Veterinärmedizinische Fakultät

UNIVERSITÄT LEIPZIG

Alternative methods to reduce infectious burdens in farm animal stables

Monika Krüger, Henning Gerlach, Achim Gerlach, Wieland Schroedl und Awad Shehata*

Institut für Bakteriologie und Mykologie der Universität Leipzig (UL)

*Albrecht Daniel Thaer-Institut für Agrar- und Veterinärwissenschaften e.V. An institut der UL

Contents

- Introduction
  - Factors influencing animal health
  - Possible approaches
- Experiment (1): Cold fogging and water application of Lactobacillus in chicken farms
- Experiment (2): Feed supplementation of charcoal, humic acids and sauerkraut juice for dairy cattle
- Conclusion

Industrial livestock farming

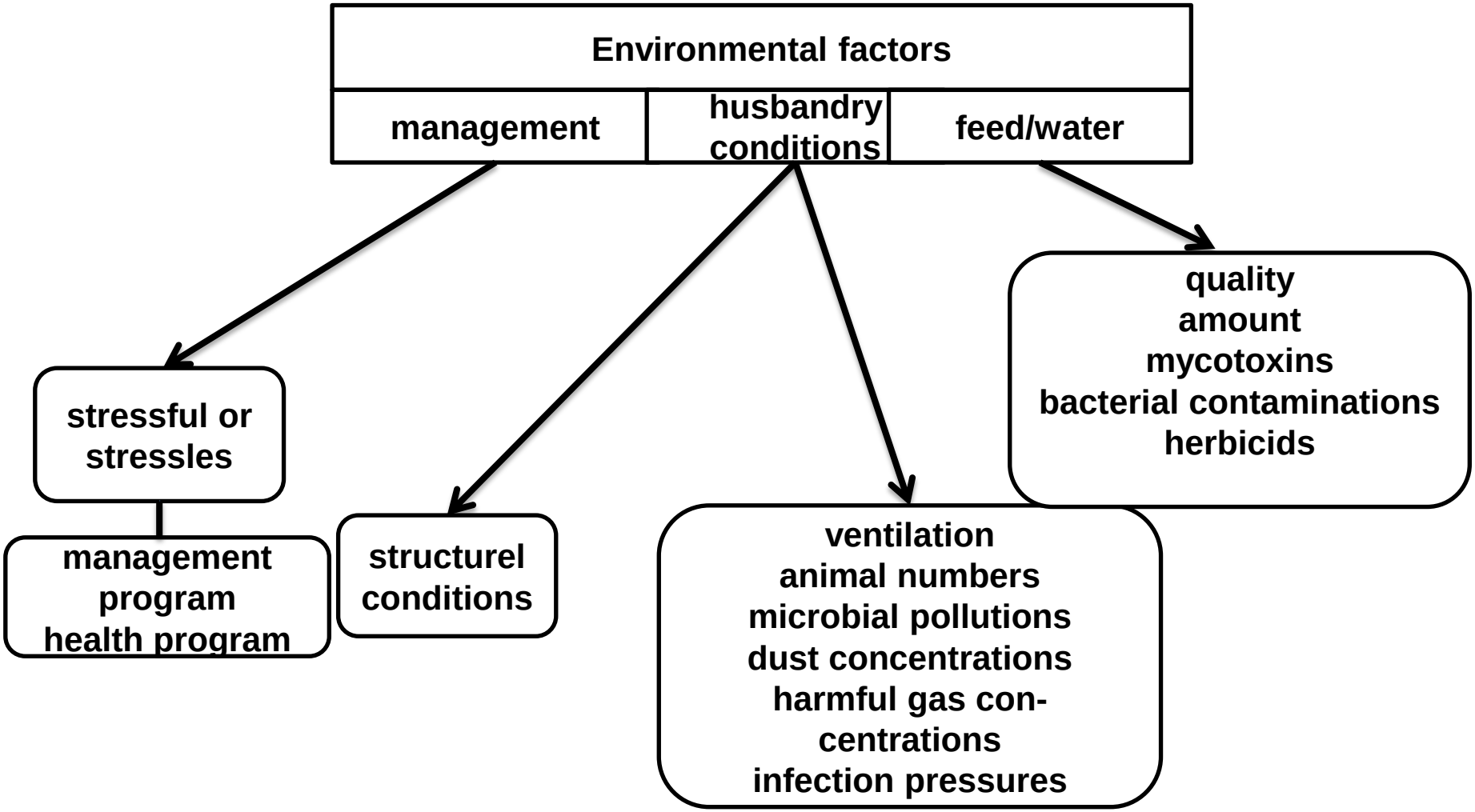
Present reality and agricultural future

Introduction- chicken trial- dairy cattle trial- summary and conclusion

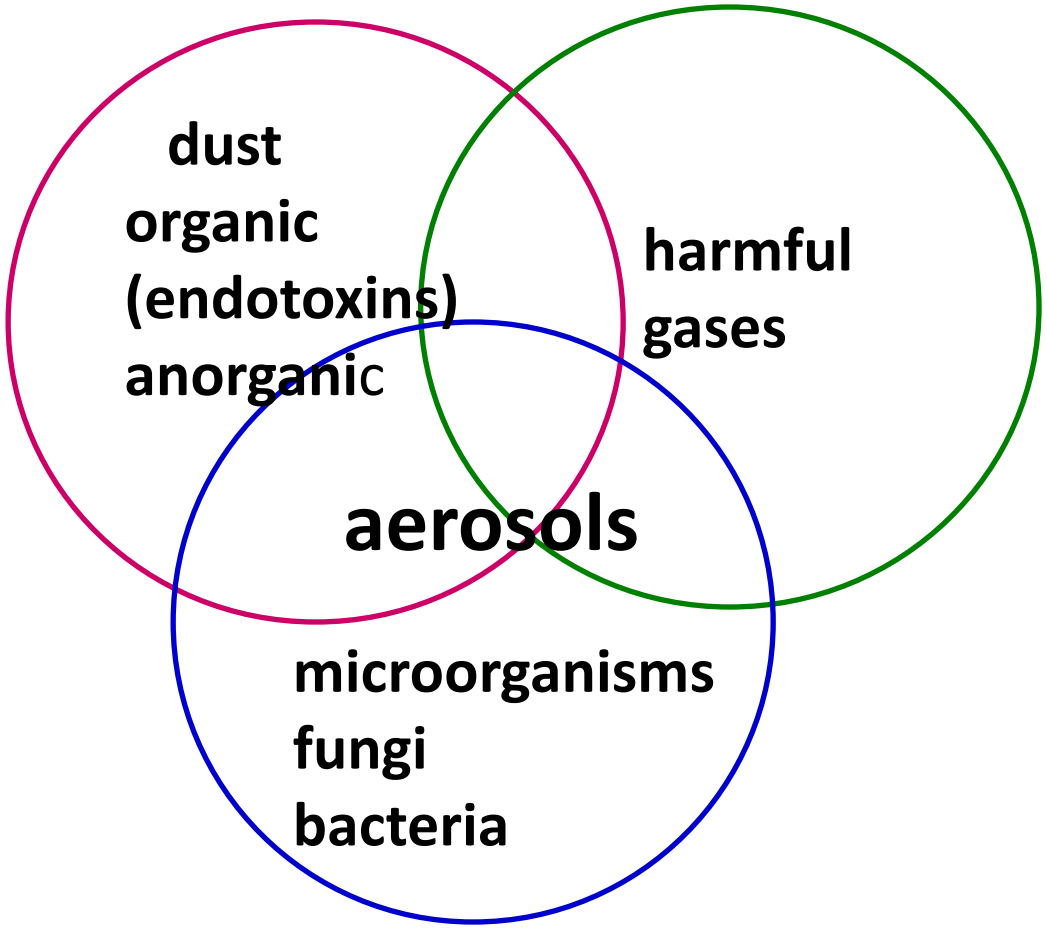
Industrial livestock farming

Beef bull farm

Dairy cow farm


Environmental factors
management
husbandry conditions
feed/water
stressful or stressles
management program health program
structurel conditions
ventilation
animal numbers
microbial pollutions
dust concentrations
harmful gas con-centrations
infection pressures
quality
amount
mycotoxins
bacterial contaminations
herbicids

Factors influencing chicken health



Clostridium botulinum toxicoinfections in dairy cows

