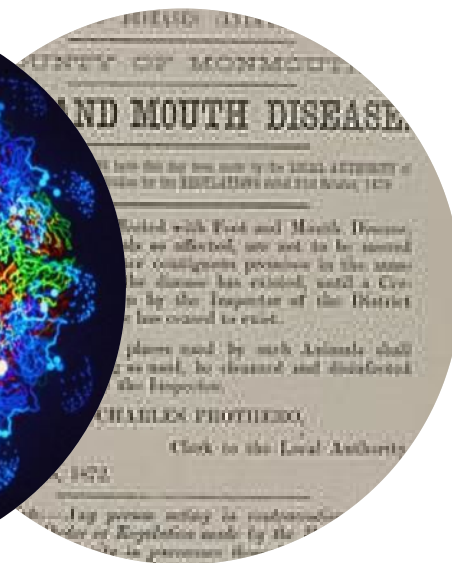
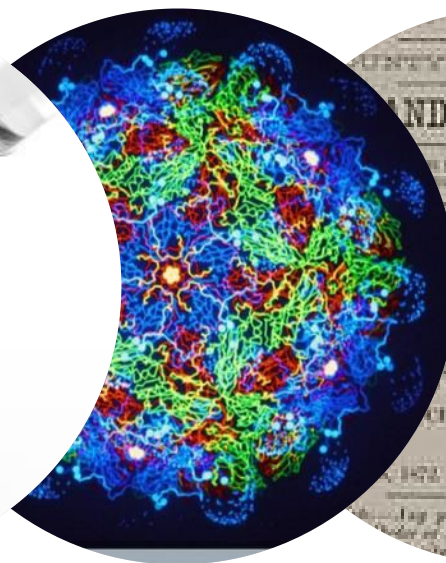
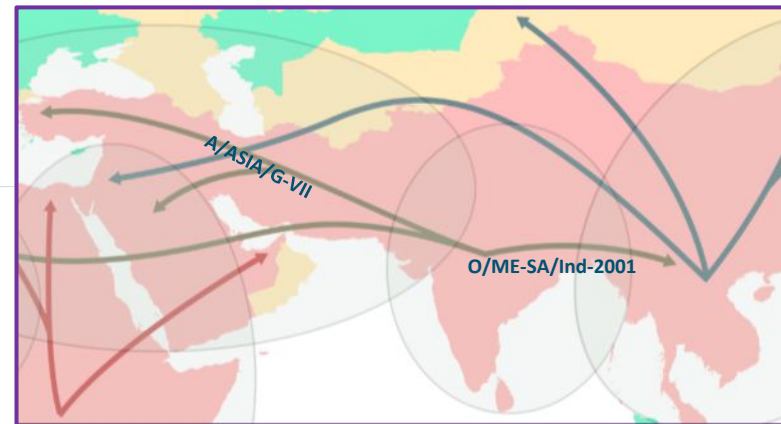


Protection of A/ASIA/G-VII vaccine against challenge with an A/IRN-05 field strain

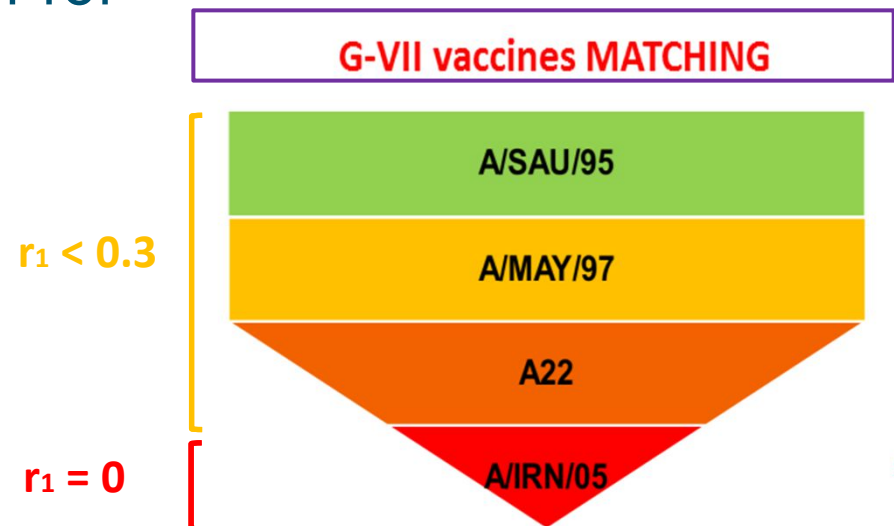
W. Vosloo, P. Eblé, N. Singanallur, D. King, A. Ludi, A. Dekker



History: A/ASIA/G-VII



- Vaccines used in the field → poor protection
- *In vitro* vaccine matching data:
 - A/ASIA/G-VII field viruses poorly matched with used vaccines
- New emerging strain problem for
 - Endemic countries
 - FMDV free countries
 - Vaccine banks



History: heterologous protection?

