

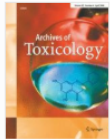
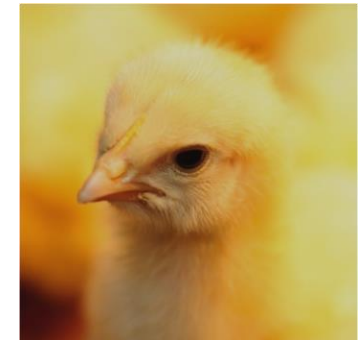
Effect of chronic endotoxin exposure on respiratory health of broilers

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Aim of the study

To investigate the effect of chronic aerosol exposure to endotoxins on respiratory health of broilers



[Archives of Toxicology](#)

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Health effects due to endotoxin inhalation (review)

Authors

[Authors and affiliations](#)

V. Liebers , M. Raulf-Heimsoth, T. Brüning

Review Article

First Online: 06 March 2008

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Abstract


Endotoxins are ubiquitous in the environment and represent bioaerosols. High exposure occurs in rural environment (collecting, textile industry etc.). Adverse effects on human



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[Human Health Effects of Dust Exposure in Animal Confinement Buildings](#)

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Authors: M. Iversen, S. Kirychuk, H. Drost, L. Jacobson

Keywords: Dust, Animal housing, Human exposure, Lung disease

Work in swine and poultry units is associated with exposure to significant levels of organic dust and endotoxins with the highest concentrations found in poultry houses, whereas values found in dairy and in cattle farming are much lower. Corresponding to this is an excess of work-related respiratory symptoms in swine farmers. A dose-response relationship exists between symptoms and number of working hours. Longitudinal studies have demonstrated an accelerated decline of lung function in swine farmers large

