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Influence of chicory roots (*Cichorium intybus* L) on boar taint in entire male and female pigs

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Chicory

Cichorium intybus L.



**A versatile plant product in the pig production
with positive effects on meat quality,
environment, parasite and bacterial infections**

The Danish Institute of Agricultural Sciences &
The Royal Veterinary and Agricultural University

Background

- It is known that pure inulin a fructooligosaccharide extracted from chicory roots can:
 - reduce boar taint (skatole in backfat and blood)
 - reduce parasite infection levels when added to specially composed experimental diets
- However, the entire chicory roots may, in comparison to inulin:
 - reduce boar taint more effectively
 - improve the taste of cooked meat from both male and female pigs
 - be more effective against parasites when added to normal diet types
 - contain secondary metabolites that add to the effect of the inulin
 - be a cheaper solution

The chicory root product, how does it fit in production systems?

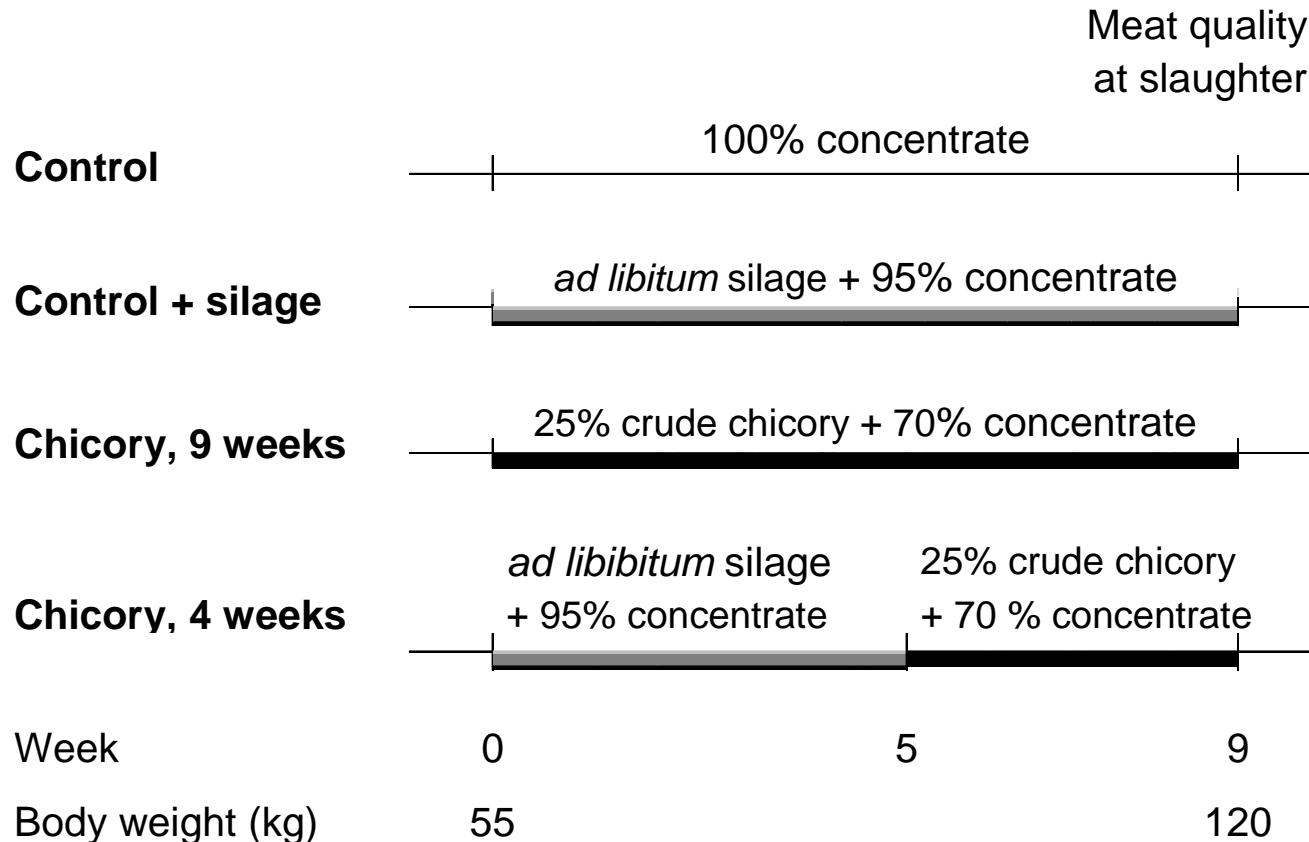
- On the farm level the chicory can be handled with the same equipment as sugar beets – hardly no or only minor need for new expertise or machines
- On the factory level the chicory roots can be dried and manufactured with existing equipment – no need for new investments
- The product can be dried and used in feed mixtures all-year round
- High biomass yield by area (e.g. 60 ton per ha)
- Can improve the soil quality and decrease the loss of N from soils by deep roots

