

# **Influenza in Ontario Swine Populations**

Zvonimir Poljak, Population Medicine, OVC

**Center for Public Health and Zoonoses**

**Opportunities in Public Health Research at the Human-Animal-Environment Interface Science Symposium**

**May 5<sup>th</sup> 2009**

# Outline

---

- ▶ **Published evidence of transmission and risk**
- ▶ **Global distribution of influenza viruses in swine**
- ▶ **Distribution of influenza in North American swine**
- ▶ **Studies of influenza in Ontario swine populations**
  - ▶ **Prevalence**
  - ▶ **Geographical distribution**
  - ▶ **Apparent mechanisms of spread**



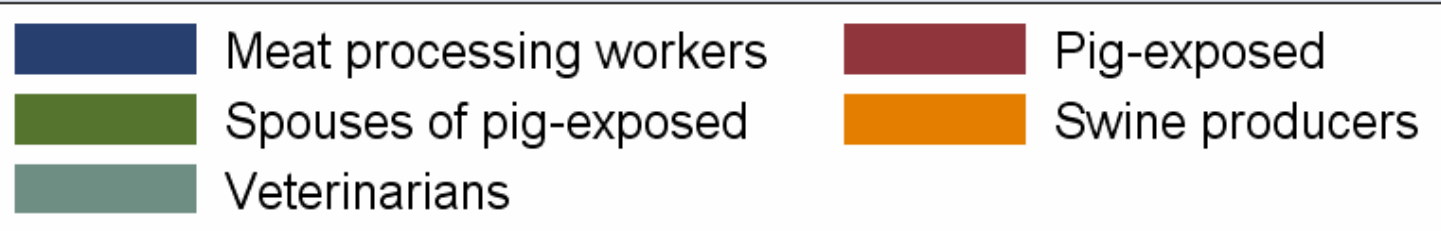
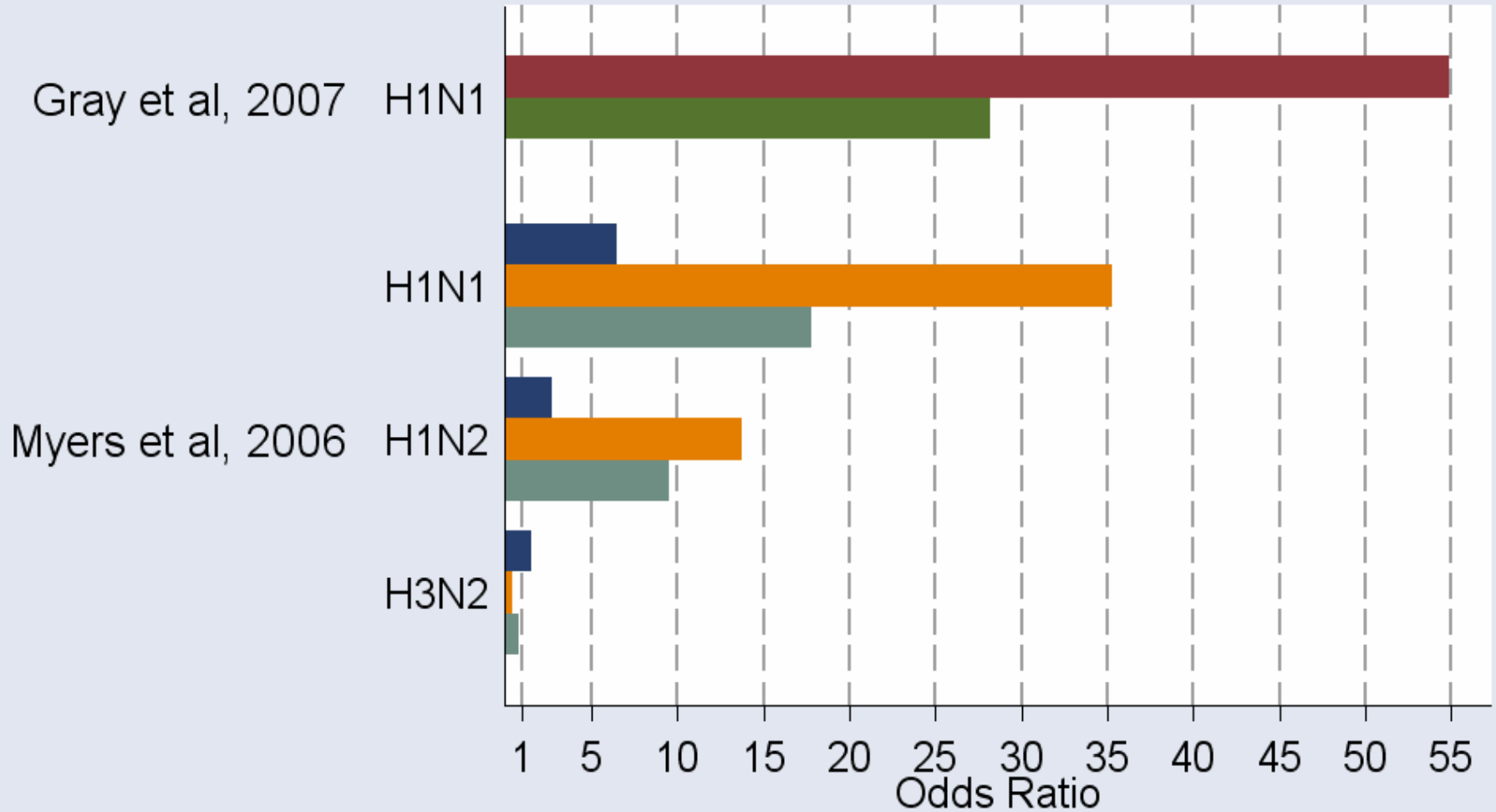
# Published evidence of transmission and risk

