Effect of chicory (*Cichorium intybus* L) on the faecal bacteria in diets for growing pigs

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Content

Background

Experiment

Results

Conclusions

Fibre in pig diets

- Inclusion of fibre is associoated with decreased nutrient utilization and growth performance
- However, inclusion of fibre manipulates the microbiota and beneficially effects gut health
- Want to find a fibre source with high digestibility and beneficial effects on gut health

Chicory (*Cichorium intybus* L)

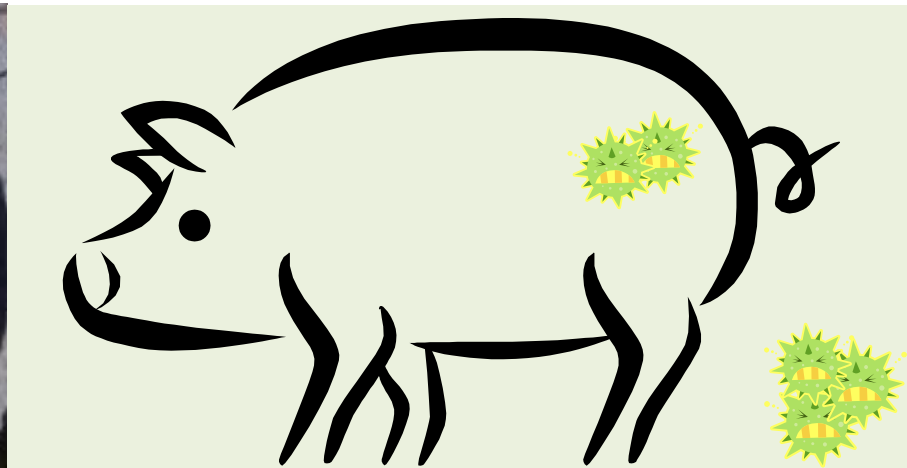
- Perennial herb
- The root contains inulin (15-20%) and oligofructose (8-12%)- classified as a prebiotic
- Vegetative part, high content (10-15%) of soluble uronic acid- the building block in pectin
- Vegetative part, high fibre digestibility, when included in diets to weaned piglets (Ivarsson *et al.,* 2010)

Uronic acid and fructans

- Inulin
  - Increased Lactobacilli:Coliform ratio and lower colon pH (Wellock *et al.,* 2007)
  - Preventive against weaning diarréa, increased lactic acid concentration in cecum and colon (Halas *et al.,*2009)
- Uronic acid
  - Improved growth rate and increased SCFA production in colon (Jeaurond *et al.,* 2008)
  - Stimulation of faecal Lactobacilli, butyrate and total SCFA production (Wang *et al.,* 2004, Bikker *et al.,* 2006)
- No data availabe on how chicory forage affect the microbiota

Aim

Study the effect of feeding diets with inclusion of chicory forage or root on the faecal microbiota, feed intake and growth rate in growing pigs



Experiment

- 18 seven weeks old healthy pigs from six litters (weaned at five weeks of age)
- 18 days growth trial
- Pigs were individually housed and fed one of three diets
  - ❑ Control, wheat and barley (**C**)
  - ❑ Chicory forage 8% (**CH80)**
  - ❑ Inulin 8% (**INU80**)

  All ingridients were milled, mixed and pelleted

Analyses

- Bacterial enumeration and pH from fresh faecal samples collected on days 6,13 and 17
  - ❑*Enterobacteriaceae* -MacConkey agar
  - ❑ Lactobacilli– Rogosa agar
- Terminal Restriction Length Polymorphism (T-RFLP) on frozen samples from days 0 and 17
- Cloning and sequencing, identified using Ribosomal database project II (RDP)
- Proc Mixed- repeated measurement and log-transformation

