Emergency A Malaysia 97 vaccine protects against A/Asia/G-VII (A/IRN/22/2015)

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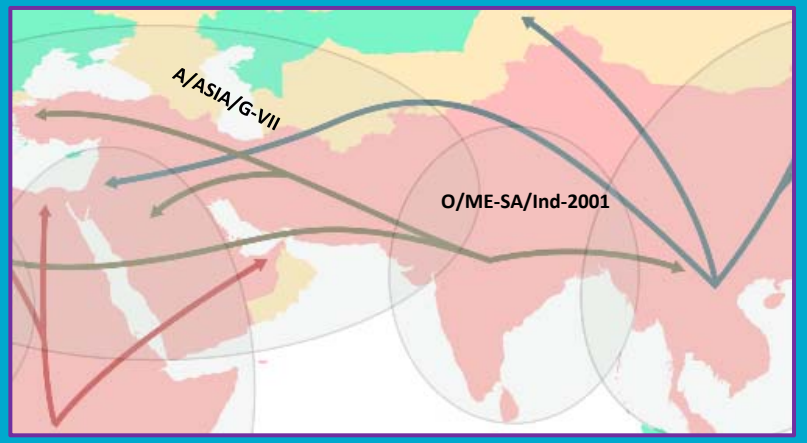

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Westward movement of A/Asia/G-VII (G18)

- Widespread outbreaks in the Middle East and Caucasus
  - Iran, Saudi Arabia, Turkey and Armenia reporting major outbreaks and apparent vaccine failures

