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High potency vaccines against FMD (O+A+Asia1) - *Strategic preparedness in Southeast Asia.*

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Introduction

Foot-and-mouth disease (FMD) remains a major transboundary animal disease (TAD) affecting livestock productivity and trade across Southeast Asia. In this region, serotype O is the most prevalent, followed by serotype A. Although serotype Asia 1 has not been detected since 2017, the use of a vaccine combining O+A+Asia1 serotypes represents a strategic approach to enhance regional preparedness. This study assesses the immune response and efficacy of FMD vaccines containing O1 Campos, A24 Cruzeiro, A2001 Argentina strains and Asia1 TUR 2015 strain.

The results demonstrate their capacity to induce a robust and long-lasting immune response after one dose and provide strong protection against homologous viral challenge.

Materials and Methods

Single emulsion water in oil vaccines containing O1 Campos, A24 Cruzeiro, A2001 Argentina and Asia1 TUR 2015 vaccine strains were produced in Argentina following Good Manufacturing Practices (GMP), ensuring consistency in quality and safety. Vaccines were assessed for safety and potency in FMD-seronegative cattle following a single 2 ml dose in a controlled trial supervised by SENASA, the WOAH FMD Reference Laboratory based in Buenos Aires. Virus Neutralization Tests were performed according to the WOAH *Terrestrial Manual*. Potency studies by challenge (PD50 "50% protective dose") were conducted in accordance with European Pharmacopoeia at the Wageningen Bioveterinary Research, the FAO FMD Reference Laboratory, based in Lelystad, Netherlands.

Results

A single vaccine dose induced strong neutralizing antibody responses in cattle against homologous FMD virus strains. Detectable titers above the established threshold were observed, reaching a peak between 90 and 120 dpv, and remained elevated for at least 180 dpv. In contrast, sera of non-vaccinated cattle were negative at all bleeding times (Figure 1).

Each vaccine strain demonstrated high potency in cattle, with value of at least 32 PD_{50} per dose, exceeding the minimum requirement established by WOAH (Table 1).

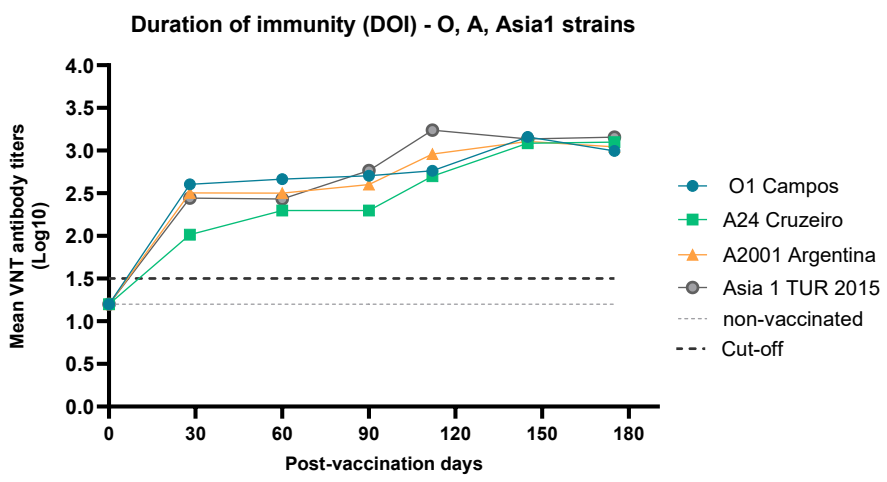

Figure 1. Duration of immunity in cattle after single vaccination for O1 Campos, A24 Cruzeiro, A2001 Argentina and Asia 1 TUR 2015 strains

Table 1. Potency by challenge in cattle of O1 Campos, A24 Cruzeiro, A2001 Argentina and Asia1 TUR 2015

Laboratory	Challenge virus	Result
The Wageningen Bioveterinary Research Institute. Lelystad, Netherlands.	O1 Campos	≥ 32 PD_{50}
	A24 Cruzeiro	≥ 32 PD_{50}
	A2001 Argentina	≥ 128 PD_{50}
FMD Reference Center (FAO)	Asia1 TUR 2015	97 PD^{50}

Conclusions

FMD vaccines containing O1 Campos, A24 Cruzeiro, A2001 Argentina, and Asia1 TUR 2015 strains induced a strong and long-lasting immune response following a single dose. Each antigen component demonstrated high potency, exceeding 32 PD_{50}, above the threshold for high-potency vaccines. These results support the vaccine's strategic value for effective FMD control in endemic and high-risk areas across Asia, including Southeast Asia.

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