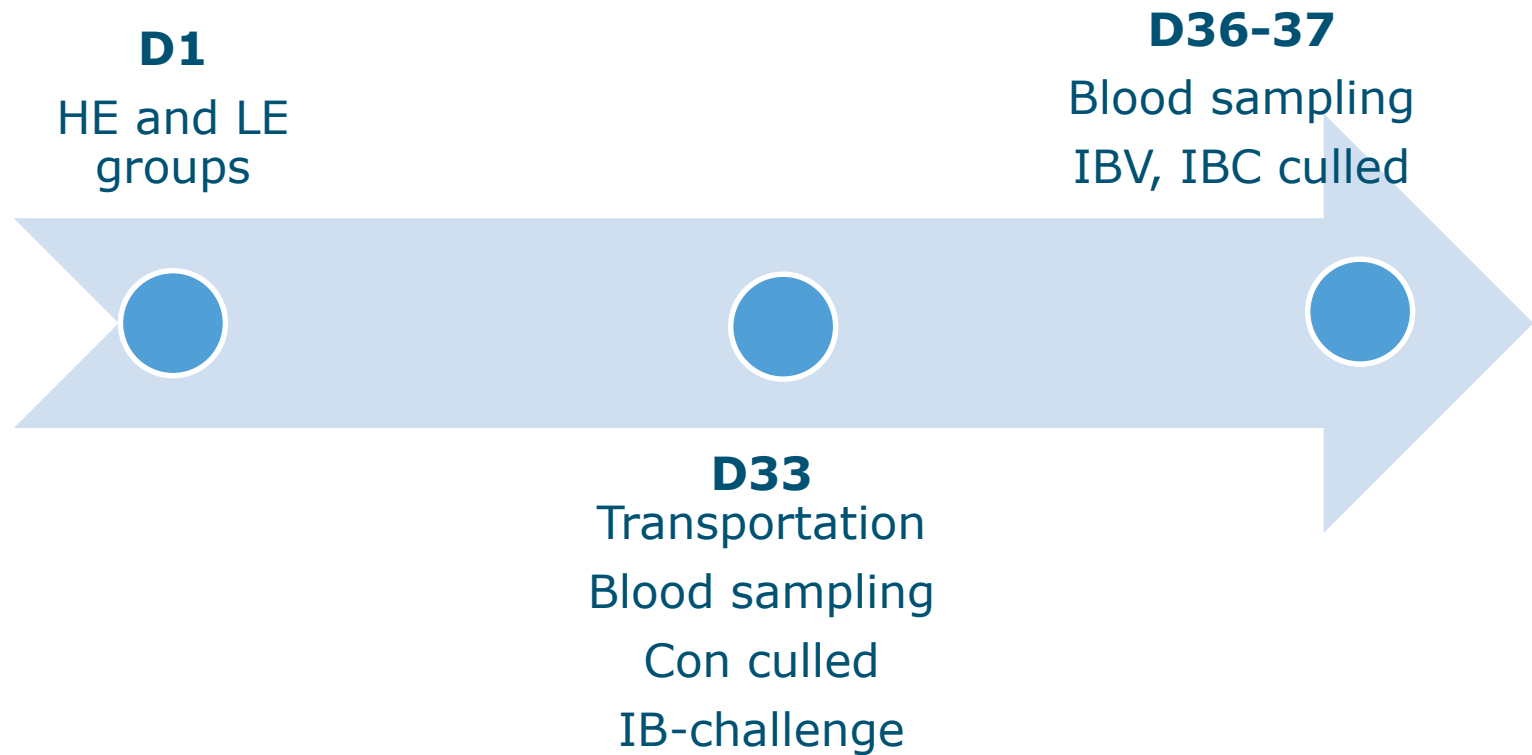
Study design

- One-day-old Ross 308 broilers (n=60)
- Two groups in separate climate controlled rooms
 1. LE = continuous low endotoxin level
 2. HE = continuous high endotoxin level
- Endotoxin: E.coli O55:B5

At D33 LE and HE groups divided over 3 treatments:

- Con (control)
- IBC (intranasally challenged with IB virus)
- IBV (intranasally vaccinated with IB virus)