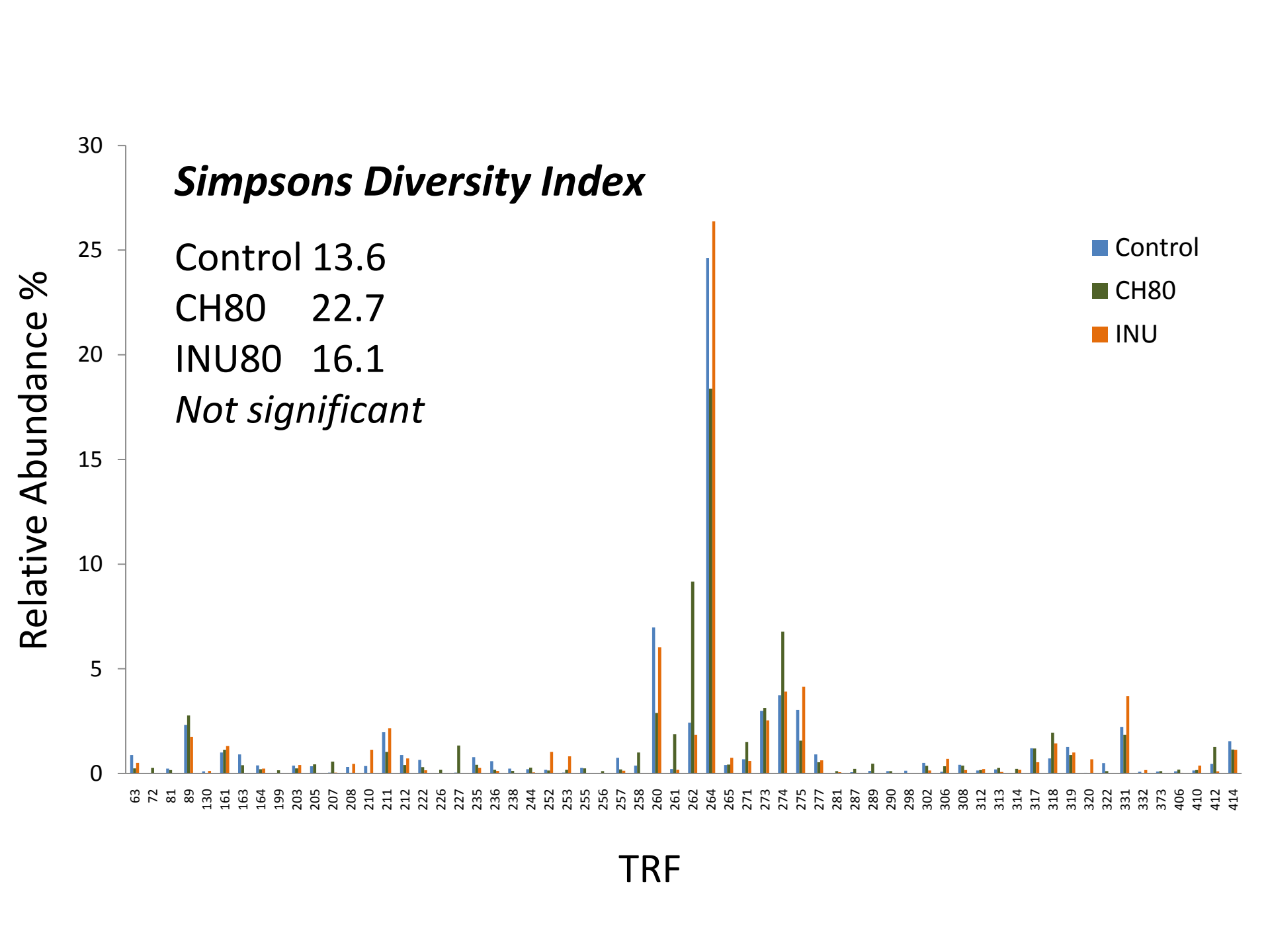
Results

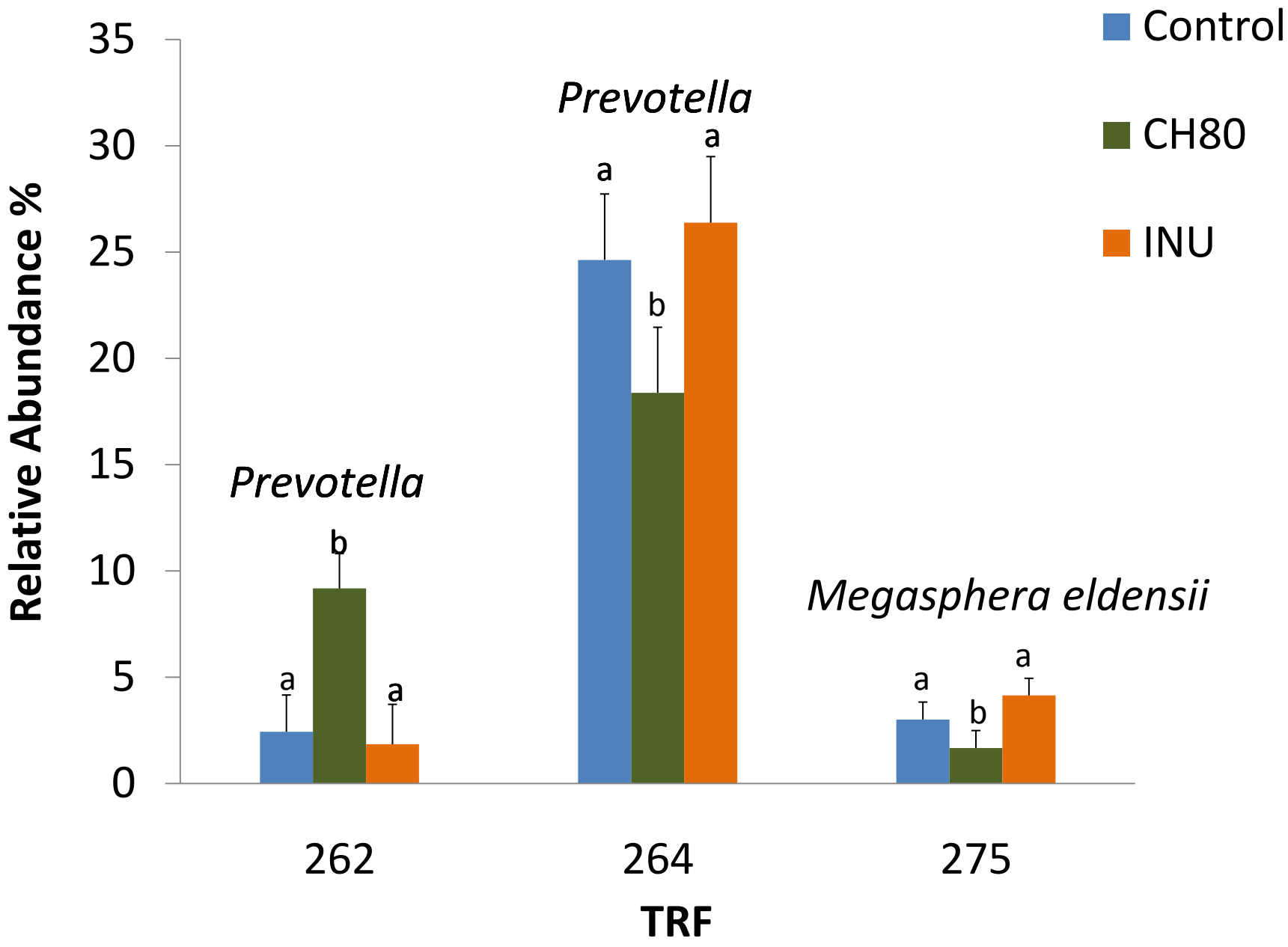
	Diet				
	Control	CH80	INU80	s.e	P-value
g/day					
DFI 0-7	944	1072	945	86.3	0.50
DFI 7-14	1473	1501	1451	73.3	0.89
DWG 0-7	555	687	615	82.1	0.54
DWG 7-14	1019	1013	966	72.7	0.85
FCR 0-7	1.96	1.55	1.99	0.30	0.53
FCR 7-14	1.52	1.48	1.48	0.10	0.94

Results

	Diet				P-value
	Control	CH80	INU80	s.e	Diet
n	18	18	18		
(log_{10} cfu g^{-1})					
Enterobacteriaceae	6.98^{a}	6.87^{a}	6.02^{b}	0.213	0.005
Lactobacilli	9.44^{ab}	8.88^{b}	9.62^{a}	0.196	0.026
pH	6.44^{ab}	6.54^{a}	6.14^{b}	0.114	0.041

Bacteria counts did not change between time points


Simpsons Diversity Index
Control 13.6
CH80 22.7
INU80 16.1
Not significant
Control
CH80
INU
Relative Abundance %
30
25
20
15
10
5
0
63 72 81 89 130 161 163 164 199 203 205 207 208 210 211 212 222 226 227 235 236 238 244 252 253 255 256 257 258 260 261 262 264 265 271 273 274 275 277 281 287 289 290 298 302 306 308 312 313 314 317 318 319 320 322 331 332 373 406 410 412 414
TRF


Control
CH80
INU
Relative Abundance %
35
30
25
20
15
10
5
0
Prevotella
Prevotella
Megasphera eldensii
a
b
a
a
b
a
a
b
a
262
264
275
TRF

Conclusion

- Chicory forage and inulin are promising fibre sources in pig nutrition
- Inulin was confirmed to have prebiotic effects, as previous studies
- Chicory forage manipulate the gut microbiota
- Further studies are on going to understand the microbial effects of forage diets

Thank you for your attention!
Poster 8, session 7