

# 牛流行熱油質疫苗研發

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## 摘要

牛流行熱是由桿狀病毒經庫蠓媒介傳染的發熱性疾病，台灣在 1967 年首次傳出疫情後，平均每 2 到 6 年爆發流行一次，為國內常在性疾病，除使牛隻產生高熱、呼吸症狀、關節疼痛等臨床症狀之外，泌乳量亦遽減，造成重大經濟損失。目前防疫政策建議小牛完成接種 2 劑疫苗之基礎免疫後，每半年需補強注射 1 劑，然而根據血清中和抗體監測結果，不分廠牌，成牛補強疫苗後約 1 個月抗體達到最高峰，之後便逐漸衰退，無法維持長久之高峰期以達到疫苗補強前足夠的保護效果。本所製作之牛流行熱不活化疫苗以水質磷酸鋁膠作為佐劑，具有安全性高、可迅速誘發抗體產生的特性，但高峰期持續時間不長卻是缺點，由於牛隻牛流行熱抗體表現與疫情的發生具關連性，為防範牛流行熱疫情造成養牛戶經濟上嚴重損失，於今年開始研發牛流行熱油質佐劑疫苗。市售合適之油質佐劑與元培科技大學梁弘人副教授研發之新型佐劑再加上對照組，共計 10 組於小鼠進行安全性及效力試驗。小鼠間隔 2 周完成 2 劑基礎免疫後，於半年後再補強接種 1 劑疫苗，大部分組別接種後均正常，僅 2 組注射部位出現嚴重之紅腫發炎反應；中和抗體揚升情況則以磷酸鋁膠組、無油成分佐劑膠 CPC 組與 MCPC 組、出現紅腫反應的 PTH 與 PTH-D 組最佳，每隻小鼠抗體力價均可達 1024 倍以上。預計明年將進行牛隻試驗，冀能篩選出安全性高、可迅速誘發抗體產生且高峰期長的佐劑，以取代現有的磷酸鋁膠來製作牛流行熱不活化疫苗，達到有效預防牛流行熱的目標。

# **Development of Bovine Ephemeral Fever Oil Vaccine**

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## **Abstract**

Bovine ephemeral fever (BEF) is an arthropod-borne disease caused by rhabdovirus. In Taiwan, the first outbreak of BEF occurred in 1967, with recurrent outbreaks occurring every two to six years thereafter. This febrile disease has caused serious economic damages to the dairy and grazing industry by reducing milk production and raising cull rates. A vaccination program has been implemented which requires two shots of attenuated vaccine in calves and one booster every half year thereafter. According to serum neutralizing (SN) antibody titers of cattle inoculated with BEF vaccine, the highest titer was observed one month after inoculation, and then dropped gradually after a few months. Although the conventional aluminum phosphate (Al-gel) vaccine is safe and induces a quick immune response, the high antibody titer does not last long enough to provide effective herd immunity. In order to minimize the financial losses caused by this disease, the aim of the study was to develop an oil-based inactivated vaccine for its longer immunity than that of a conventional, water-based vaccine. A total of fifty mice were divided into ten groups and were inoculated with two doses of the same amount of antigen with different adjuvants in two week intervals. Six months later, the mice in each group received one booster shot. The results revealed that most mice showed no adverse reaction after vaccination except the ones in PTH and PTH-D groups. Although the skin around the injection sites appeared seriously red and swollen in these two groups, the mice developed a rapid and high level of SN antibody response against BEF virus. Similar results were also observed in the Al-gel, CPC and MCPC groups. In addition, the antibody titers of each mouse in these five groups were higher than 1:1024 after 3 rounds of vaccination. We plan on conducting safety and efficacy trials for these vaccines on cattle in the coming year. We hope to find an adequate and safe adjuvant capable of conferring long-term herd immunity thus replacing the original Al-gel for the BEF inactivated vaccine.