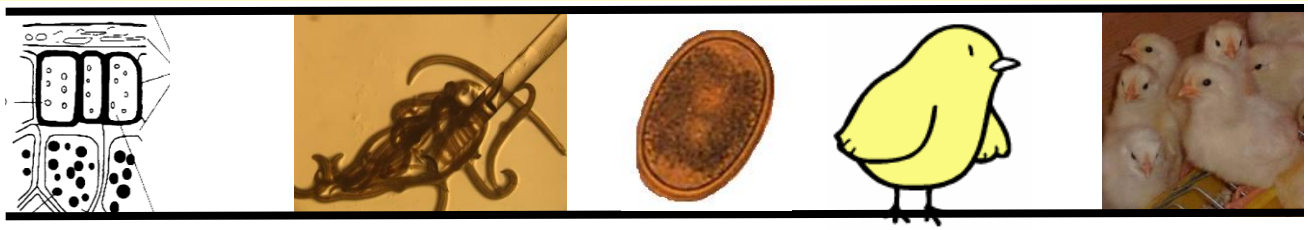
GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

Effects of dietary non-starch polysaccharides (NSP) on *Heterakis gallinarum* infection in chicks



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Background

- **Number of layers kept in floor husbandry in EU ↑**
- **Re-emerging parasitic infections**
  - *Heterakis gallinarum, Ascaridia galli, Capillaria spp., Tapeworms* [1]
- **Diets**
  - Birds with outdoor access can directly consume fiber rich plants
  - In organic farming, it is difficult to balance amino acids
  - Energy diluted (fiber rich) diets are suggested [2,3]
  - Stimulate feed intake
    - **Positive effects on animal welfare** [4]

[1]: Kaufmann et al., 2010; [2]: Sundrum et al., 2005; [3]: Van de Weerd et al., 2009; [4]: Van Krimpen et al., 2008.