Study design





26/1/2017 12:52



WAGENINGEN
UNIVERSITY & RESEARCH



100years
1918 - 2018

Spraying system



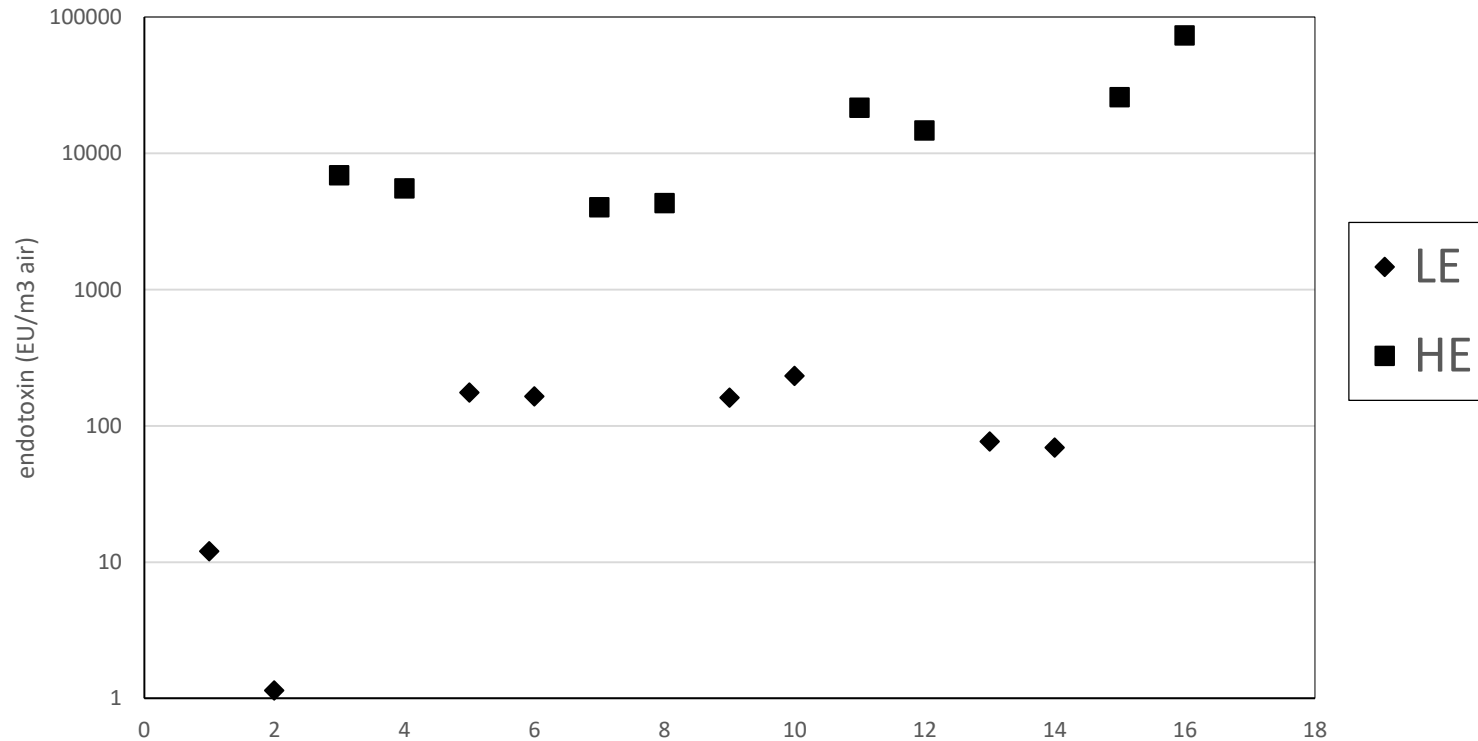
Parameters

- Weekly: Air, bodyweight and feed intake
- Week 3 and 5: Behavioural observations
- D33: Blood, trachea and lung tissue (Con) or D37 (IBC and IBV)

Parameters:

- Blood: IgM and IgG natural antibody titres (NAB)
- Lung tissue: cytokines and TLR-4 mRNA expression
- Upper, middle, and lower part of the trachea: ciliary movement and IB RNA (as a measure for replication)

