

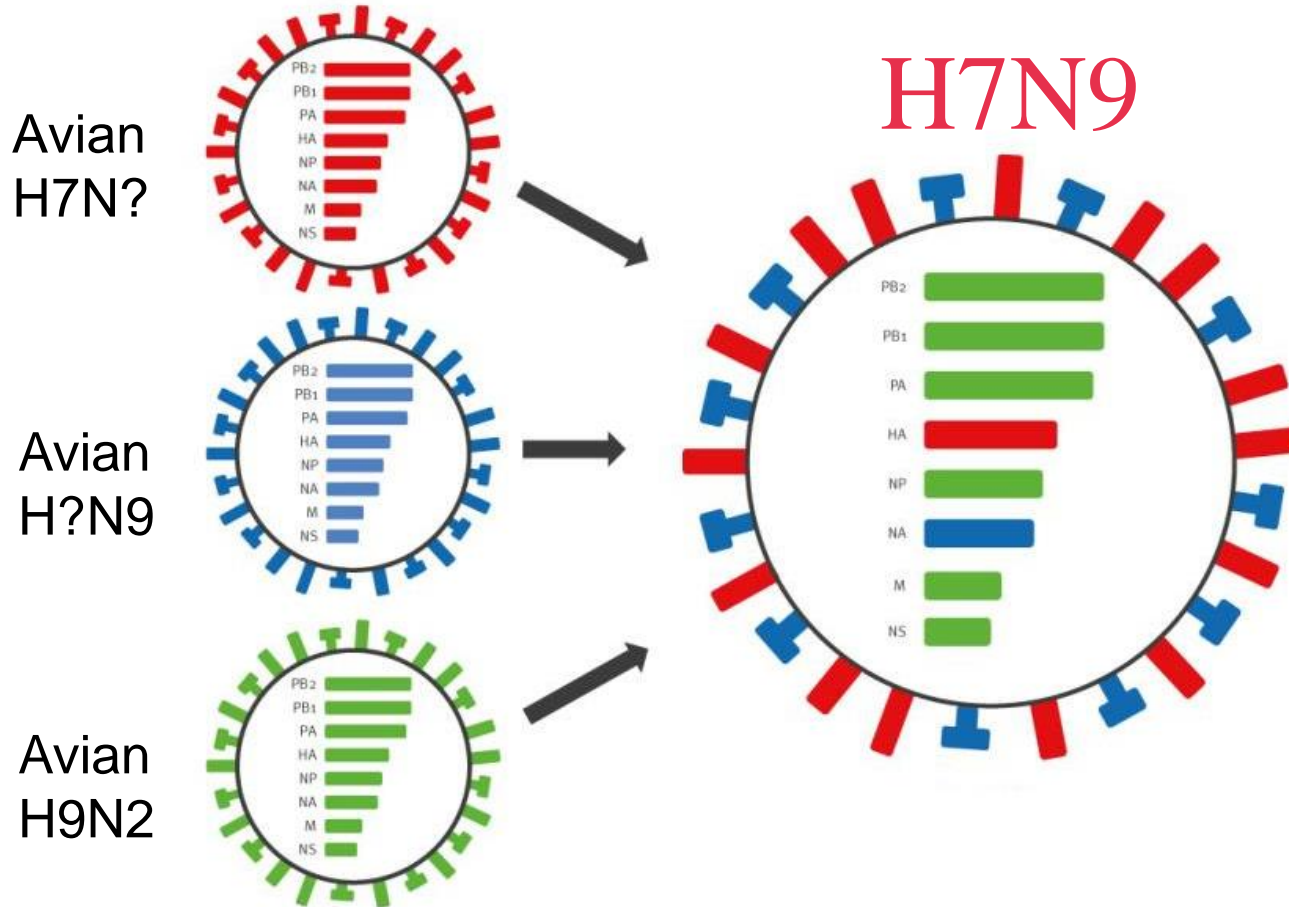


Infectivity, Transmission and Pathology of Human-isolated Avian Influenza A (H7N9) Virus in Ferrets and Pigs Press Conference

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State Key Laboratory of Emerging Infectious Diseases
School of Public Health
The University of Hong Kong
Li Ka Shing Faculty of Medicine



Human Infections with H7N9 Subtype of Influenza Viruses



131 cases of infection and 36 death in mainland China and Taiwan up till now

Data in WHO/HQ as of 16 May 2013, 08:00 GMT+1
Source: WHO/GIP



Key Questions

- Human-to-human transmissible?
- Pathogenicity?
- Other host?



Experiment on animals

- Ferret: the best model for the study of human influenza
- Clinical signs, transmission route and pathology similar to humans





