

**COMPARISON OF THE
ADAPTIVE IMMUNE
RESPONSES INDUCED BY
FMD-VACCINES
FORMULATED WITH 146S
AND 75S PARTICLES IN MICE
AND CATTLE**

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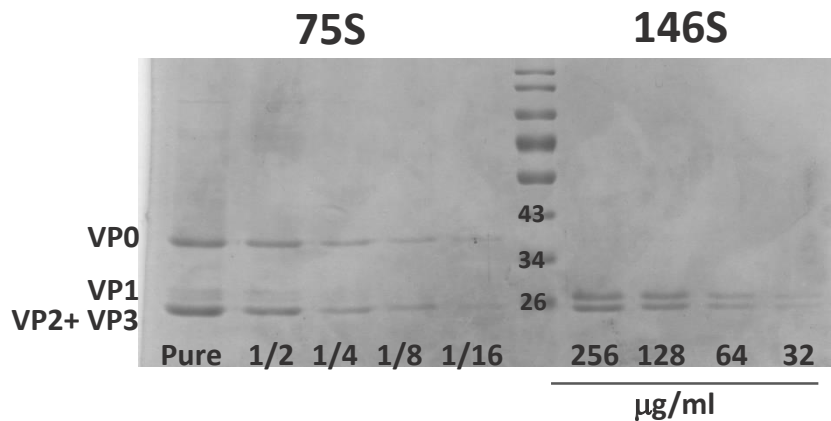
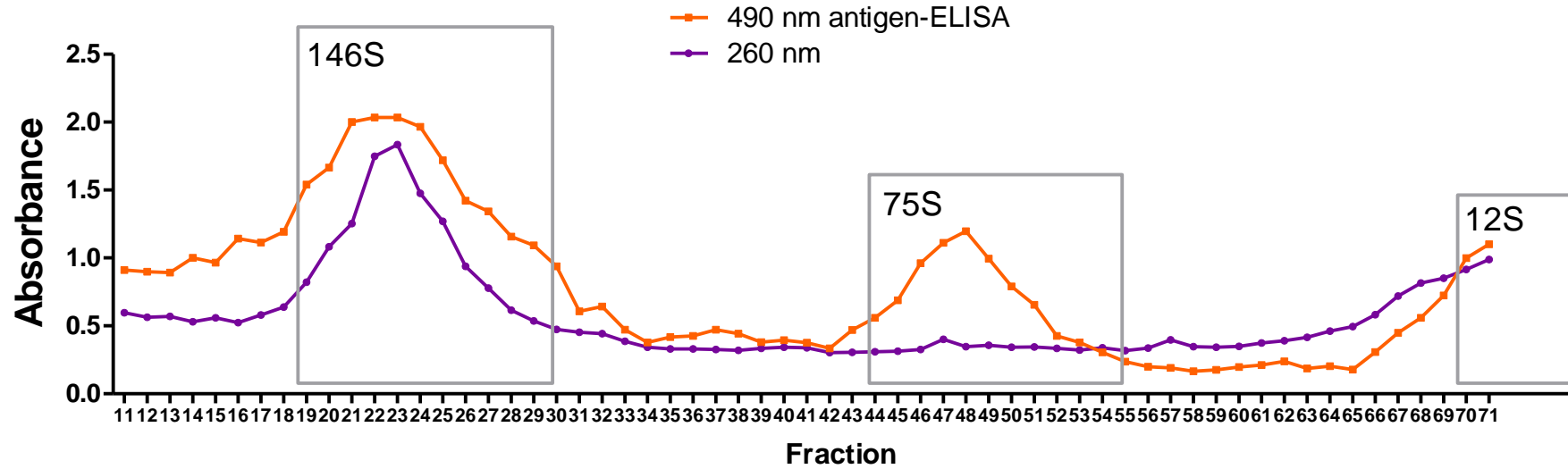
OBJECTIVE

To compare the immunogenicity of FMDV natural empty capsids (75S) vs. whole viral particles (146S) from the same virus strain.

EXPERIMENTAL DESIGN

- ✓ 146S and 75S antigens were purified from the same inactivated antigenic preparation by means of a 15%-45% discontinuous sucrose gradient.
- ✓ Single oil emulsion vaccines were formulated using the purified 75S and 146S particles from the A24/Cruzeiro strain.
- ✓ Both oil-vaccines contained 1.5 µg/ml and were used to immunize mice and cattle.

Antigen purification



SDS-PAGE 10%

- Concentration of 146S particles was estimated by RNA spectrophotometry (260 nm)
- Concentration of 75S particles was estimated by using 146S as a reference
- Yields of 146S particles were approximately 6 times higher than those of the 75S particles

