Foot and mouth disease has been the scourge of cloven-hoofed animals since long before its identification in 1898 and still continues to be so 106 years later. This is enough proof of the tenacity of the virus to mould itself to the changing scenarios in the field of animal health and survive the test of time. The impact of the disease is quite prodigious on the economic front. Consequently, a great amount of stress is laid on the control of the disease, which in turn is dependent on the efficacy of the vaccines which used to control the disease. Currently used inactivated vaccine, though effective in generating a good protective immune response, has several limitations. Hence, need to search for newer vaccines to circumvent these limitations. Recent developments in recombinant DNA technology and DNA
vaccines, has enabled researchers to envisage ideal vaccine, which could combine the efficacy of the conventional inactivated vaccines while trying to circumvent the inherent disadvantages. This work is an attempt to design and evaluate the efficacy of bovine Interleukin 18 (IL18) adjuvanted gene vaccine against FMDV delivered by cationic PLG micro particles.

Interleukin 18 (IL18) modulates immune functions by inducing interferon-γ (IFNγ) production and promoting Th1 immune responses. Gene coding for bovine Interleukin 18 (bIL18) was amplified by RTPCR from con A stimulated bovine macrophages and cloned into pcDNA3.1+ under CMV promoter. The cloned bIL18 gene was sequenced and found to be matching with what was reported sequences. Nucleotide and the deduced amino acid sequence of the *Bos indicus* IL18 showed an identity of 86-98% with IL18 sequences of the other ruminants compared. Bovine IL18 sequence was subcloned in pET32a expressed in *E.coli*. Expresson of 42kDa (24kda BIL18 protein+18kda fusion tag from the pET32R vector) fusion protein was confirmed by SDS PAGE followed by western blot using human IL18 Mabs. Matured protein obtained by caspase I treatment. Expressed Il18 was protein purified through Ni-NTA agarose column under strong denaturing conditions. The biological activity of the purified protein was analysed by its ability to induce IFN-γ production in PBMC measured by Enzyme linked
immunosorbent assay (ELISA) and quantitative polymerase chain reaction (qPCR).

Gene coding for FMDV P1-2A-3C was amplified from already available clone in lab. The amplicon was cloned into pcDNA3.1+ under CMV promoter. The gene was sequenced and found to be in agreement with is reported. P1-2A-3C expression was conformed in BHK-21 cells which reacted, specifically in western blot.

Cationic PLG microparticle prepared by solvent evaporation method and the size of the particles was analysed by Electron microscope. The plasmid DNAs carrying the genes of interest were extracted in bulk from large cultures of E.coli transfected with the corresponding plasmids by alkali lysis method. The DNA was ctab precipitated and endotoxin-free, supercoiled DNA isolated. The DNA was quantitated spectrophotometrically and employed for inoculation in guinea pigs and cattle in separate experiments.

Initially the DNA vaccine constructs were evaluated in guinea pigs. The animals were inoculated with 10µg/dose of plasmid and booster was given after 21 days of first inoculation. The animals were bled before vaccination (day ‘0’) or pre vaccinated 14, 21 and 35 days after first vaccination. The humoral responses analyzed by sandwich ELISA and SNT CMI responses by MTT have shown higher responses in the group inoculated with P1-2A-3C-p CDNA+IL18+PLG and P1-2A-3C–p
CDNA+IL18. These animals were fully protected when challenged with homologous virus.

To evaluate the efficacy of these constructs in natural host cattle FMD antibody free animals (male indigenous breeds of 6 months to 1 year age) of were vaccinated with the DNA vaccine constructs (200µgs) along with controls and conventional vaccine. The animals were given after 21 days. Sera samples collected at 0, 14, 21 and 28 days post vaccination were analysed for humoral and CMI responses. P1-2A-3CpcDNA+ IL18 construct gave higher immune response than the remaining vaccine formulations. When challenged with 10000 cattle infective doses, P1-2A-3CpcDNA+ IL18 protected four of the six where as P1-2A-3CpcDNA protected only one and conventional vaccine three of the six animals.