Effects of dextran sulfate sodium (DSS) on (immune) development in broilers and layers

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Immunoforce

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Dextran sulfate sodium (DSS)

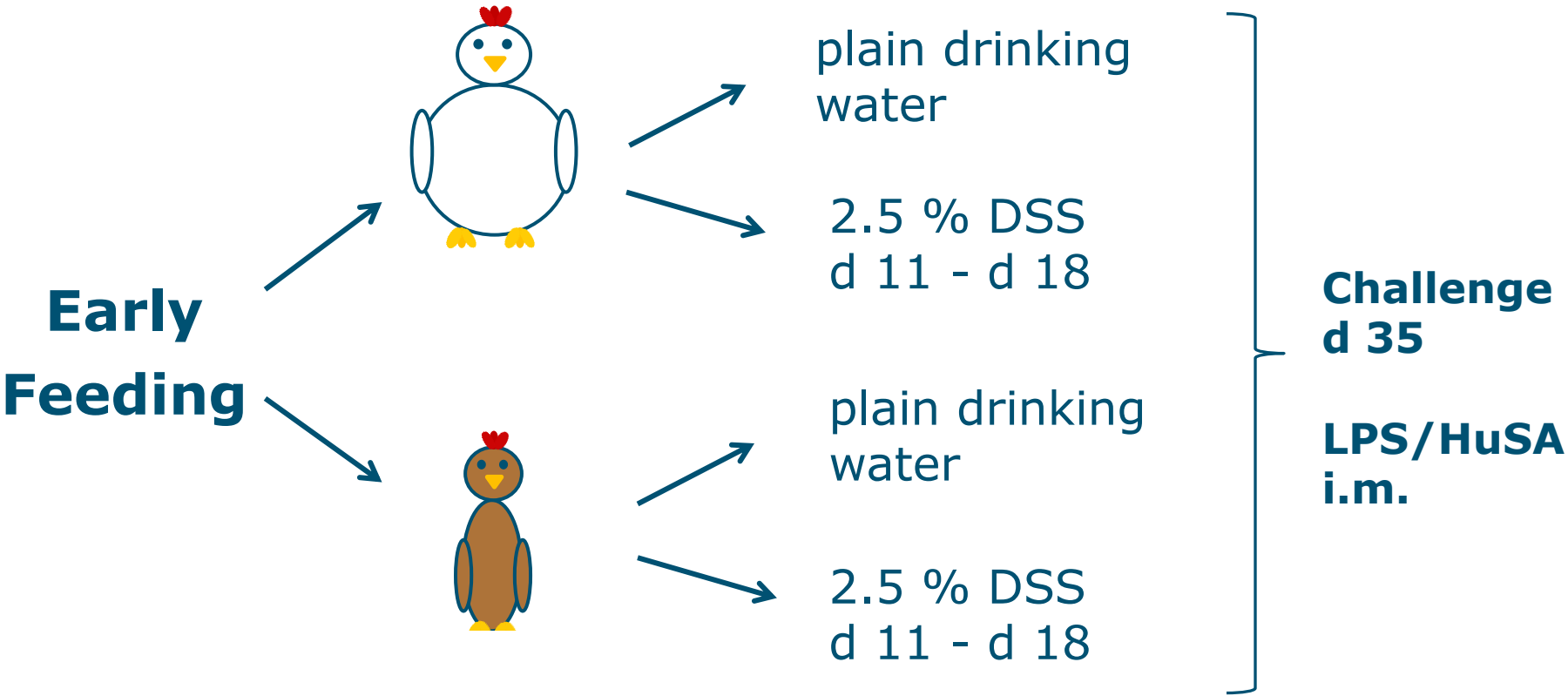
- DSS via drinking water induces colitis
- DSS affects intestinal barrier function
  → inflammatory response
- DSS changes microbiota composition
  → effects on immune system

Ohkusa et al., 1995; Stevceva et al., 2001b; Faure et al., 2006; Lupp et al., 2007; Johansson et al., 2010

Aim

- DSS as a model for disruption of intestinal homeostasis in chickens?
- Inflammatory response
  → accelerated immune development?
  → effects on immune response?
- Differences between broilers & layers?