■ Vaccine banks

- UK: European vaccine bank
- Australia: national vaccine bank
- The Netherlands: national vaccine bank



■ Collaborative project: test type A vaccines of vaccine banks for efficacy against A/ASIA/G-VII

- ~~A/IRN/05~~
- ~~A/SAU/95~~
- A/MAY/97
- A22/IRQ

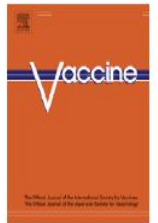
Vaccine (2008) 26, 1681–1687



available at www.sciencedirect.com



journal homepage: www.elsevier.com/locate/vaccine



High potency vaccines induce protection against heterologous challenge with foot-and-mouth disease virus

K.E. Brehm^a, N. Kumar^a, H.-H. Thulke^b, B. Haas^{a,*}

History: Pilot study A/22/IRQ and A/MAY/97

■ Full doses vaccine

- 7 animals vaccinated with A/MAY/97
- 7 animals with A22/IRQ
- 3 unvaccinated control animals.

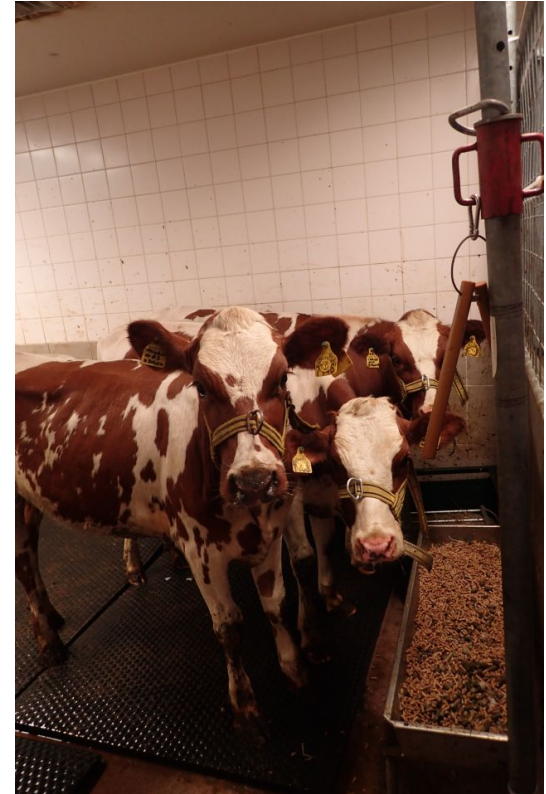
Vaccine	Podal generalization	Protected
A/MAY/97	2/7 (28.5%)	5/7 (71.5%)
A22	5/7 (71.5%)	2/7 (28.5%)

■ A/MAY/97 vaccine:

- reduced virus shedding in mouth swabs
- good correlation VN-titre and protection ($p=0.008$)
- 72% protection ~ 3 PD₅₀/dose

History: Heterologous PD₅₀ A/MAY/97 vaccine

- Vaccine: A/MAY/97
- Challenge: A/ASIA/G-VII
- Results
 - reduced virus shedding
 - good correlation
VN-titre and protection
 - 6.5 PD₅₀/dose (heterologous)
- Conclusion
 - Good quality, high potent vaccines can protect against heterologous challenge
 - A/MAY/97 needed in vaccine banks



History: which vaccine(s) in vaccine bank?

- A/ASIA/G-VII vaccine became available
- NL: A/MAY/97 not included in vaccine bank
- Can we replace A/IRN-05 vaccine with A/ASIA/G-VII vaccine?
- Does A/ASIA/G-VII vaccine protect against A/IRN-05 lineage?
- New experiment:
 - Heterologous PD₅₀
 - A/ASIA/G-VII vaccine
 - A/IRN-05 (A/IRN/10/2018) challenge