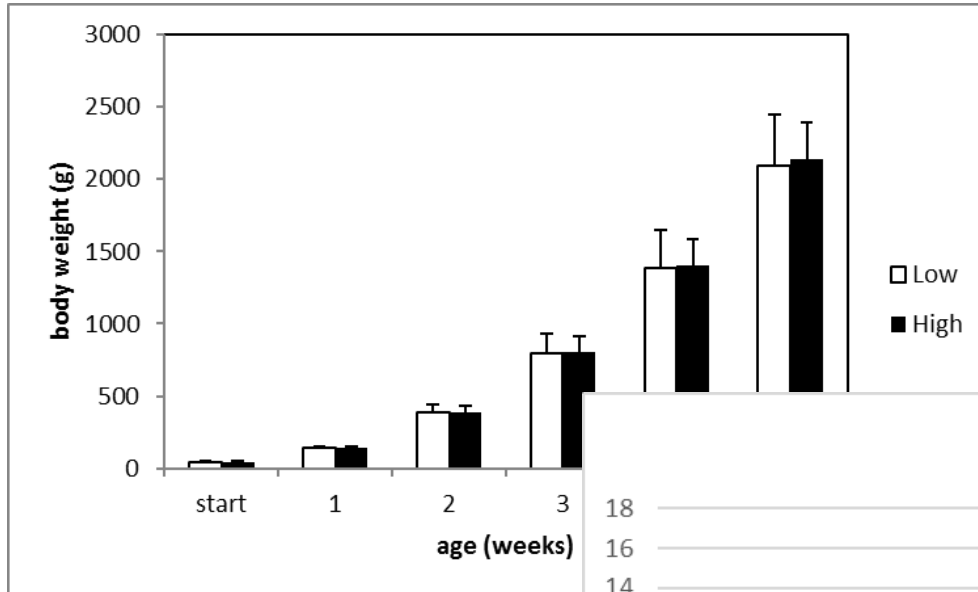
Results - Endotoxin levels in air



LE = 119 EU/m³

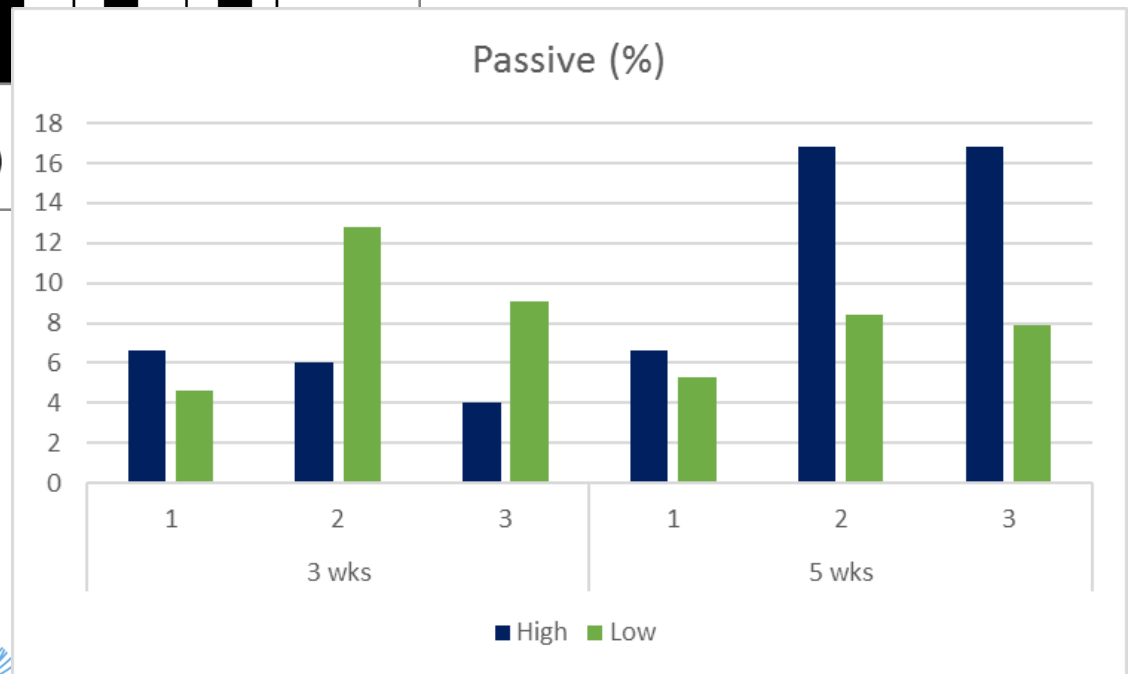
HE = 6203 EU/m³

Results - Body weight and behaviour