- **Increasing since 1996**
- ***C. botulinum* spores germinate and produce botulinum neurotoxin in the gastrointestinal tract because of dysbacteriosis**

- **Dysbacteriosis happens due to contamination of feed with the total herbicide glyphosate**

Clostridium botulinum toxicoinfections in dairy cows

- **Health promotic and antagonistic bacteria like enterococci, lactobacilli, bacilli, bifido-bacteria are reduced by glyphosate**

  (Shehata et al. 2012, Krüger et al. 2013)

- **Charcoal, Sauerkraut juice and humic acid bind, neutralise ore antagonise the effect of this herbicide**

Aim of the investigations

1. **Reduction of the concentrations of harmful gases, dust and microbial pollutions in a chicken broiler farm by cold fogging and oral application of lactobacilli (fermented herbage extract, FHE)**

2. **Reduction of gastrointestinal burden due to *Clostridium botulinum* by oral application of charcoal, sauerkraut juice or humic acids**

Control house (22.000/pen)

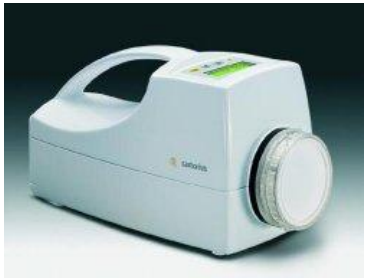
Trial house (22.000/pen)

Treatment:

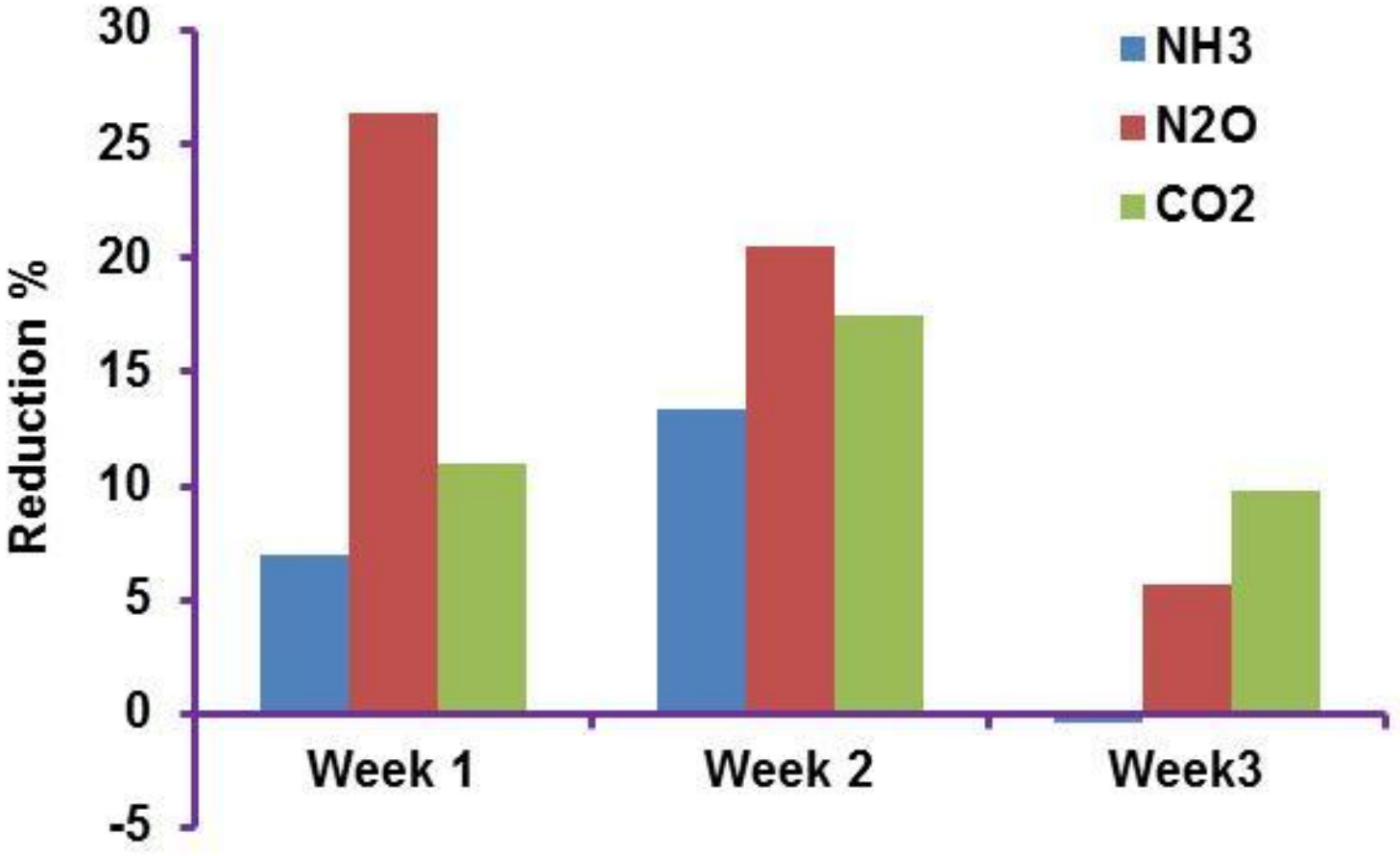
1. **Cold fogging of 50l FHE on 1000 m2 before littering**
2. **Cold fogging of 50 l FHE after littering**
3. **Twice daily fogging of 20 l/d 10% FHE diluted in water**
4. **Daily application of about 10 l FHE in drinking water**

