# Effect of chronic endotoxin exposure on respiratory health of broilers

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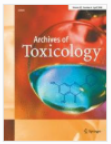
# Aim of the study

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



Archives of Toxicology

April 2008, Volume 82, Issue 4, pp 203–210 | Cite as

## 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 repre
bioaerosols. High exposure occurs in rural environment
collecting, textile industry etc.). Adverse effects on huma

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## Human Health Effects of Dust Exposure in Animal Confinement Buildings

Published by the American Society of Agricultural and Biological Engineers, St. Joseph, Michigan www.asabe.org

***Citation:*** Journal of Agricultural Safety and Health. 6(4): 283-288 . (doi: 10.13031/2013.1911) @2000
***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

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# 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)


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# Spraying system

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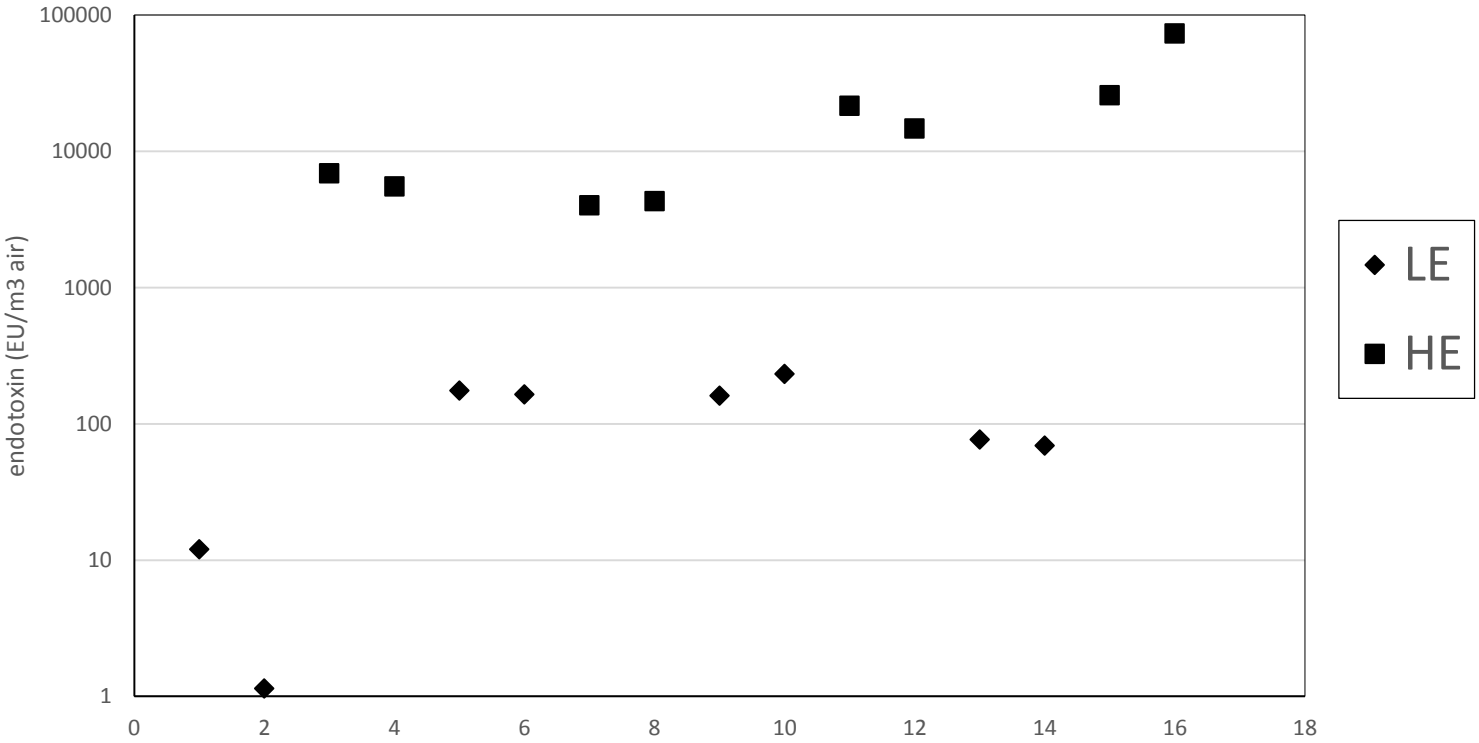
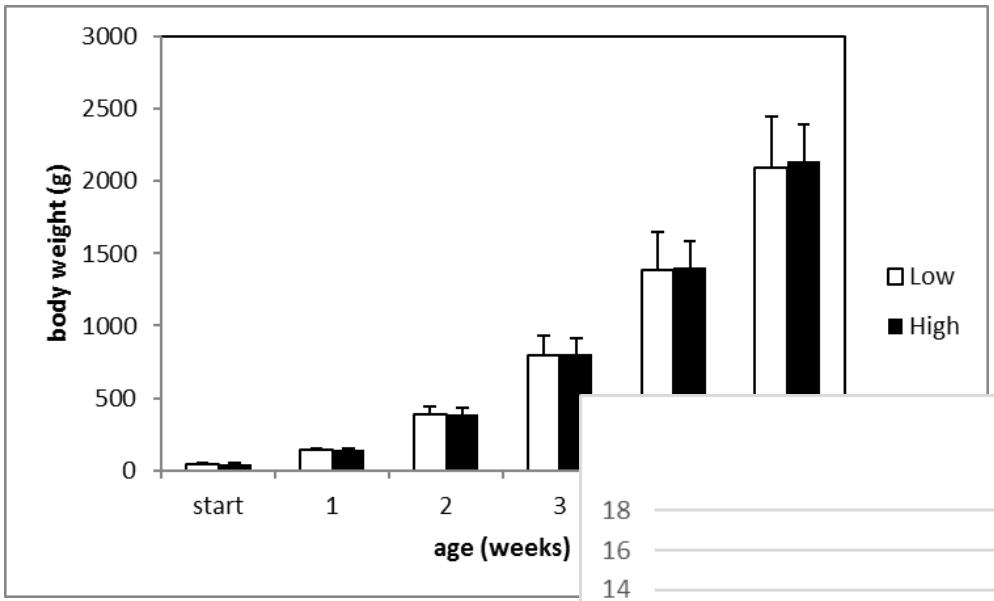
# Results - Endotoxin levels in air