---

## ▶ **1958-2005**

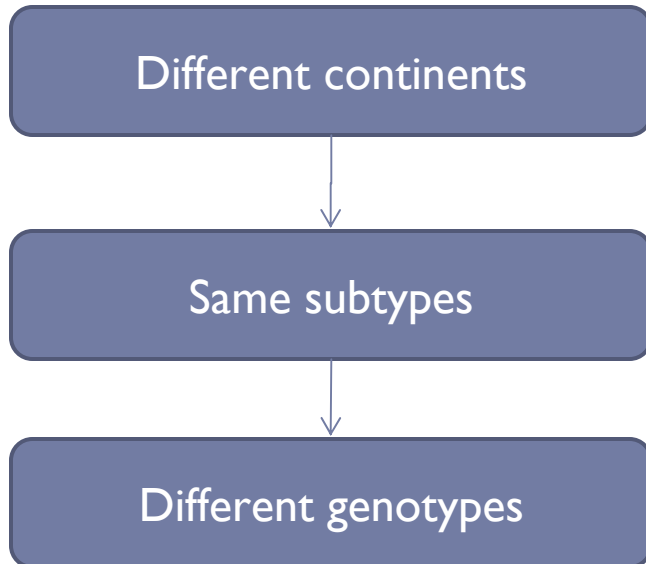
- ▶ **50 cases (37 civilian), 19 US, 1 Canada**
- ▶ **10% H3N2, 90% H1N1**
- ▶ **Age of 24.5, 29 cases between Sept/March**
- ▶ **61% had recent exposure to swine, 35% worked with swine**
- ▶ **54% healthy, others had a medical condition**
- ▶ **6 people (2 healthy)**

