THE TOP-DOWN APPROACH IN THE ELIMINATION OF *CAMPYLOBACTER JEJUNI/COLI* FROM THE PIG POPULATION

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SUMMARY

Campylobacter jejuni/coli has been identified as a major cause of gastroenteritis in man. Epidemiological reports link foods of animal origin to human campylobacteriosis. Not only poultry is seen as a source of campylobacteriosis, also pork is, less frequently, recognised as such. To produce guaranteed campylobacter-free pig meat, porkers should be kept free of campylobacter. Porkers get infected by the sows on the piggeries and this makes it necessary to follow a top-down approach.

During two subsequent visits to a Specific Pathogen Free farm (SPF-farm), rectal faeces samples of 40 sows were collected. The same type of samples were taken from five mature porkers, born under SPF-conditions but housed since their first day of life in a clean and empty conventional stall on a farm without other pigs (farm 1). Additionally, 60 faeces samples were collected (during three visits to the farm) from sows on a conventional farm that had been populated 2.5 years ago with SPF-pigs (farm 2). As controls three conventional top breeding farms which had no link with SPF were screened. Bacteriological analysis on the presence of *Campylobacter jejuni/coli* was carried out on all faeces samples, using Preston media for detection of campylobacter.

The results show that all the samples of the SPF-farm were negative for campylobacter. The animals of farm 1 were free of campylobacter and only four of the 60 samples taken on farm 2 were positive for this pathogen. All the sows of the three control farms were heavily contaminated (10^2 to 10^5 c.f.u. of *Campylobacter jejuni/coli* per gram of faeces).This experiment shows that when fattening farms are supplied with campylobacter free piglets, it is possible to keep these animals free of campylobacter until slaughter. Supplying piggeries with campylobacter-free sows could drastically reduce the level of contamination of the pig population. To keep the pig population free of campylobacter, the top-down approach has to be part of an overall strategy including strict hygienic measures.

Introduction

Campylobacter jejuni/coli has been identified as a major cause of gastroenteritis in man. Numerous epidemiological reports link foods of animal origin to human campylobacteriosis. Not only poultry is seen as a major source of campylobacteriosis, also pork is, less frequently, recognised as such (Kapperud, 1992; Yanagisawa, 1980).

To be able to produce campylobacter-free pig meat, this pathogen should be eliminated from the pig population. The treatments pork is undergoing in the slaughterhouse, the cutting room and the butchery shop do not guarantee the absence of campylobacter on the meat (Stern, 1985).

A previous survey (Weijtens, 1993) showed that more than 85% of the sampled porkers on 8 pig farms spread over The Netherlands were intestinal carriers of campylobacter at all stages of fattening. Subsequent groups of pigs housed in the same stalls were all carriers, too. Typing with a genetic typing method (Restriction Fragment Length Polymorphism, RFLP) showed similarities between campylobacter strains isolated during subsequent samplings of the same group of pigs, but not between strains isolated on the same farm from subsequent groups housed in the same stall, suggesting that the piglets get already infected at a young age at the breeding farm. Another study performed on two piggeries (unpublished results) confirmed that nearly 90% of the piglets get infected with campylobacter by their mothers in their first four weeks of life. These results suggest a top-down approach to eliminate campylobacter from the pig population.

This paper includes the results of research carried out on Specific Pathogen Free (SPF) and traditional (non-SPF) farms, in order to elucidate the possibilities of producing campylobacter-free pigs through a top-down approach.

Materials and methods

1. The sampling procedures

The following farms were examined:

- The SPF-farm of the Central Veterinary Institute at Lelystad (SPF-farm); 40 rectal faeces samples of sows were collected during two subsequent visits, at each visit 20 samples.
- A small (non-SPF) testing farm, where pigs had never been raised before (Farm 1). On this farm, only five mature porkers were housed. They were born under SPF-conditions at the CVI and brought to this farm on their first day of life. Hygienic measures at the farm were as on the average Dutch fattening farm. Rectal faeces samples were taken from all five pigs.
- A conventional (non-SPF) piggery that had always housed pigs, but that had been repopulated 2.5 years ago with SPF-sows after having been empty (clean and disinfected) for 2 months (Farm 2). Sixty rectal faeces samples of sows were collected during three subsequent visits to the farm, at each visit twenty samples.
- Three top-breeding farms, which had no connections with SPF-breeding (Farm 3, 4 and 5). For the last twenty years, no pigs had been introduced on the farms from outside. The first two farms were situated at the top of large breeding pyramides. On the first two farms, 20 sows were sampled rectally and on the third 5 sows.

