GOVERNMENT OF WESTERN AUSTRALIA

PathWest LABORATORY MEDICINE WA

THE UNIVERSITY OF WESTERN AUSTRALIA

Respiratory illness in a piggery associated with novel influenza A viruses: assessing the risk to human health

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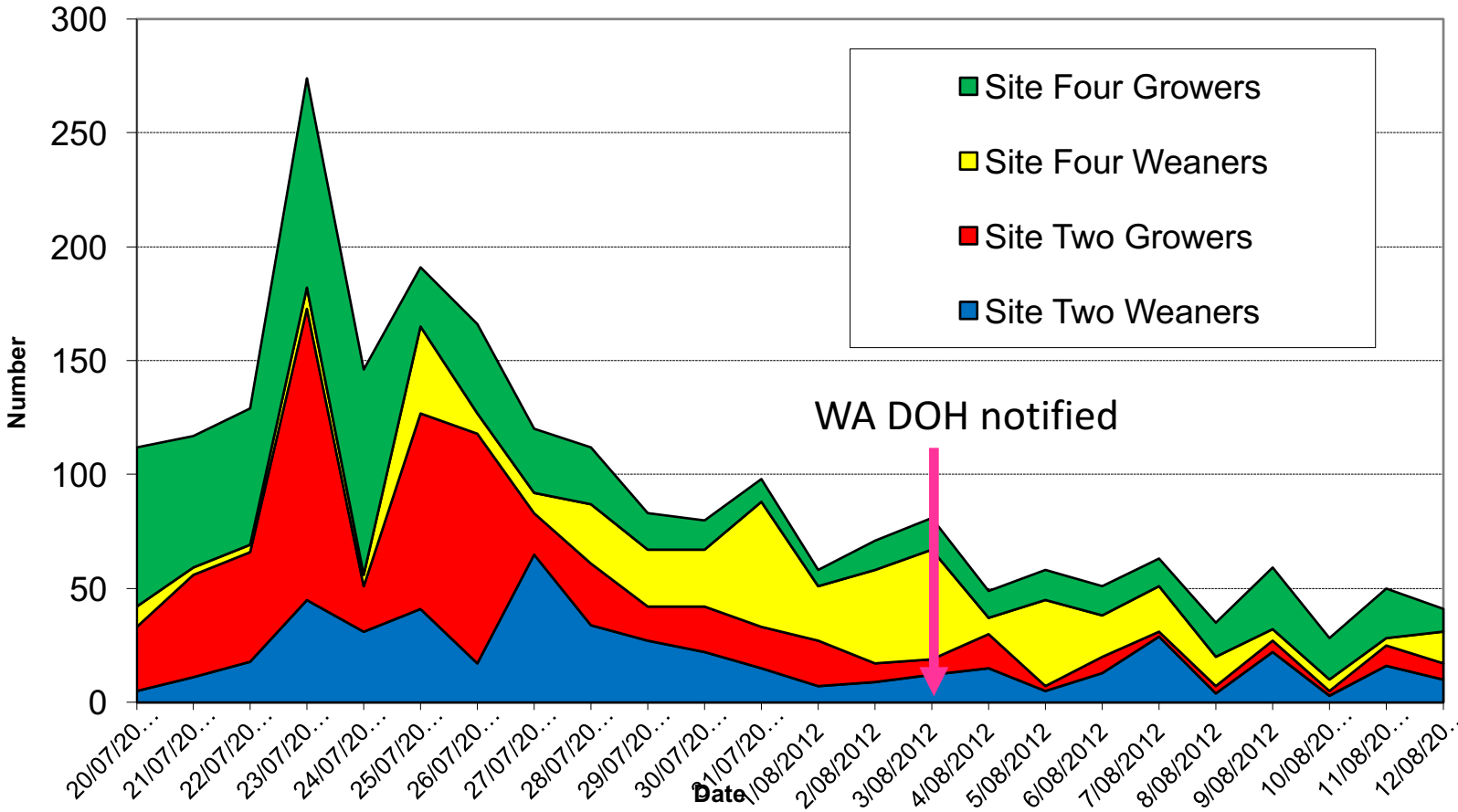
Known influenza A infections in pigs in Australia