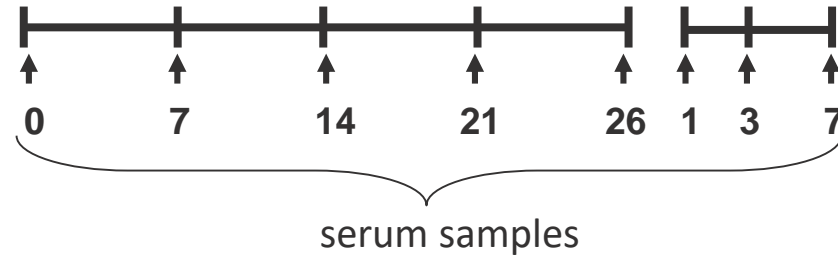


Experimental Design in Mice

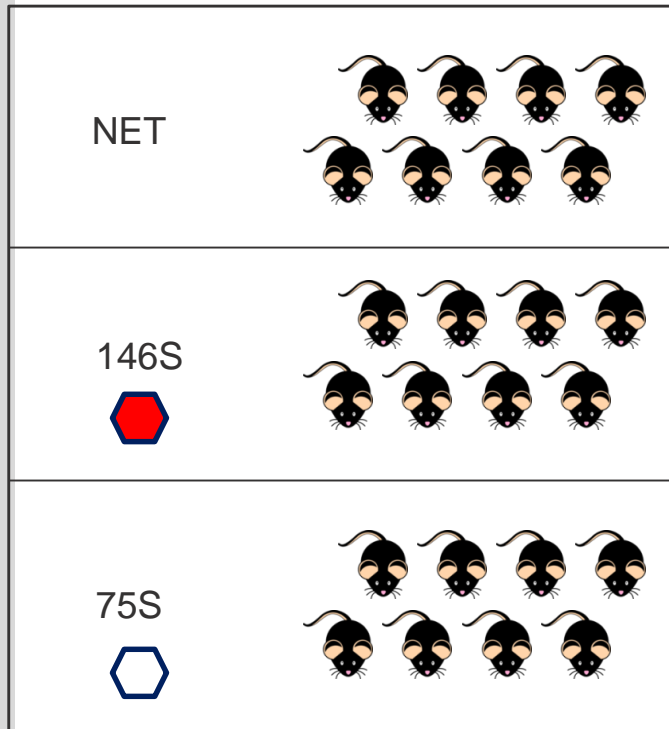
146S or 75S vaccines
(0.3 $\mu\text{g}/\text{dose}$)



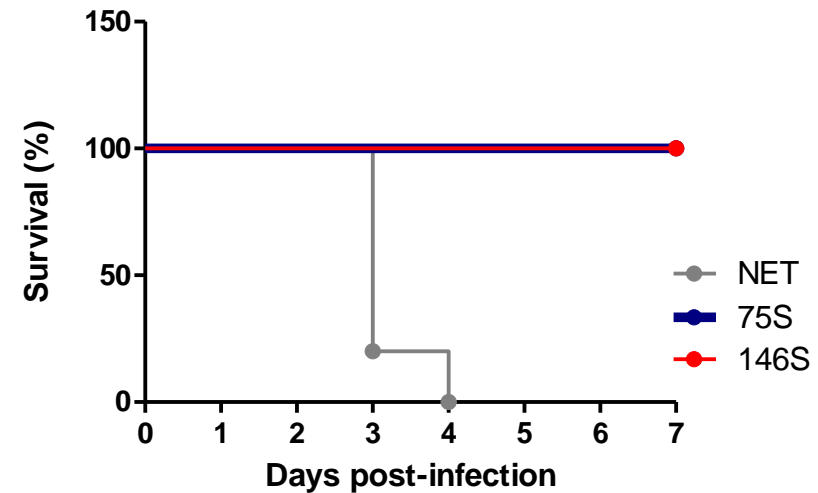
Challenge
 1×10^6 UFP/200 μl i.p.



