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Evaluation of the vector competence of *Dermacentor variabilis* (American dog tick) for transmission of *Francisella tularensis*

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Ticks have historically been considered important biological vectors of *Francisella tularensis*, the etiological agent of tularemia, because they can transmit the bacteria to humans as well as propagate the organism in zoonotic cycles. In the United States, the American dog tick, *Dermacentor variabilis* is considered among the most important species involved in enzootic maintenance and for bridging *F. tularensis* from zoonotic cycles to humans. The geographic distribution of this tick is concordant with states reporting the highest incidence of tick-borne tularemia (Missouri, Arkansas, and Oklahoma). Immature life stages of *D. variabilis* (e.g., larvae and nymphs) are thought to be associated with enzootic transmission, whereas adult *D. variabilis* have been implicated in outbreaks of human tularemia in South Dakota and endemic transmission in other parts of the United States. Although there is strong historical evidence implicating *D. variabilis* with tick-borne tularemia cases, there have not been any recent studies comparing the vector efficiency of *D. variabilis* subsequent to the recognition of epidemiologically significant differences among *F. tularensis* subspecies and clades (A1, A2 and type B). In this study we compared nymphal transmission rates of *D. variabilis* infected as larvae with wild type strains of A1, A2 and type B as well as bacterial kinetics of the infection in ticks, and the fitness cost of infection was compared to uninfected ticks. Transmission of *F. tularensis* to 6 week old Swiss Webster mice was not observed with clade A1 (n = 37), and low rates were observed with clade A2 (8.0 %; n = 25) and type B (13.5 %, n = 37). Bacterial loads determined at specific time periods (1 day post-infection, pre-molt, post-molt, day of nymphal feed and post-nymphal feed) suggest that A1, A2 and type B *F. tularensis* replicate significantly during the nymphal bloodmeal. On average, we observed a 2.2 log increase in bacterial loads between unfed and replete nymphs. We also observed a significant difference in the survivorship of uninfected nymphs (68.3 %) compared to A1- (31.7 %), A2- (18.0 %) and type B-infected (29.8 %) nymphs 63-70 days post-larval blood meal. Our results provide evidence for a high fitness cost and low transmission rates during the immature stages, suggesting that *D. variabilis* may play a limited role in enzootic maintenance of *F. tularensis*.