Design

Trial 1

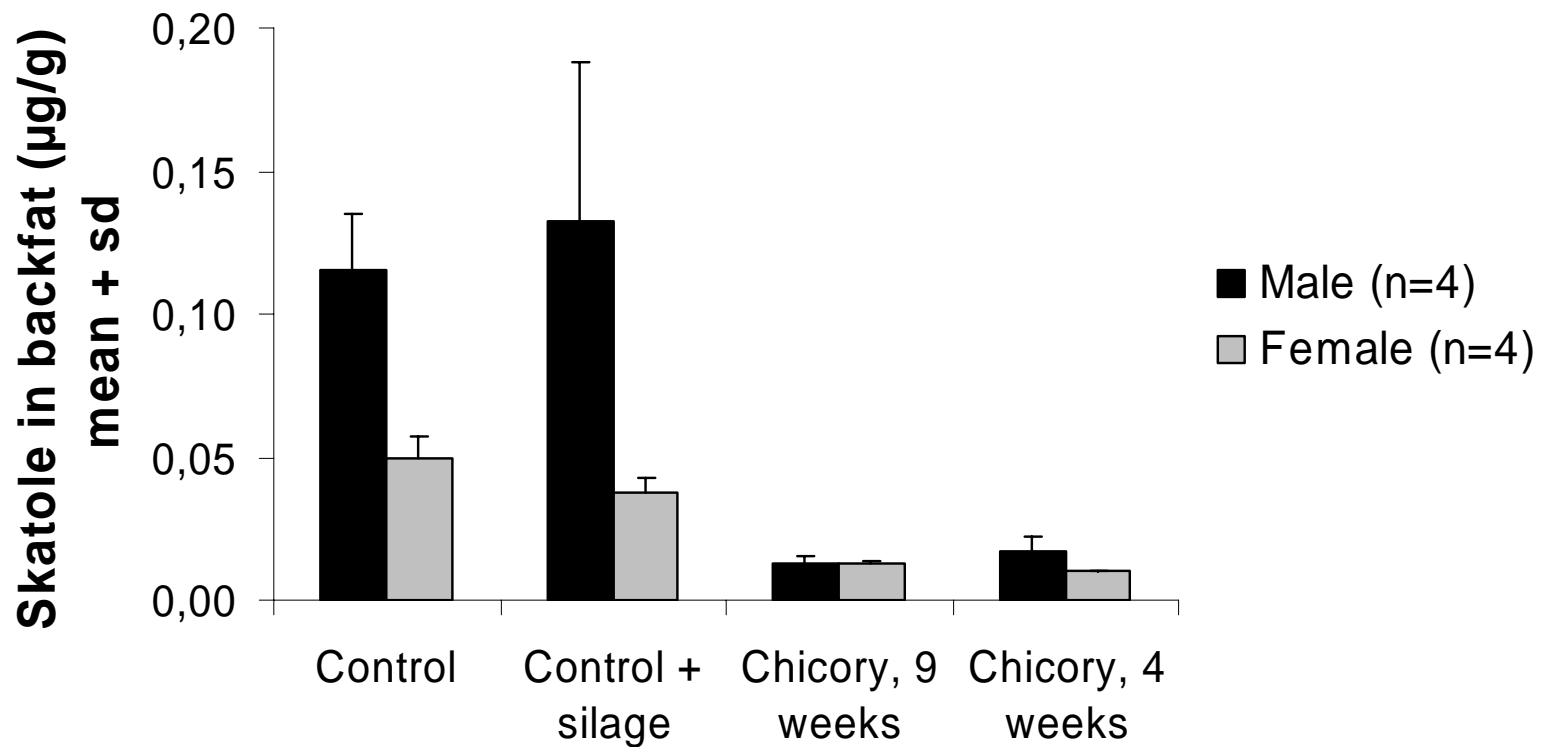
All pigs were given a basal diet of organic concentrate
(given as % of total energy intake)