# Occupation and exposure to swine influenza viruses



# Global distribution of influenza viruses in swine

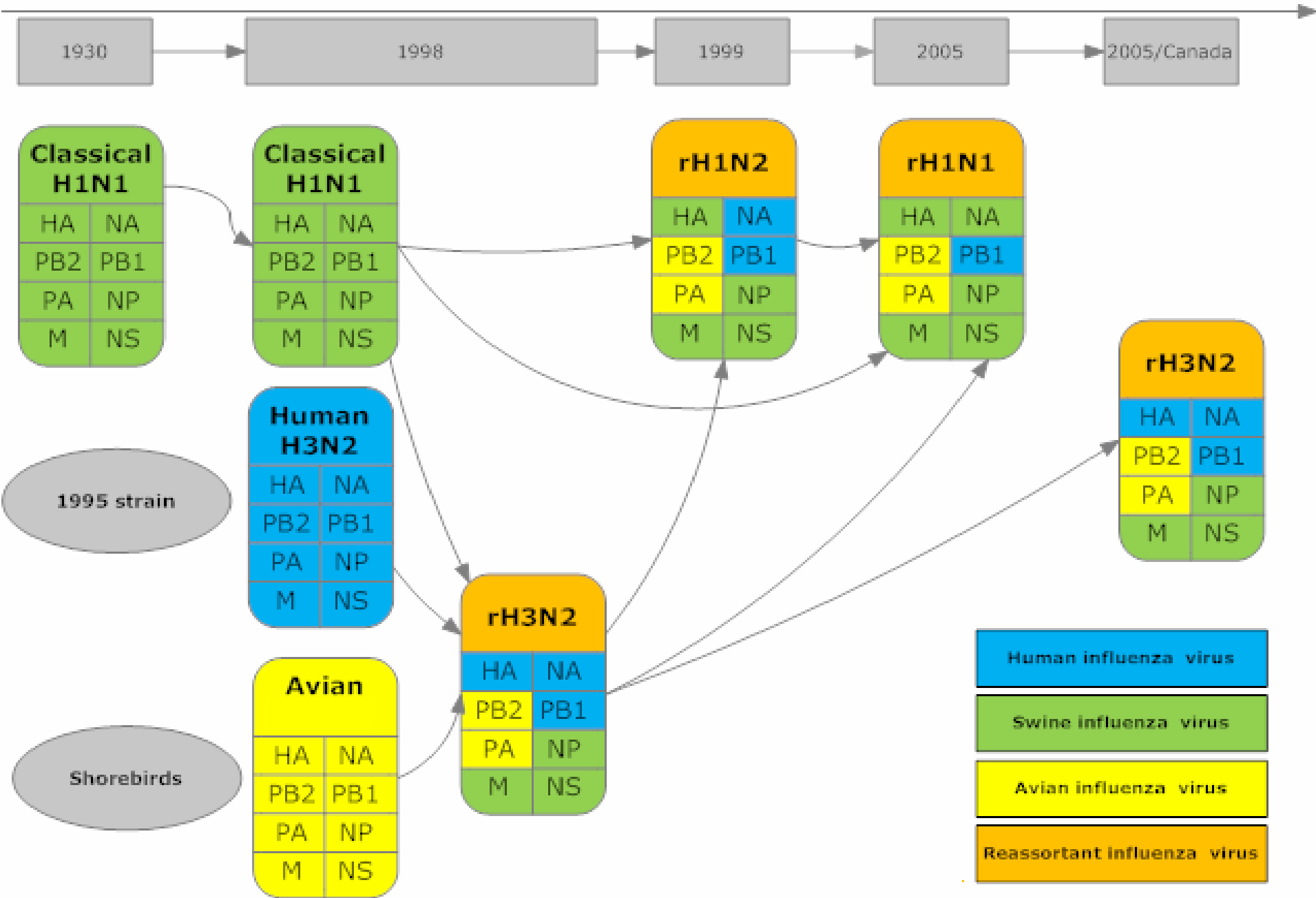
- ▶ Susceptible to many subtypes
- ▶ Replication?
- ▶ Typically
  - ▶ H1N1, H2N3, H1N2