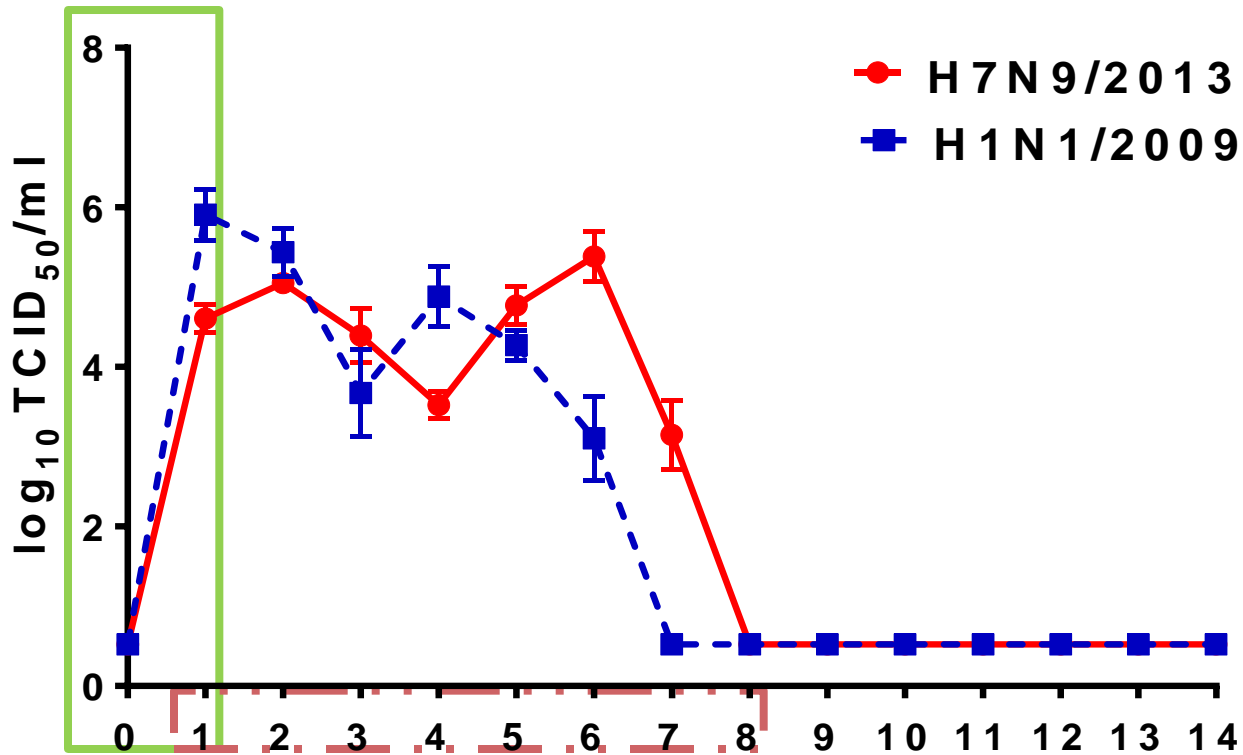
Experiment on Ferrets

- Virus shed to high titers within 24 hours post-inoculation
- Followed by symptoms like fever, sneezing, reduced activity, coughing and pneumonia
- Shedding of virus lasts for 5 to 7 days
- Specific antibody occurred on Day 7
- Virus replication and shedding kinetics similar to pandemic A (H1N1) 2009





Virus Shed by Nasal Route

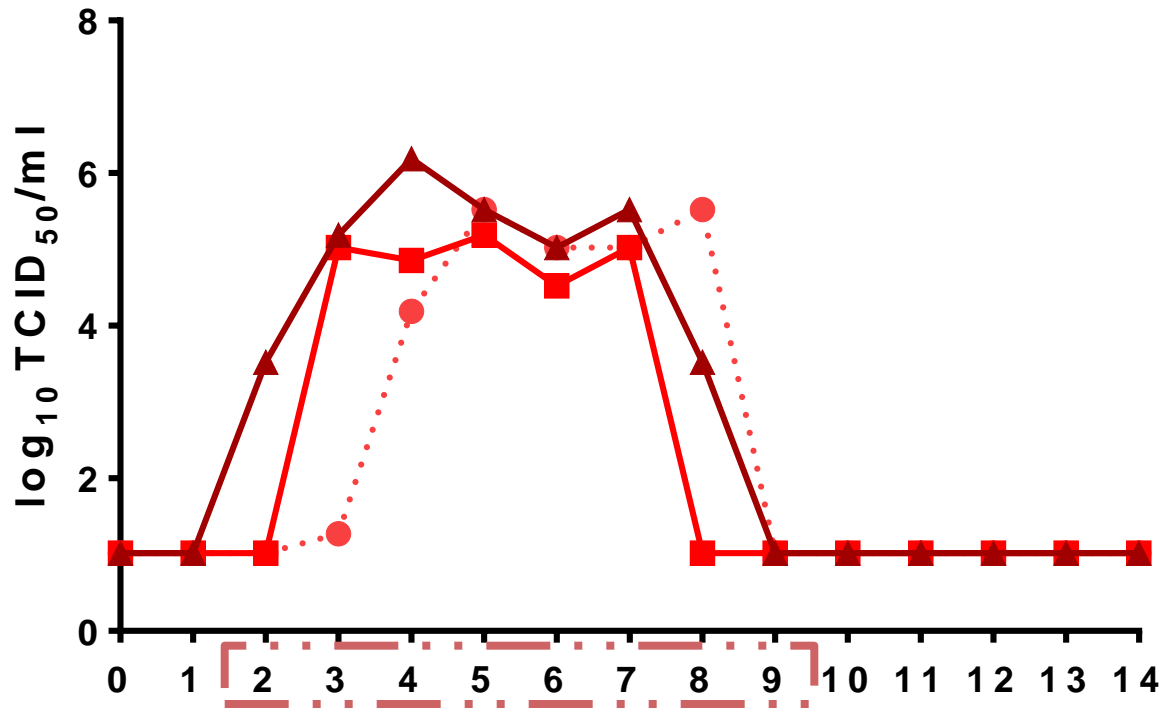


➤ Virus shed to high titers within 24 hours (before clinical signs)

➤ Shedding of virus lasts for 7 days (similar to pandemic A (H1N1) 2009)



H7N9 transmission via Direct Contact

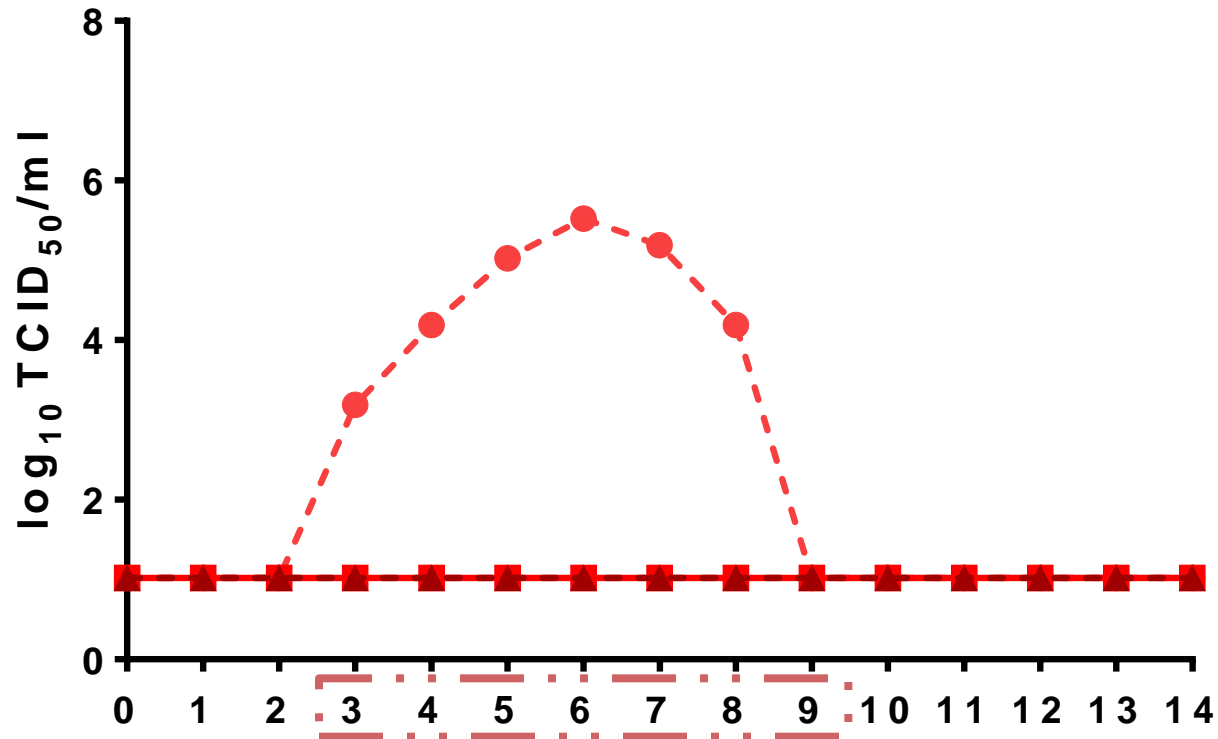


➤ All three direct contact ferrets (as indicated by 3 lines in the graph) are infected and start to shed virus at Day 2-3