H1N1 (2009) pdm infections in pigs in Australia

- **First reported in 2009**
- **One outbreak in WA Jul 2011**
- **All acquired from humans**

Pig Deaths at WA Piggery by Day and Farm Site, July-Aug 2012



Timeline of Events

Friday 3 Aug – notified of possible influenza outbreak at a piggery in WA, some workers had recent mild respiratory tract infections

Saturday 4 Aug am – site visit and get pig swabs

Saturday 4 Aug pm – approx 20 pig samples tested at PathWest and initial PCR results indicated influenza A infection, unlikely to be the current seasonal H1 or H3 strains

Sunday 5/Monday 6 – Initial PCR results confirmed. Positive and some negative samples referred to WHOCC Melbourne and AAHL for further testing. Sequencing of PCR products commenced.

Wednesday 8 Aug - piggery worker with classic ILI – swabs taken – PCR indicated likely seasonal H3N2 – this event occurred in the middle of our infleunza season – dominated by H3N2 and B

Friday 10 August - vaccination and oseltamivir clinic conducted

Friday 24 August - blood draws & more swabs

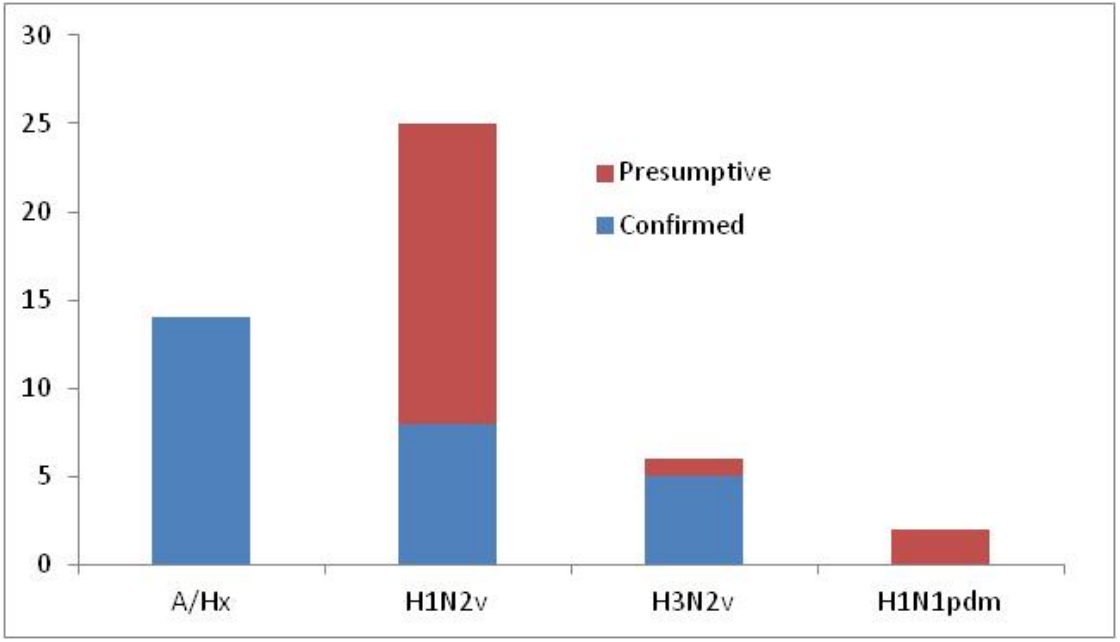
The viruses from WA pigs

- Two novel influenza viruses were isolated from pig samples at AAHL and WHOCC Melbourne and fully sequenced at both laboratories – they were distinct from those found in an outbreak in a Qld piggery, and zoonotic swine influenza infections occurring in the USA
- Other influenza A segments were sequenced at PathWest from PCR products - probable human H1N1pdm or possibly another reassortant