Heterologous A/ASIA/G-VII PD₅₀

■ Vaccine

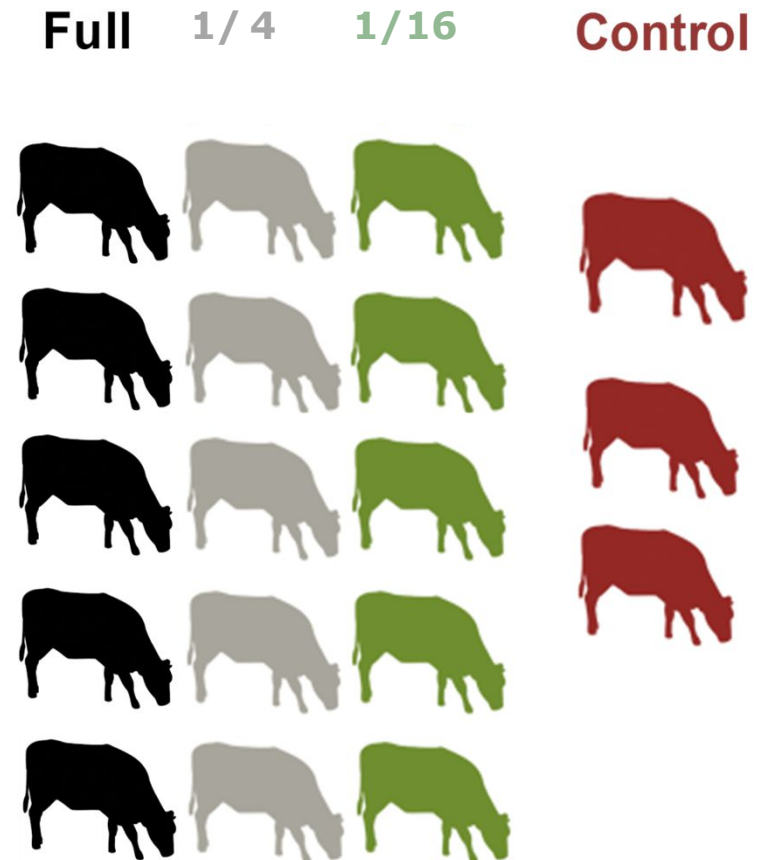
- A/ASIA/G-VII

■ Challenge

- 21 dpv
- Tongue inoculation
- A/IRN-05

■ Parameters

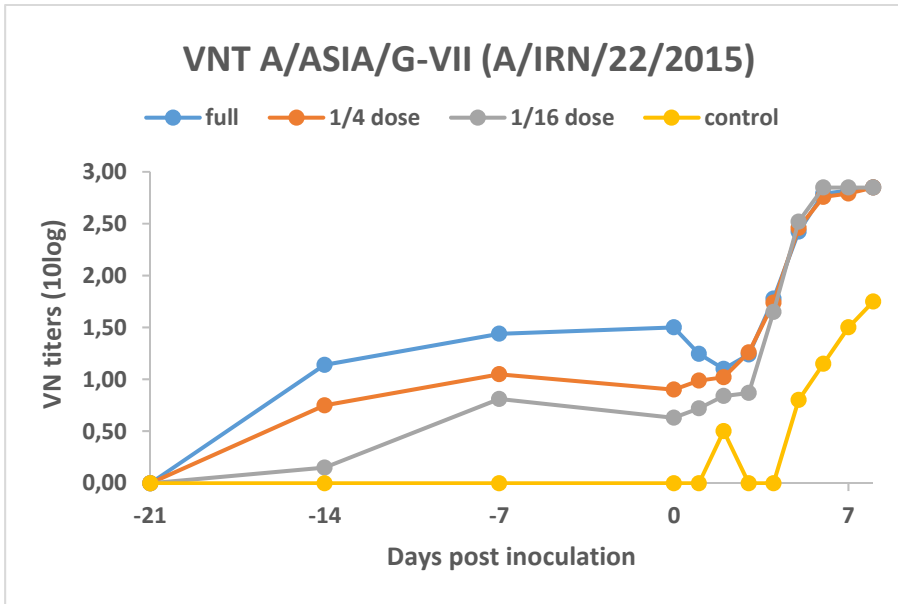
- Clinical protection
- Virus excretion
- Serological responses