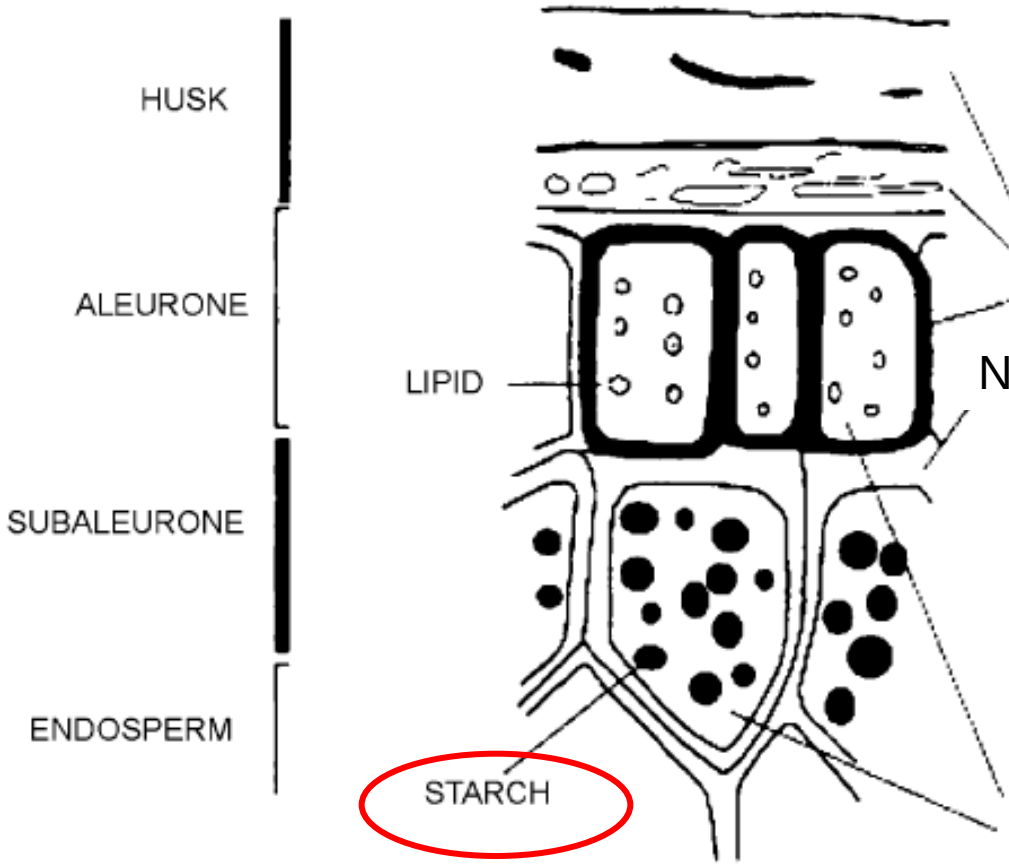
Dietary fiber and parasites

- **Influence pig nematodes** [1,2,3]
  - *Trichuris suis*
  - *Oesophagostomum dentatum*

- **Poultry parasites??**
  - Viscous NSP favor development of *A. galli* [4]

[1, 2, 3]: Petkevičius et al., 1997; 2001; 2003; [4]: Daenicke et al., 2009.

Plant polysaccharides



Non Starch Polysaccharides (NSP)

- Major part of dietary fibre
- Cellulose
- Pectins
- Glucans
- Inulin
- Chitin
- exclude lignin

Insoluble NSP: less fermentable

Soluble NSP: easily fermentable

Heterakis gallinarum

Predilection site	**Caeca**
Size, cm	**0.7-1.5**
Feeding on	**Bacteria** [1]

Histomonas meleagridis [2]

≈ 1 cm

[1]: Bilgrami and Gaugler, 2004; [2]: McDougald, 2005.

Objective

Establishment and fecundity of

***H. gallinarum* influenced by low and highly fermentable dietary NSP?**

Material and methods

Diets

Nutrient (g/kg DM)	CON*	I-NSP	S-NSP	
Ins-NSP	103	172	104	
Sol-NSP	20	23	95*	Dilution
Crude protein	216	199	202	- 8.0 %
ME, MJ/Kg DM	13.6	12.6	12.2	- 8.8 %

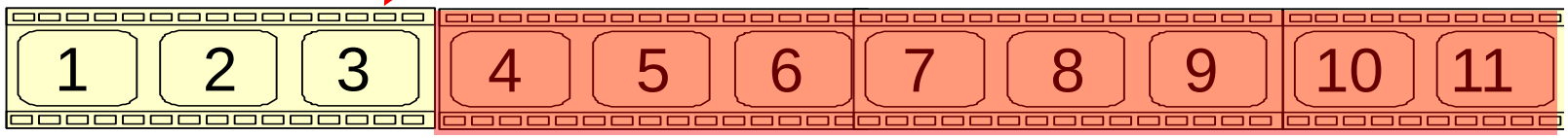
(*) : Supplied ME and nutrients according to feeding standards for growers (NRC, 1994)

(**): Composed of inulin (79%), DP=9

Experimental setup (x 3)