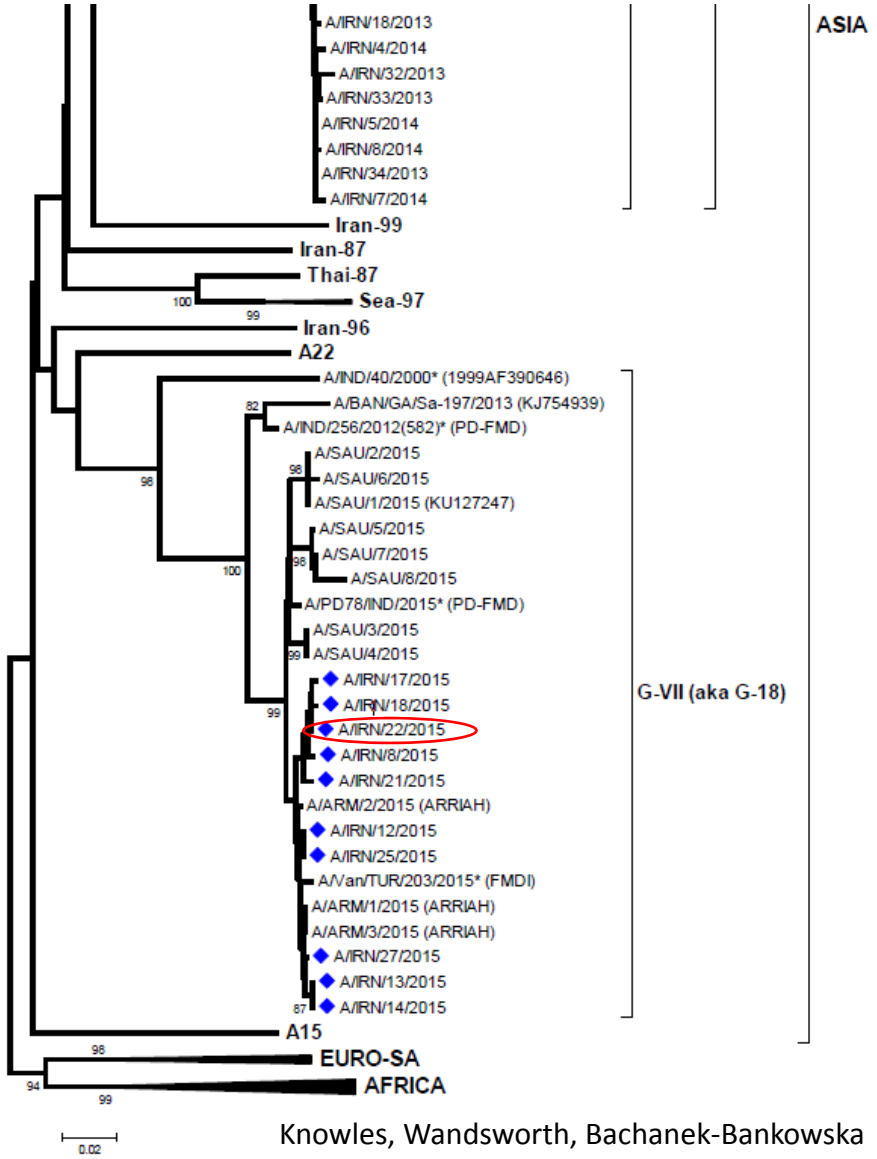
Vaccine matching studies at TPI

	Field Virus	A/SAU/1/2015	A/SAU/2/2015	A/SAU/19/2016	A/IRN/8/2015	A/IRN/12/2015	A/IRN/22/2015	A/IRN/25/2015	A/IRN/8/2016	A/SAU/24/2016	A/SAU/41/2016	A/EGY/19/2016	A/BHU/03/2017
Vaccine Virus	A/IRN/05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	A22/IRQ	**0.11**	**0.11**	**0.08**	**0.13**	**0.04**	**0.20**	0.00	**0.13**	**0.12**	**0.22**	**0.17**	**0.11**
	A/MAY/97	**0.14**	**0.23**	-	**0.23**	**0.15**	-	-	-	-	-	-	-
	A/TUR/20/06	**0.03**	**0.06**	0.00	0.00	**0.15**	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	A/SAU/95	**0.20**	**0.17**	**0.22**	**0.26**	**0.11**	**0.25**	-	-	-	-	-	-
	A/IRN/87	0.00	**0.04**	-	-	-	-	-	-	-	-	-	-
	A/IRN/96	**0.04**	**0.06**	-	-	-	-	-	-	-	-	-	-
	A/IRN/99	0.00	0.00	-	-	-	-	-	-	-	-	-	-
	A/IND/40/2000	**0.26**	-	-	-	**0.24**	-	-	**0.03**	-	-	-	-
	A TUR 11	**0.01**	-	-	-	**0.04**	-	-	**0.10**	-	-	-	-
	A TUR 14	0.00	-	-	-	0.00	-	-	0.00	-	-	-	-
	A ERITREA	-	-	-	-	-	-	-	-	-	-	**0.21**	-

Vaccine efficacy study by the TPI

- Commercial polyvalent vaccine, incorporating 7 different strains of serotypes O, Asia-1, SAT-2 and serotype A (A/IRN/05 and A/SAU/95)

- Partial protection in a modified PPG test (56% protection i.e. ~1 PD_{50}/dose)