C57b/6
n=8 animals/group

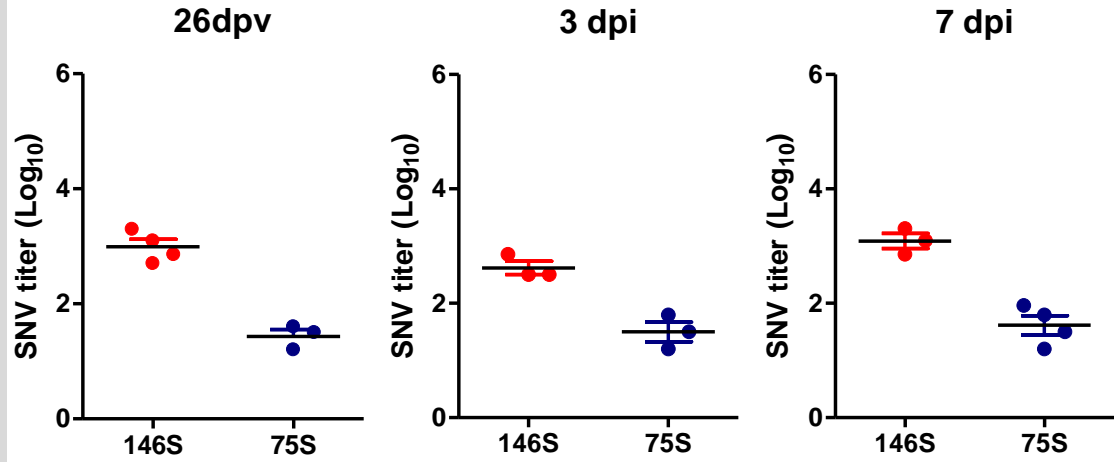
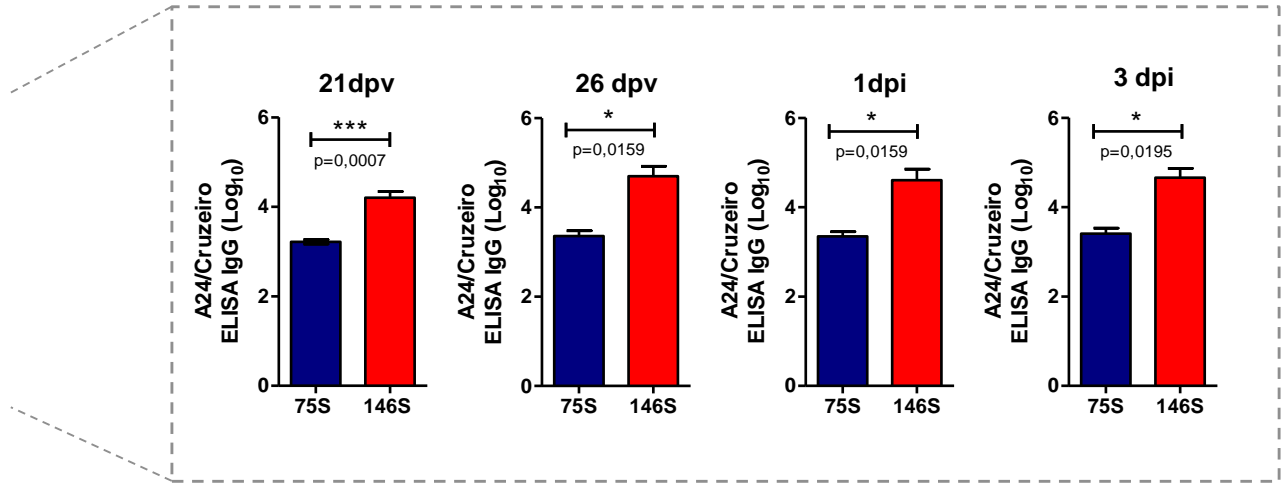
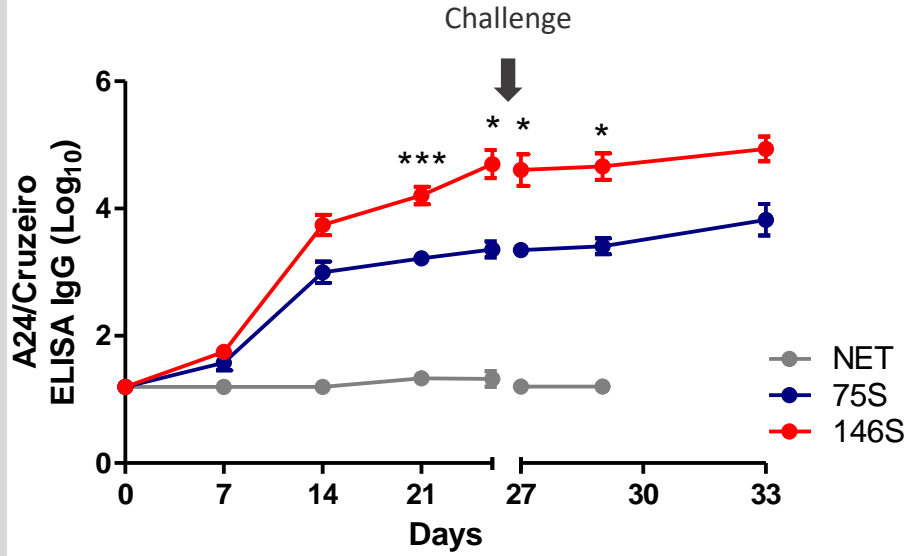


Experimental challenge in mice



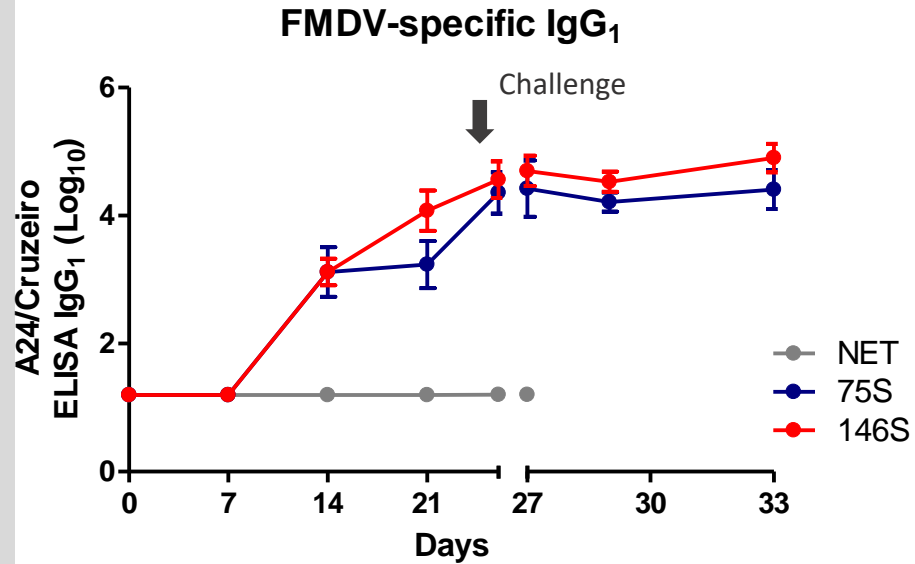
- Animals vaccinated with 146S or 75S particles survived to experimental challenge while all animals in the control group (NET) died between 3 and 4 dpi.