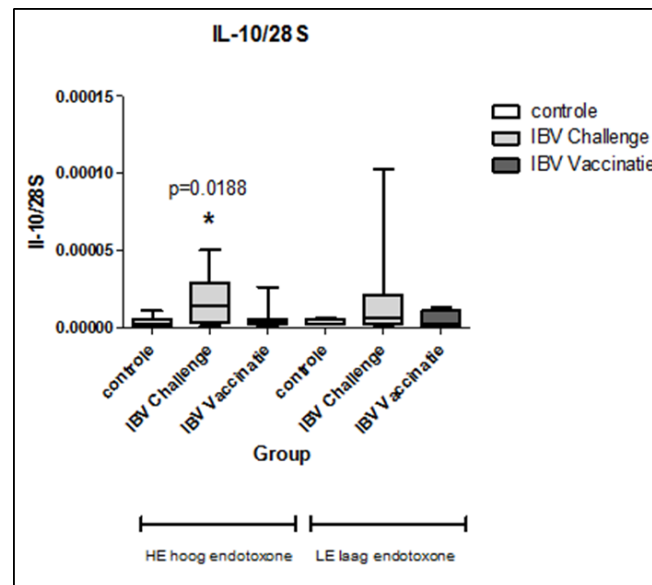
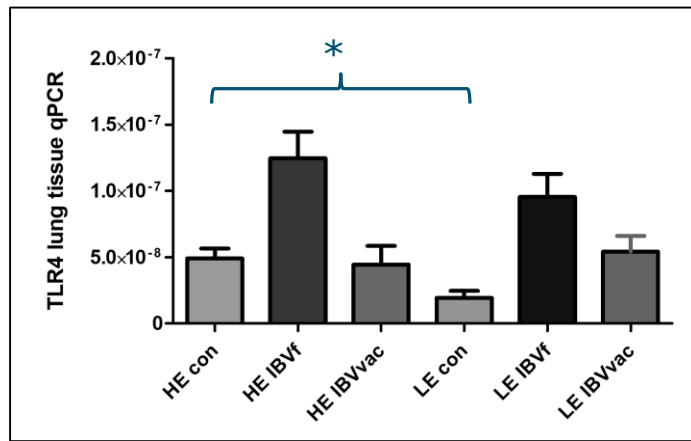
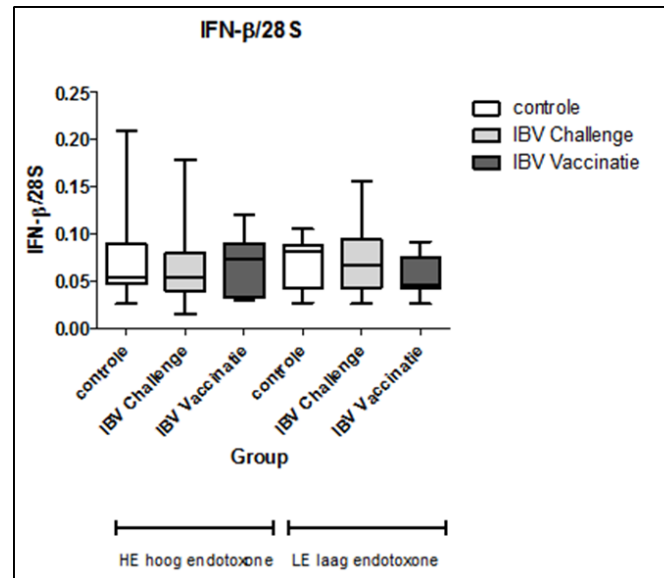
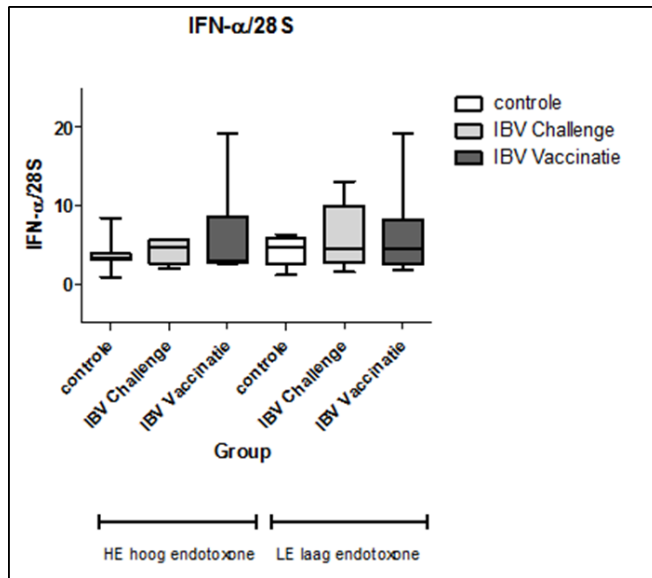