A/ASIA/G-VII PD₅₀: Clinical, VI, PCR results

	Cow number	Foot lesions	Viraemia		Shedding (nose)		Shedding (mouth)		Protection Yes/No
			VI	PCR	VI	PCR	VI	PCR	
Full dose	2780	-	-	D	+	+	+	+	Yes
	2781	+	-	+	+	+	+	+	No
	2782	-	-	D	-	+	+	+	Yes
	2783	+	-	+	+	+	+	+	No
	2784	-	-	D	-	+	+	+	Yes
1/4 dose	2785	+	-	D	-	+	+	+	No
	2786	+	-	+	+	+	+	+	No
	2787	+	-	+	+	+	+	+	No
	2788	+	+	+	+	+	+	+	No
	2789	-	-	-	+	+	+	+	Yes
1/16 dose	2790	+	+	+	+	+	+	+	No
	2791	+	-	+	+	+	+	+	No
	2792	+	-	+	+	+	+	+	No
	2793	+	-	+	+	+	+	+	No
	2794	-	-	+	-	+	+	+	Yes
controls	2795	+	+	+	+	+	+	+	No
	2796	+	+	+	+	+	+	+	No
	2797	+	+	+	+	+	+	+	No

A/ASIA/G-VII PD₅₀: Serological results VNTs



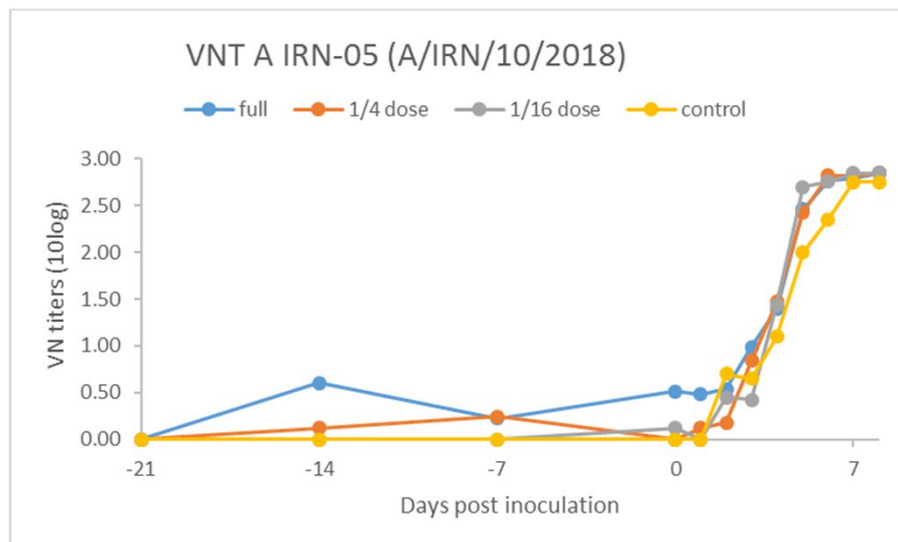
Mean values at 21dpv / 0dpi

VNT A/ASIA/G-VII

Full dose: 1.5

1/4 dose: 0.9

1/16 dose: 0.6



VNT A/IRN-05

Full dose: 0.5

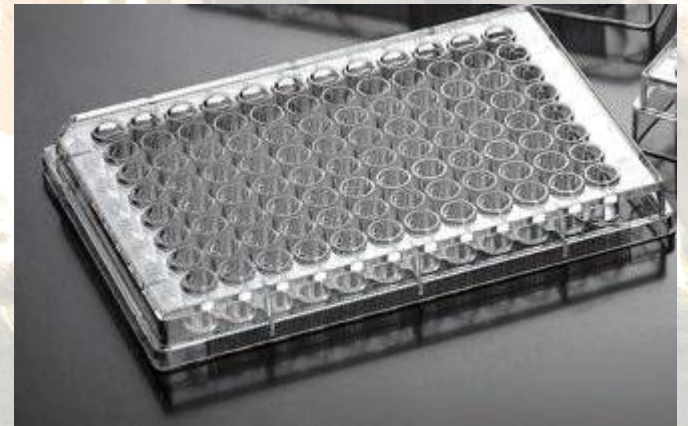
1/4 dose: 0

1/16 dose: 0.1

A/ASIA/G-VII PD₅₀: Serological results cont.