➤ Shedding lasts for 5-7 days



H7N9 transmission via air-borne exposure

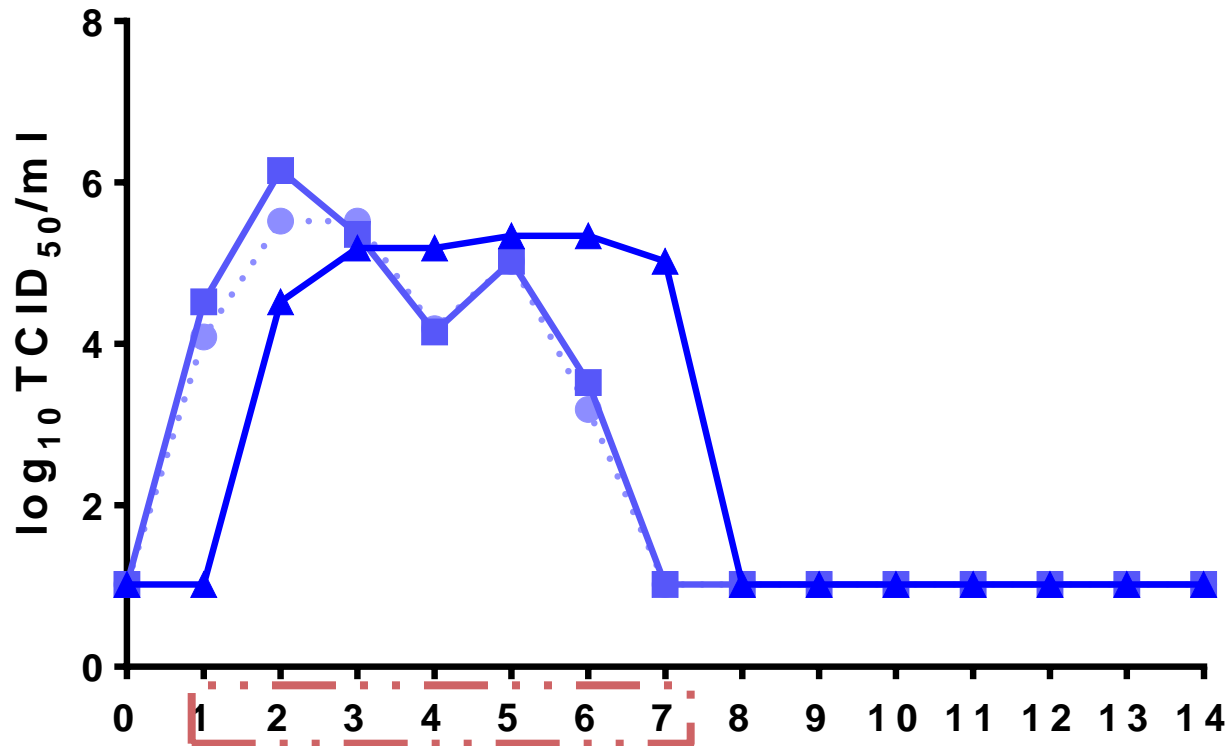


➤ one out of the 3 air-borne exposed ferrets sheds virus (as indicated by 3 lines in the graph, two lines at the bottom overlap)

➤ shedding lasts for 6 days



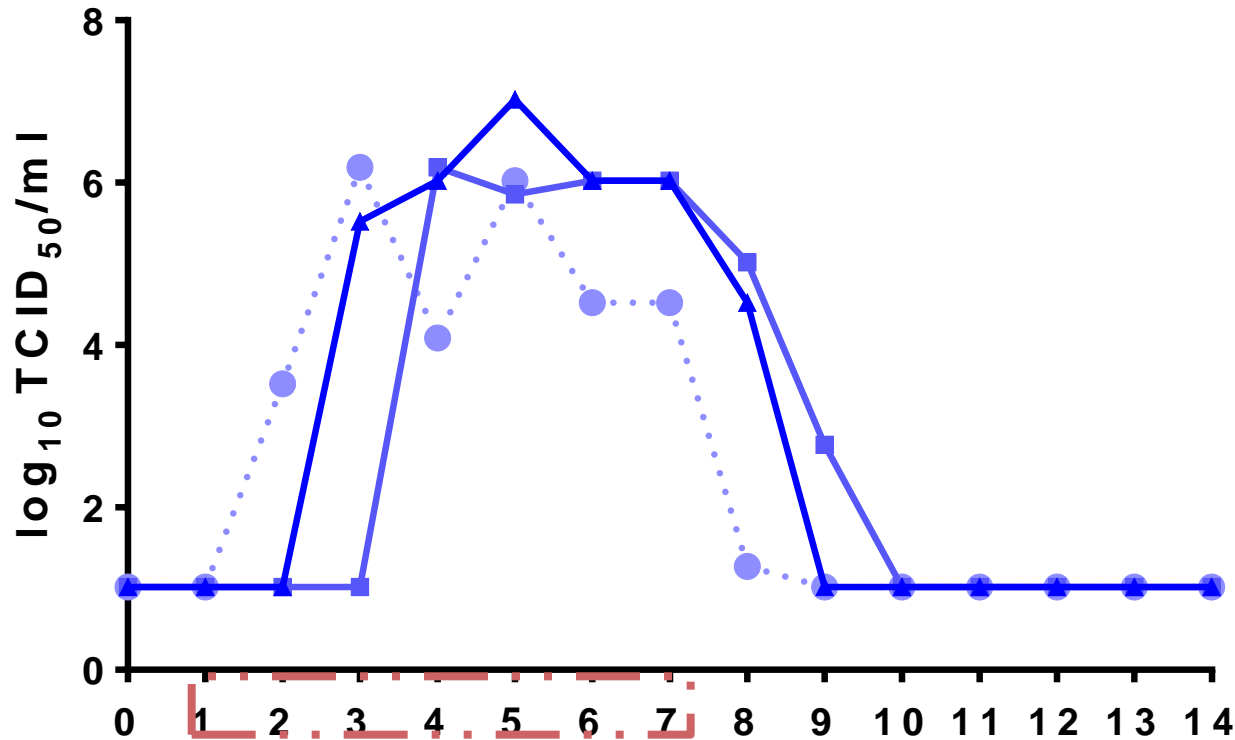
Transmission of A(H1N1)2009 via Direct Contact