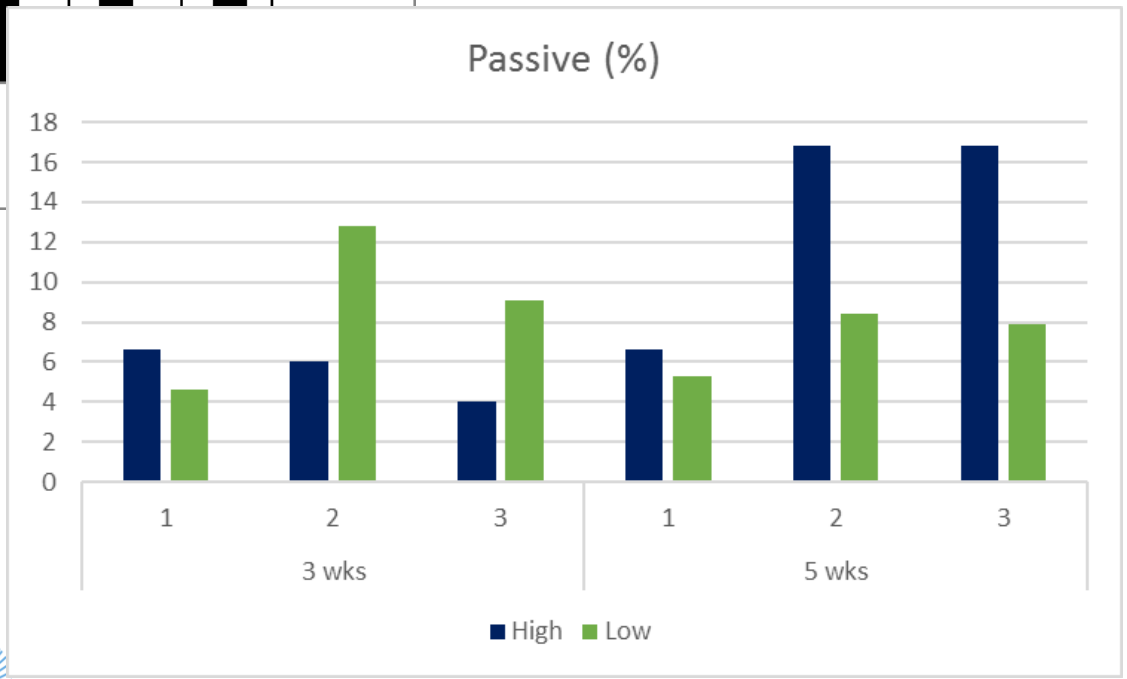

LE = 119 EU/$m^3$

HE = 6203 EU/$m^3$

# Results - Body weight and behaviour




No difference in body weight at D33: 2.09 (± 0.35) and 2.14 (± 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

