

Reducing the risk of food borne pathogens (*Campylobacter*) in pre-slaughter pigs via short-time feeding with prebiotics

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Background:

Reducing the presence of human pathogens like *Campylobacter* and *Salmonella* (zoonoses) in their animal hosts is important to enhance food safety of products of animal origin. *Campylobacter* is considered to be a commensal in the gastrointestinal tract of pigs due to its typically high prevalence. Consequently, it is difficult to control *Campylobacter* in pigs at farm level by usual hygienic measures, especially in open systems of organic pig production (Jensen et al 2006). However, another potential means to control pathogens is inclusion of non-digestible oligosaccharides (prebiotics) in the diet. For example, prebiotics proved successful in control of the intestinal disease swine dysentery caused by the spirochaete *Brachyspira hyodysenteriae* (Molbak et al. 2007)

Methods:

In two similar feeding experiments each with 24 pre-slaughter pigs, the pigs were divided into 3 groups that were given a diet of either I) control (100% organic concentrate (OC), II) chicory (10% chicory, 90% OC) or III) lupine (25% blue lupine seed, 75% OC) for 1 week or 2 weeks before slaughter (Fig. 1).

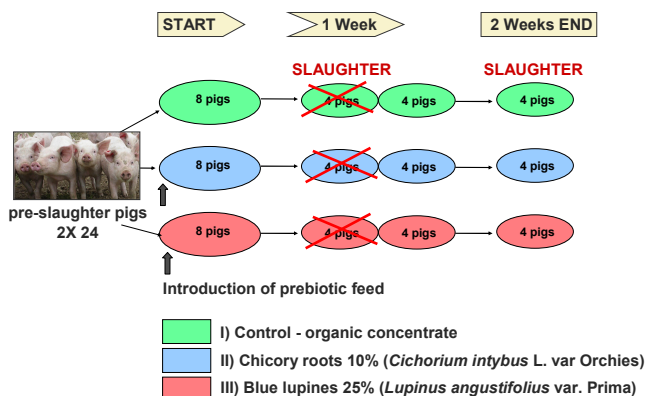


Fig. 1. Experimental design of short-time prebiotic feeding experiment with pre-slaughter pigs.

Results:

All the pigs excreted *Campylobacter* spp. However, the excretion level in the pigs fed lupine for one week was reduced approximately one log CFU g⁻¹ faeces compared to the excretion level in pigs fed chicory or control feed (mean log 2.9 vs. 4.1 CFU g⁻¹, Table 1). When the feeding period was prolonged to two weeks, the *Campylobacter* excretion level returned to a level similar to the level at start of the feeding experiment, Table 1.

Table 1. Level of *Campylobacter* excretion in 3 groups of pre-slaughter pigs given 3 different diets.

Diet	<i>Campylobacter</i> spp. excretion (mean log CFU g ⁻¹ faeces)*		
	0 (Start)	1	2
Control	4.37 (0.26)	4.08 (0.24)	4.44 (0.46)
Chicory	4.23 (0.28)	4.09 (0.32)	3.93 (0.25)
Lupine	4.74 (0.29)	2.94 (0.25)	3.99 (0.18)

*The number in () is standard error (s.e.) of the mean


Aim:

To assess a possible *Campylobacter* spp. reducing effect of feeding pre-slaughter pigs with lupin and chicory (prebiotics) just prior to slaughter.


Prebiotics are defined as "non-digestible food ingredients that beneficially affect the host by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon, and thus improve host health". Gibson & Roberfroid. J Nutr. 1995. 125(6): 1401-12.

Prebiotics are mainly carbohydrates such as e.g. inulin and fructo-oligosaccharides (FOS) (both fructans) and raffinose-oligosaccharides

Lupine, a source of raffinose (*Lupinus angustifolius*)



Chicory, a main source of inulin (*Cichorium intybus*)



The *Campylobacter* spp. level was determined in rectal faecal samples collected at time 0, 1 and 2 weeks by direct plating of ten-fold dilution series of faeces (1 g) on charcoal-cefoperazone-deoxycholate agar plates (mCCDA) (Fig. 2).

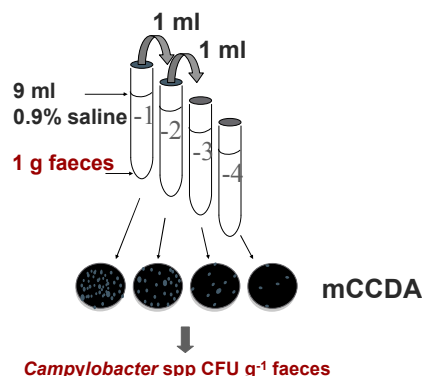


Fig. 2. Bacteriological enumeration of *Campylobacter* spp.

Discussion:

In the current study, a reduced level of *Campylobacter* spp. excretion was seen in the pigs fed lupine for one week. This potential for reducing the *Campylobacter* excretion level prior to slaughter infers a lower risk of carcass contamination, which would help to improve the food safety of pork as *Campylobacter* is one of the most important human pathogens. The results seems promising for the possibility of controlling also other food borne pathogens like e.g. *Salmonella*.

References

Molbak, L., Thomsen, L.E., Jensen, T.K., Bach Knudsen, K.E. and Boye, M. (2007) Increased amount of *Bifidobacterium thermacidophilum* and *Megasphaera elsdenii* in the colonic microbiota of pigs fed a swine dysentery preventive diet containing chicory roots and sweet lupine. J Appl Microbiol 103, 1853-1867.

Jensen, A.N., Dalsgaard, A., Baggesen, D.L. and Nielsen, E.M. (2006) The occurrence and characterization of *Campylobacter jejuni* and *C. coli* in organic pigs and their outdoor environment. Vet Microbiol 116, 96-105.

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