N = 670

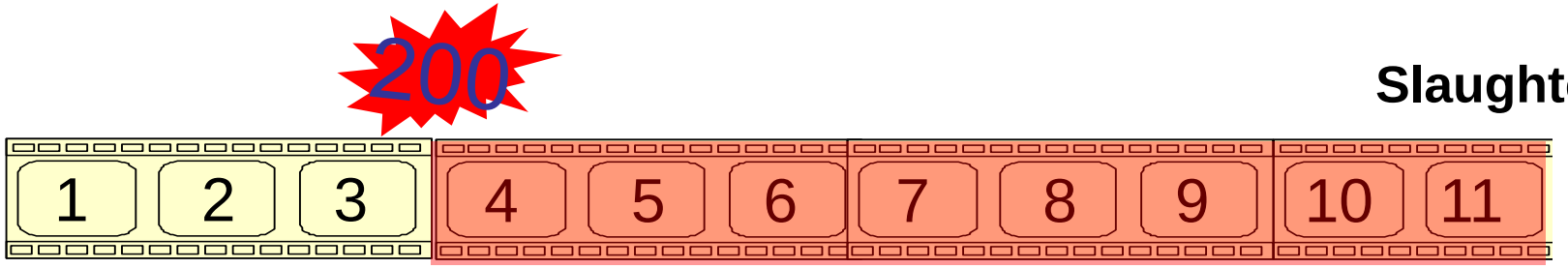
Slaughtering

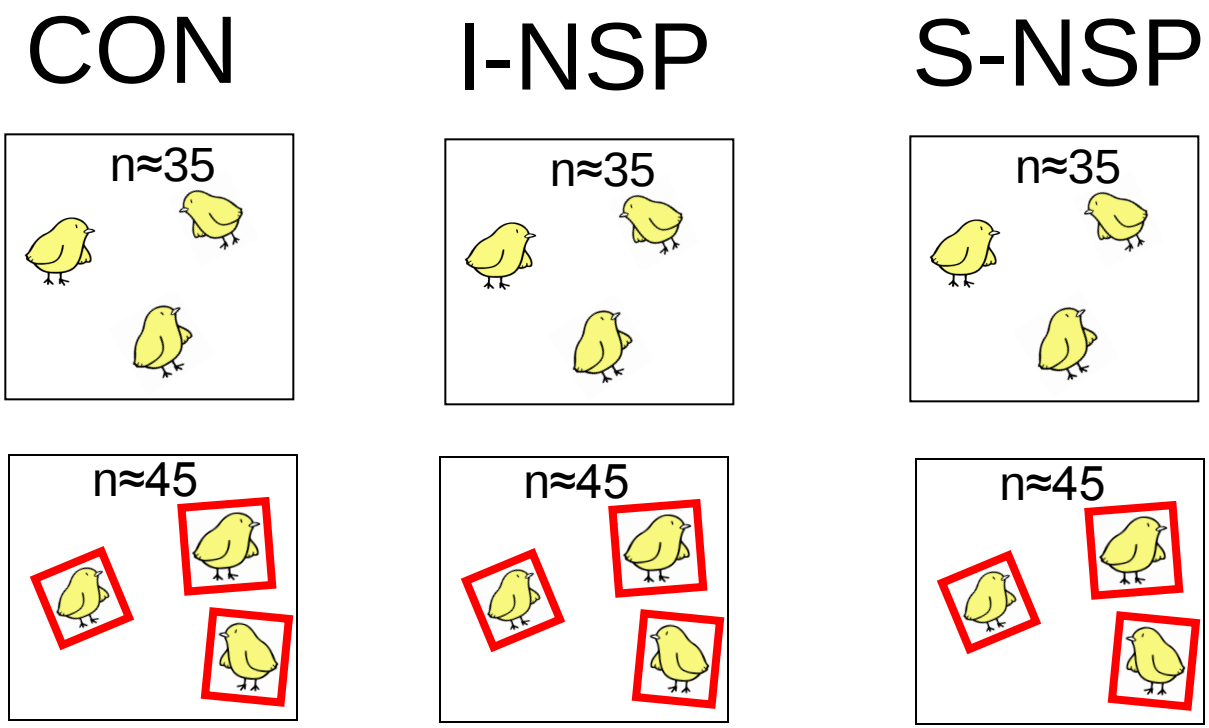


Experimental weeks

CON I-NSP S-NSP

Experimental setup (x 3)