- all three direct contact ferrets (as indicated by 3 lines in the graph) are infected and start to shed virus at Day 1-2
- shedding lasts for 6 days



Transmission of A(H1N1)2009 via airborne exposure

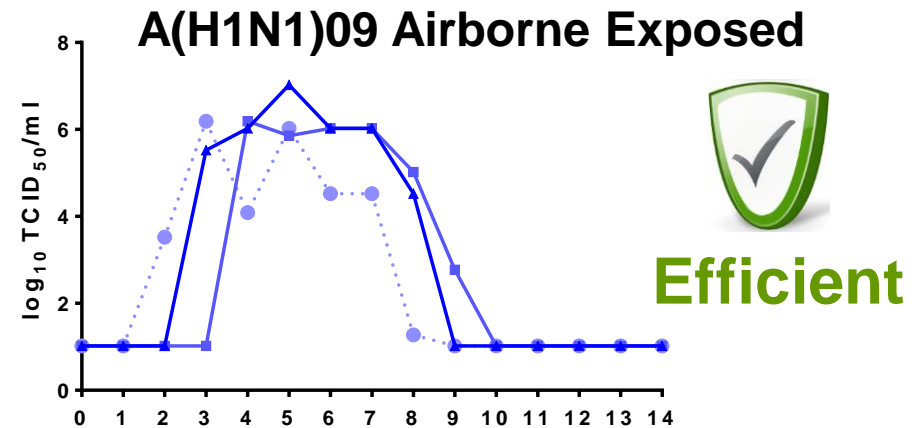
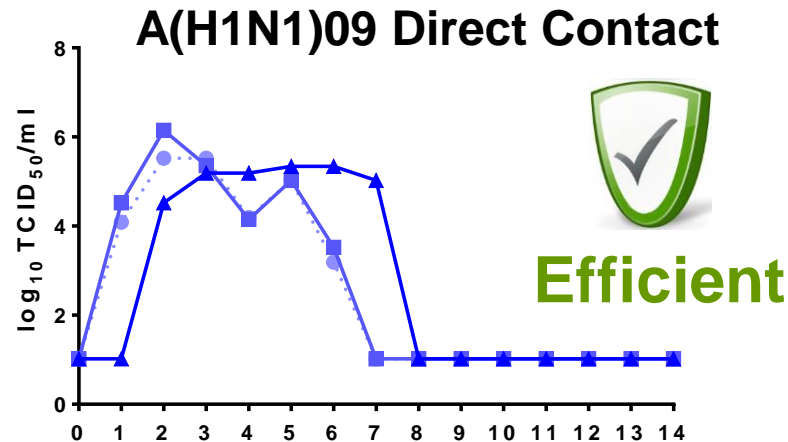
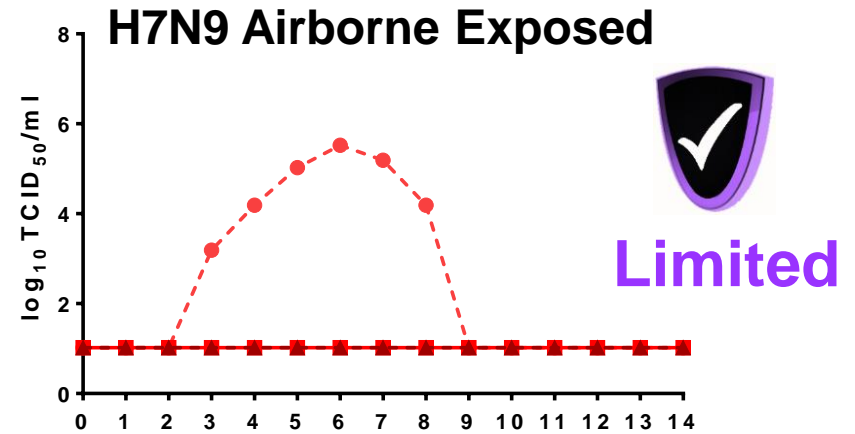
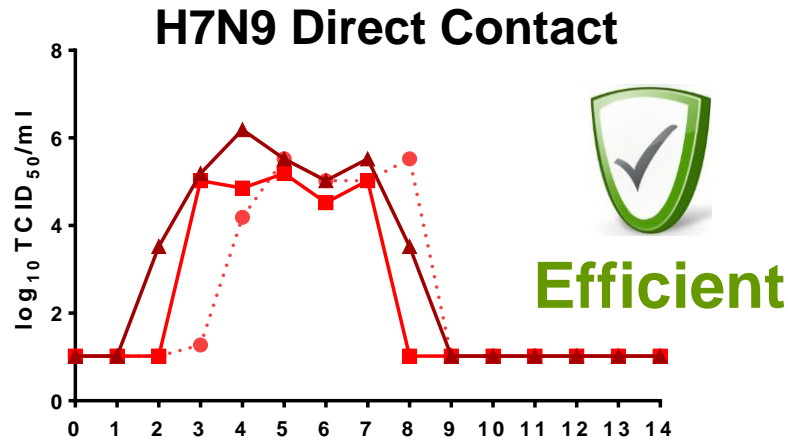


➤ All three airborne exposed ferrets (as indicated by 3 lines in the graph) start to shed virus at Day 2-4

➤ Shedding lasts for 6-7 days



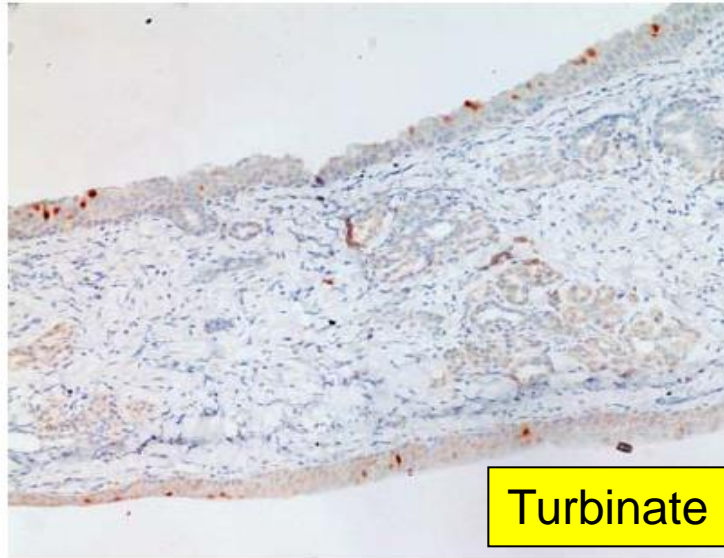
Virus transmission via direct contact and air-borne exposure