# 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.

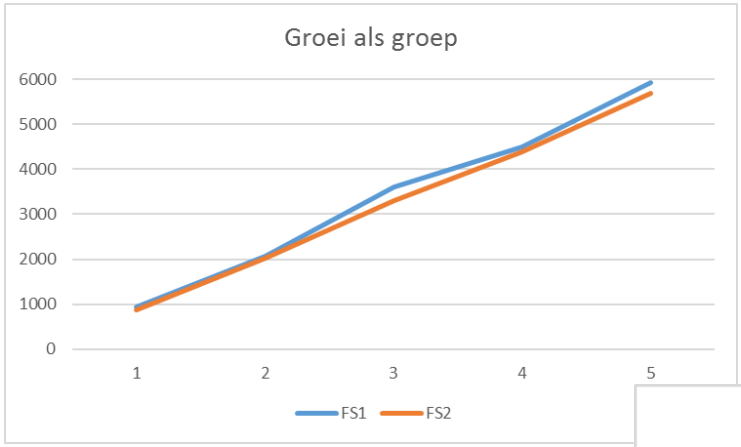
# Intervention study, broilers

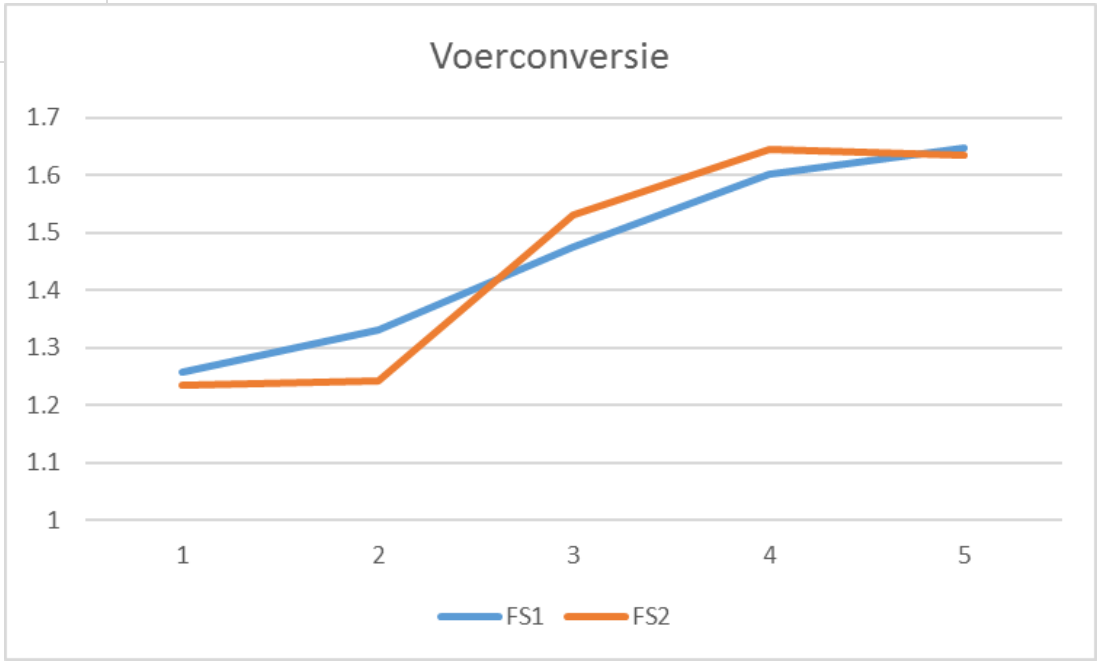
- Reduction of endotoxin levels on animal level, endotoxin and fine dust mostly from faeces.
- Intervention of the faecal microbiome including manure quality with different feed

- **FS1: High digestible, low fermentation**
- **FS2: Low digestible, high fermentation**