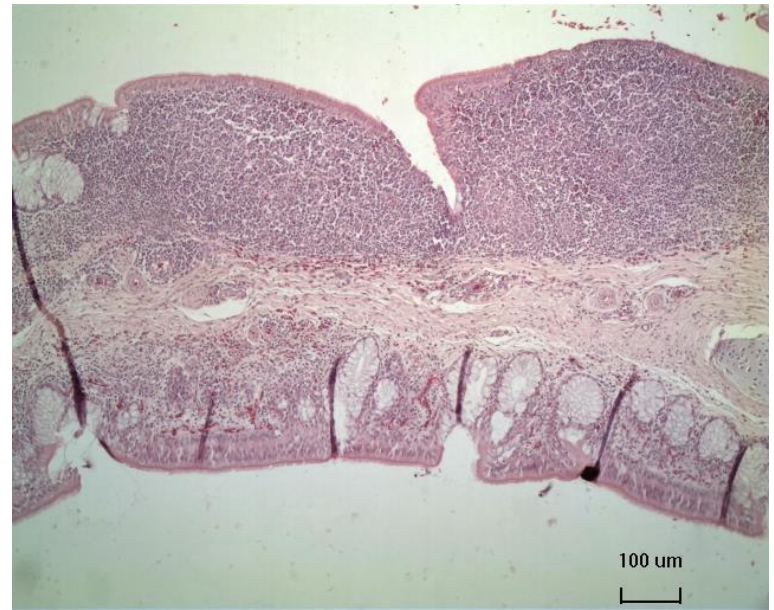
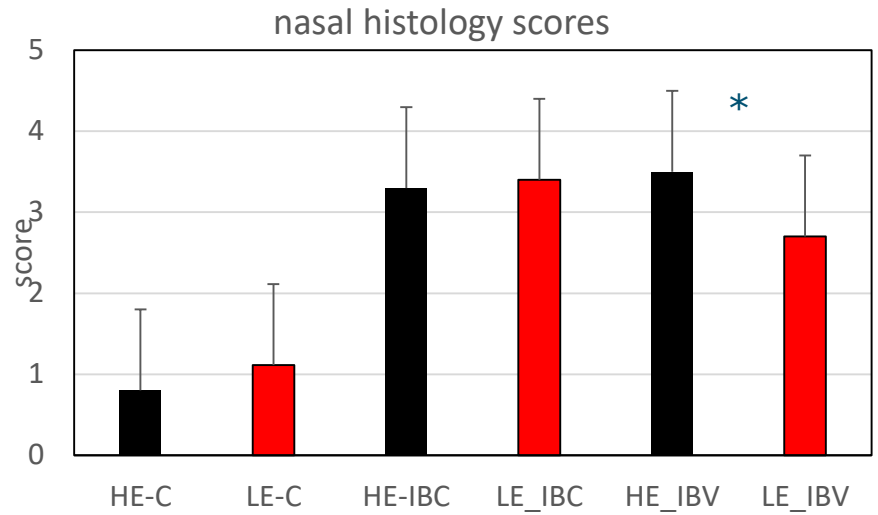
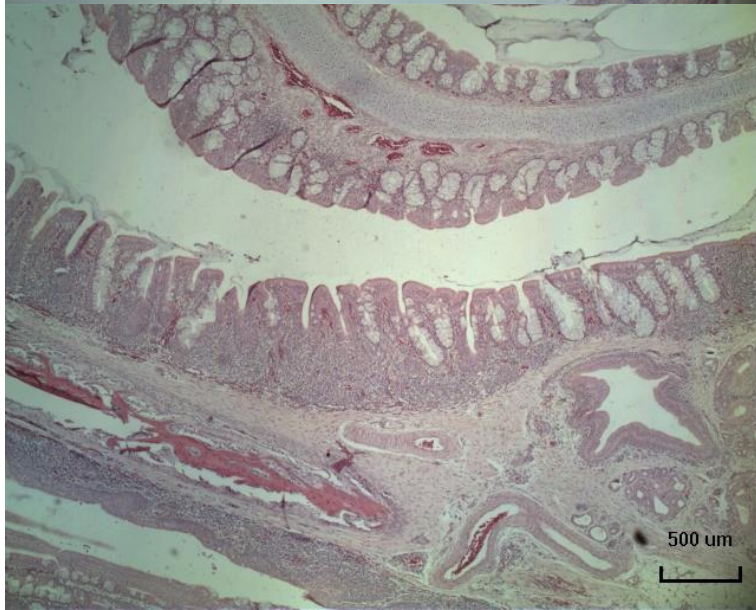
No difference in body weight at D33: 2.09 (\pm 0.35) and 2.14 (\pm 0.26) kg
 No difference in average feed intake: 85 and 86 g/day in LE resp. HE