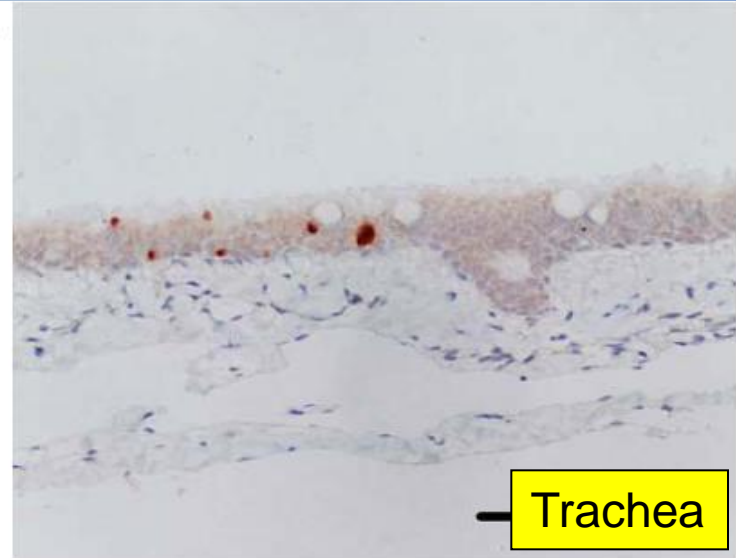


H7N9 Causes Infection in the Respiratory Tract

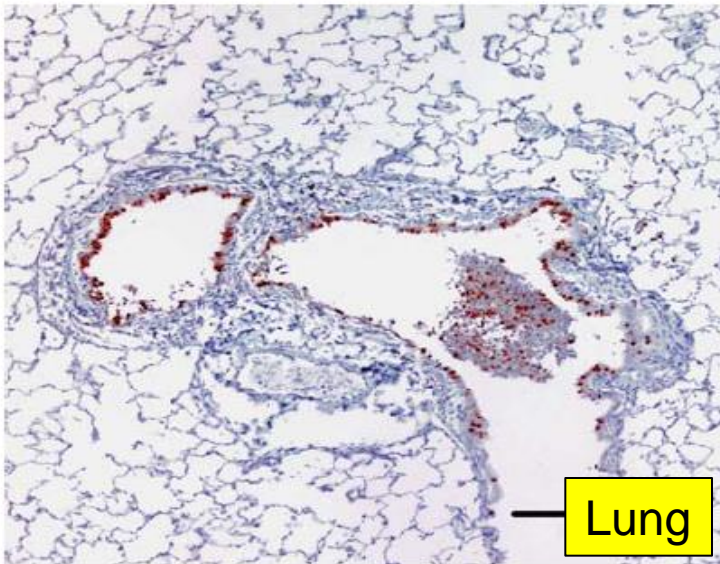
A



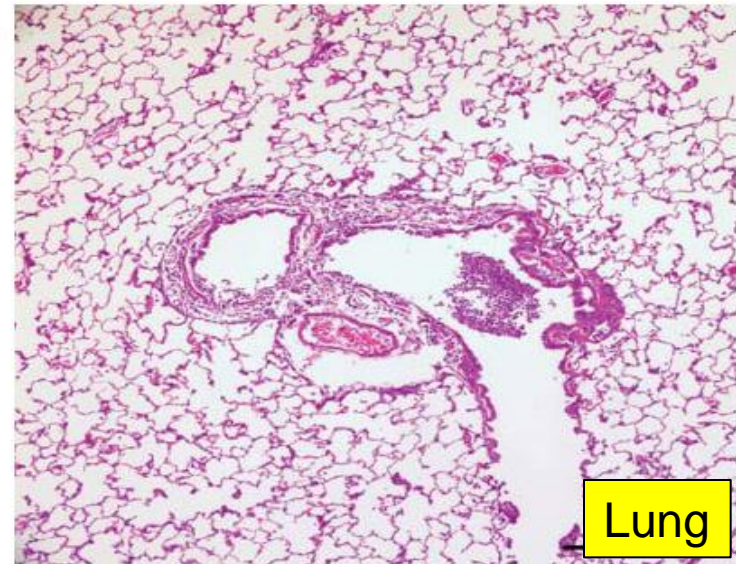