4 female & 4 entire male pigs per treatment

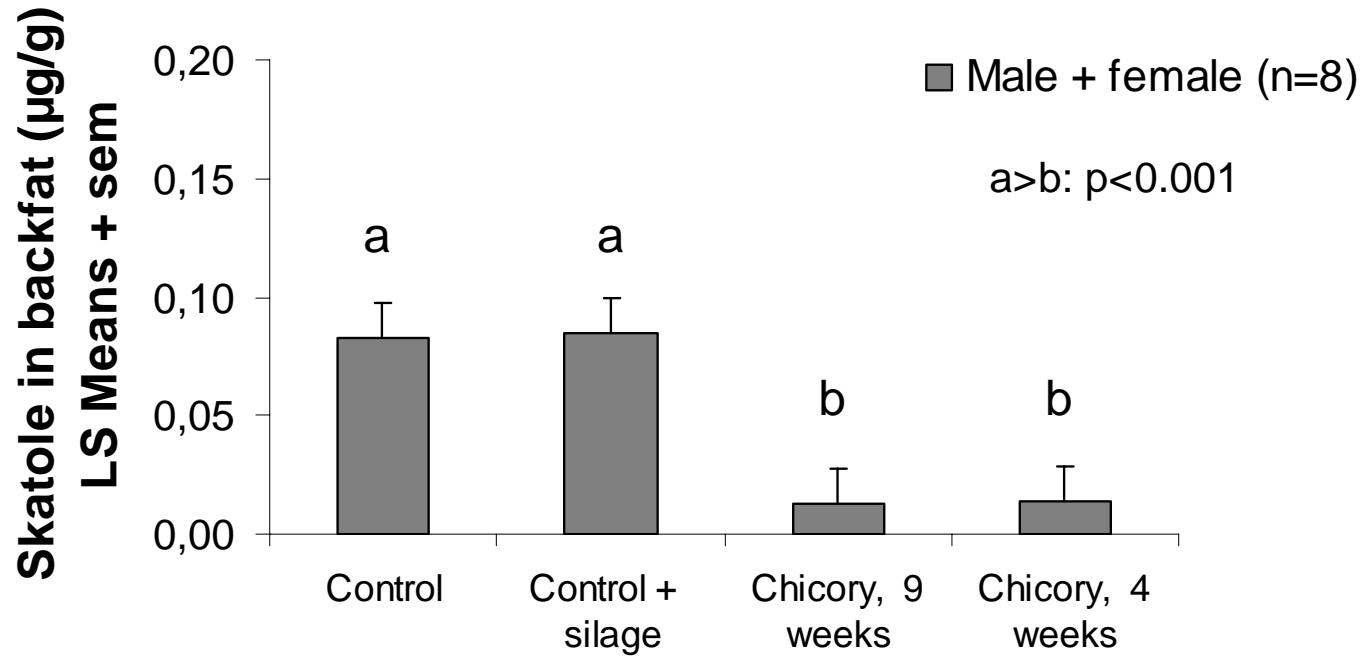


Trial 1

Skatole in backfat at slaughter



Skatole in backfat at slaughter

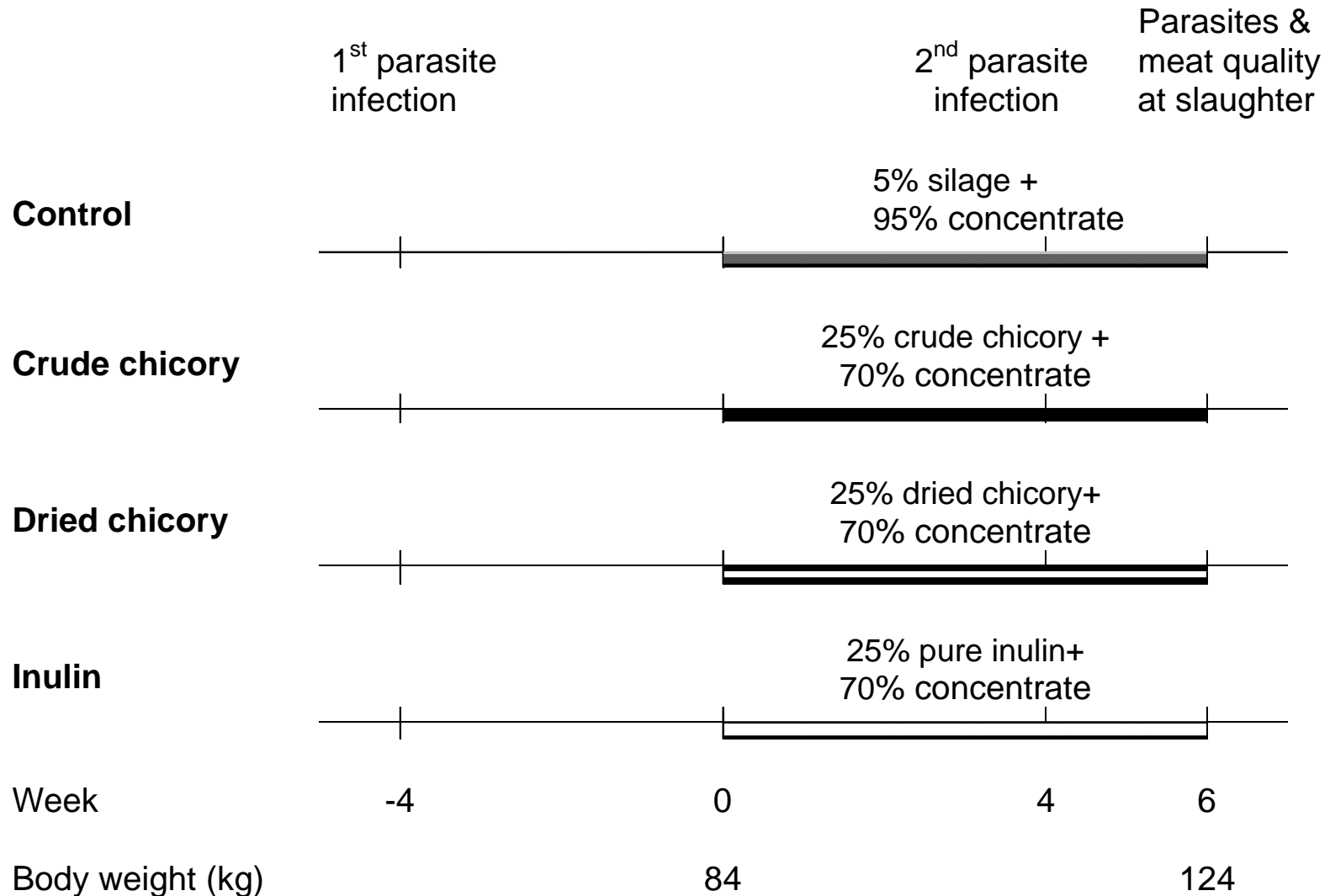


Design

Trial 2

All groups were individually fed 100% concentrate until week 0

8 entire male pigs per treatment



Drying method

Trial 2, 3

Important that inulin and secondary metabolites are not decomposed by too high temperatures in the root material

