DNA Vaccine to Protect Cattle Against Texas Tick Fever (bovine babesiosis)

The Texas cattle industry is threatened by reestablishment of the Fever Tick (*Boophilus*) that transmits *Babesia bovis* and *Babesia bigemina*, protozoan blood parasites that cause Texas Tick Fever (bovine babesiosis). The disease was eradicated 55 years ago by a 36-year campaign that purged the vector tick from the southern U.S. Despite a quarantine buffer zone maintained along the Rio Grande for the past 50 years, today Fever Tick outbreaks are occurring in Texas, placing the industry at risk for cattle production losses and mortality due to babesiosis. Climatic change has led to expanded habitat for Fever Ticks, which will facilitate their spread to other states and introduce bovine babesiosis to highly susceptible livestock. No Tick Fever vaccine exists, and treatment options are limited. Recent success in malaria control using DNA vaccines targeting a *Plasmodium* surface protein, apical membrane antigen-1 (AMA-1), that functions in parasite invasion into the host cell suggests its anti-*Babesia* potential. The *Babesia* AMA-1 homologue has similar function. *Babesia* cysteine protease is critical to parasite reproduction. A combination vaccine that interrupts the function of these two parasite proteins has the potential to prevent bovine babesiosis.

Process

- Construction of vaccine plasmid constructs containing *B. bovis* and *B. bigemina* AMA-1 and cysteine protease genes
- Expression of recombinant *B. bovis* and *B. bigemina* AMA-1 proteins and cysteine proteases
- Inoculation of cattle following a prime (DNA vaccine)-boost (recombinant protein) regimen
- Test for seroconversion
- Test efficacy by challenge infection

Outcome

- Efficacious DNA-based vaccine to protect against bovine babesiosis

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