Anti-FMDV IgG and Neutralizing Antibody Titters

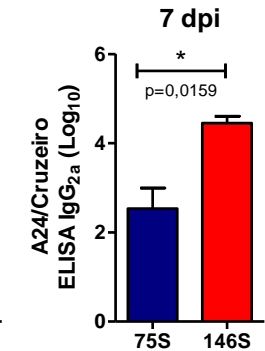
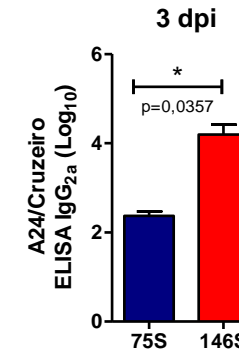
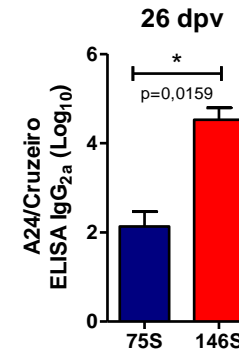
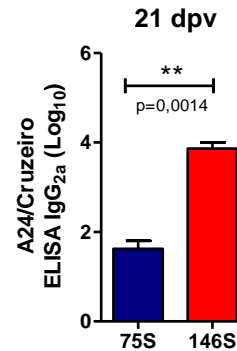
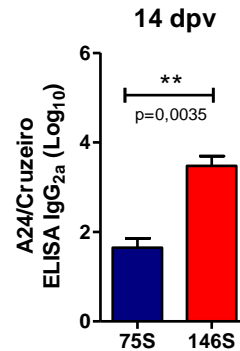
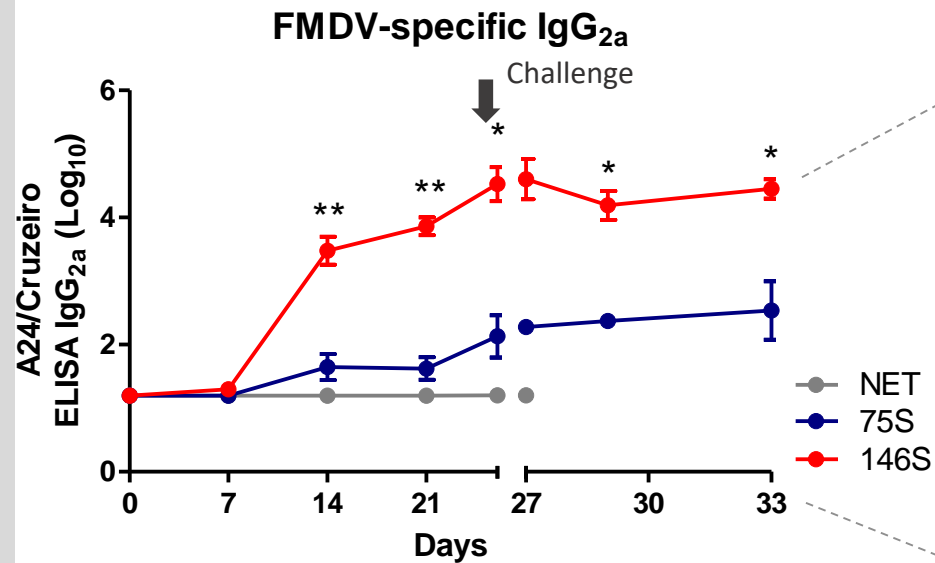


- 146S particle vaccines induced significantly higher FMDV-specific IgG titers than 75S vaccines starting at 21 dpv
- Mean neutralizing antibodies titers in 75S group were 10 to 30 times lower than those in 146S vaccinated group

Anti-FMDV IgG Isotype Antibody Titers



- Animals vaccinated with 146S and 75S particles do not show any differences as regard IgG₁ antibody titers
- As of 14 dpv, IgG_{2a} titers were higher in the 146S vaccinated group than in the 75S vaccinated group