	HA	NA	M	PA	PB1	PB2	NP	NS
H1N2tr (isolate)	H1N1 1983-96	H3N2 1970-03	H1N1 pdm	H1N1 pdm	H1N1 pdm	H1N1 pdm	H1N1 pdm	H1N1 pdm
H3N2r (isolate)	H3N2 1970-03	H3N2 1970-03	H3N2 1970-03	H1N1 1983-96	H3N2 1970-03	H3N2 1970-03	H3N2 1970-03	H3N2 1970-03
H1N1pdm (PCR)	ND	H1N1 pdm	H1N1 pdm	ND	ND	ND	ND	ND

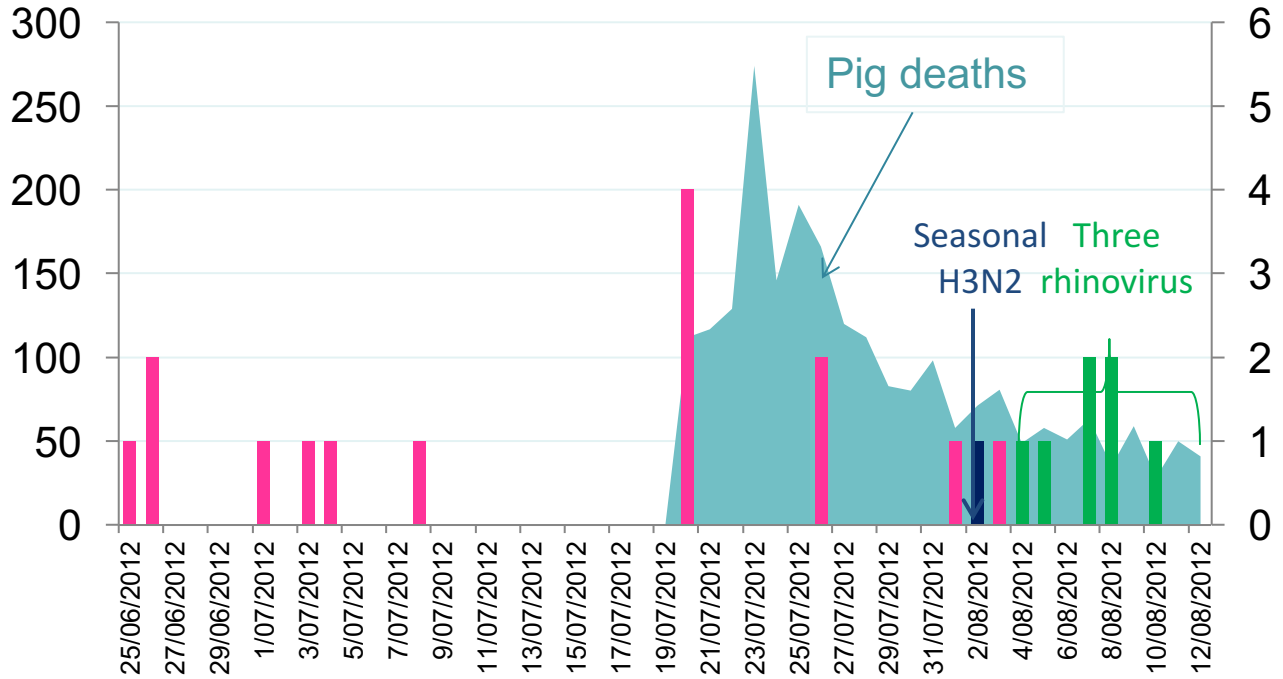
The pigs

- 131 pigs, mainly nose swabs, some tissue samples
  - PCRs directed at multiple targets, isolation
  - Sequencing from isolates and from PCR products
- 19.1% had confirmed or presumed H1N2tr
- 4.6% had confirmed or presumed H3N2r
- 10.7% had unsubtyped influenza A
- One mixed H1N1tr and H3N2r



Confirmed means at least two separate indicators (sequence or specific PCR) of subtype
Presumptive means only one indicator of subtype