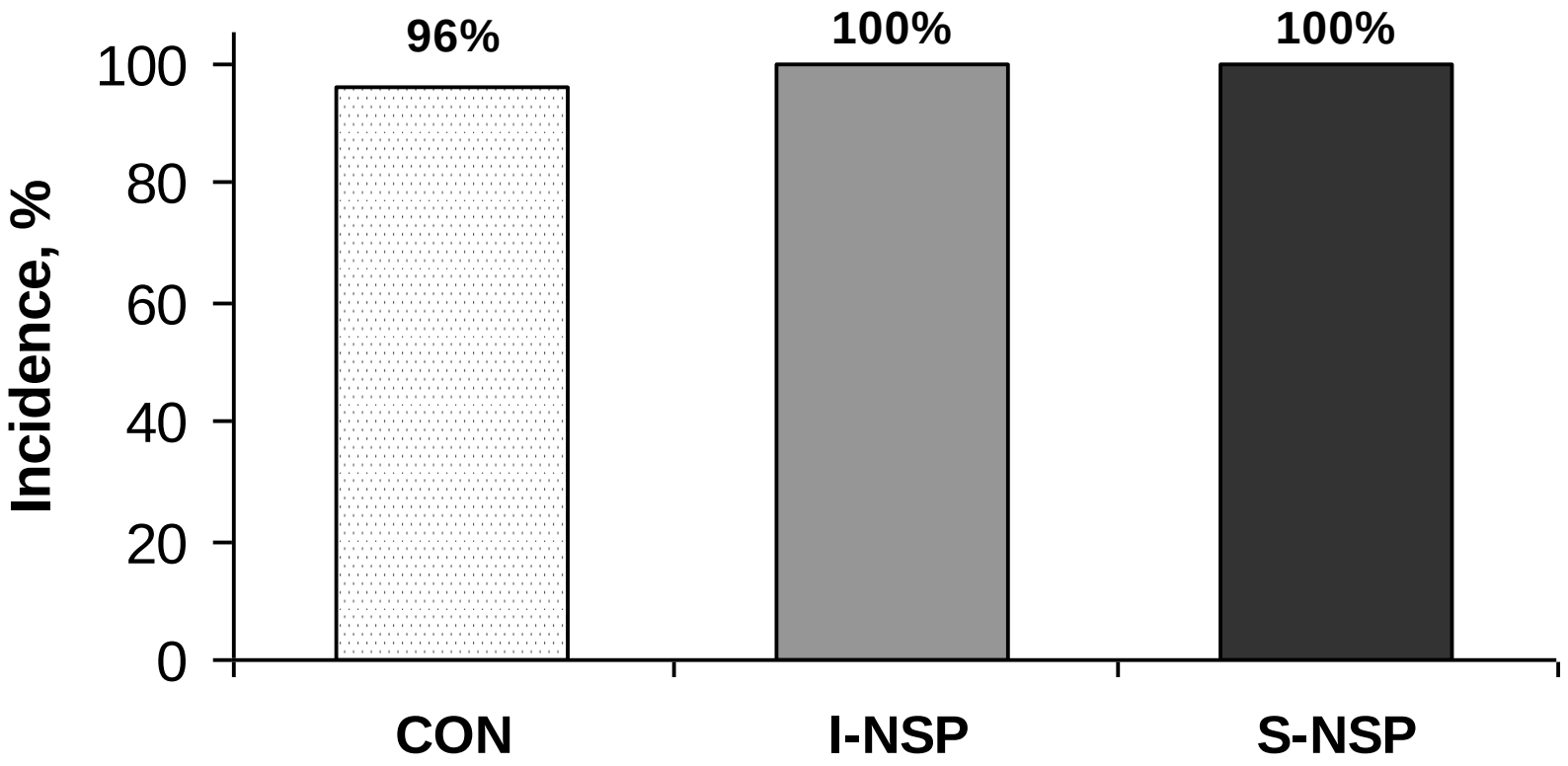




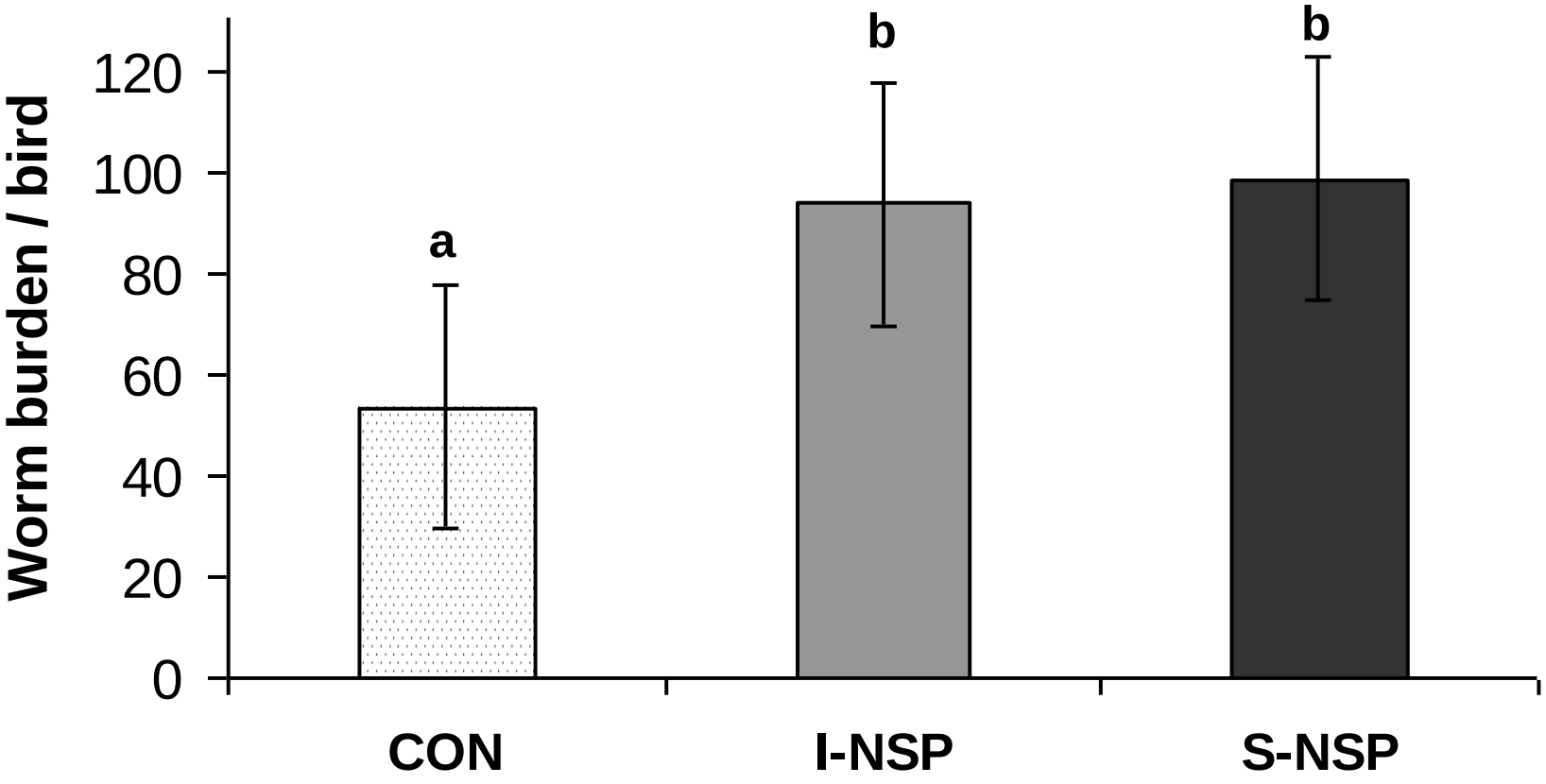
Results

Infection parameters

