ISOLATION OF BRACHYSPIRA PILOSICOLI FROM ENVIRONMENTAL AND OTHER SOURCES ON A PIGGERY

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Introduction
The intestinal spirochaete Brachyspira pilosicoli causes intestinal spirochaetosis (IS), a diarrhoeal disease of pigs and other species. This condition is widespread, though often undiagnosed, and causes losses to the pig industry through reduced growth rates and poor feed conversion (1). Relatively little is known about the epidemiology of the infection, although it is assumed that faecal-oral cycling between pigs is responsible for transmission within and between piggeries. Nevertheless, other animals and birds have been shown to be colonised by this organism, and they may play a part in transmission. There is evidence that B. pilosicoli can be transmitted between species. In a study in Papua New Guinea, pulsed field gel electrophoresis was used to show that some isolates of B. pilosicoli from humans were identical to strains isolated from dogs (2). In addition, experimental infection of day-old chicks and newly weaned pigs using human strains of B. pilosicoli has induced disease consistent with porcine IS (3). Survival of this organism in contaminated slurry or water may also play a part in persistence of infection in a piggery. B. pilosicoli is able to withstand adverse environmental conditions better than B. hyodysenteriae (the causative agent of swine dysentery), and B. pilosicoli has been isolated from the faeces of waterbirds and water in a lake that supported a large bird population (4).

The purpose of this study was to investigate environmental and other sources of B. pilosicoli that could be involved in the cycle of infection on a piggery.

Materials and Methods
This study was conducted on a research station where poultry, sheep and kangaroos were also housed. Faeces from 72 weaner and grower pigs in the research piggery, and from 65 chickens, 14 emus, six sheep, two kangaroos and two human piggery workers were cultured for B. pilosicoli, as were 38 faecal samples from wild ducks living on an effluent pond. Twelve samples of this piggery effluent water and a sample of solid pig waste from the lagoon were obtained, and the drinking water for the chickens and pigs, which came from an underground bore, was also sampled. All the water samples were centrifuged at 1037 x g for 10 minutes before the resulting pellet was streaked onto selective plates.

All specimens were cultured on selective Trypticase Soy agar plates supplemented with 5% defibrinated ovine blood, 400 µg of spectinomycin/ml, and 25 µg each of vancomycin and colistin/ml. These were incubated anaerobically at 37°C for up to 14 days. Surface growth on the plates was harvested and subjected to an B. pilosicoli-specific polymerase chain reaction amplifying a portion of the 16S rRNA gene (5).

Results
B. pilosicoli was isolated from four of the 74 (5.4%) porcine faecal samples, whereas the specific PCR applied to the growth on primary isolation plates detected B. pilosicoli DNA in nine (12.2%) of the specimens. Four isolates (10.5%) of B. pilosicoli were obtained from the feral ducks, and these were also detected by PCR analysis. One isolate (8.3%) was obtained from the effluent water samples, whilst five samples (41.6%) were PCR positive. B. pilosicoli DNA was also detected in two (3.1%) of the chicken faecal samples, however none was found in the solid pig waste, emu, sheep or human samples nor in the pig and chicken drinking water. No further isolations of B. pilosicoli were made.

Other weakly beta-haemolytic Brachyspira spp., distinct from B. pilosicoli as judged by PCR, were isolated from the chickens, ducks, effluent water and pigs, but these were not characterised further. Spirochaetes also were isolated from one kangaroo sample (50.0%), and these were identified as B. intermedia using multilocus enzyme electrophoresis. This is the first time that intestinal spirochaetes have been isolated from a kangaroo.

Discussion
This study confirmed that PCR from the surface of the primary isolation plates is more sensitive for detecting B. pilosicoli than is selective culture alone. Between 5-10% of the pigs sampled were positive for B. pilosicoli, and this organism has previously been associated with cases of colitis on the piggery. The study also has shown that B. pilosicoli can be isolated from effluent water and feral water birds on a piggery where B. pilosicoli infection was present in pigs. Interestingly, there was evidence that the spirochaete also was infecting chickens on the piggery. It is known that B. pilosicoli can survive in water for several months (4), and it is reasonable to assume that it might survive in pig effluent and have been passed on to the ducks. Alternatively the ducks may have already been colonised from other sources, and they may represent an important reservoir of infection for pigs where they are present on ponds located near pig houses.

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References