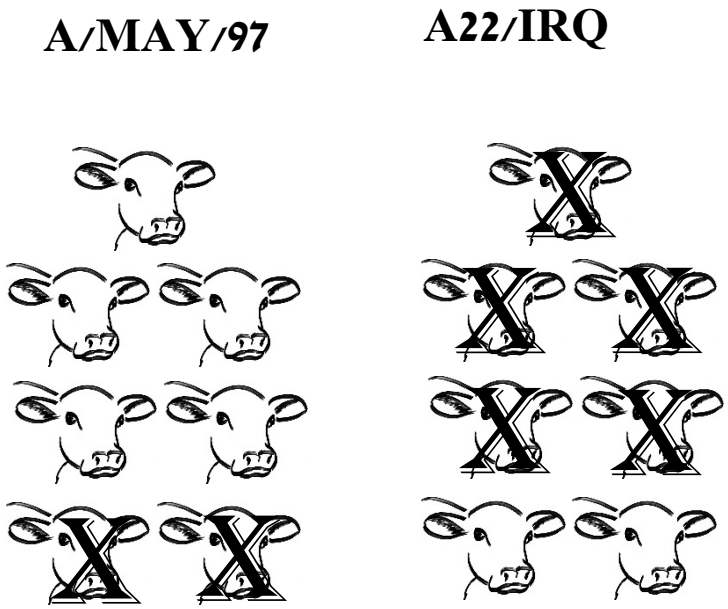
Knowles, Wandsworth, Bachanek-Bankowska

Waters et al, submitted

Pilot study with A22/IRQ and A/MAY/97 vaccines

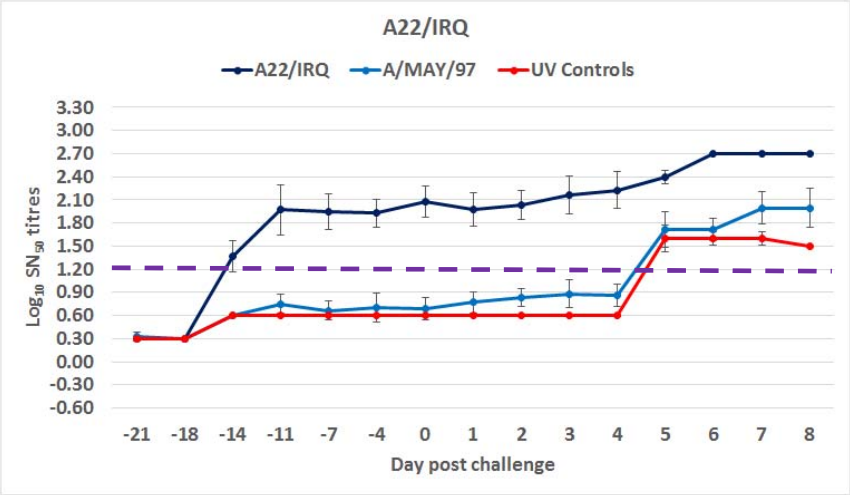
- A22/IRQ (r1~0.1)
- A/MAY/97 (r1~0.2)
- Two groups of vaccinated cattle
  - 7 for each vaccine (3 controls)
  - Challenged IDL at 21 dpv
- A/MAY/97 – 5/ protected (~70%)
- A_{22}/IRQ – 2/7 protected (~30%) (p=0.286)

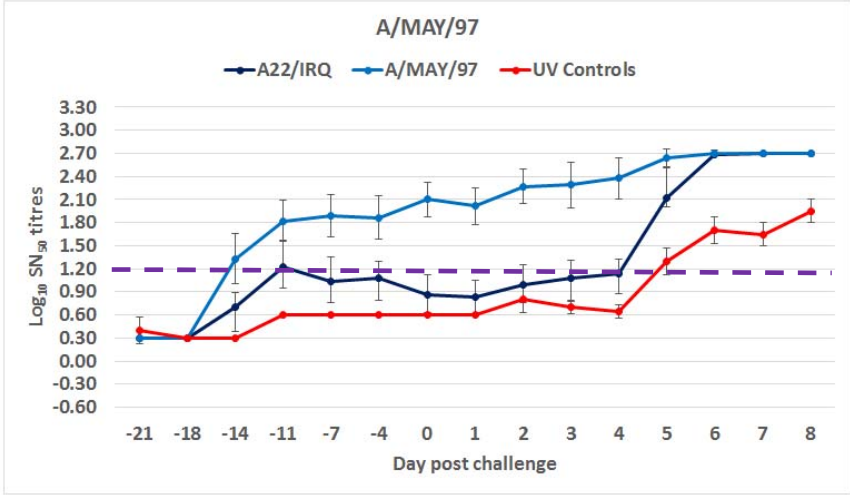
- Viraemia only in UV controls (p=0.16)