Parameters

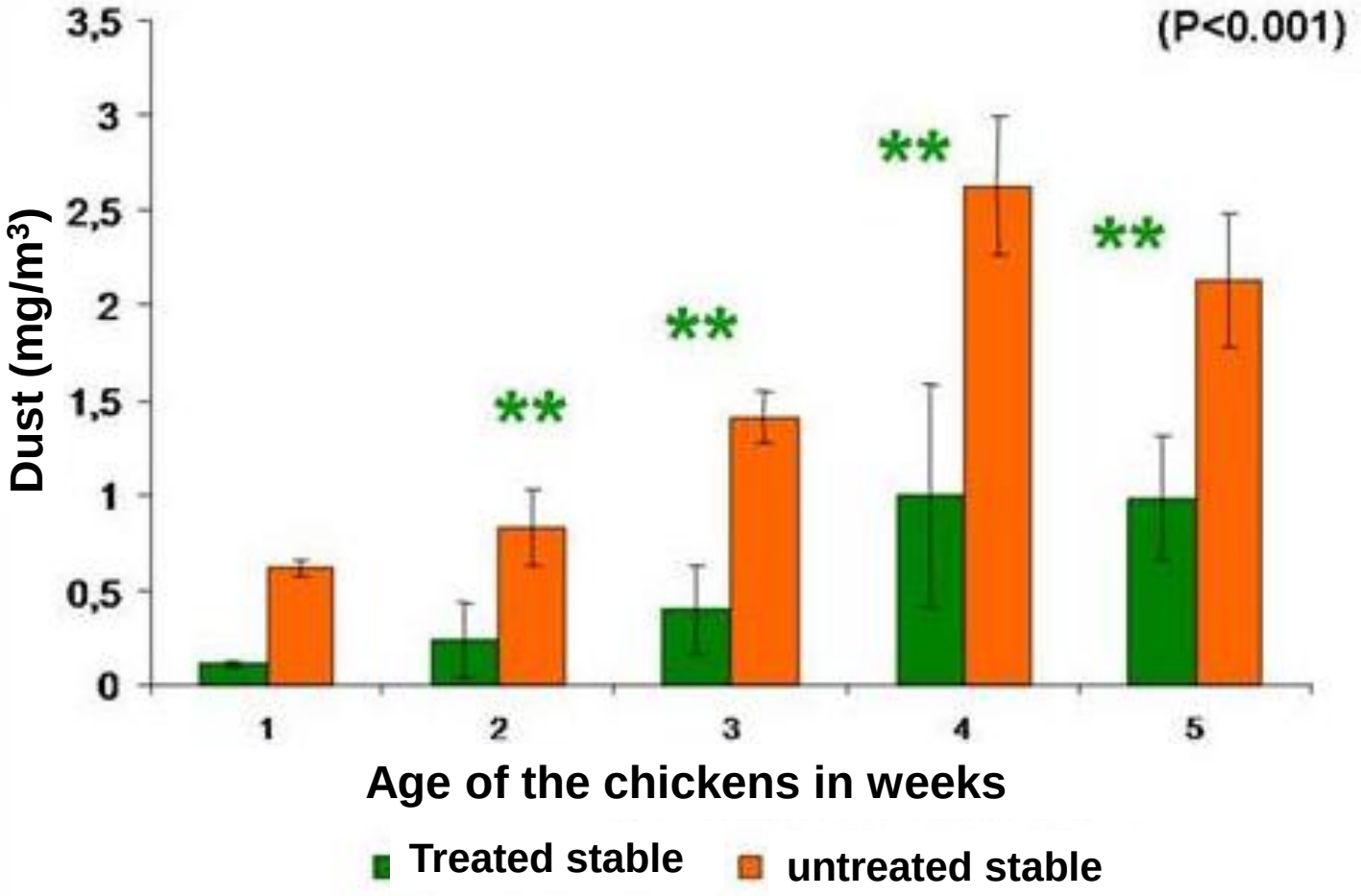
- Harmful gases
- Dust
- Microbial pollution
- Endotoxin concentration
- Performance
- Health
- Litter quality at the end of fattening