25% DM

Crude roots (used in trial 1 & 2)



Mincing

(Lightning fast mincer, Wiencken)



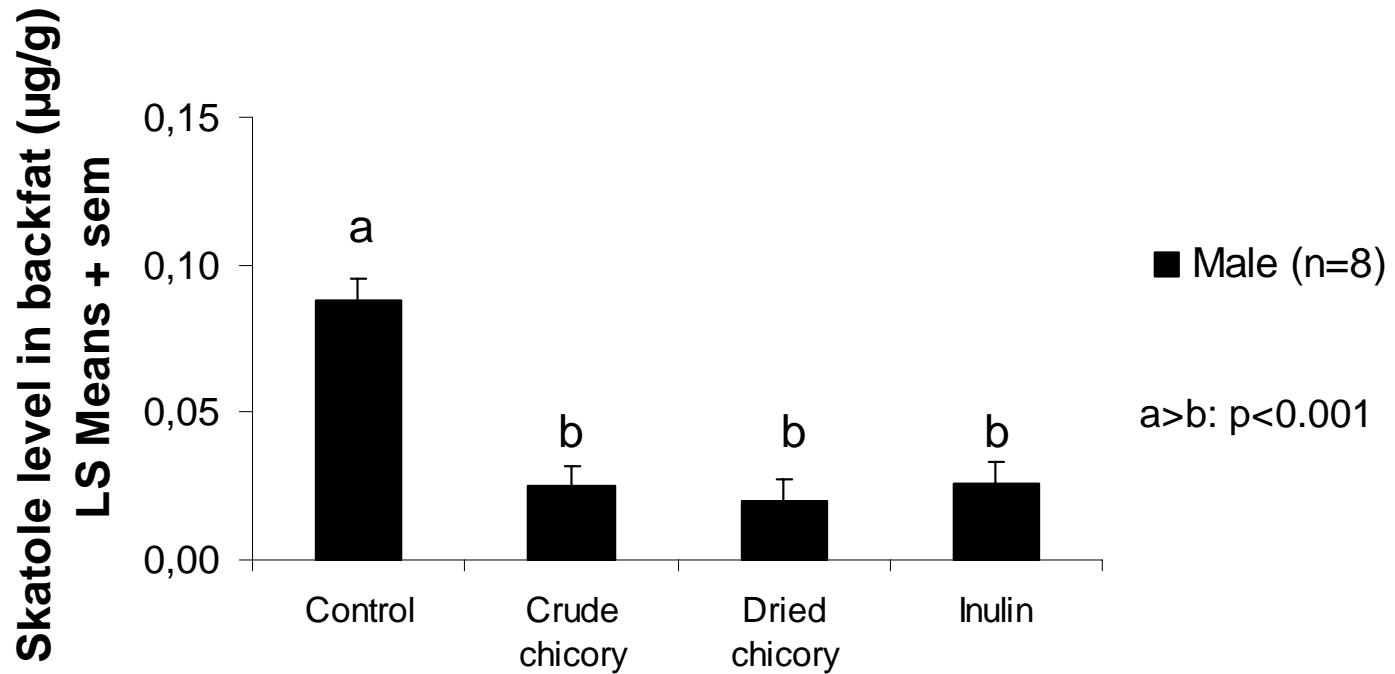
90% DM

Drying

(Drying cupboard for 48 hours at 60 °C)