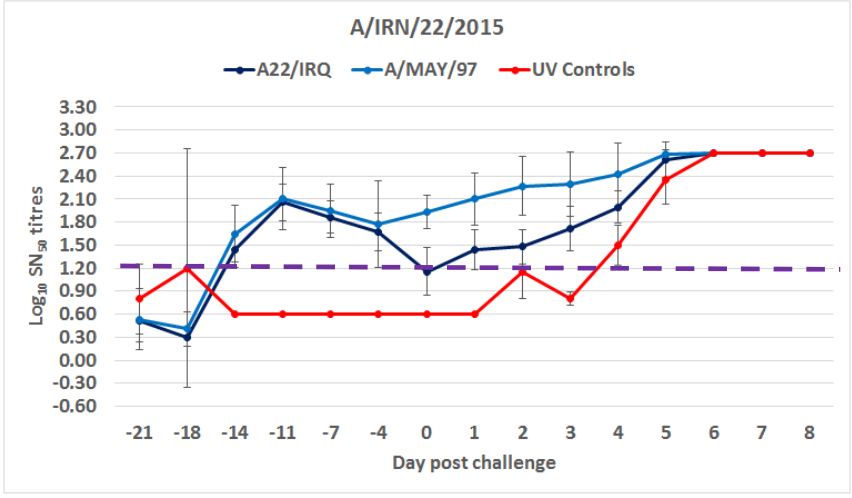


Unvaccinated controls

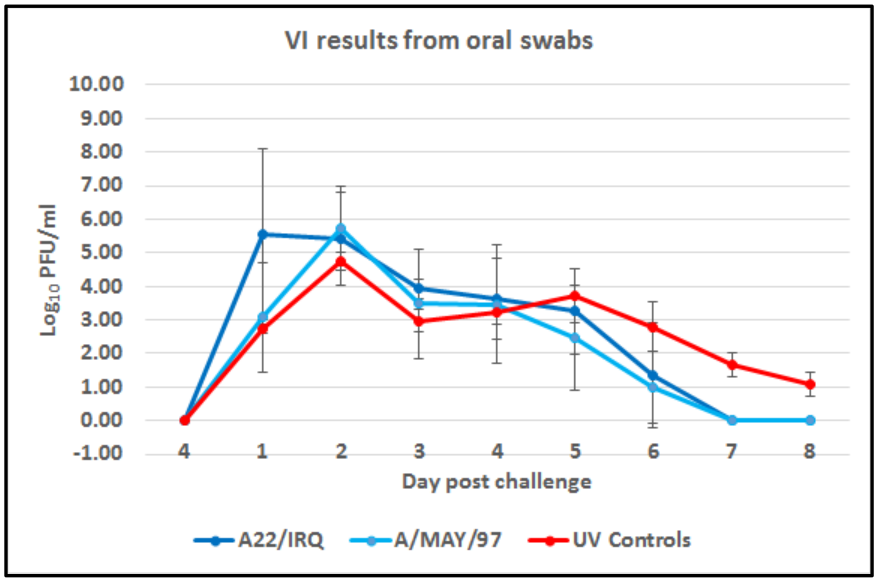
Antibody titres before and after challenge

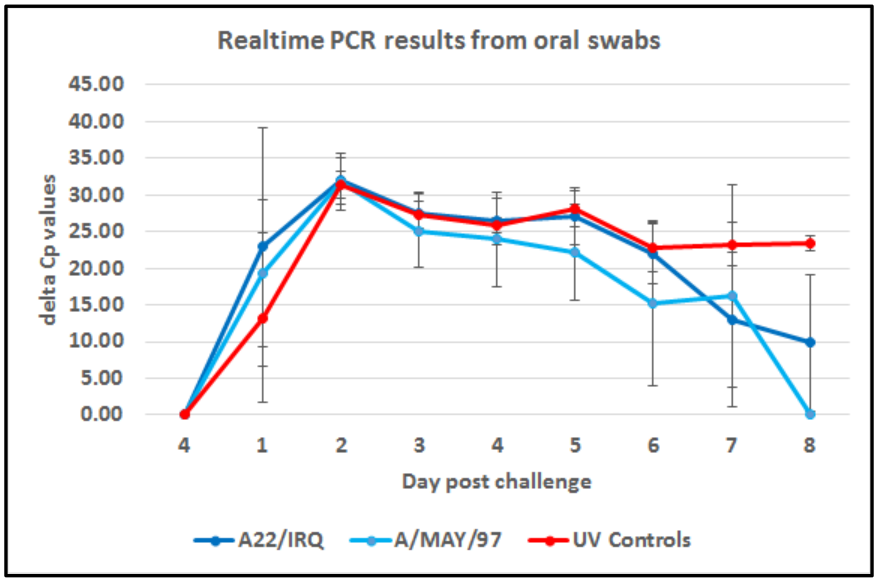






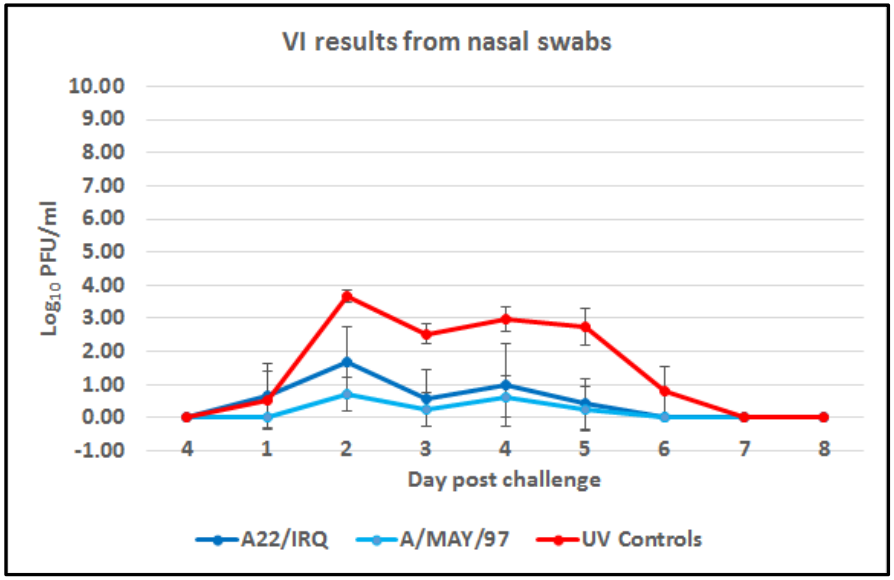
Virus isolation and PCR* results in oral swabs