# Set up – RW Lelystad

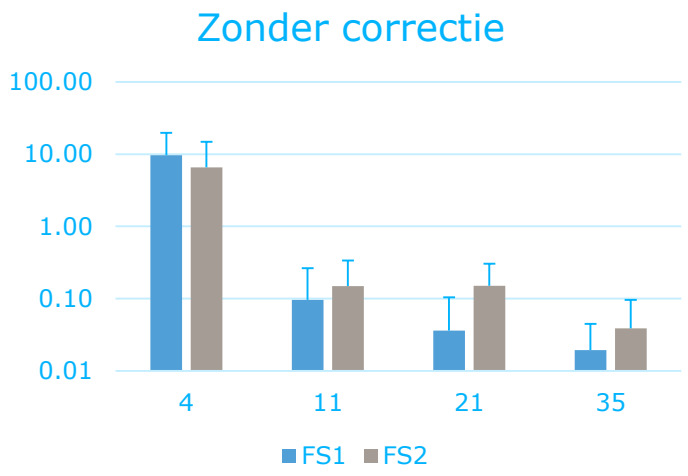
# Grow and feed conversion

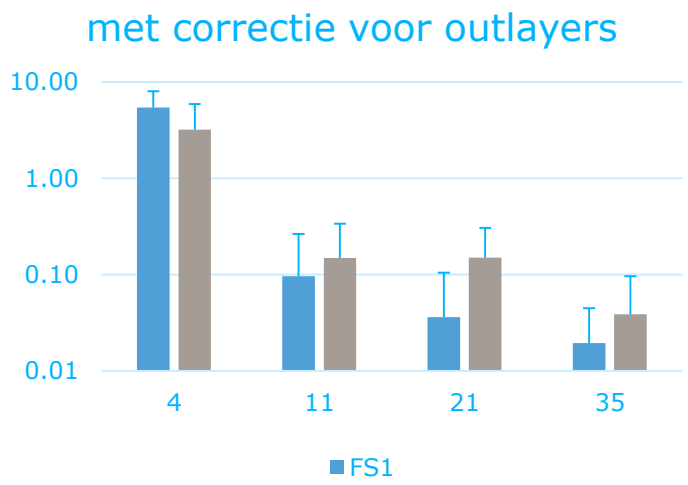


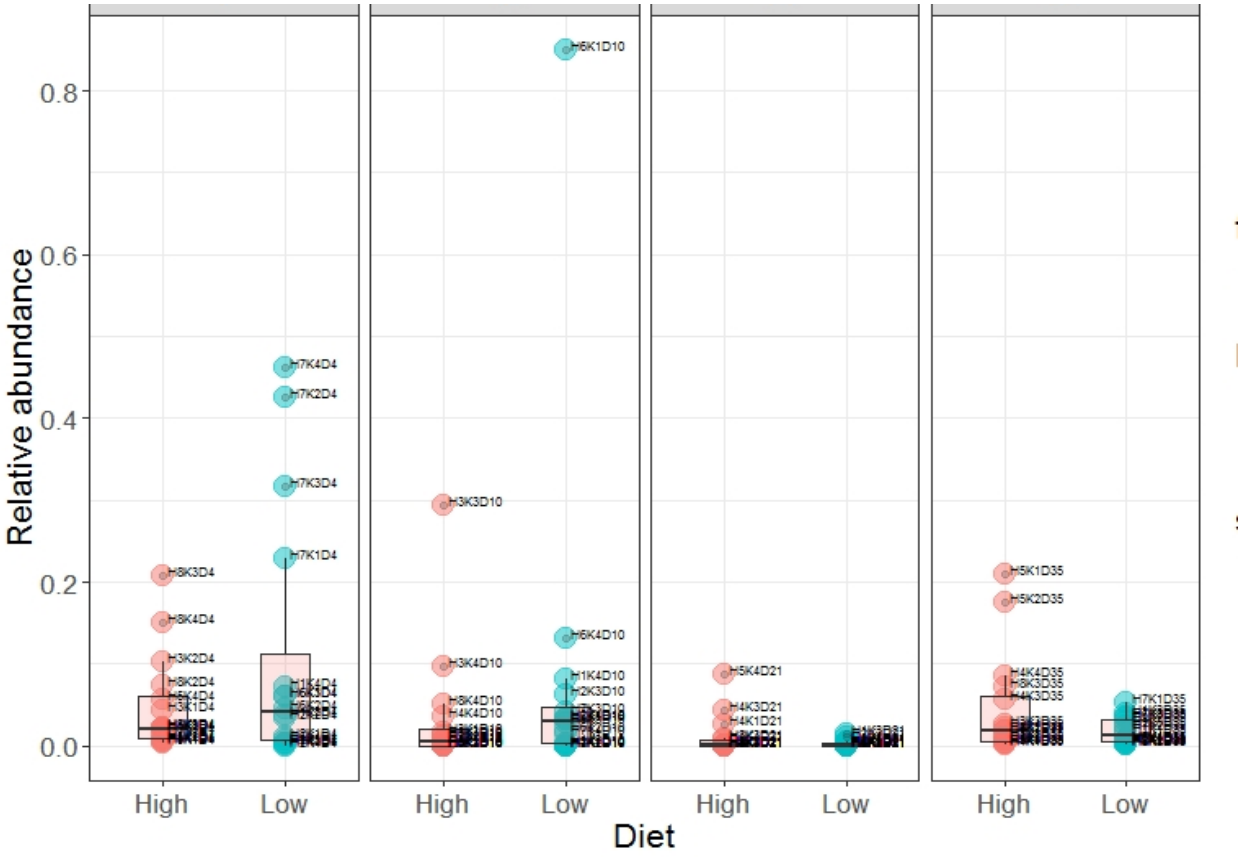
# endotoxin activity

ug/ml LPS



# Proteobacteria (gram -), in faeces, day 4;10;25;25



# conclusion

- Intervention in broilers affects endotoxin level in bedding and less in faeces.
- intervention affects microbiome diversity ceca, faeces and bedding. Also on gram negative population
- Endotoxin level and activity seems to be correlated
- Thus feed could influence emission