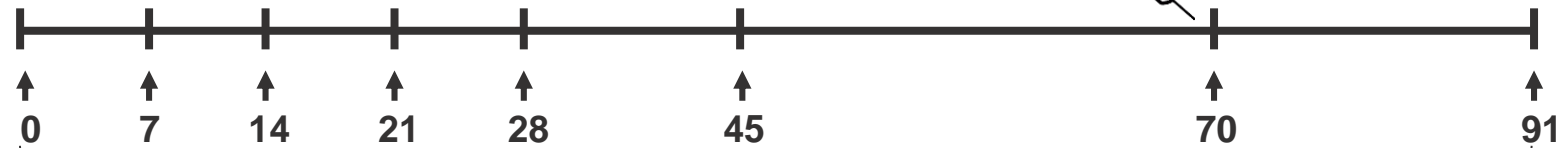
Experimental Design in Cattle



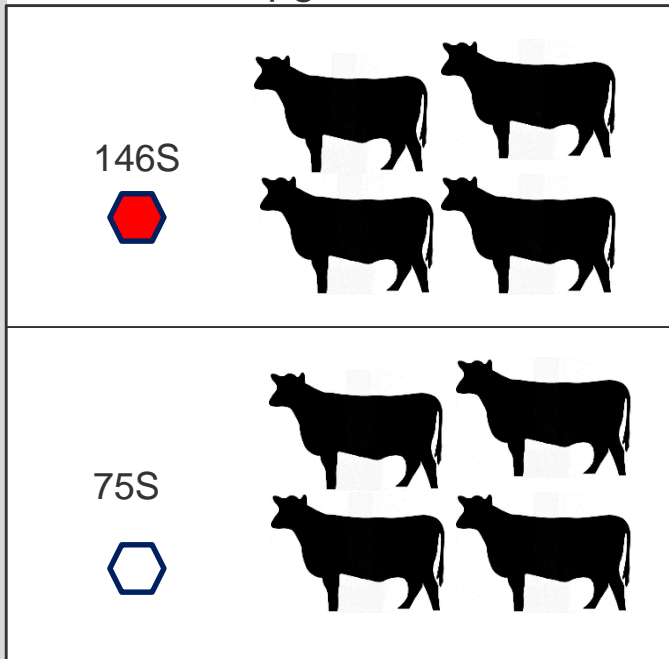
146S or 75S vaccines
(3 µg/dose)



Commercial
tetravalent
vaccine (70 dpv)



n=4 animals/group
3 µg/dose



Days post-vaccination

Calves <8 months-old
without colostral
antibodies.

serum
samples



Serological assessments:
FMDV-specific IgG antibodies
and Neutralizing antibodies