Results 1: Reduction of harmful gases in relation to the control pen by FHE

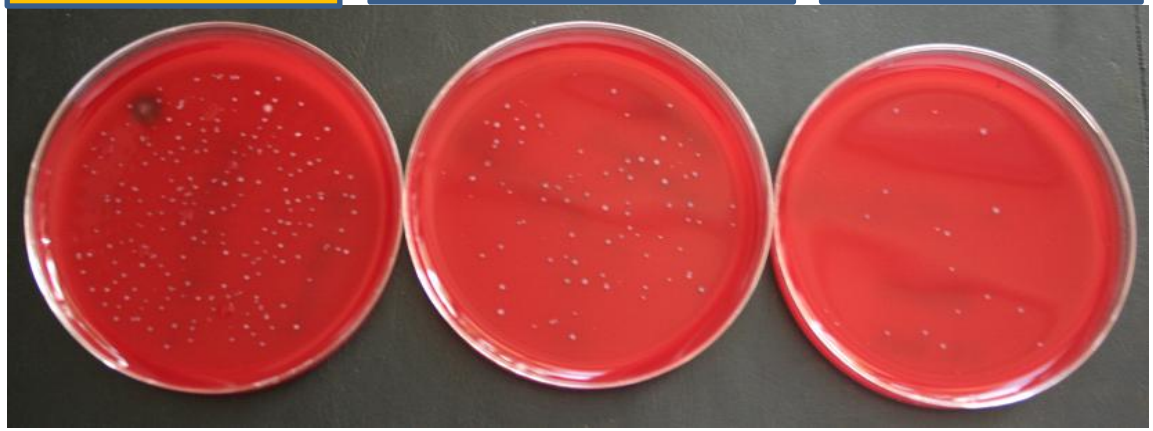


Results 1: Reduction of dust in FHE cold fogged chicken pen

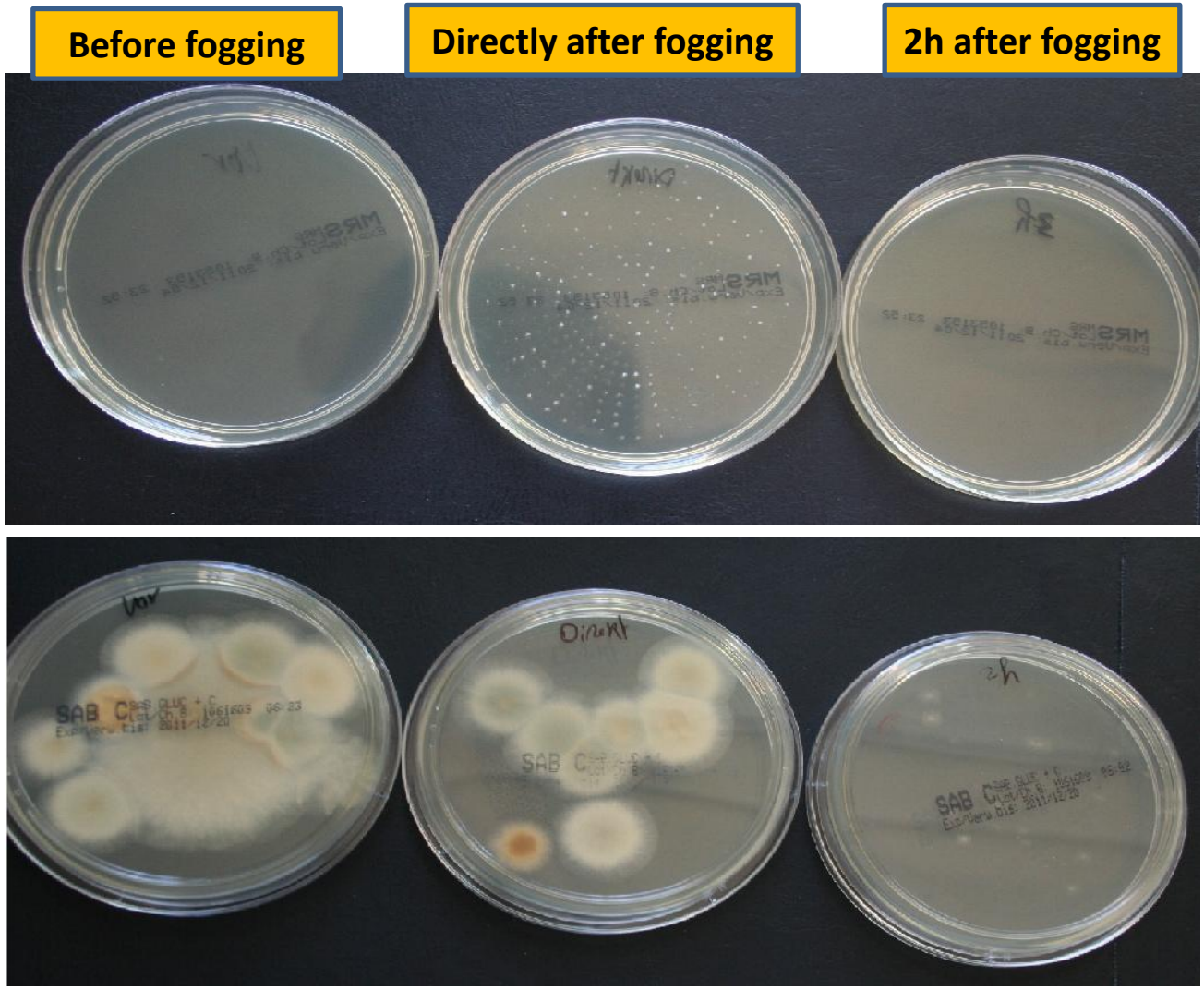


Results 1: Reduction of total aerobe and anaerobe bacteria in the air of FHK cold fogged chicken pen