Each faeces sample was collected in an individual sterile stomacher bag, brought to the laboratory in a cool box (2 to 5°C) and analyzed within 3 hours of sampling.

2. Bacteriological culturing

The following bacterial colony counts per gram of faeces were assessed:

- Enterobacteriaceae, in poured plates of violet red bile glucose agar (VRBG, Oxoid CM485) with a similar overlay, after 24 h of incubation at 37°C.
- *Campylobacter jejuni/coli* on spread plates of Preston campylobacter medium. Additionally, the presence or absence of *Campylobacter jejuni/coli* was performed on 1 gram of each sample by means of selective enrichment in 9 ml of Preston broth. The culturing procedures and confirmation are described in detail in Weijtens et al. (1993).

Results

Campylobacter could not be isolated from the 40 faeces samples of the SPF-farm of the CVI, nor from the 5 faeces samples of the porkers of farm 1. Four of the 60 samples collected from pigs on farm 2 were shown to be positive for campylobacter. All the faeces samples of the three top-breeding farms (the farms 3, 4 and 5) were positive for campylobacter. Table 1 gives the results of the counts of Enterobacteriaceae and campylobacter in the faeces samples of the pigs of the different farms and the numbers of positive samples for campylobacter in 1 g of faeces.

Discussion

Campylobacter could not be isolated from the 40 faeces samples collected on the SPF-farm; as this farm houses only 55 sows in total, it is very probable that it is free of campylobacter. This is not surprising if you consider that the farm started in 1980 with piglets born by caesarean section in a SPF-environment and housed immediately in the SPF-farm, without any previous contact with other animals, including their (potentially infected) mothers. The SPF-farm can be considered to be a `closed box', the building, ventilation and hygiene being such that introduction of pathogens from outside is very unlikely.

The results of the sampling of the porkers of farm 1 suggest that these porkers were free of campylobacter, too. Even if samples have been collected only once from these pigs, the results are convincing when you consider that the prevalence of campylobacter in porkers is very high in The Netherlands (Weijtens, 1993): nearly 90 % of the porkers are contaminated with high numbers of campylobacter (3.2 in logN/g of faeces). The results of farm 1 show that it is possible to raise pigs free of campylobacter when the piglets are free at the start of the fattening period.

The results of the samplings of farm 2 are in contrast with the results of the farms 3, 4 and 5. Whereas only 4 of the 60 faeces samples of farm 2 were positive, all 45 samples of the top-breeding farms were positive.

This is a very significant difference if you consider that the four farms did not differ very much from each other regarding construction, farm hygiene and husbandry practices. This again emphasizes the importance of a 'campylobacter-free' start of a farm.

Despite the significant difference in prevalence of campylobacter between farm 2 and the top-breeding farms, it is to be noticed that campylobacter has been able to contaminate the farm after campylobacter-free sows had been introduced 2.5 years ago. This emphasizes the importance of strict hygiene in the elimination of campylobacter. A start with campylobacter-free animals is obviously a conditio-sine-qua-non, but without strict hygienic rules, contamination with campylobacter from the environment is very likely to occur on the farm. A possible horizontal infection complicates the elimination of campylobacter from the pig population. A once settled infection is hard to combat in a piggery because piggeries don't practice all-in all-out under normal production circumstances. This in contrary to fattening farms where horizontal recontamination is easier to cure, as long as the new piglets are free of campylobacter.

Conclusion

It is possible to raise pigs free of campylobacter when a start is made with campylobacter-free animals and strict hygiene measures are respected. As recontamination is difficult to cure in piggeries, control of the hygiene is especially critical on these farms.

References

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