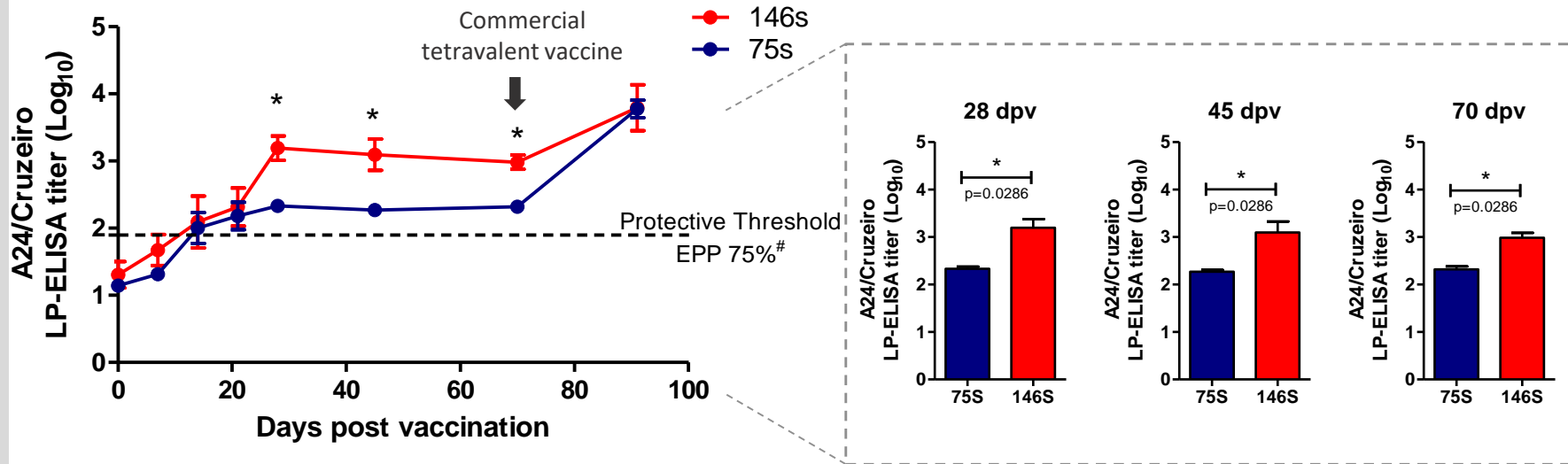
whole blood
samples



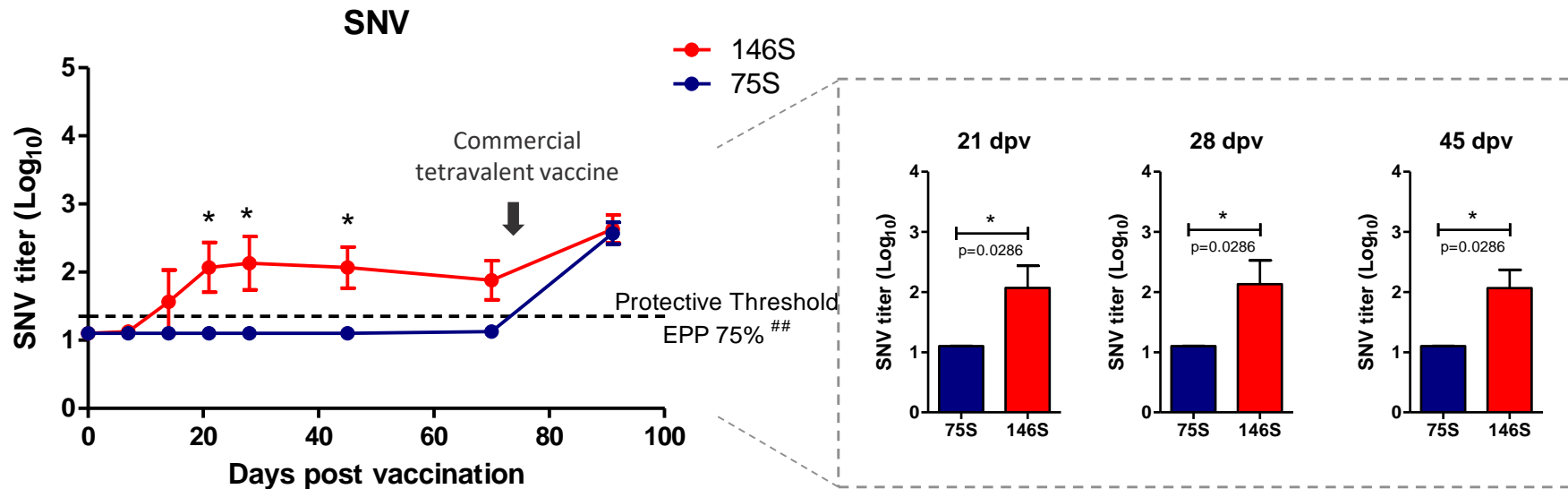
IFN-gamma



Anti-FMDV Total and Neutralizing Antibody Titers



Cattle vaccinated with 146S particles showed higher total antibody titers than those immunized with 75S particles between 28 and 70 dpv.

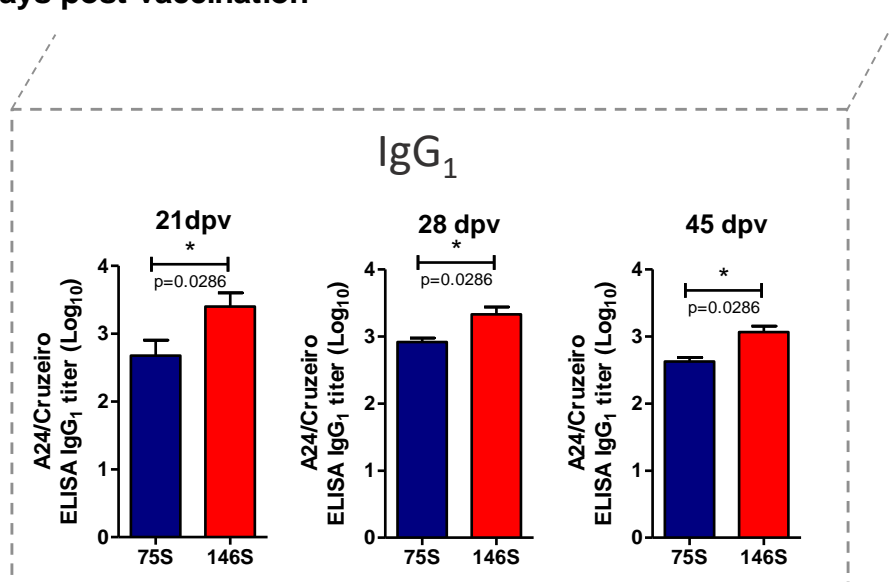
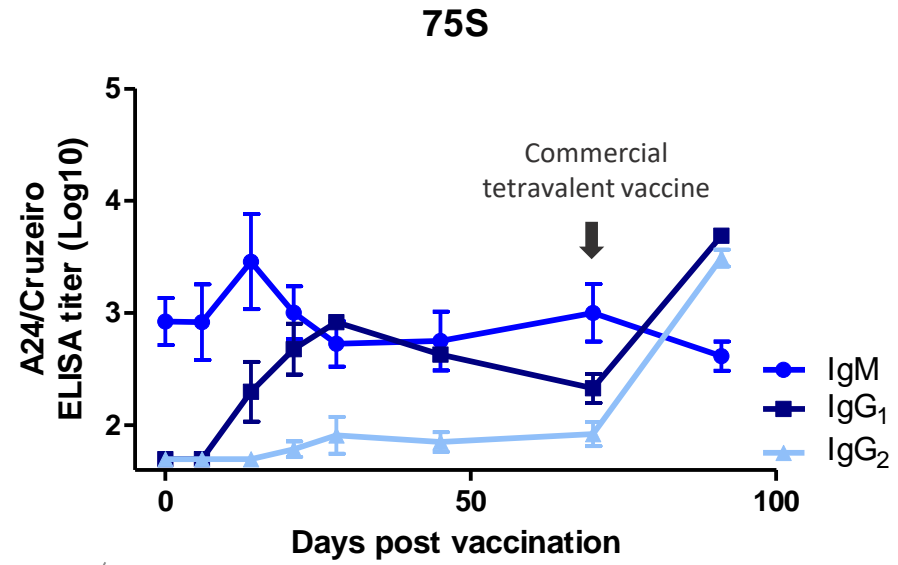
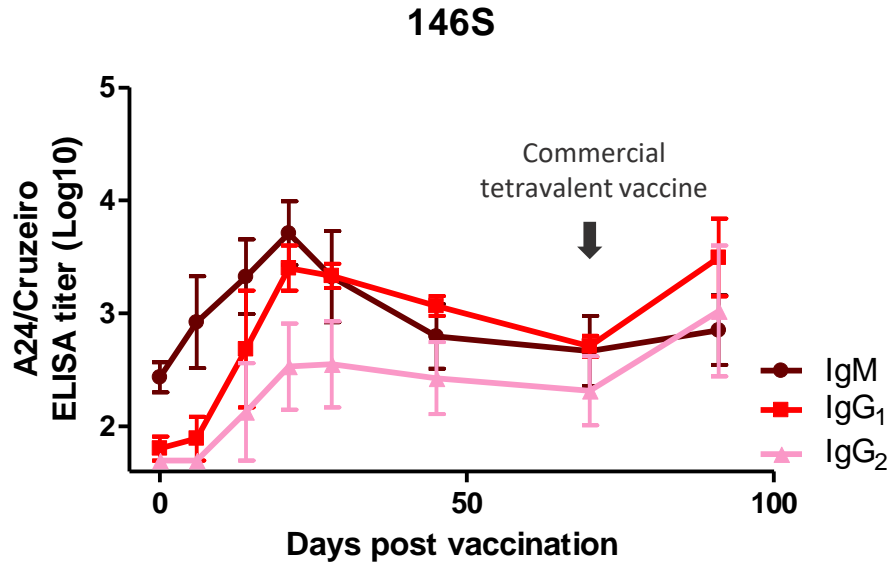