Experimental Setup

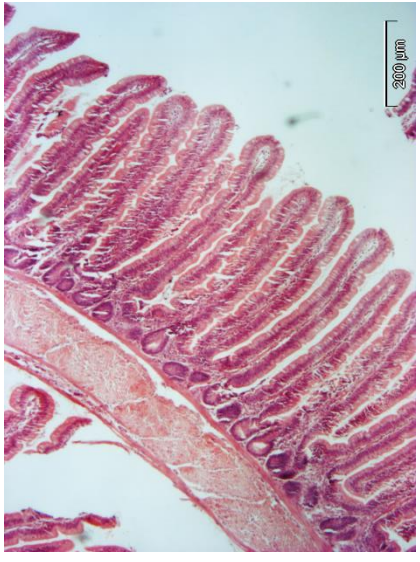


Measurements

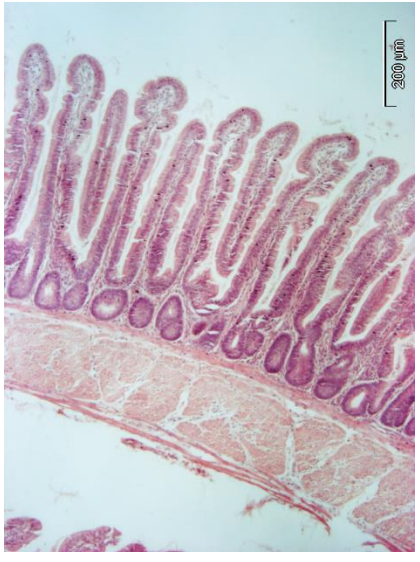
- Intestinal morphology
- Performance
- Ileal cytokine and Ig mRNA expression levels
- Antibody response after challenge

