

Effect of feed particle size and processing on bacterial community structure in the stomach of pigs

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Feed particle size and processing have a marked effect on physical, chemical and microbiological properties in the stomach of growing pigs. We previously reported that pigs fed a coarse non-pelleted feed have a more dense population of bacteria and a different profile of organic acids produced in their stomach than pigs fed a fine and pelleted feed. The coarse non-pelleted feed also resulted in a significantly higher in vitro death rate of *Salmonella* in stomach content and a reduced number of enterobacteria (i.e., *E. coli* and *Salmonella*) throughout the gastrointestinal tract (Mikkelsen *et al.* 2004). These results indicate that a coarse non-pelleted feed stimulates microbial activity and induces changes in microbial composition in the stomach of pigs. The aim of the present study was to investigate the effect of particle size and processing on bacterial community structure in the stomach of pigs using Terminal-Restriction Fragment Length Polymorphism (T-RFLP) analysis.

Samples for the T-RFLP analysis were collected from a total of 24 crossbreed Danish Landrace x Yorkshire pigs. The experimental treatments were feeds ground at two levels, fine (F) or coarse (C) and fed either as non-pelleted (NP) or pelleted (P) feed (2 x 2 factorial design). The resulting four treatment groups (n = 6) were fine non-pelleted (F-NP), fine pelleted

(F-P), coarse non-pelleted (C-NP) or coarse pelleted (C-P) feed.

Significantly more T-RFs were observed in stomach samples from pigs fed the C-NP feed as compared with pigs fed the other experimental feeds. These T-RFs were alike and consistently observed within the six replicate pigs, indicating that specific bacterial species in the stomach of the pigs were stimulated by the C-NP feed. The T-RFs were tentatively identified by comparing their lengths in base-pair with theoretical T-RF lengths predicted from known 16S rRNA gene sequences (from own pig isolates or GenBank). Several of the T-RFs could be assigned to lactobacillus species (Figure 1). The phylogenetic interference of the T-RFs was verified by performing the T-RFLP analysis with another four restriction enzymes. In conclusion, the present study has demonstrated that growth of lactobacilli is stimulated in the stomach of pigs fed a coarse non-pelleted feed.

Mikkelsen, L.L., Naughton, P.J., Hedemann, M.S. and Jensen, B.B. (2004). Effect of physical properties of feed on microbial ecology and survival of *Salmonella enterica* Serovar Typhimurium in the pig gastrointestinal tract. *Applied and Environmental Microbiology* 70(6), 3485–3492.

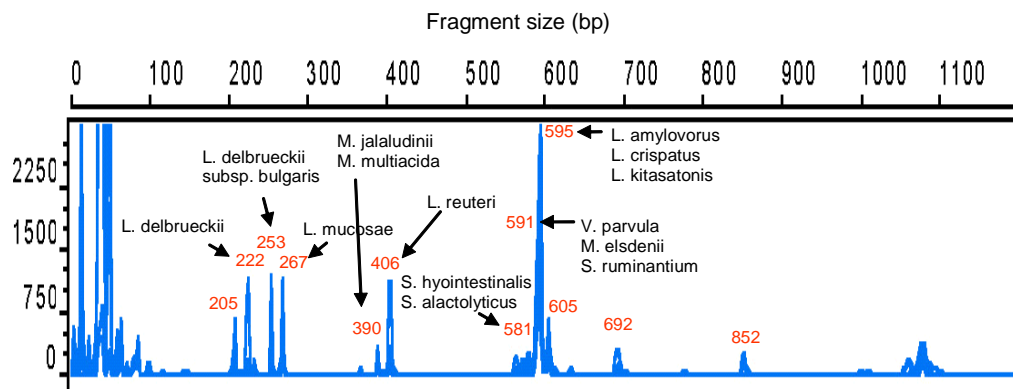


Figure 1 Six T-RFLP profiles (stacked) of stomach samples taken from pigs fed the coarse, non-pelleted feed. Tentative identifications are given for some of the T-RFs.