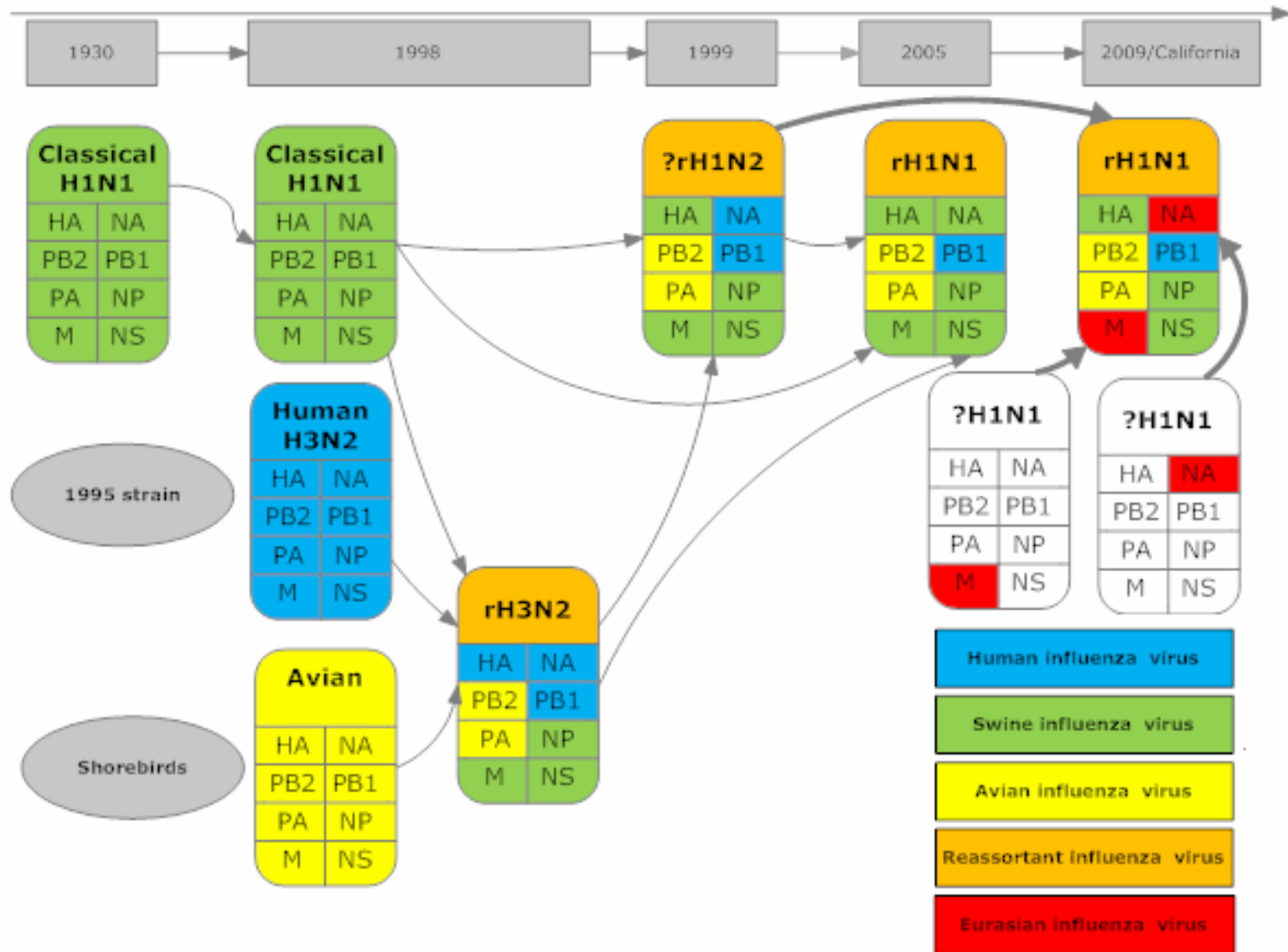
Region	Asia	Europe	North America
H1N1	Reassortant	Avian-like	Classical Reassortant
H3N2	Reassortant (variable)	Reassortant (variable)	Reassortant
H1N2	Reassortant	Reassortant	Reassortant
Other subtypes	Yes	Yes	Yes



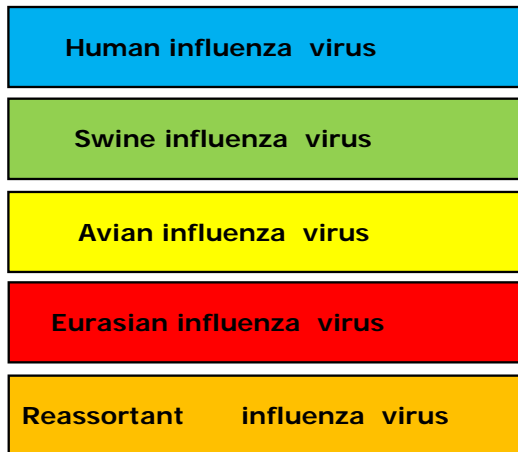
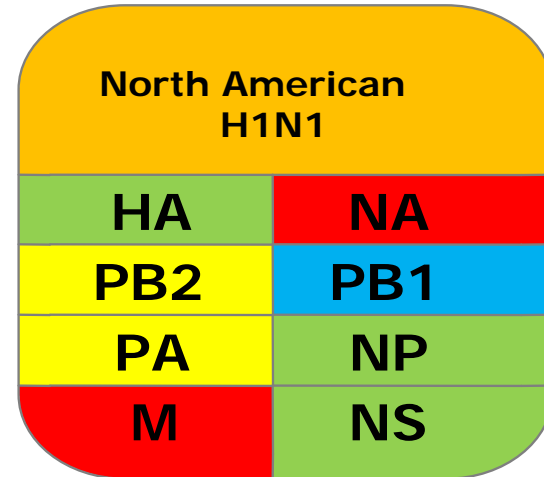
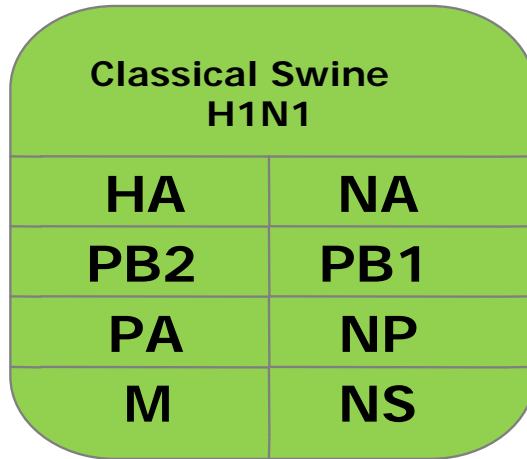
# Influenza in North American (US/Canada) swine