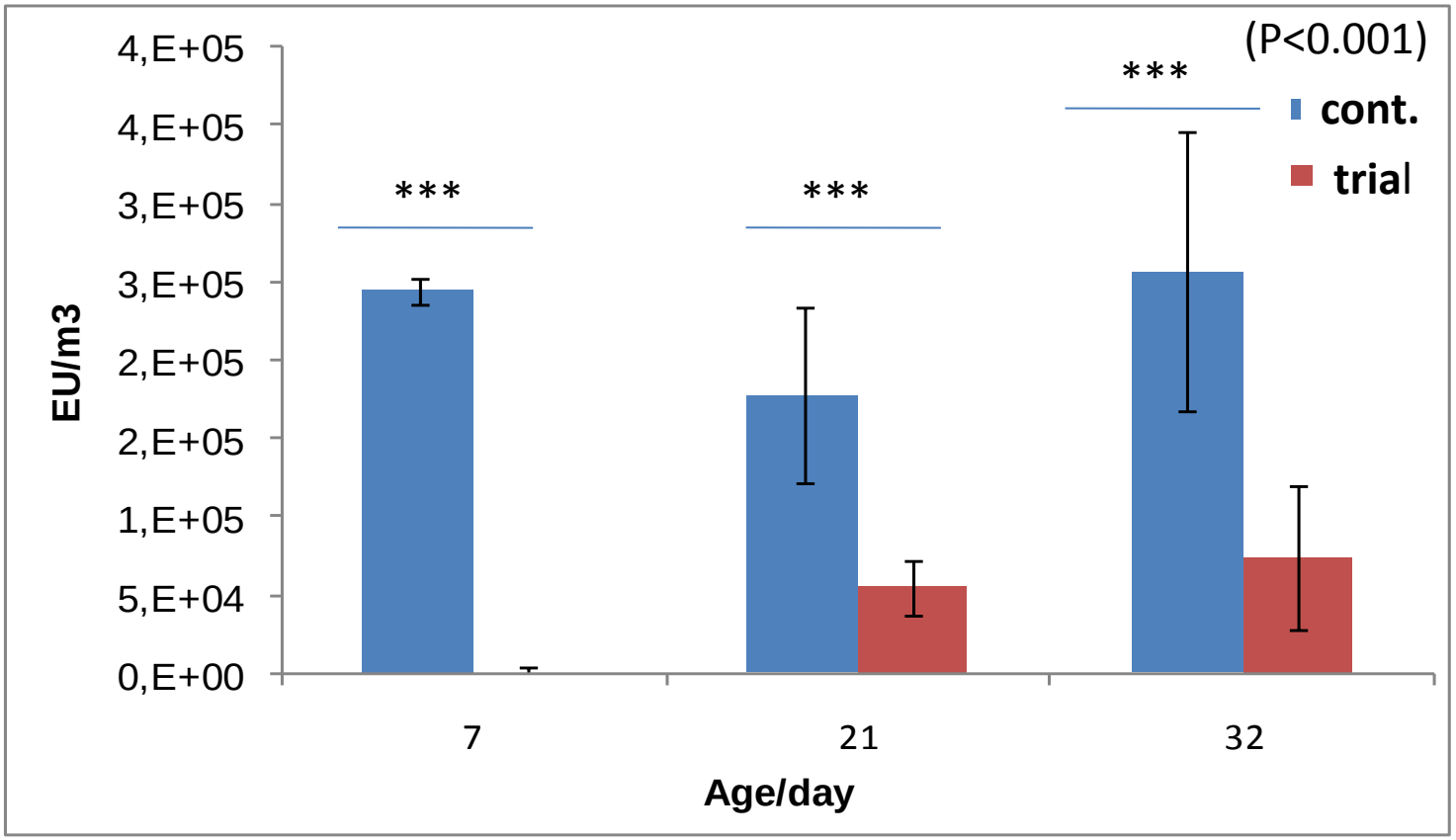
Before fogging | Directly after fogging | 2h after fogging



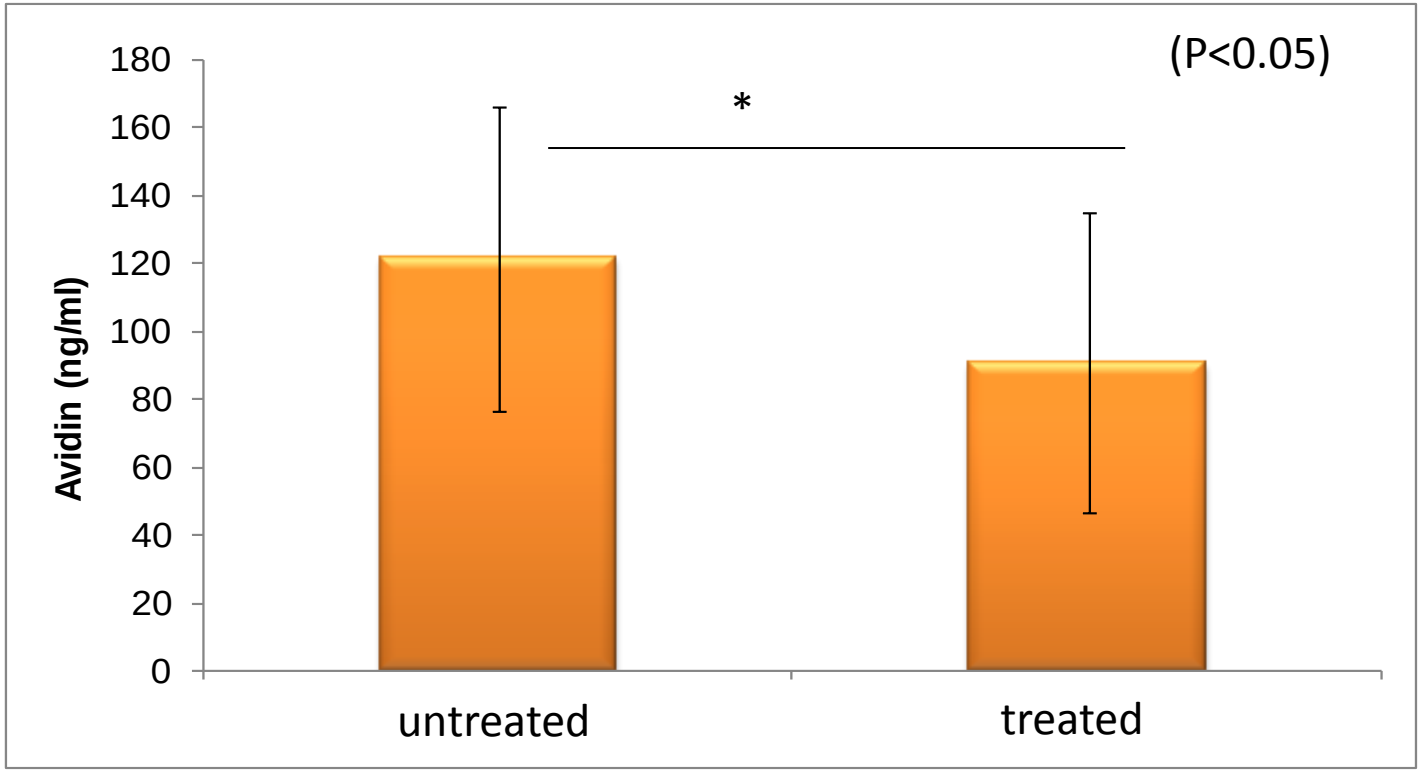
Results 1: reduction of lactobacilli and mould spores in the air of FHK cold fogging of chicken pen



