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A Trial for Preparation of Mucosal Vaccine for Foot and Mouth Disease Virus

A Thesis Submitted By

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ABSTRACT

Mucosal vaccines for foot and mouth disease virus are expected to block viral entry, thus, limiting (FMDV) spread in the cattle herd. Immunization strategy based on both mucosal and systemic immunity platforms is greatly needed to control FMD. In this study, several immunization strategies, using two foot and mouth disease vaccine formulations, including Montanide ISA 206 oil - based FMD inactivated vaccine and Montanide IMS 1313 VG N PR - based concentrated semi-purified FMD mucosal vaccine were applied. Results of intra nasal immunization with the prepared FMD mucosal vaccine given, once or twice, induced IgA levels in both nasal and salivary secretions besides a high response of lymphocyte proliferation with protection levels reaching 20% and 40%, respectively, in a challenge trial in cattle. Prime boost strategy based on the administration of mucosal vaccine followed by inactivated vaccine appeared to be the most potent strategy, achieving 100% protection against an FMDV challenge. Indeed, the study reports the efficacy of the prepared IMS 1313 FMD mucosal vaccine and the possible use of this vaccine in the context of different vaccination strategies to control FMDV.

Keywords:FMDV; mucosal vaccine; immunization strategy; prime boost.

Contents

LIST OF TABLES

LIST OF FIGURES

List of Abbreviation

AEI	Acetyl ethylene imine
APCS	Antigen presenting cells
BEI.	binary ethylene imine
BHK 21	Baby hamster kidney cells
BID_{50}	Bovine infective dose fifity
CPE.	Cyto-pathic effect
DNA	Deoxyribonucleic acid.
DDW	Double Distilled water
ELISA	Enzyme linked immunosorbent assay.
FMDV	Foot and mouth disease virus
IL	Interleukine
IRES	Internal ribosome entry site
IgA	Immunoglobulin A
IgG	Immunoglobulin G
I.U	International unit
I/N	Intranasal.
KDa	Kilo dslton
L pro	Leader protein
MALT	Mucosal associated lymphoid tissue
MEM	Minimal essential medium
M cells	Micro-fold cells
Min	Minutes
µl	Micro liter.
mg	miligram

mRNA	Messenger RNA.
NALT	Nasopharynx Associated lymphoid tissue
Nm	Nanometer
NSP	Non structural proteins
OIE	Office des epizootic international (World Animal health organization).
O.D	Optical density
PBS	Phosphate buffer saline
PEG	Poly etyhylene glycol
pH	Hydrogen Ion Concentration.
PBMC	Peripheral blood mononuclear cells
PD_{50}	Protective dose fifty
PI	Proliferative indec
RNA	Ribonucleic acid.
RPM	Round per Minute.
RPMI	Roswer park Memorial Institute
S	Svedberg unit
SD	Standard deviation
S/C	Subcutaneous.
SNT	serum neutralization test
ss	Single stranded.
$TCID_{50}$	Tiissue culture infective dose fifty
UTR	Un translated region
VNT	Virus Neutralization Test
VP	Viral protein

VSVRI	Veterinary Serum and Vaccine Research Institute
TlRS	Tol like receptors
UV	Ultraviolet