# Apparent link between SIV and NA influenza

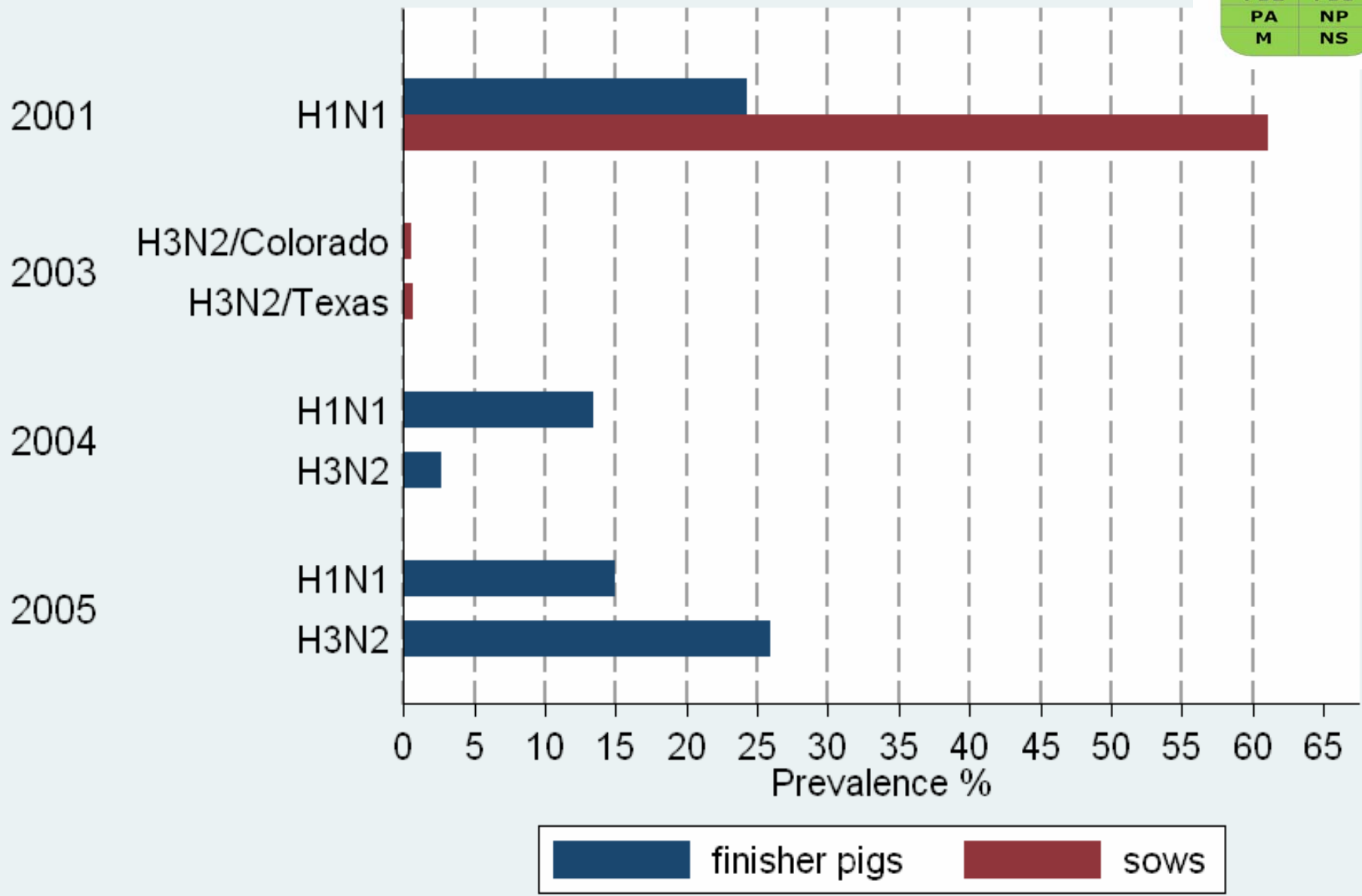


# Not all H1N1 viruses are the same



# Pig-level prevalence of