Results 1: reduction of endotoxin concentration in the air after FHK-cold fogging



Results 1: Significant reduction of blood serum avidin level after FHK-cold fogging



Results 1: Litter quality after FHK cold fogging on day 35

Litter of treated pen (dry)

Litter of untreated pen (wet)

Summary 1:

Application of Fermented herbal extract leads to reducion of harmful gases, dust and microbial pollutions in chicken broiler pens.

Simultaneously the endotoxin concentration of the air was significantly reduced.

Experiment 2: Feed supplementation with charcoal , sauerkraut juice or humic acids in a dairy dairy cow farm

- 380 dairy cows
- 4 groups of 10 animals

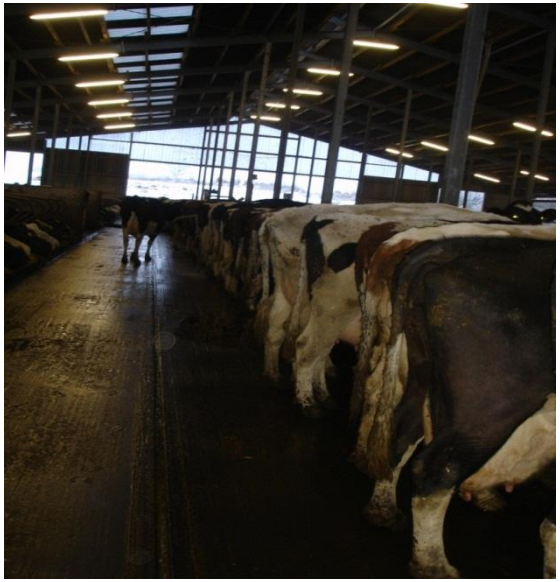
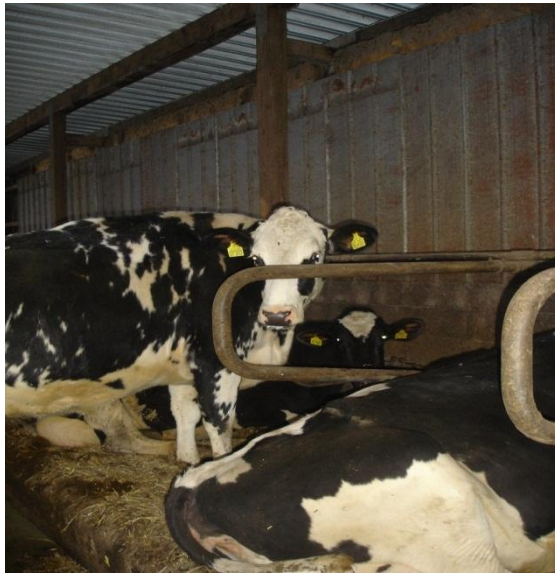
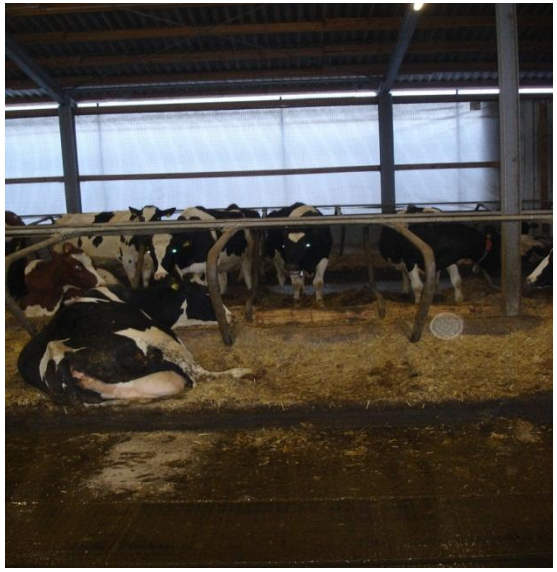
  Group 1: first third of lactation

  Group 2: second third of lactation

  Group 3: third third of lactation

  Group 4: dry cows

Experiment 2: Feed supplementation with charcoal , sauerkraut juice or humic acids in a dairy dairy cow farm

Health problems: reduced performance, movement disorder, fertility disorders, inflammation of the urinary bladder, viscous salivas, diarrhea.