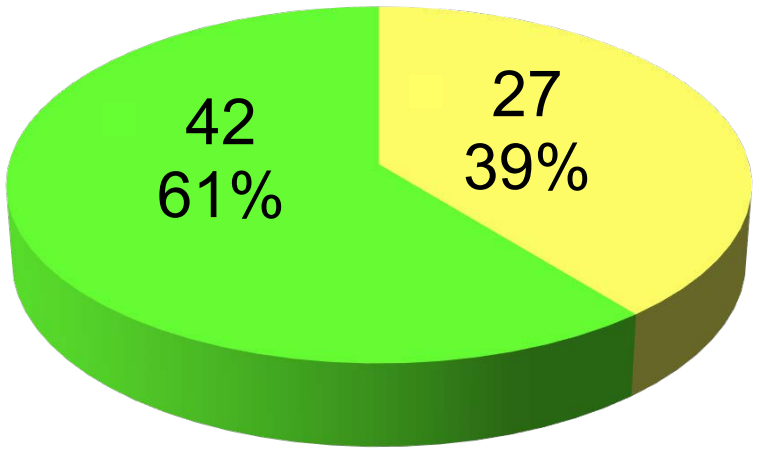
Pig mortality and human illness



<u>Convalescent serology available for 21 piggery workers with illness</u>

- Two unvaccinated individuals (a married couple) had evidence of recent H1N1 2009 infection
- Two vaccinated individuals had evidence of recent H1N1 2009 infection
- Two vaccinated individuals had evidence of recent seasonal H3N2 infection
- Others could not be interpreted

