2</sup>, Mieke G.R. Matthijs<sup>3</sup>, Joop A.J. Arts<sup>2</sup>, Henk Bovenhuis<sup>1</sup>, R. Marius Dwars<sup>3</sup>, Jan J. van der Poel<sup>1</sup>, Henk K. Parmentier<sup>2</sup>

Tom Berghof MSc  
PhD Candidate  
E-mail: Tom.Berghof@wur.nl



## Objective

Test **general disease resistance** through **selection and breeding for natural antibody (NAb)** levels  
 → Layer chickens were divergently selected and bred for total NAb level at 16 week of age for **four generations**  
 → **Proof-of-principle**: intratracheal infection with avian pathogenic *Escherichia coli* (APEC) in early life  
 Used APEC: *E. coli* O78:K80, strain 506

## Conclusion and Implication

- **Lower mortality** in layer chickens selected for **high NAb level** compared to chickens with **low NAb level** after intratracheal **avian pathogenic *Escherichia coli* infection** in early life
- Investigation on survival and resistance for other diseases is needed to conclude on breeding for general disease resistance

## Background

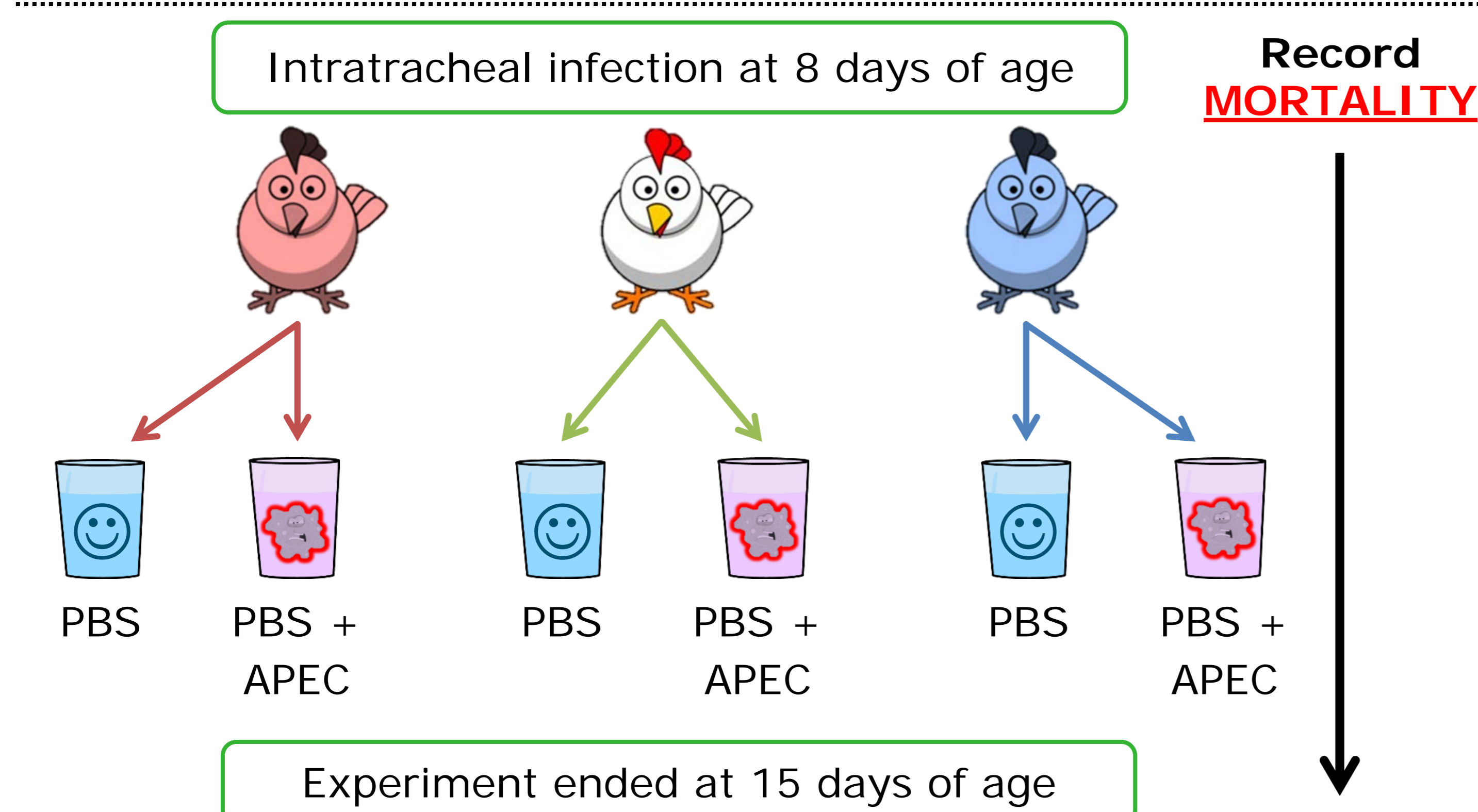
- Natural antibodies (NAb) are antibodies present in individuals without previous exposure to the recognized antigen.
- NAb binding Keyhole Limpet Hemocyanin (KLH) are:
  - heritable ( $h^2 = 0.07-0.14$ ) (Berghof et al., 2015, *PLoS ONE*).
  - associated with increased survival in layers (Star et al., 2007, *Poult Sci*).