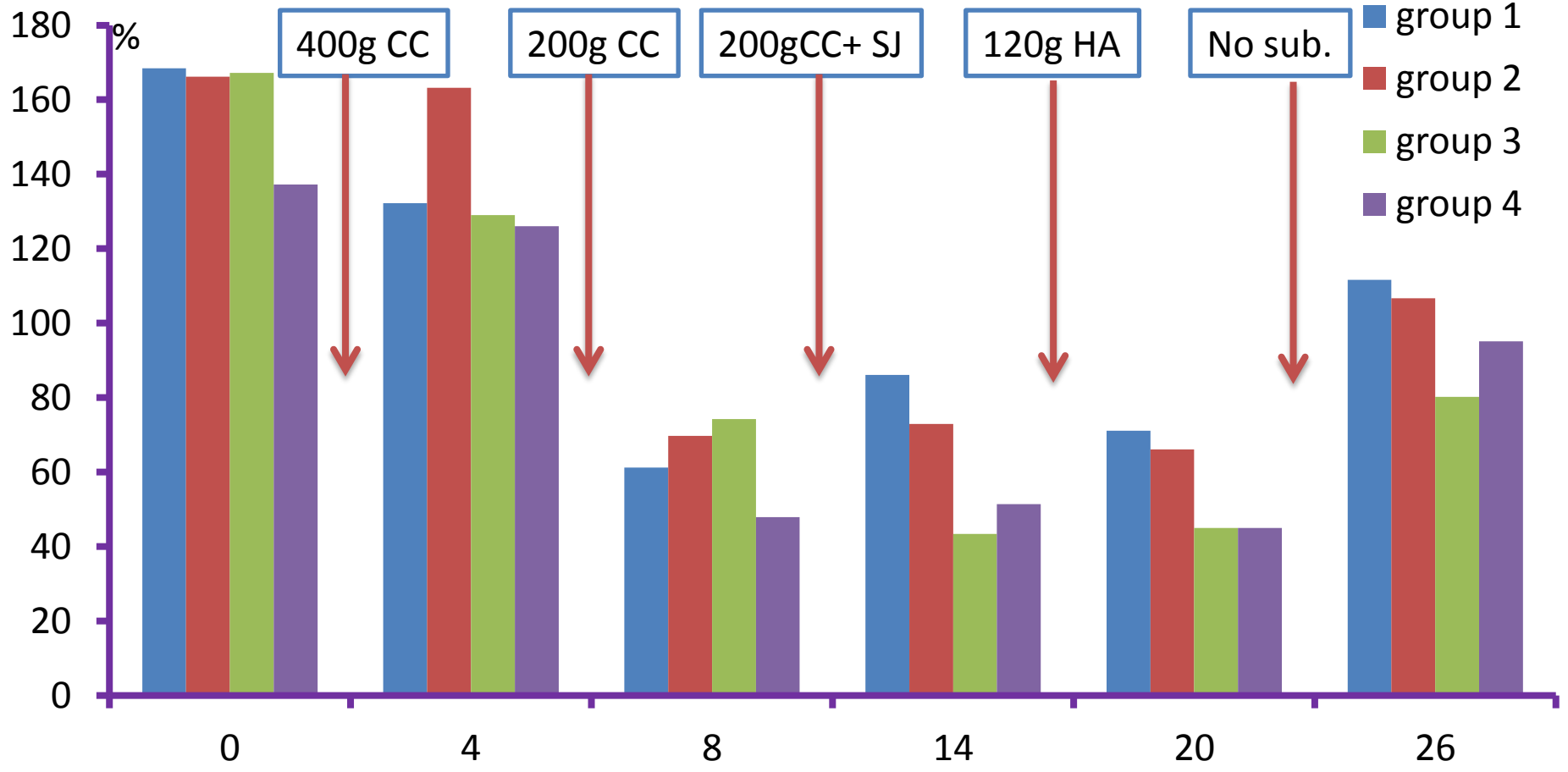
Treatment:

1. **4 weeks 400g charcoal/d**
2. **4 weeks 200g charcoal/d**
3. **6 weeks 200g charcoal + 500ml Sauerkraut juice**
4. **4 weeks 120 g humic acids/d**

Parameters dairy cow trial

- *C. botulinum* **antibody concentration in blood serum**
- **Haptoglobin concentration in blood serum**

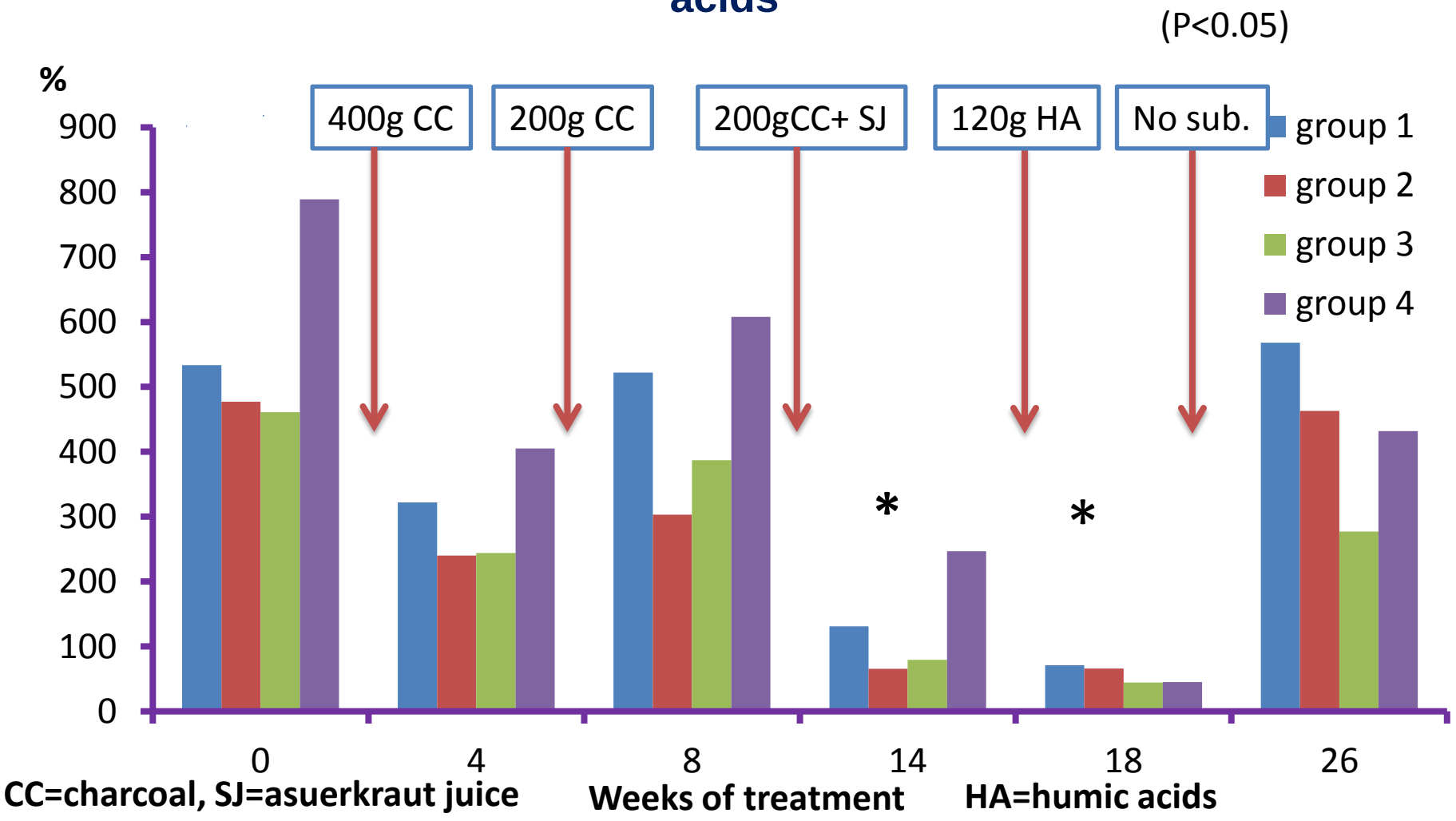
Results 2: Development of *C. botulinum* type ABE antibody levels in blood serum of dairy cows in relation to the application of charcoal, SJ or humic acids