Results

Broiler

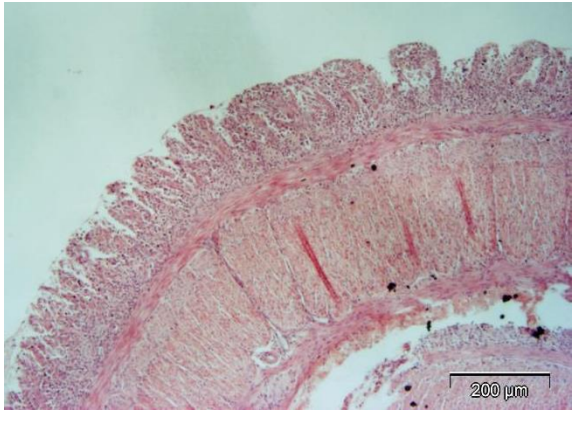


Ileum control

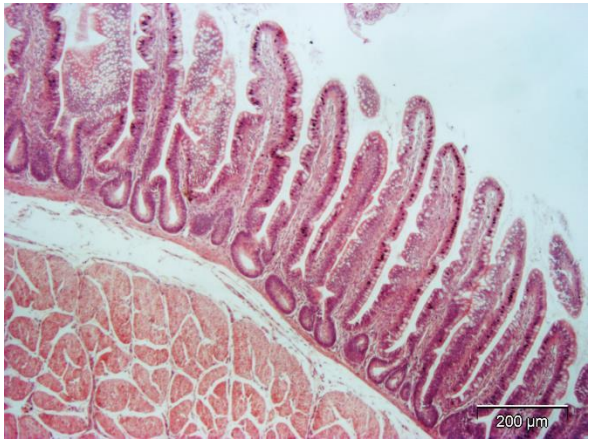


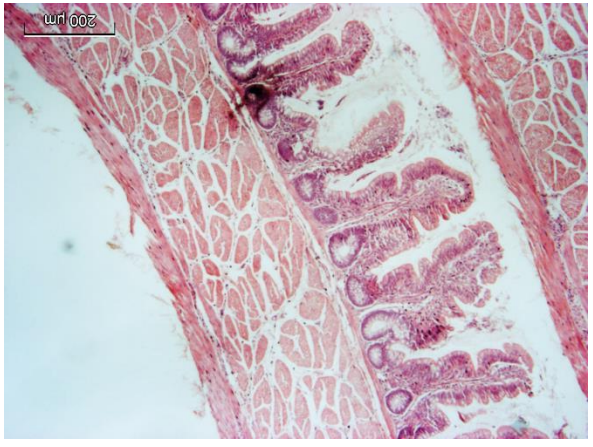
Ileum DSS

Layer



Broiler

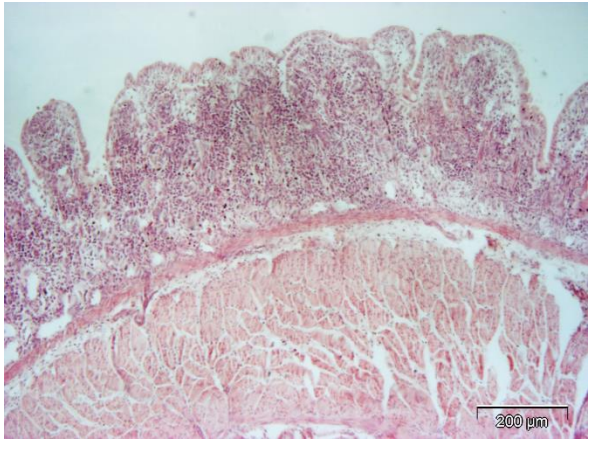




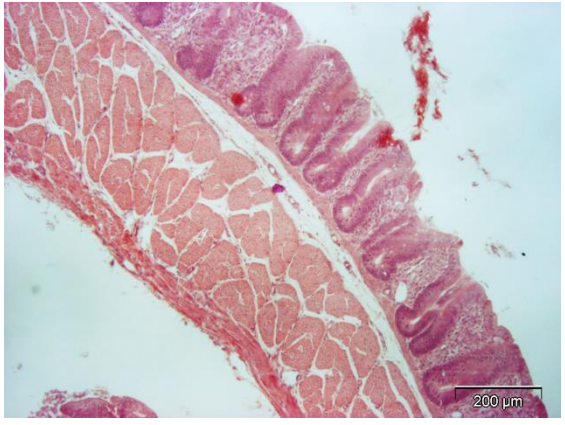
Colon control

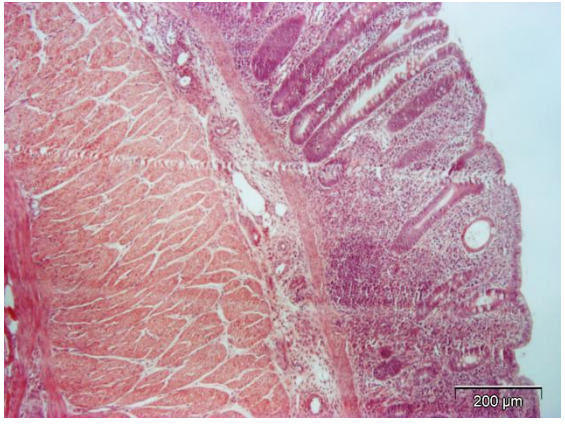
Colon DSS

Layer



Broiler

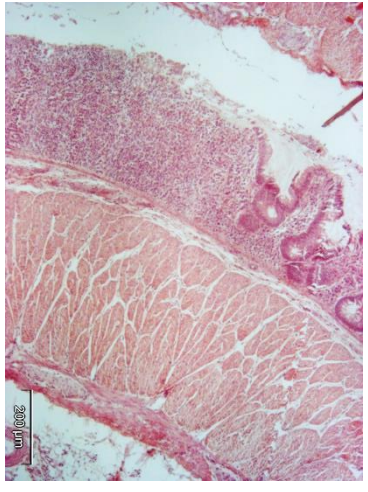




Caecum control

Caecum DSS

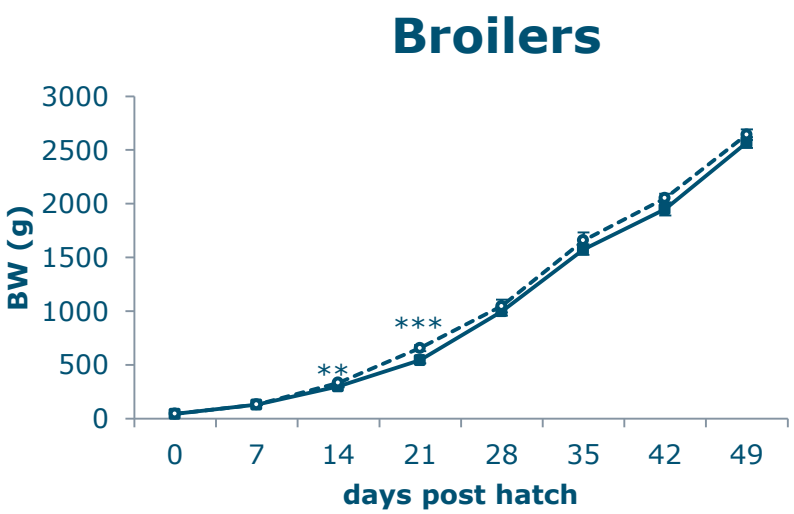
Layer

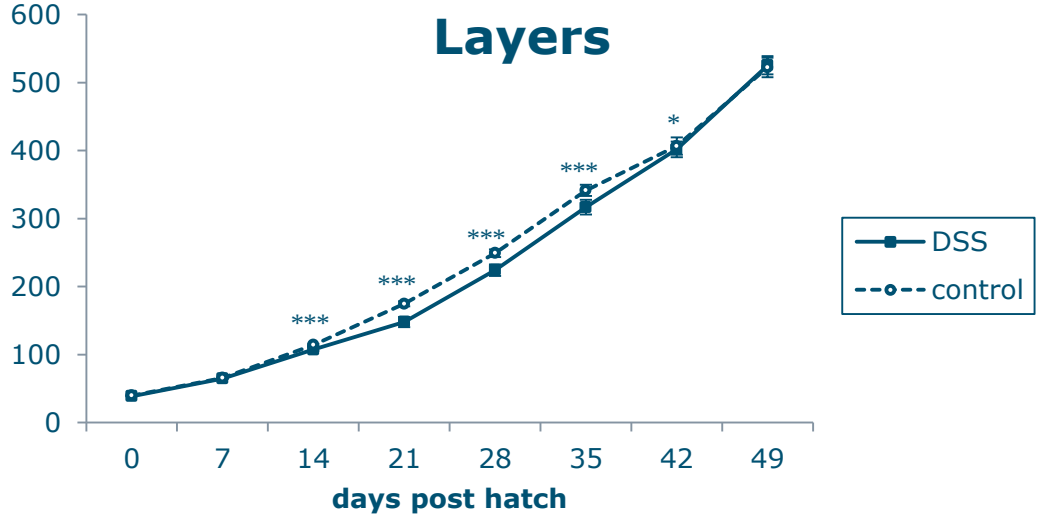


Intestinal length & performance

- DSS → shorter colon & caecum d 18
- Colon still shorter in DSS layers on d 35

- Performance:





Immune parameters

- Limited effects on ileal cytokine expression levels
- Ileal Ig expression levels ↓ in DSS broilers
- Antibody response towards LPS ↓ in DSS broilers

Mortality

Differences between broilers & layers:

- Mortality higher in layers (3% vs 11%)
- Even several days after cessation of DSS treatment

Discussion

- Mortality not expected → no mortality in pilot experiment

  → Severity of colitis may depend on stress
  → Less stress in pilot experiment

- Layers more affected by DSS & need more time to recover

  → More susceptible to DSS under stressful situation

- Broilers have a higher cell turnover due to rapid growth

  → Intestinal damage more limited

Gué et al., 1997; Cameron & Perdue, 2005; Saito et al., 2005; Reber et al., 2006


10 d

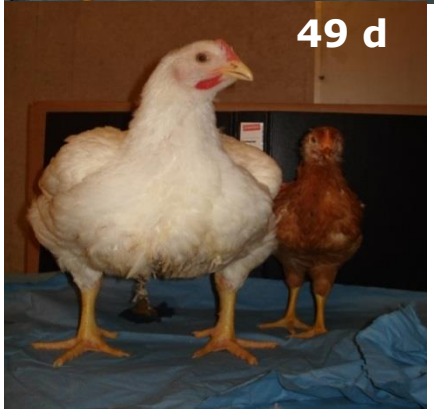

14 d


21 d

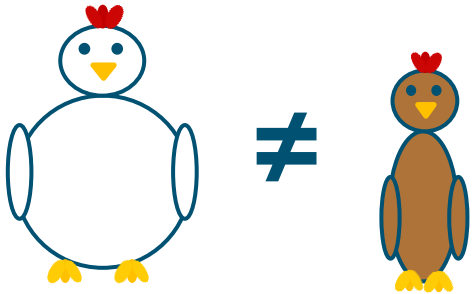

28 d


35 d


42 d


49 d

Conclusion

- DSS may be a good model to investigate effects of disruption of intestinal homeostasis in chickens
- **BUT:** 
- More research needed on the appropriate dose

Questions?