Numerally more passive behaviour in HE at 5 weeks of age



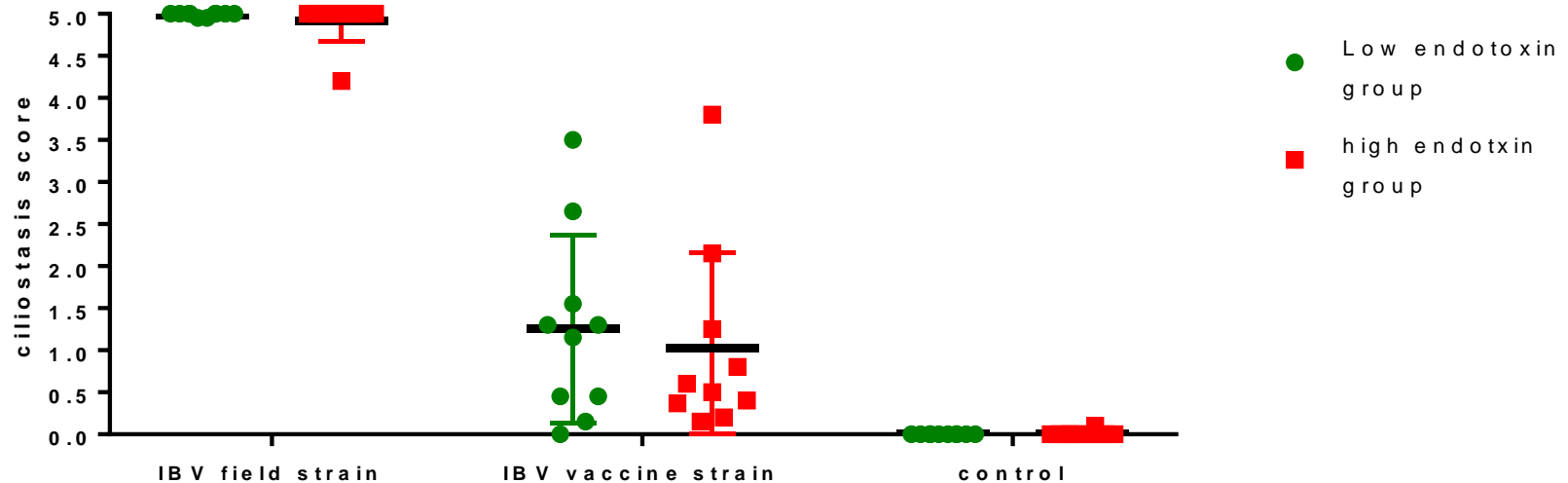
Results – Immune response lung





Results – Cilial activity

Trachea Cilial activity reduction afyter IB V or IB V vac inoculation



Conclusion

- Chronic exposure to high levels of airborne endotoxin did not affect production performance, but induced behavioural changes.
- Respiratory health of broilers was affected as shown by differences in TLR 4 expression in lungs, and histology of the beak.
- Reduction of endotoxin levels should not only be focussed on the environment, but also on animal level.

Thank you for your
attention



Results – Immunology

- No differences in IgM and IgG NAB
- IgM NAAB levels tended to be higher in LE
- IgG NAAB tended to be higher in LE-males than HE-males
- No differences in mRNA expression of IFN- α , IFN- β and IL-10
- TLR4 mRNA expression differed significantly between Con-HE and Con-LE.
- Higher TLR4 mRNA expression in IBC than Con and IBV in both HE and LE