

**Development of *Brucella abortus* RB51**

**as a Vaccine to Protect Against**

**Brucellosis and Anthrax**

**By**

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# **Development of *Brucella abortus* RB51 as a Vaccine to Protect Against Brucellosis and Anthrax**

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## **Dissertation Abstract**

*Bacillus anthracis* is a facultative extracellular bacterial pathogen that causes cutaneous, gastrointestinal or respiratory disease in many vertebrates, including humans. Commercially available anthrax vaccines for immunization of humans are known to provide protection of limited duration and may not protect against the respiratory form of the disease. Commercially available live vaccines for animals have been shown to cause disease in certain species. *Brucella abortus* is a facultative intracellular bacterium that causes chronic infection in animals and humans. As with other intracellular pathogens, cell mediated immune responses (CMI) are crucial in affording protection against brucellosis. *B. abortus* strain RB51 has been shown to be useful in eliciting protective CMI and antibody responses against *Brucella* in cattle and other animal species. Since the protective antigen (PA) of *B. anthracis* is known to induce antibodies, the *pag* gene encoding PA was expressed in *B. abortus* RB51, producing a dual vaccine to protect against both brucellosis and anthrax. In a previous study, the entire *pag* gene was expressed in strain RB51 and following immunization the vaccine induced antibodies against PA in A/J mice. However, PA stability and protective efficacy were less than desirable as only 1/6 were protected. The studies in this dissertation involved synthesizing a gene corresponding to domain 4 (PA4) of the *pag* gene utilizing the native codon usage of *Brucella*. The PA4 domain was fused to *Brucella* signal sequences of *Brucella* 18kDa protein, superoxide dismutase or no signal sequence to localize the PA4