## Materials & Methods

### Selection approach



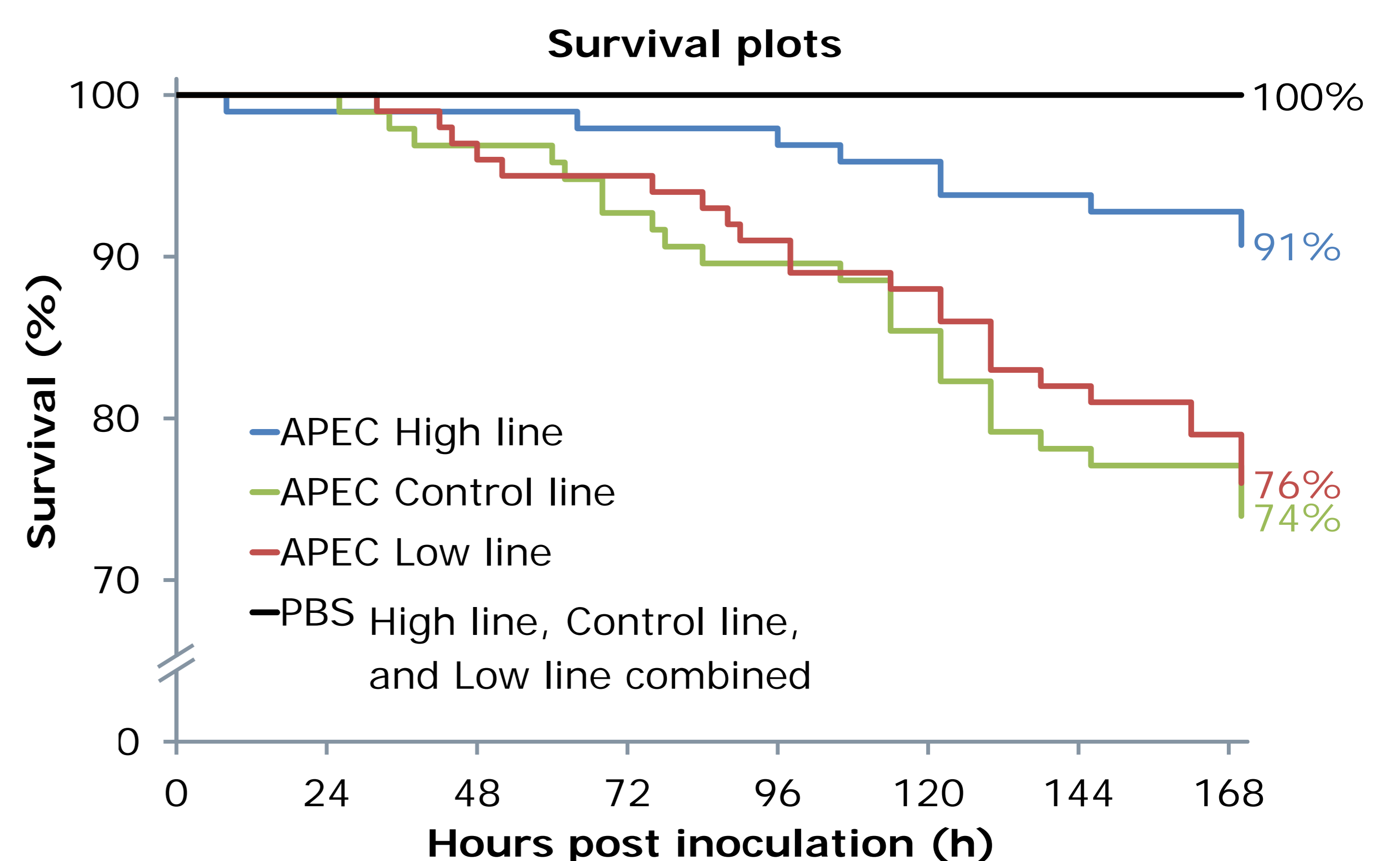
### Infection experiment



## Results

	High line		Control line		Low line	
	PBS	APEC	PBS	APEC	PBS	APEC
$n_{total}$	99	97	96	96	96	100
$n_{dead}$	0	9	0	25	0	24
HR	-	1 <sup>a</sup>	-	3.3 <sup>b</sup>	-	3.0 <sup>b</sup>
[95%-CI]	-	-	-	[1.5; 7.0]	-	[1.4; 6.4]

**Hazard ratio:** The relative risk to die compared to the reference group at any given time point. The reference group is set to 1.  
 HR significances: **High line** < **Control line** = **Low line**



## Answers to questions you may have...

- In generation 4, the **High line** had on average ~4x more NAb at 16 weeks of age compared to the **Low line**.
- Lesion scores between lines were not significantly different: Chickens were either clean (PBS) or maximally infected (APEC)
- Body weight at 7 days of age was (also) predictive for survival

## Acknowledgements

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