Trial 2

Skatole in backfat at slaughter



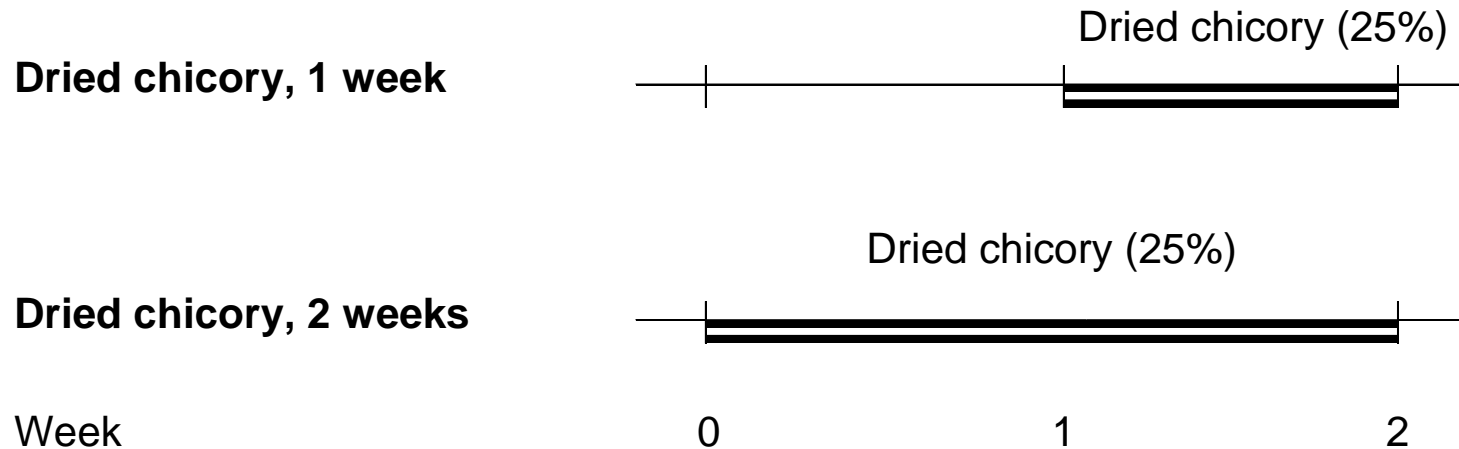
Design

Trial 3

Initially both groups were individually fed 100% concentrate, but this was reduced to 75% (of total energy intake) after the introduction of chicory

