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THE EPIDEMIOLOGY OF INFECTIONS  
BY  
STREPTOCOCCUS SUIS TYPES 1 AND 2

A thesis presented in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Veterinary Pathology and Public Health at Massey University.

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## ABSTRACT

An Indirect Fluorescent Antibody Test (I.F.A.T.) was developed for the identification of carriers of Streptococcus suis. This test was more accurate than the "traditional" cultural techniques. The sensitivity for detecting S. suis type 1 from tonsillar swabs was 62%, and 76% for S. suis type 2. For nasal swabs collected from live pigs the sensitivity was 48% and 60% respectively.

From the examination of 959 non specific pathogen free domesticated pigs from 63 herds, 263 specific pathogen free (SPF) pigs from seven herds and 96 feral pigs it is concluded that all non-SPF domesticated pigs older than five weeks of age are infected with both S. suis types 1 and 2. Variation in the apparent prevalence of infection between different herds was associated with the number of pigs sampled in each herd rather than a real variation in the prevalence and was similar in both New Zealand and Australian non-SPF domesticated pigs. Three of seven SPF herds tested in Australia were free from infection with S. suis types 1 and 2. It is proposed that all SPF pigs are delivered free from infection and that infection is subsequently introduced into the piggery.

Streptococcus suis was detected from numerous tissues and fluids including the blood of normal pigs. It is suggested that the isolation of S. suis from "diseased" tissue does not infer that S. suis was the primary aetiological agent.

Although both S. suis types 1 and 2 were readily detected in the environment of pigs housed in an intensive piggery, the main routes of transmission were considered to be direct contact or neonatal infection of piglets born to sows with vaginal infections.

Based on serological results from using an Enzyme Linked Immunosorbent Assay (ELISA), the pattern of infection due to S. suis types 1 and 2 was similar in domestic pigs. In feral pigs the pattern of infection due to S. suis type 2 was similar to that of domestic pigs, but in the case of S. suis type 1 the prevalence and titres were considerably lower in feral pigs. It is concluded from these results,

that both domestic and feral pigs are true long term carriers of S. suis type 2 whilst S. suis type 1 is maintained within a population by a series of reinfections dependent on the population density.

There was no evidence of ascending uro-genital infection or signs of clinical disease in 24 bacon weight pigs inoculated with S. suis type 1 or 2 by either the intravaginal or intrapreputial routes. When two litters of previously non-infected pigs were intranasally inoculated with S. suis, no pigs developed clinical signs. The results of this experiment showed that the infective dose was less than 100 organisms by this route. Only one of eight pigs developed "classical" clinical signs after intravenous inoculation with a porcine isolate of S. suis type 2. Some pigs remained apparently normal even though high numbers of organisms were present in the blood for up to two weeks. Only two of fourteen pigs inoculated with S. suis type 2 into the cerebro-spinal fluid (C.S.F.) developed signs of clinical disease. Both these pigs were inoculated with a human strain of S. suis type 2. To explain these results it is proposed that strains of S. suis of different pathogenicity exist. This hypothesis was supported by the findings that this human strain was also pathogenic for mice, rats and rabbits whilst the porcine isolate was pathogenic only for rabbits.

A cross-sectional study of various occupational groups showed a positive correlation between contact with pigs and being seropositive to S. suis type 2. No veterinary students, 10.3% of meat inspectors, 14% of dairy farmers who also kept pigs and 21.4% of pig farmers were seropositive. In exposed pig farmers the annual incidence of sero-conversion could be as high as 30%. It is believed that subclinical infection of humans, as well as pigs, occurs and that isolates pathogenic for pigs are also pathogenic for other species of animals including man.

It is hypothesized that S. suis is endemic in pigs at a prevalence rate approaching 100% in all countries where pigs are kept. The pathogenicity of isolates can vary and this could account for variations in the severity of disease reported throughout the world. It is concluded that S. suis is usually a commensal and is involved in a disease process only when pathogenic strains are present and after some other primary insult.

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