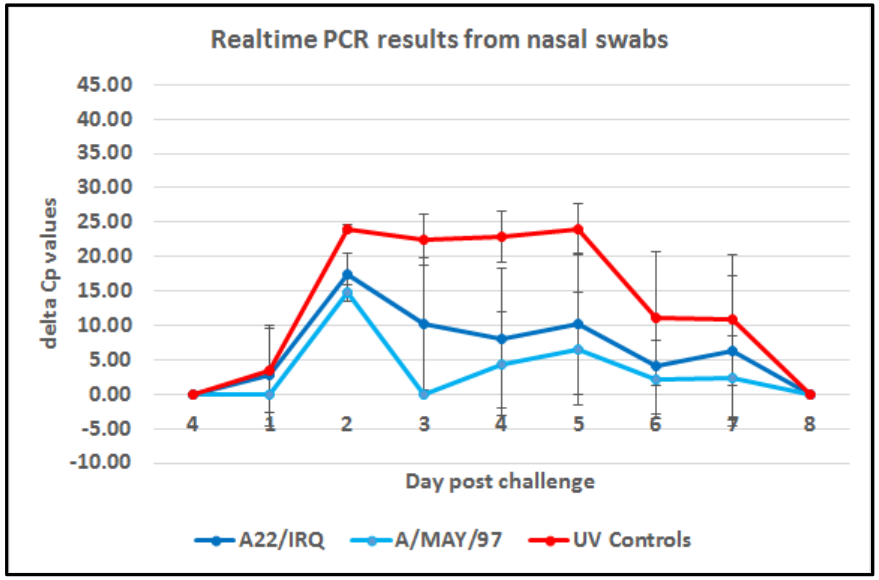




*Moonen et al 2003

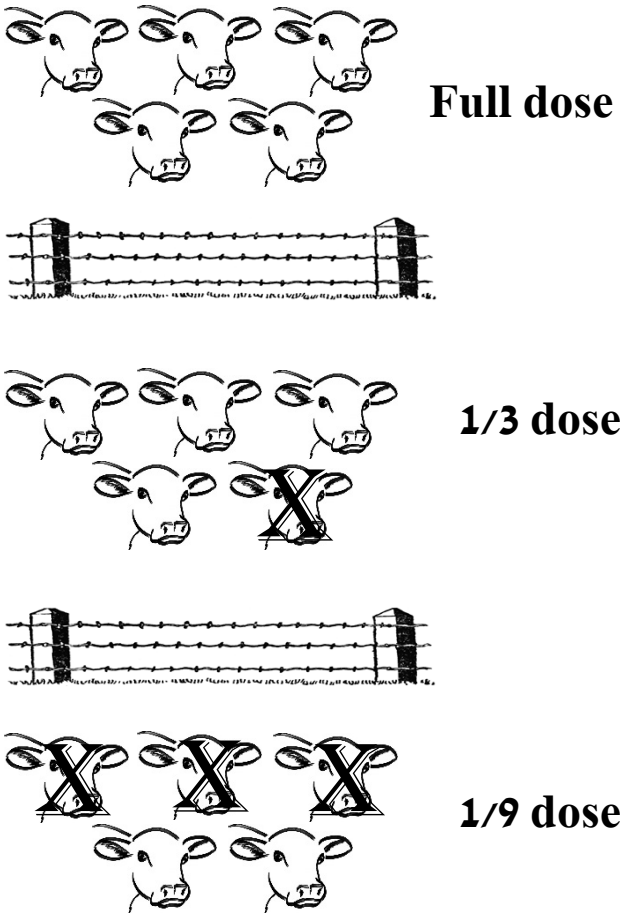
Virus isolation and PCR results in nasal swabs