Cattle vaccinated with 75S vaccine has undetectable levels of NAb

Maradei E, 2008.

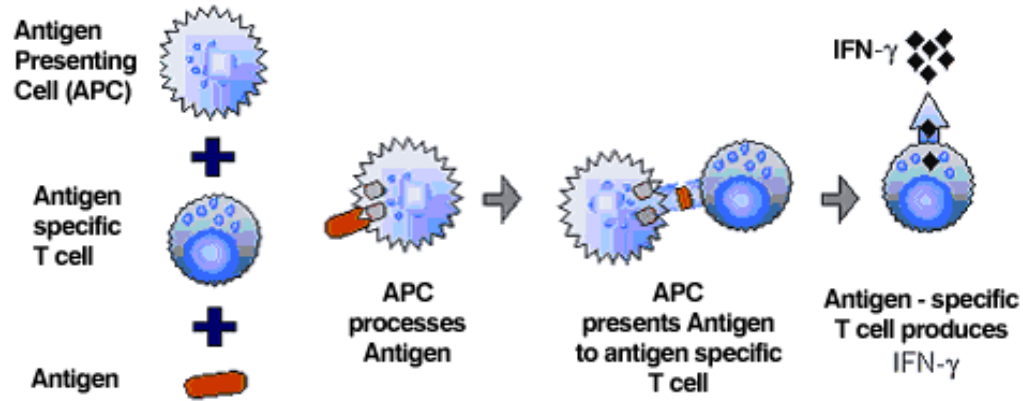
PANAFTOSA, 1994.

