

## Kansas State University Research Foundation TECHNOLOGY LICENSING PROFILE

## A Recombinant Ehrlichia ruminantium MAP1 subunit vaccine

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**Description:** Researchers at Kansas State University have created a DIVA-compatible (differentiate infected from vaccinated animals) subunit vaccine candidate for *Ehrlichia ruminantium* (heartwater). The vaccine consists of glycosylated *E. ruminantium* immunodominant major antigenic protein (MAP1). The use of glycosylated MAP1 is based on the hypothesis that glycans contained in the antigenic protein (MAP1) are important epitope determinants that contribute to induction of protective immunity in vaccinated animals. Using a eukaryotic recombinant baculovirus expression system, KSU expressed and characterized, for the first time, a glycoform profile of MAP1 of two Caribbean *E. ruminantium* isolates, Antigua and Gardel.

Heartwater, or cowdriosis, is a tick-borne disease of domestic and wild ruminants that is endemic in the Caribbean and sub-Saharan Africa. The disease is caused by the intracellular pathogen *Ehrlichia ruminantium* and may be fatal within days of the onset of clinical signs with **mortality rates of up to 90% in susceptible hosts**. Due to the presence of competent tick vectors in North America, there is substantial risk of introduction of heartwater with potentially devastating consequences to the domestic livestock industry. There is currently no reliable or safe vaccine for use globally.

Early Results: Three groups of sheep (n = 3-6) were vaccinated with increasing doses of a bivalent (Antigua and Gardel MAP1) rMAP1 vaccine cocktail formulation with an adjuvant. The glycosylated recombinant subunit vaccine induced *E. ruminantium*-specific humoral and Th1 type T cell responses, which are critical for controlling intracellular pathogens, including *E. ruminantium*, in infected hosts.

Future plans: Perform proof-of-concept efficacy studies against homologous challenge

## Advantages:

- DIVA Compatible
- K-State has the necessary expertise and facilities to work with this pathogen for further collaborative animal studies with a company partner

**Applications:** Vaccine for cattle and other ruminants

## Patent Status: Patent Pending