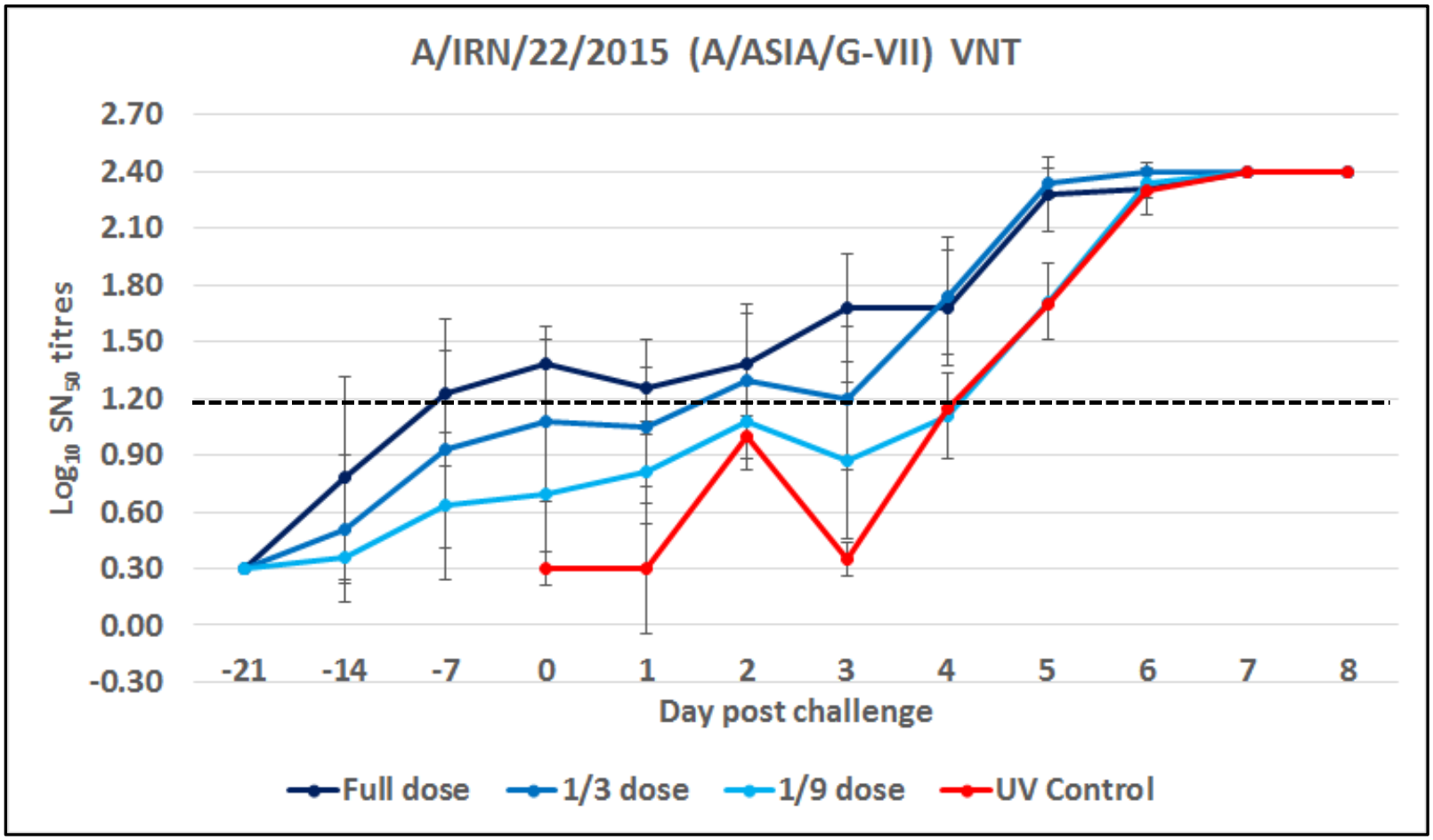


Potency test with A/MAY/97 vaccine

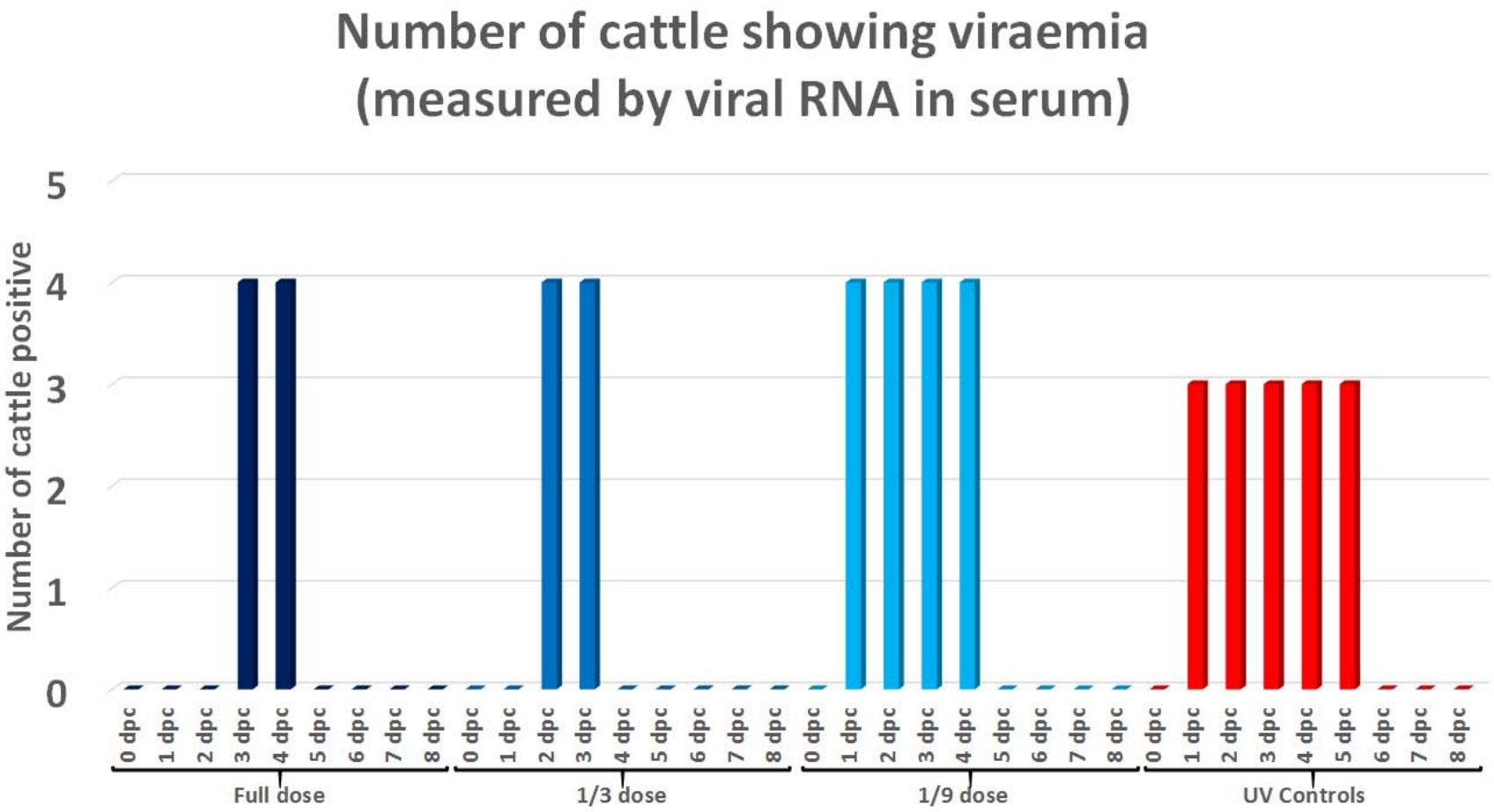
- A/MAY/97 emergency vaccine (>6 PD_{50})
- 3 groups with 5 cattle (full, 1/3, 1/9th dose)