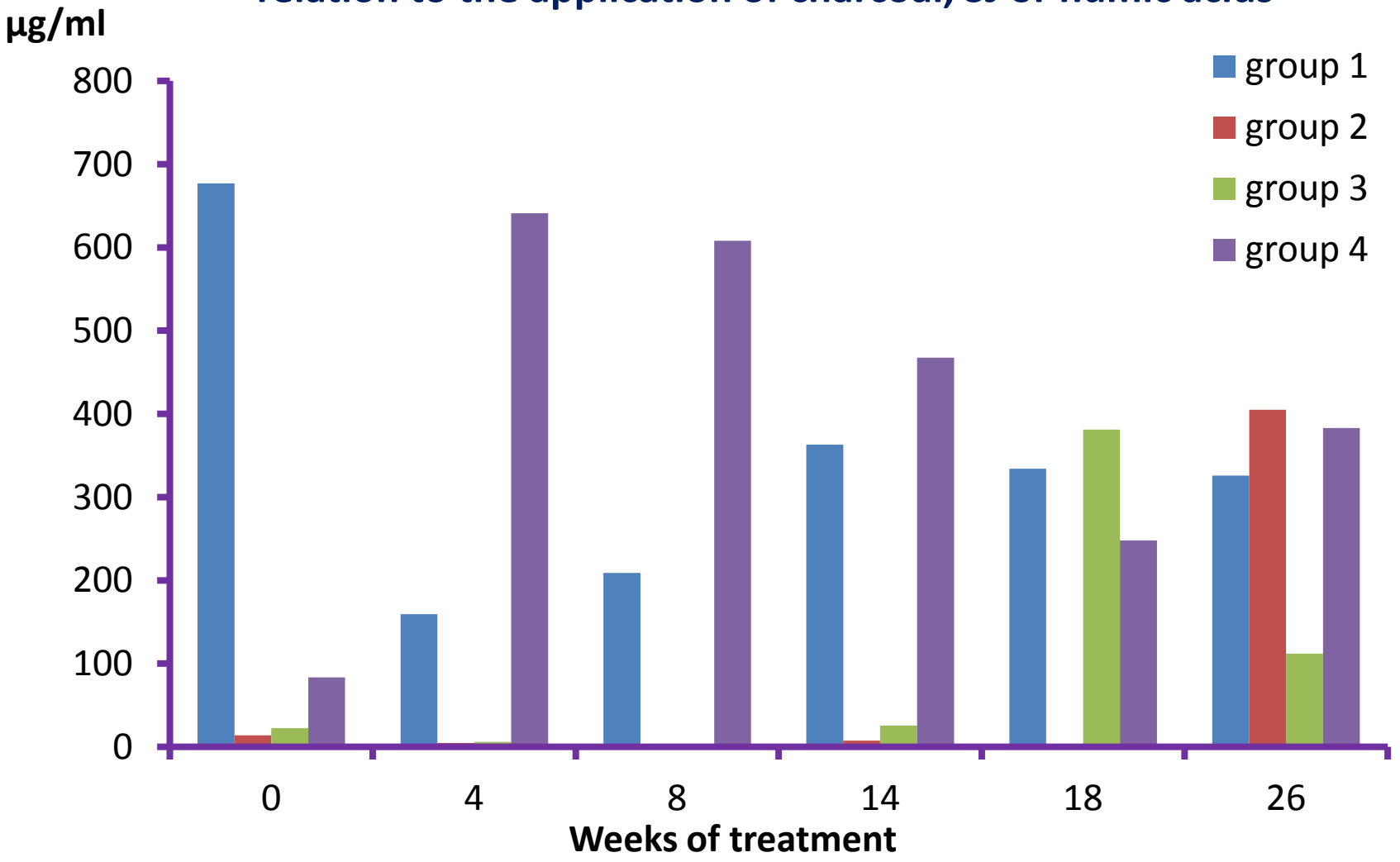
CC=charcoal, SJ=asuerkraut juice

HA=humic acids

Results 2: Development of *C. botulinum* type CD antibody levels in blood serum of dairy cows in relation to the application of charcoal or humic acids



Results 2: Development of haptoglobin levels in blood serum of dairy cows in relation to the application of charcoal, SJ or humic acids



Summary 2:

Oral application of charcoal, Sauerkraut juice and humic acids influence the *C. botulinum* antibody levels indicating reduced gastrointestinal neurotoxin burden.

Omitting of these substituts led to increased antibody levels.

Conclusions

- **Cold fogging and water application of Fermented Herbal Extract is suitable to reduce the burden of animals and their farmers inside the pens but the emissions too.**

- **Charcoal, sauerkraut and humic acids are old but still good strategies to control the homeostasis in the gastrointestinal tract of dairy cows.**

Thank you for attention