Illness survey among piggery workers



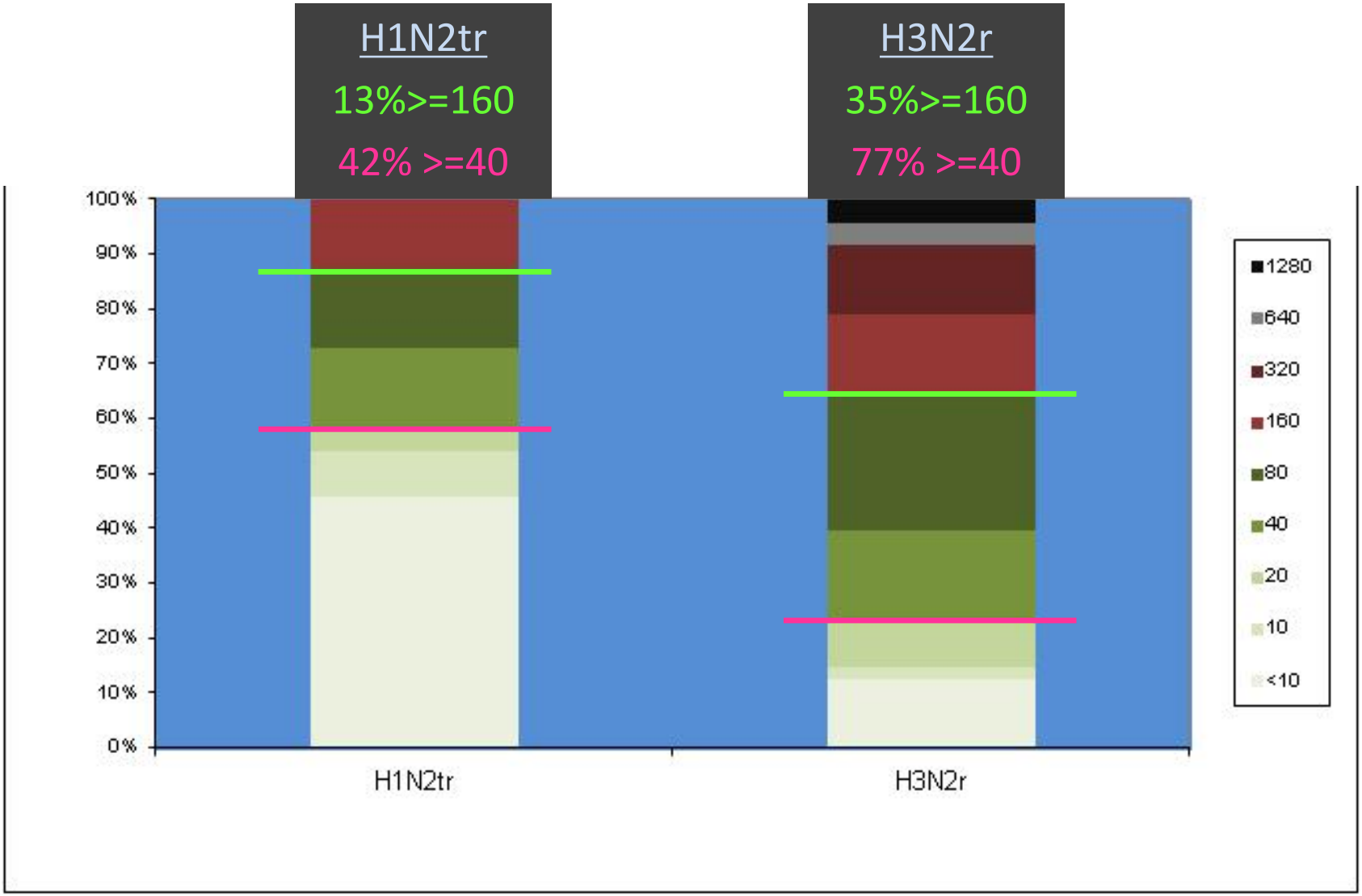
Symptoms

- Cough ~ 70%
- Runny nose ~50%
- Sore throat ~35%
- Fever ~25%

The people

- Eight workers with influenza-like illness were swabbed for virus
  - One confirmed seasonal H3N2, three rhinoviruses
- 57 piggery workers bled
  - 4 had acute and convalescent sera, including the one confirmed case of seasonal H3N2 infection
  - 48 had received the seasonal influenza vaccine 2 weeks prior, including 3 of 4 with paired sera (excluding the confirmed seasonal H3N2 infection)
  - 9 had not received the seasonal influenza vaccine

HI titres in vaccinated piggery workers



Zoonotic influenza, seasonal human infleunza or vaccine responses?

- Was this due to infection with the reassortant viruses at some stage or due to the vaccinations?
- Ferret antisera raised to vaccine strains did not cross-react with the swine viruses
  - Suggests vaccination or seasonal infections **may** not cause cross-racting antibodies to the novel viruses
- The four paired serum samples not helpful only showed vaccine responses (three), or response to proven seasonal H3N2 infection (one)

Effect of seasonal vaccination on the HI titres to the pig influenza viruses

		Mean (95% CI) Log_2 HI titre
WA H1N2tr	Unvaccinated	4.12 (2.92-5.32)
	Vaccinated	4.13 (3.58-4.69)
WA H3N2r	Unvaccinated	3.62 (1.21-2.42)
	Vaccinated	6.11 (5.52-6.71)

- Seasonal vaccination did not affect the HI titres to the H1N2tr, but did significantly increase the titres to the H3N2r
- No adequate control group to determine whether these titres are higher than those seen in unvaccinated and vaccinated individuals without exposure to pigs

Assessing the risk to human health

- No evidence of any immediate significant public health risk
  - No evidence of human illness due to swine viruses
  - No evidence of unexplained fever or respiratory illness outbreaks in piggery workers

- Suggests potential for commercial (and possibly “backyard” pigs) within Australia to act as potential mixing vessel for human and animal influenza => generate new pandemic strains

Implications

- No evidence of any immediate significant public health risk
  - No definitive evidence of human infection has occurred, but needs further investigation
  - No evidence of human illness due to these viruses
  - No evidence of unexplained fever or respiratory illness outbreaks in piggery workers
- Suggests that commercial (and possibly “backyard” pig) within Australia act as potential mixing vessel for human and animal influenza and could generate new pandemic strains
  - Needs more sampling and testing (PCR/culture/serology)
- Need to consider the risk to highly susceptible individuals who have contact with pigs
- Need to review the recommendations for influenza vaccination, antivirals and PPE for people in contact with pigs

Acknowledgements

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