- Challenged IDL 21 dpv with A/IRN/22/2015 by IDL
- $PD_{50/}$dose ~ 6.47 ($p<0.001$, Fischer exact test)



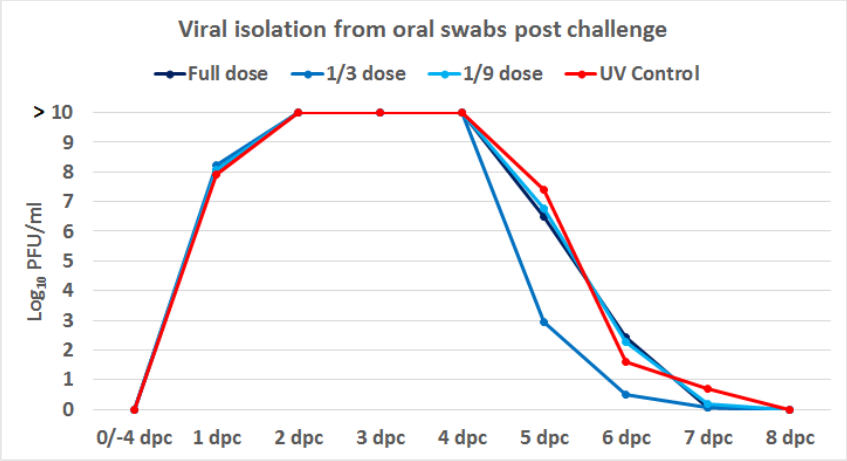
Antibody titres in different groups before and after challenge – A/IRN/22/2015