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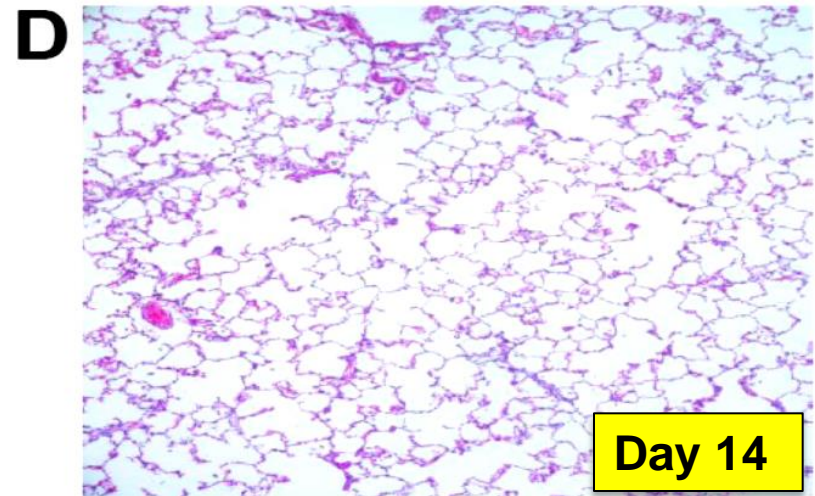
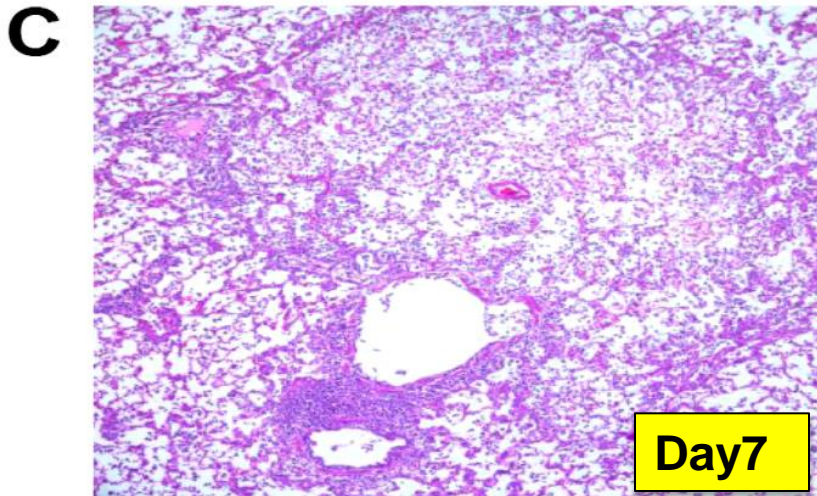
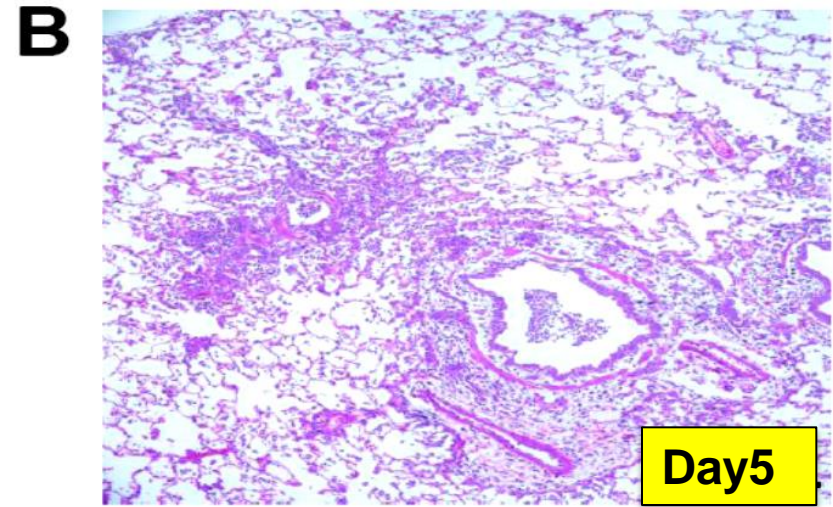
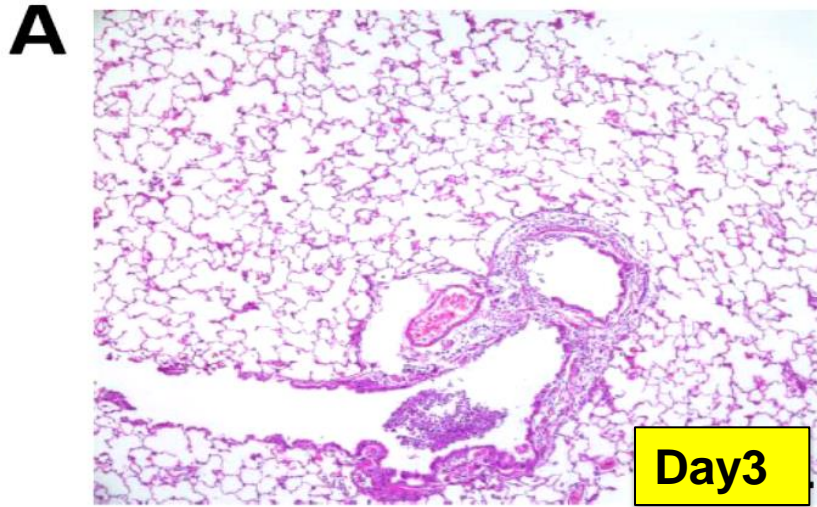