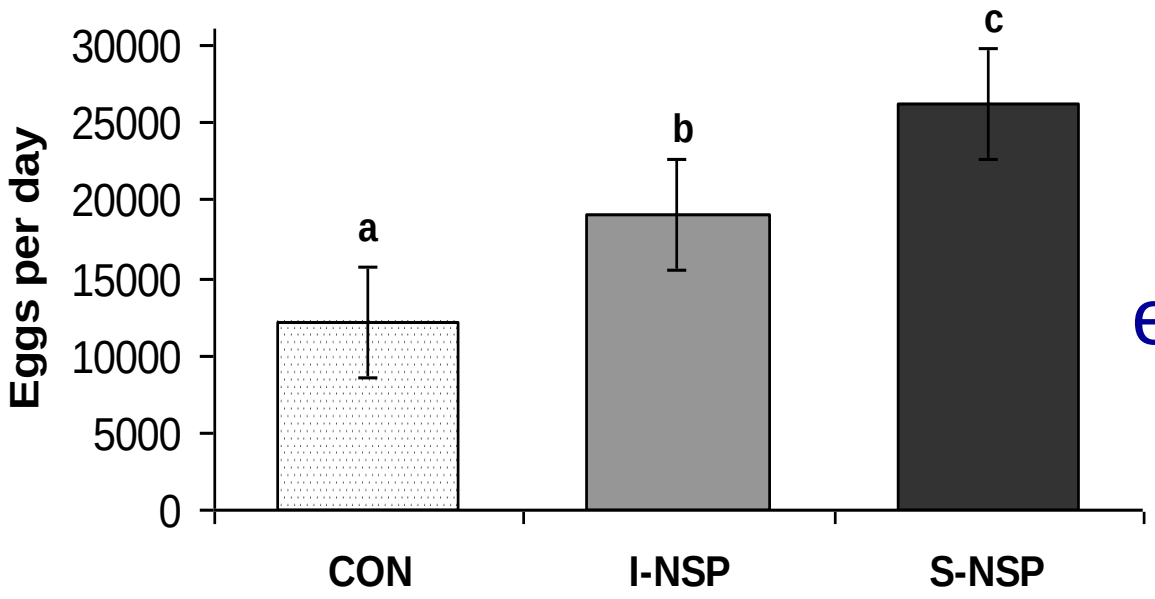
Incidence, %



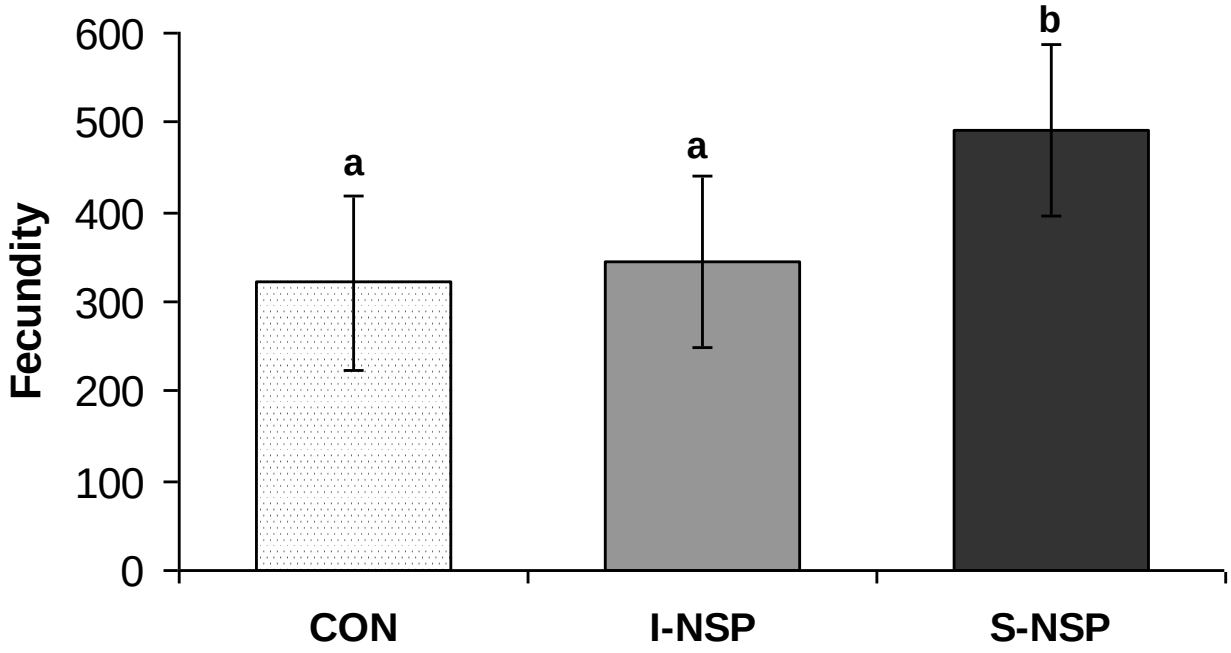
Average worm burden per bird



*: ab: Tukey, p<0.05; after a mixed model using log-transformed data (P<0.001)