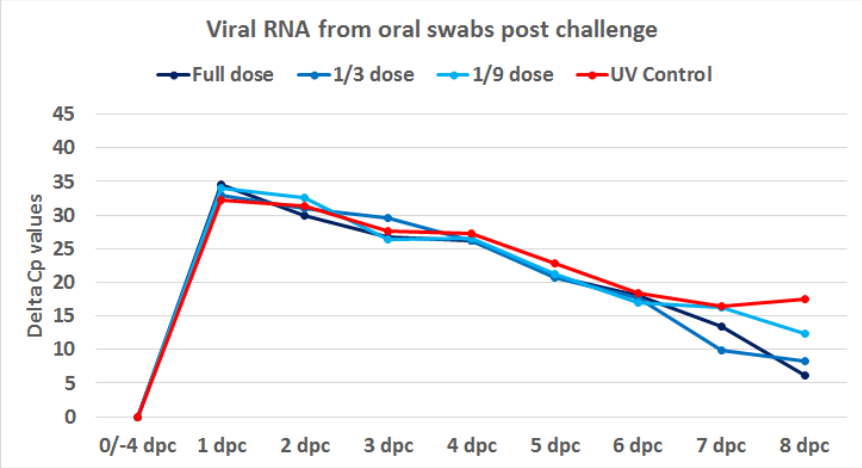


Viraemia


Number of cattle showing viraemia
(measured by viral RNA in serum)
Number of cattle positive
5
4
3
2
1
0
0 dpc
1 dpc
2 dpc
3 dpc
4 dpc
5 dpc
6 dpc
7 dpc
8 dpc
Full dose
1/3 dose
1/9 dose
UV Controls

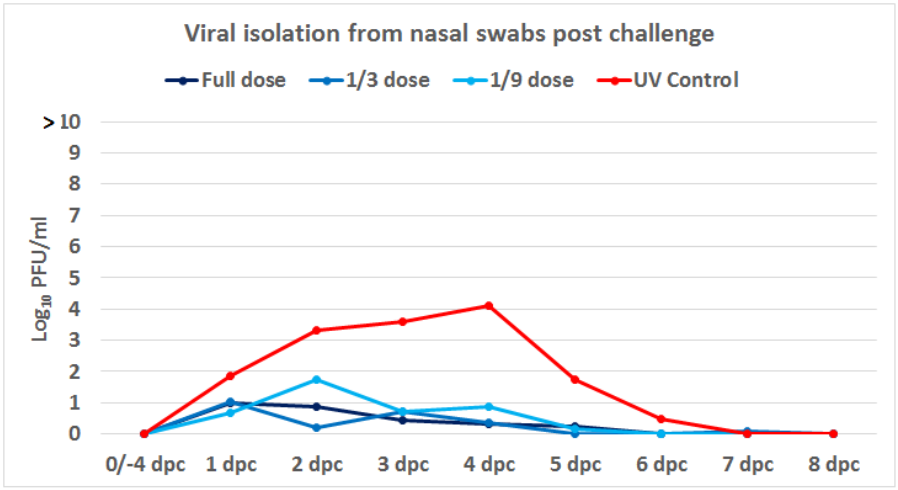
Virus RNA in oral swabs

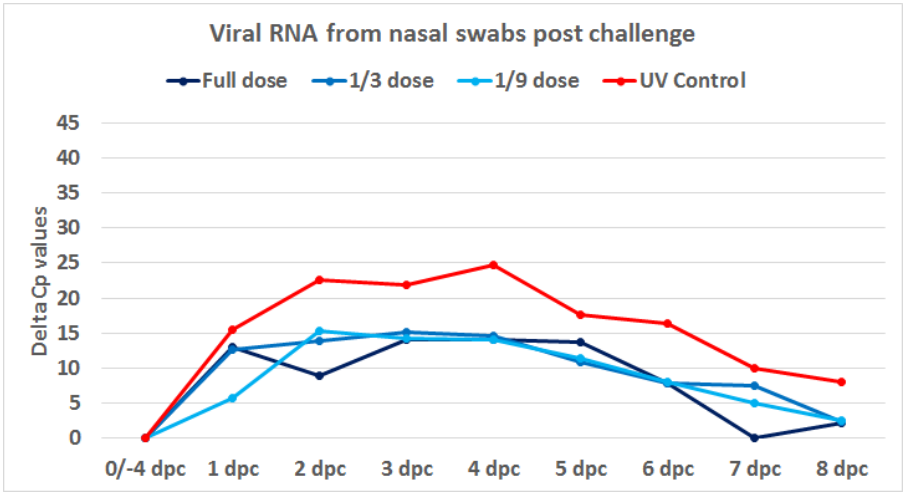




No difference between groups; p>0.05

Virus RNA in nasal secretions





No difference between groups; p>0.05

Conclusions

- r-value is not an accurate predictor of protection with emergency vaccines
- Good correlation between heterologous antibody titres and protection
- Clinical protection was seen in the absence of detectable abs on the day of challenge
- Nasal and oral swabs were positive as soon as 1 dpc and remained positive for at least 7 dpc – good diagnostic samples
- Potency test:
  - No significant differences in virus excretion and viraemia despite differences in vaccine antigen load, but there were differences in clinical outcome

- A good quality A Malaysia 97 vaccine protects against A/Asia/G-VII
- Pre-existing natural and vaccine-induced immunity to A/ASIA/Sea-97 could be a possible explanation why the A/ASIA/G-VII lineage has not been identified so far in the South East Asia

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Transboundary Animal Disease Mitigation Team

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