	Cow number	VN-titer D21		NS ELISA	Protection Yes / No
		G-VII	IRN 05		
Full dose	2780	1.5	0.9	+	Yes
	2781	1.35	0	+	No
	2782	1.95	0.75	+	Yes
	2783	1.2	0	+	No
	2784	1.5	0.9	+	Yes
1/4 dose	2785	0	0	+	No
	2786	1.2	0	+	No
	2787	0.6	0	+	No
	2788	1.05	0	+	No
	2789	1.65	0	+	Yes
1/16 dose	2790	0	0	+	No
	2791	0.6	0	+	No
	2792	1.05	0.6	+	No
	2793	0.6	0	+	No
	2794	0.9	0	+	Yes
controls	2795	0	0	+	No
	2796	0	0	+	No
	2797	0	0	+	No

r_1 value = 0.1



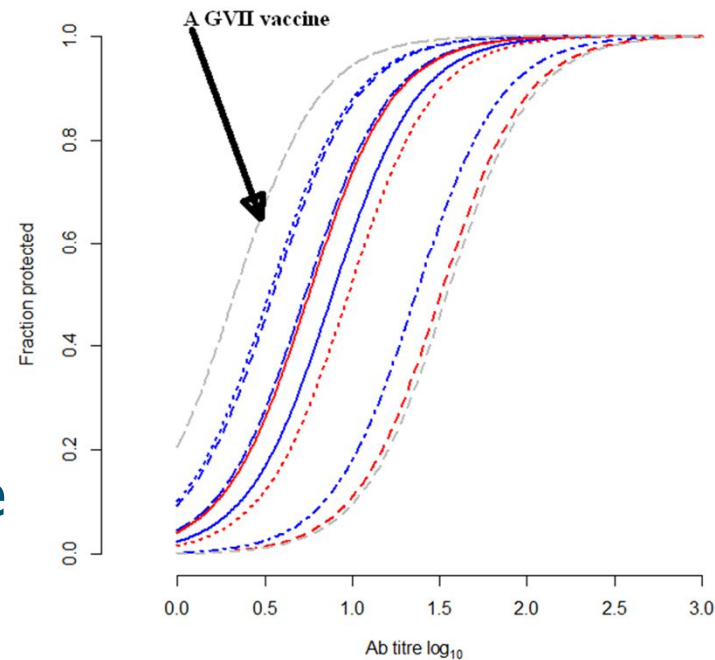
A/ASIA/G-VII PD₅₀: Potency

■ Heterologous potency

- Protected animals: 3, 1, 1
- Spearman-Kärber:
 - 2 (0.7-5.5) PD₅₀/dose
- Probit analysis
 - 1.6 (0.4-5.9) PD₅₀/dose
- **NOT SUFFICIENT**

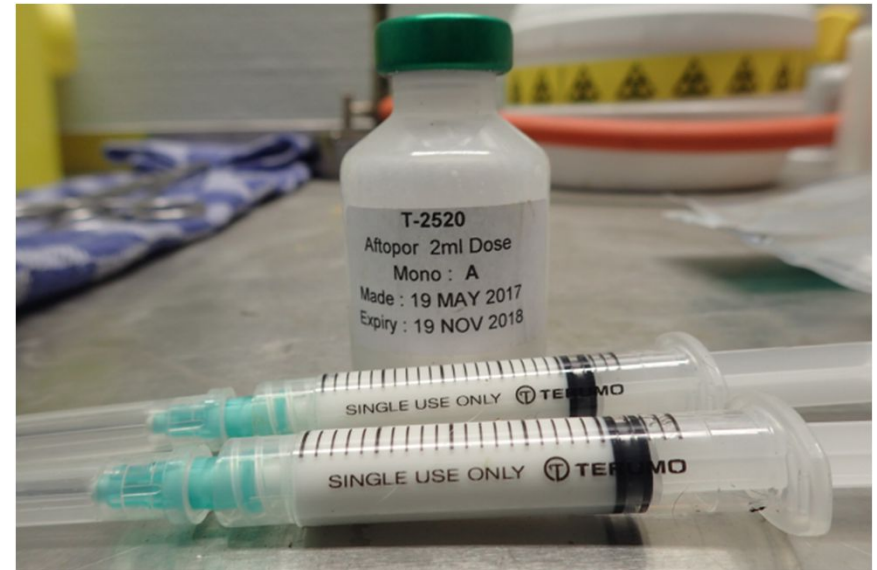
■ Homologous potency

- Previous PD₅₀ experiment (BI): 43 PD₅₀/dose
- Current experiment: 36 PD₅₀/dose
- Estimated using serological results both experiments
 - model of historical data



Conclusion / Discussion:

- A (high potent) A/ASIA/G-VII vaccine does not protect against A/IRN-05
- Both A/ASIA/G-VII and A/IRN-05 are needed in vaccine banks
- More research needed regarding relationship between the heterologous and homologous potency of a vaccine ($\sim r_1$ -value?)



Acknowledgements



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Klaas Weerdmeester, Animal service department



Thank you for your attention

Questions?