Avg. daily total egg excretion per worms of a bird



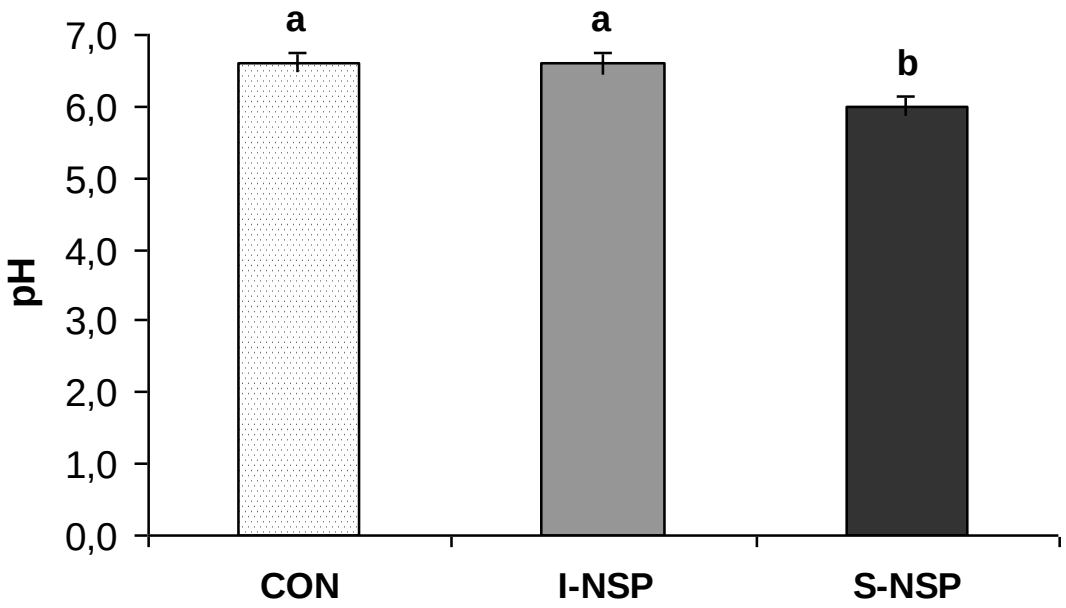
Daily eggs per ♀ worm

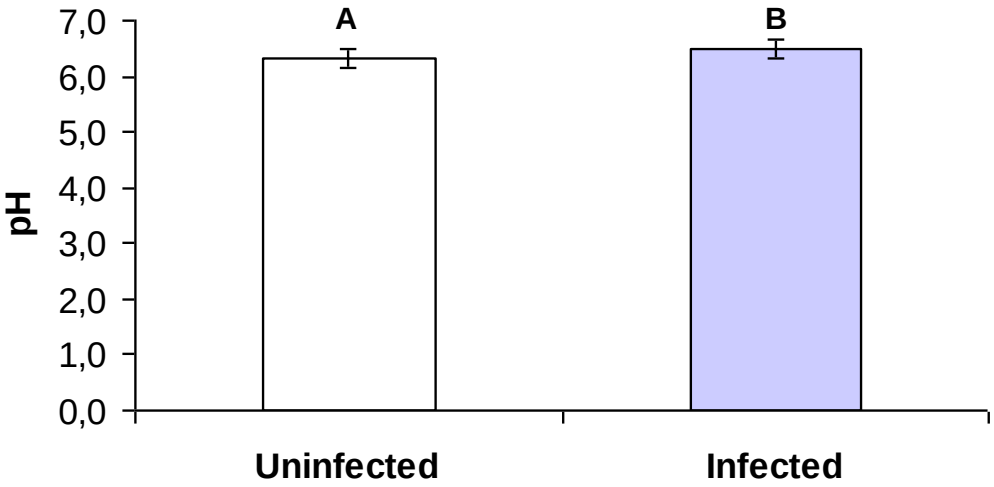
*: abc: Tukey, p<0.05; after a mixed model using log-transformed data (P<0.001, P=0.002, respectively)