D





Development and Resolution of Pneumonia



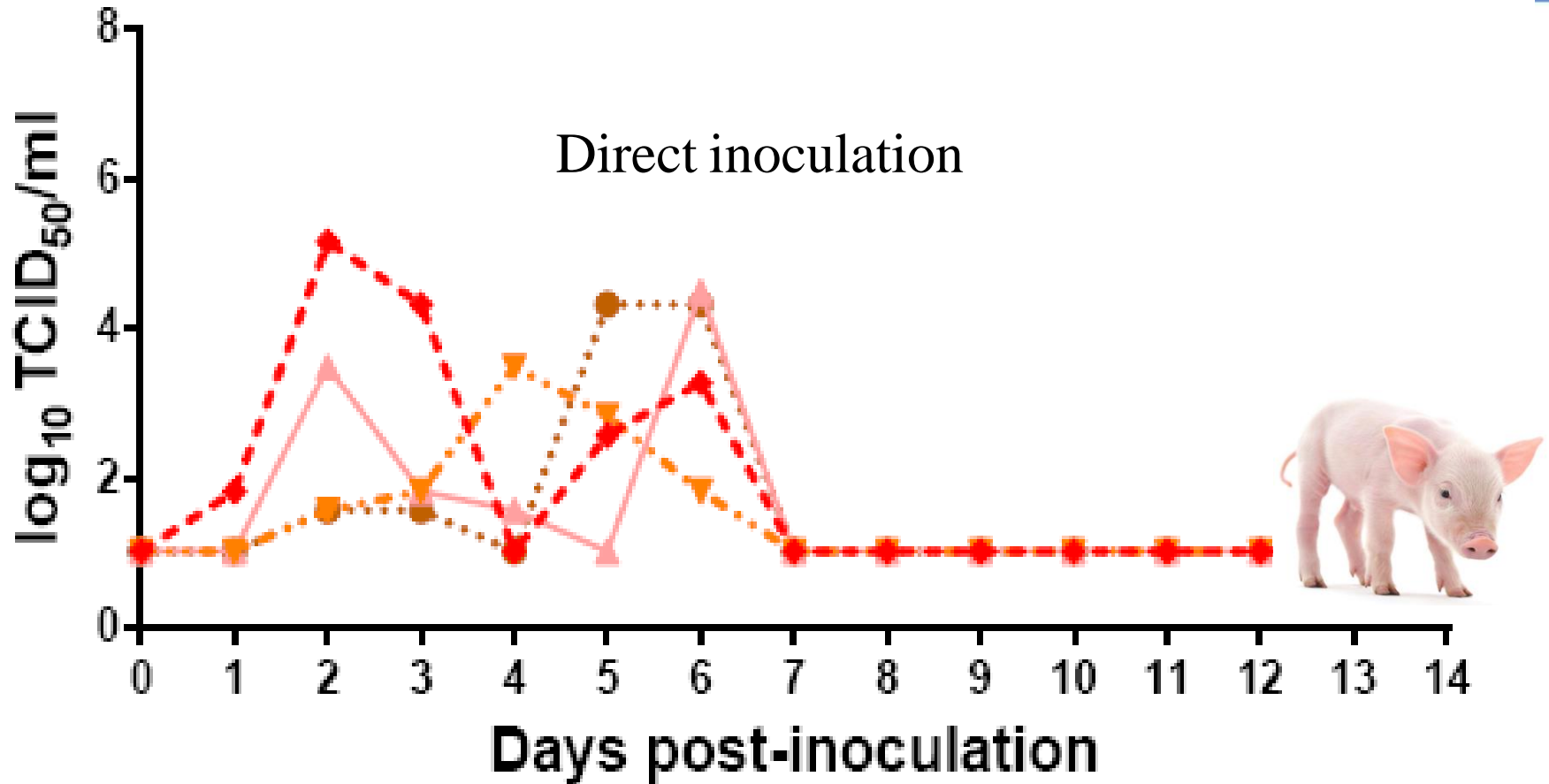


Virus Replication and Transmission in Pigs





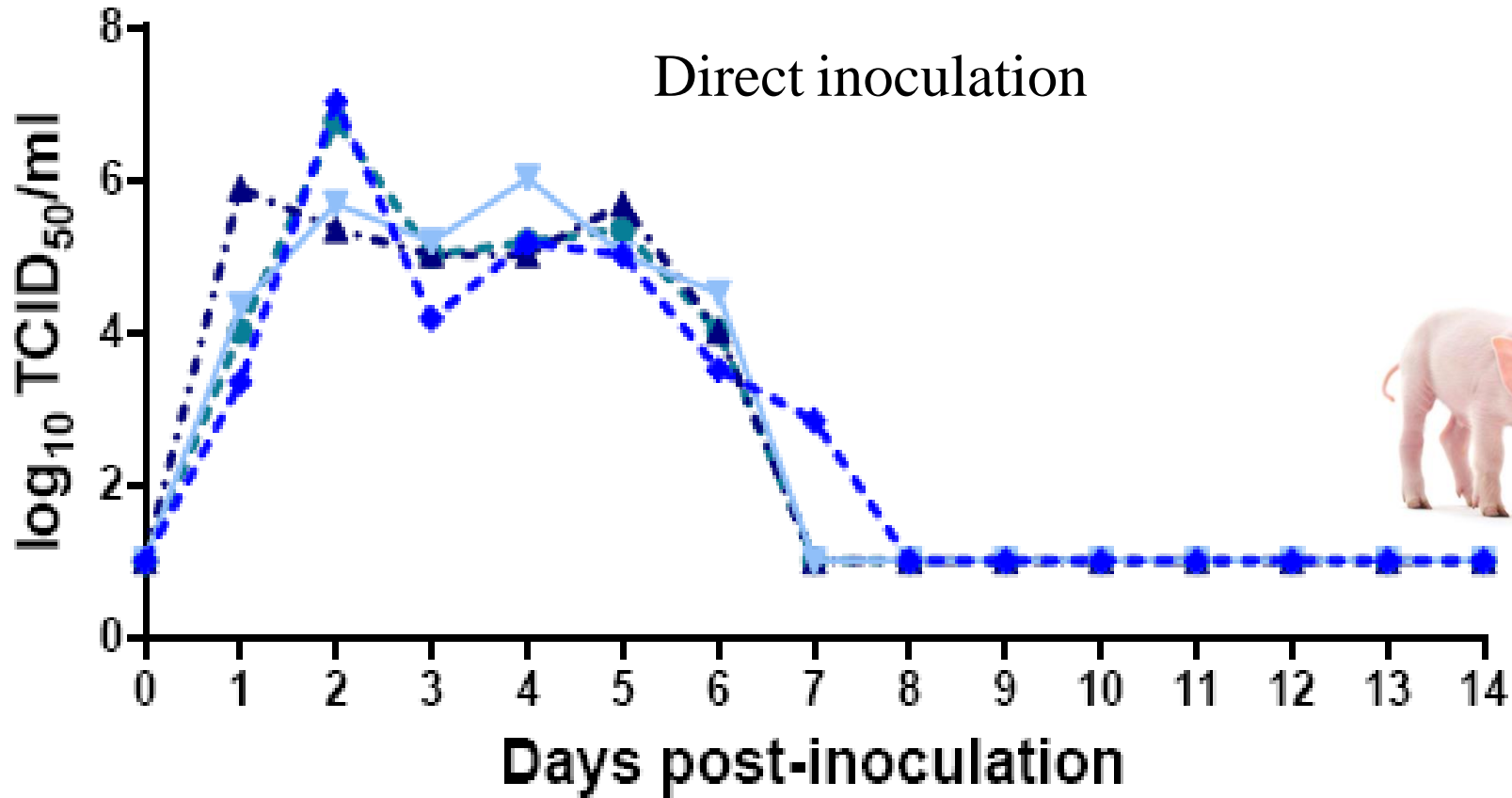
H7N9 Infection in Pigs



All four pigs (as indicated by 4 lines in the graph) are infected and shed virus for 5-6 days