Anti-FMDV Isotype Antibody Titers

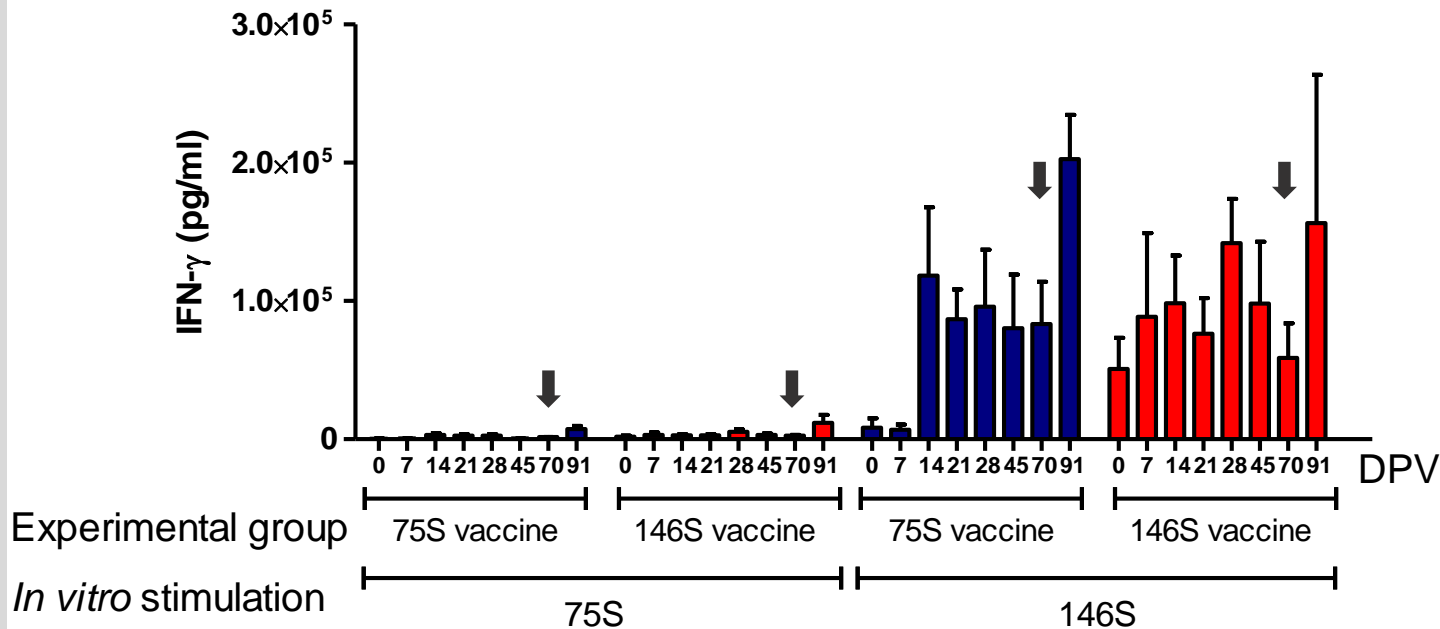


- Animals vaccinated with 75S particles did not induce IgG₂ and showed significantly lower IgG₁ levels compared to animals vaccinated with 146S particles

FMDV-specific Cellular Responses

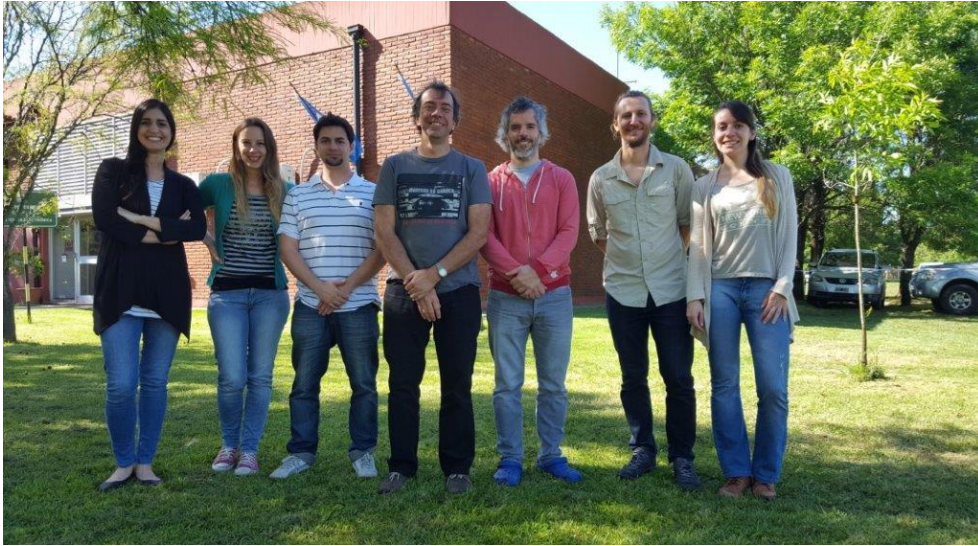


Vaccine		Stimulating antigen			
		PWM			NET
		PWM			NET
		PWM			NET
		PWM			NET
		PWM			NET
		PWM			NET



- Stimulation with 75S particles was unable to promote *in vitro* cell-mediated immune responses
- The onset of the antigen-specific IFN- γ production was delayed in 75S vaccinated cattle

- ✓ Vaccination with natural empty capsids induced very low or undetectable levels of NAb titers in mice and cattle
- ✓ Immunological differences also include lower levels of total antibodies and changes in the induced IgG isotype profiles, both in mice and cattle
- ✓ Natural empty capsids failed to induce antigen-specific *in vitro* IFN-gamma responses in vaccinated cattle
- ✓ Further studies are needed to assess the protective capacity of the empty capsids in target species



Thank you!

Dr. Mariano Pérez Filgueira
Dra. Alejandra Capozzo

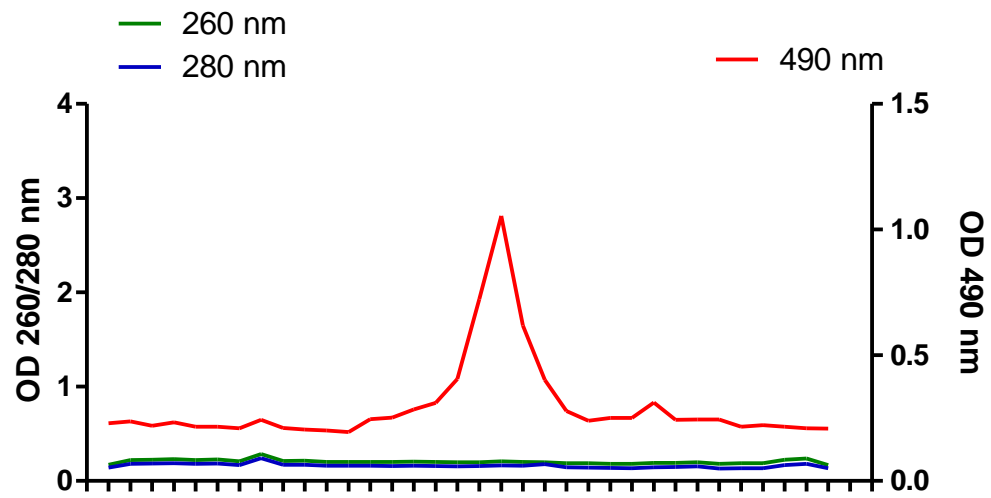
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Dra. Eliana Smitsaart
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Cattle vaccinated with 146S or 75S (10 µg/dose)