Results

Caecal environment

Intracaecal pH





P values

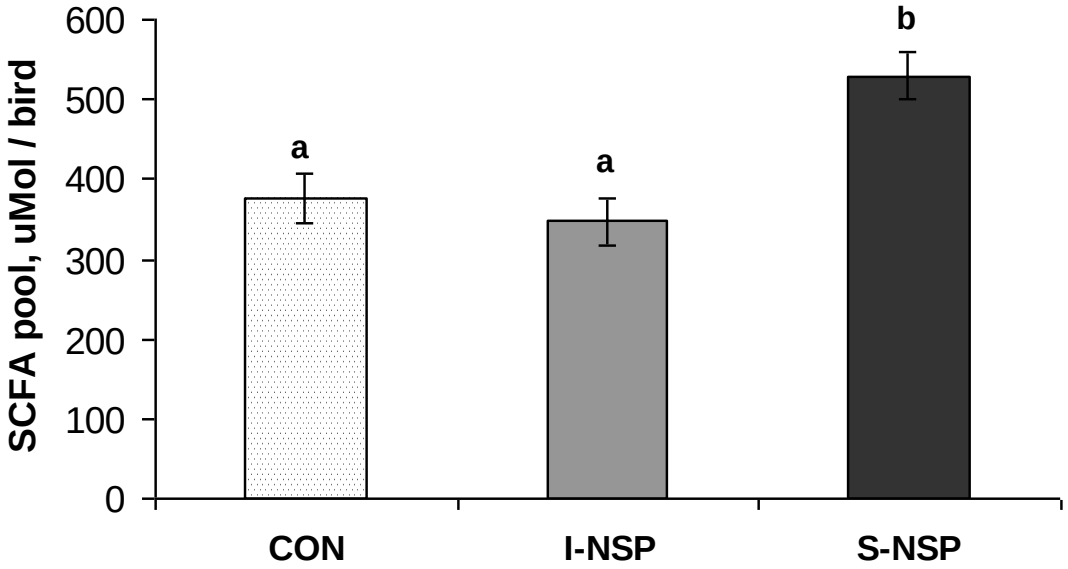
Diet : 0.001

Infection : 0.002

Interaction : 0.210

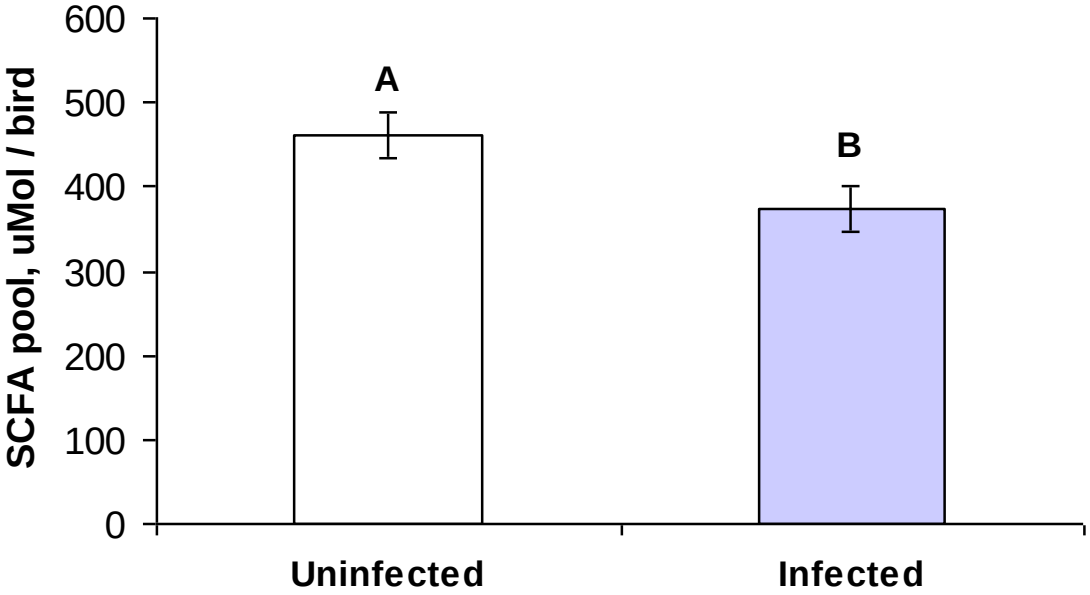
*: abc: Tukey, p<0.05; after a mixed model

SCFA pool in caeca



P values

Diet	***: 0.001***
Infection	***: 0.001***
Interaction	***: 0.144***



*: abc: Tukey, p<0.05; after a mixed model

Conclusions

- **Both NSP diets**
  - Favour establishment of the nematode
  - S-NSP additionally enhances worm fecundity

- **The ffects are probably through**
  - Altered gastrointestinal environment
  - S-NSP > I-NSP
- **Particular measures of precaution!**

  - where;
    - parasites are abundant
    - fiber rich diets are offered

Acknowledgements

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Thank you for your attention!