A(H1N1)2009 Infection in Pigs

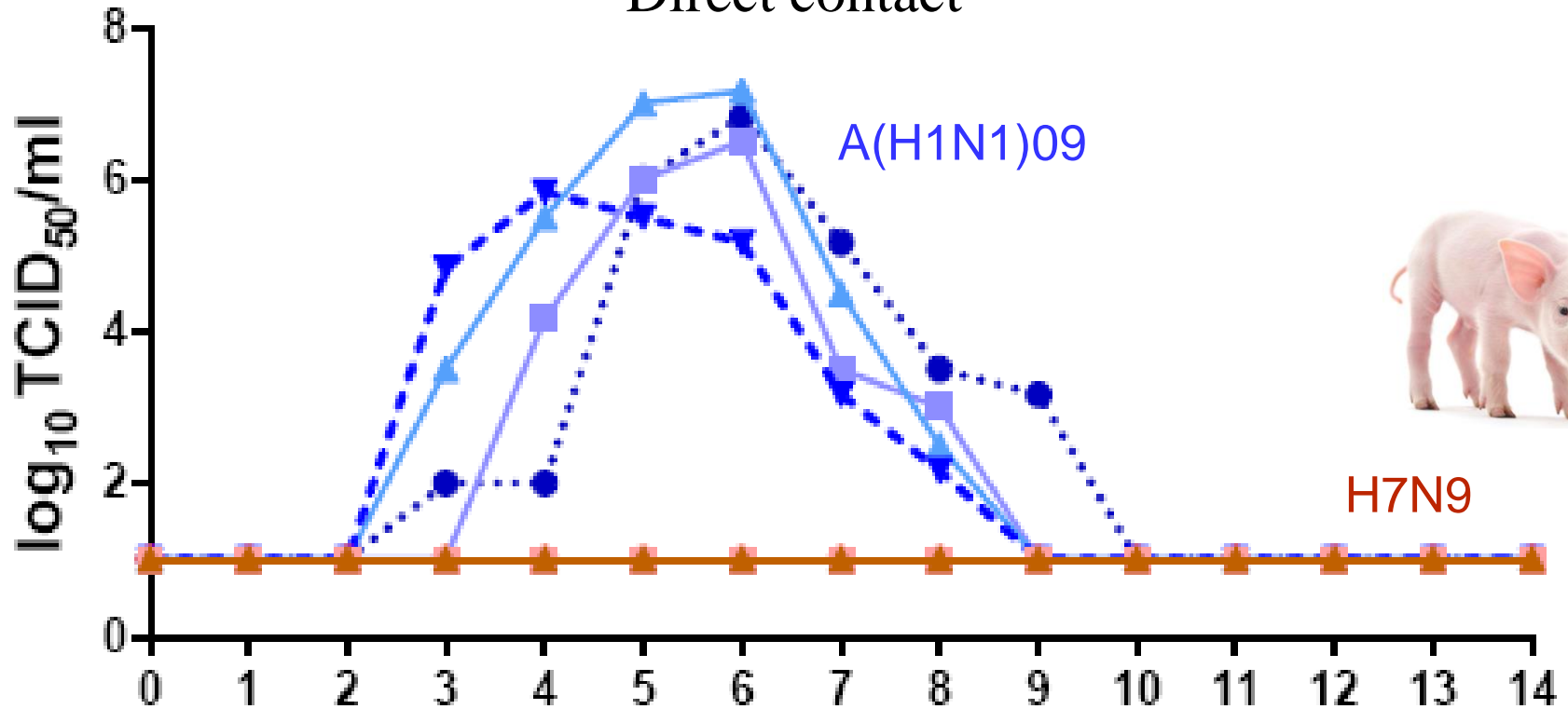


All four pigs (as indicated by 4 lines in the graph) shed virus for 6-7 days, with higher virus titer than that for H7N9



Virus Transmission in Direct Contact Pigs

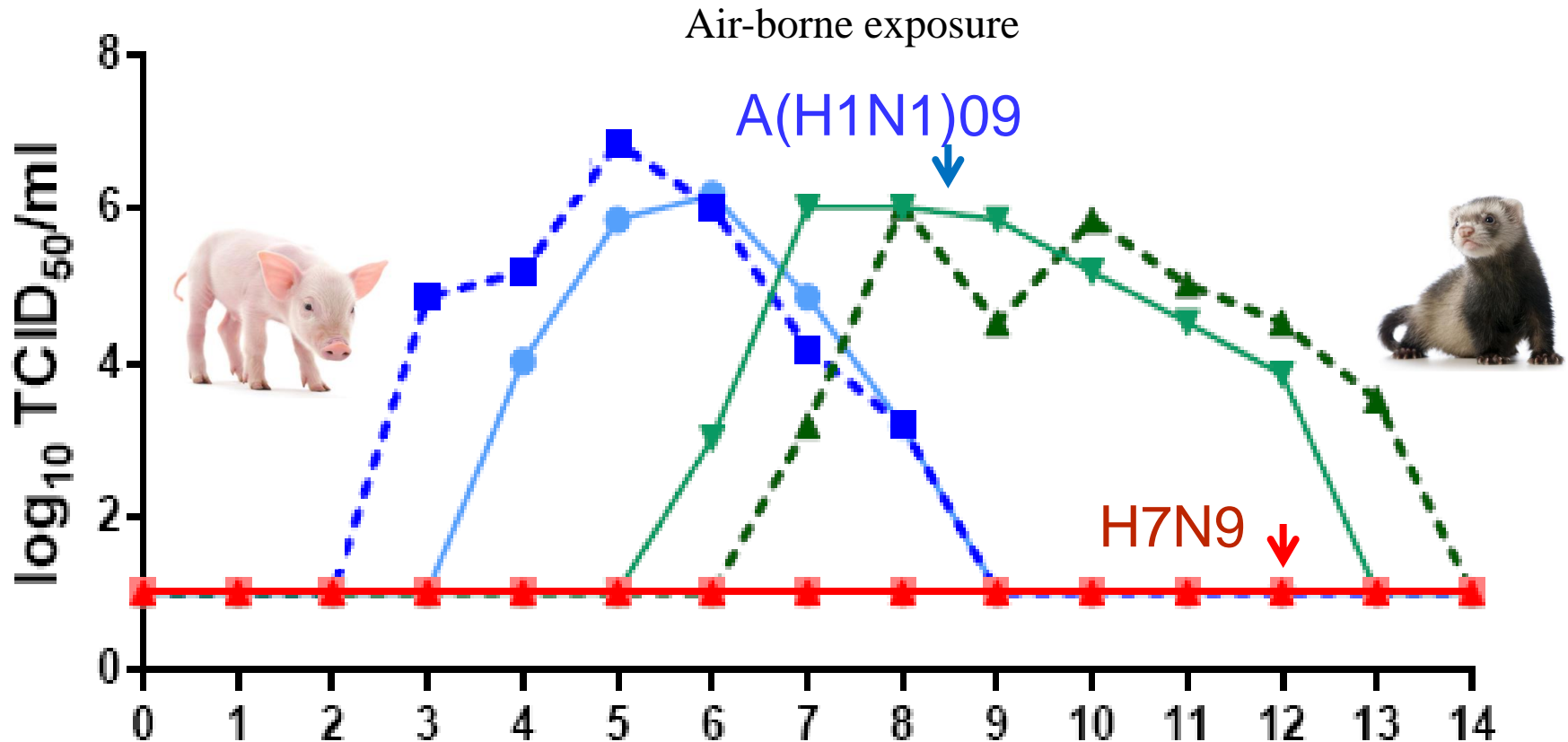
Direct contact



A(H1N1)09 can be efficiently transmitted to all four direct contact pigs, while H7N9 direct contact pigs do not shed virus



Virus Transmission via Air-borne Exposure



A(H1N1)09 can be efficiently transmitted from pigs to pigs and from pigs to ferrets, but H7N9 (Line at the bottom) cannot be transmitted via air-borne exposure from pigs to other animals



Key Findings on H7N9 Virus

- Relatively mild clinical signs (similar to 2009 pandemic H1N1)
- Efficient replication in the respiratory tract and shedding of virus from nasal route
- Efficient transmission via close contact
- Limited transmission via air-borne exposure
- Able to infect pigs, but inefficient in transmission



Implications of research

- Some infected animals do not develop fever and other clinical signs, indicating that asymptomatic infections among human are possible
- As the avian influenza A (H7N9) can also infect pigs, surveillance of pigs is needed to prevent the epidemic from further spreading and reassortment with the swine influenza viruses
- The findings suggests that the possibility of this virus, evolving further to form the basis of a future pandemic threat, cannot be excluded.



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