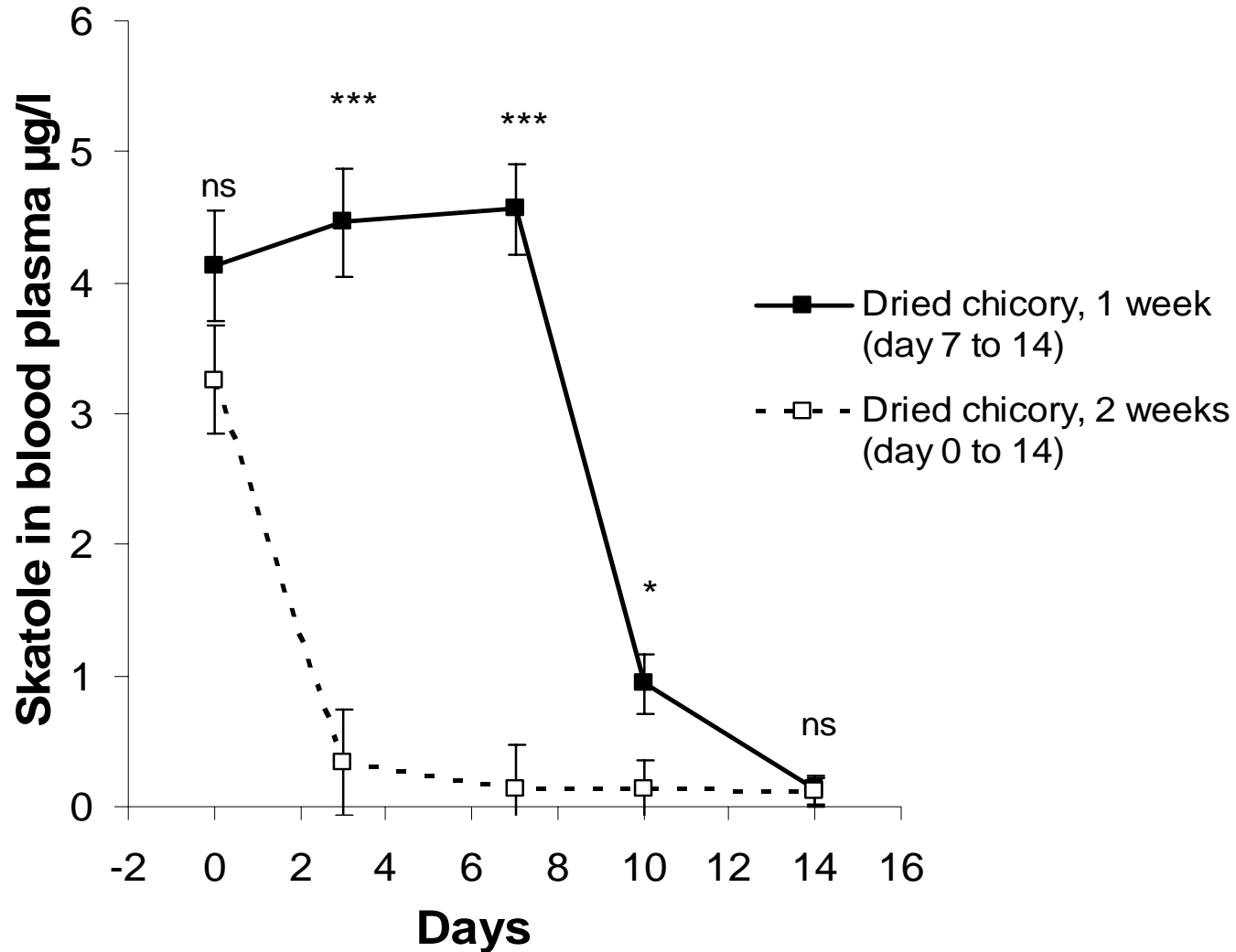
8 entire male pigs per treatment

Collection of blood samples



Trial 3

Skatole in blood plasma



Sensory profiling - method

- A defined descriptive vocabulary was developed for cooked meat, odour, texture, flavour, taste, aftertaste and overall acceptability/impression.
- Cooked meat samples were then evaluated with this descriptor list through sensory profiling using a trained panel of expert judges.
- Two of widely consumed muscle types were included:
 - *M. Longissimus dorsi* (pork loin)
 - *M. Psoas major* (pork tenderloin)
- Multivariate Principal Component Analysis (PCA) and Partial Least Squares Regression (PLSR) were used to analyse the results.

Sensory profiling - Conclusions

- Chicory feeding appears to reduce/remove sensory boar taint to levels acceptable to the consumer
- Moreover, chicory feeding does not impart negative sensory characteristics, in that the meat is considered to be acceptable and have a high overall impression.
- This was the case for 2 of the most commonly consumed pork meat cuts, both of which maintained their freshly cooked pork characteristics when from chicory fed animals.
- Chicory feeding appears to be a very effective solution to removing the sensory Boar taint.
- Such a feeding effect has not previously been seen to have such a clear effect on reduction/removal of sensory Boar taint

Research has revealed the following diverse properties of the chicory root in pig feed:

- Decreasing concentration of the boar taint compound skatole with increasing chicory percent in the feed
- Increased meat quality and decreased boar odour with increasing chicory content in the feed
- Deodorizing effect on the colon contents with relevance to environment in the stable
- Decreased parasite transmission
- Pronounced protective effect against swine dysentery

Perspectives of feeding chicory to pigs

- Improved animal welfare as:
 - male pigs do not need to be castrated
 - production diseases caused by intestinal parasites and bacteria can be reduced or eliminated
- Increased meat quality because:
 - boar taint is eliminated in both male and female pigs
 - the odour, flavour, taste and aftertaste is improved for meat from both male and female pigs
 - the use of antibiotics and deworming drugs is reduced
- Improved stable environment due to:
 - the reduced malodour coming from pig stables and manure may possibly lead to environmental benefits for the farmer and the public?