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TRANSMISSION OF *CAMPYLOBACTER JEJUNI* IN BROILER CHICKENS

A thesis presented in partial (50 %) fulfilment of the requirements for the degree of

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ABSTRACT

Investigations were carried out aimed at identifying potential sources of transmission of *Campylobacter jejuni* to broiler chickens, determining whether boots can mechanically transmit *C. jejuni* to susceptible chickens, determining the transmission rate of *C. jejuni* in broiler chickens, and assessing the effect of washing slaughterhouse fomites with chlorinated water on the level of *C. jejuni* contamination during the day.

Bacteriological culture of samples taken in the premises of a broiler slaughterhouse showed that after washing and just before departure for depopulation of broiler farms, 75%, 58.33%, 47.22%, 50%, 54.29%, 66.67%, 31.25%, and 0% of pallets, crates, truck beds, truck wheels, drivers' boots, catchers' boots, forklift wheels, and tractor wheels respectively, were contaminated with *C. jejuni*. Therefore it was concluded that slaughterhouse personnel and fomites could potentially transmit *C. jejuni* during partial depopulation of broiler flocks.

The level of *C. jejuni* in consecutive sample batches of fomites (n = 30) that were collected in six periods of one hour each day (hence six batches), between 0530 and 1230 hrs, over six days, was found to range from 44.83% in the 1st batch and 66.67% in the 5th batch, indicating that washing fomites with pressurized chlorinated water makes no statistically significant difference ($p>0.05$) in the contamination level. The fomites sampled were pallets, crates, truck bed, truck wheels, and drivers' boots.

Susceptible broiler chickens became colonized with *C. jejuni* after exposure to boots that had been worn in a pen with infected chickens demonstrating that boots can mechanically cause horizontal transmission of the bacterium.

A transmission study conducted by introducing a bird infected with *C. jejuni* to 99 susceptible chickens demonstrated a rapid spread of the infection to all the birds within 48 hours and a transmission rate best represented by a simple epidemic curve. A transmission parameter beta (β), with a value of $2.1 \times 10^{-3} \pm 0.013 \times 10^{-3}$ (mean ±

standard error), was calculated by fitting the data into a simple deterministic epidemic model. The transmission rate in a population of 100 birds, predicted by this model, was very similar to that obtained in the experiment. Therefore, it was concluded that the transmission rate of *C. jejuni* in broilers resembles a simple epidemic.

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