influenza in Ontario pigs

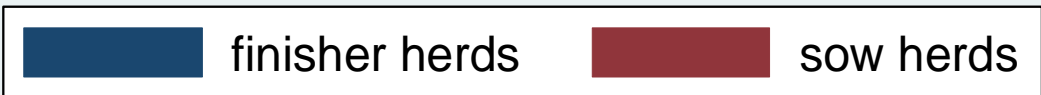
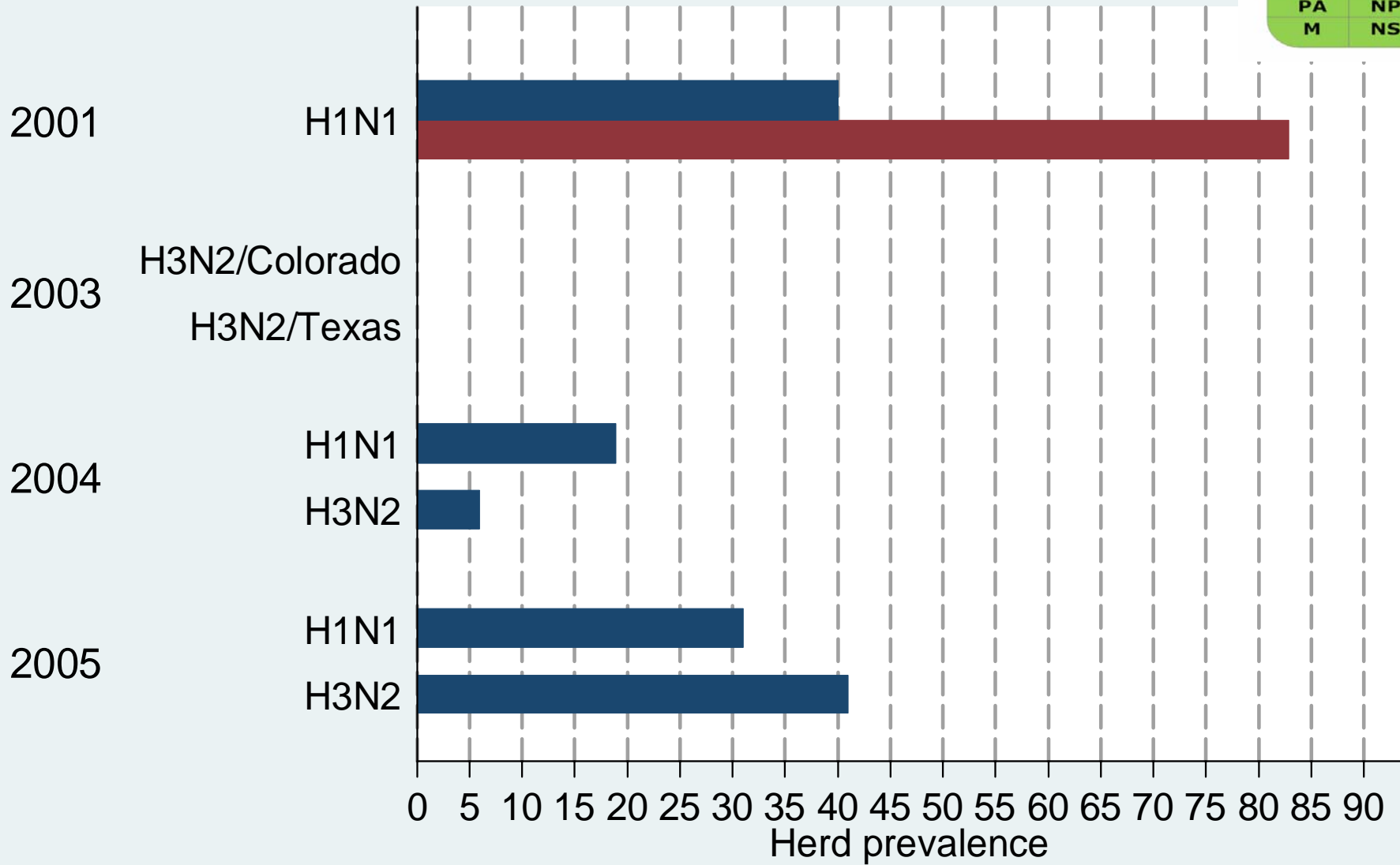
Classical Swine H1N1	
HA	NA
PB2	PB1
PA	NP
M	NS



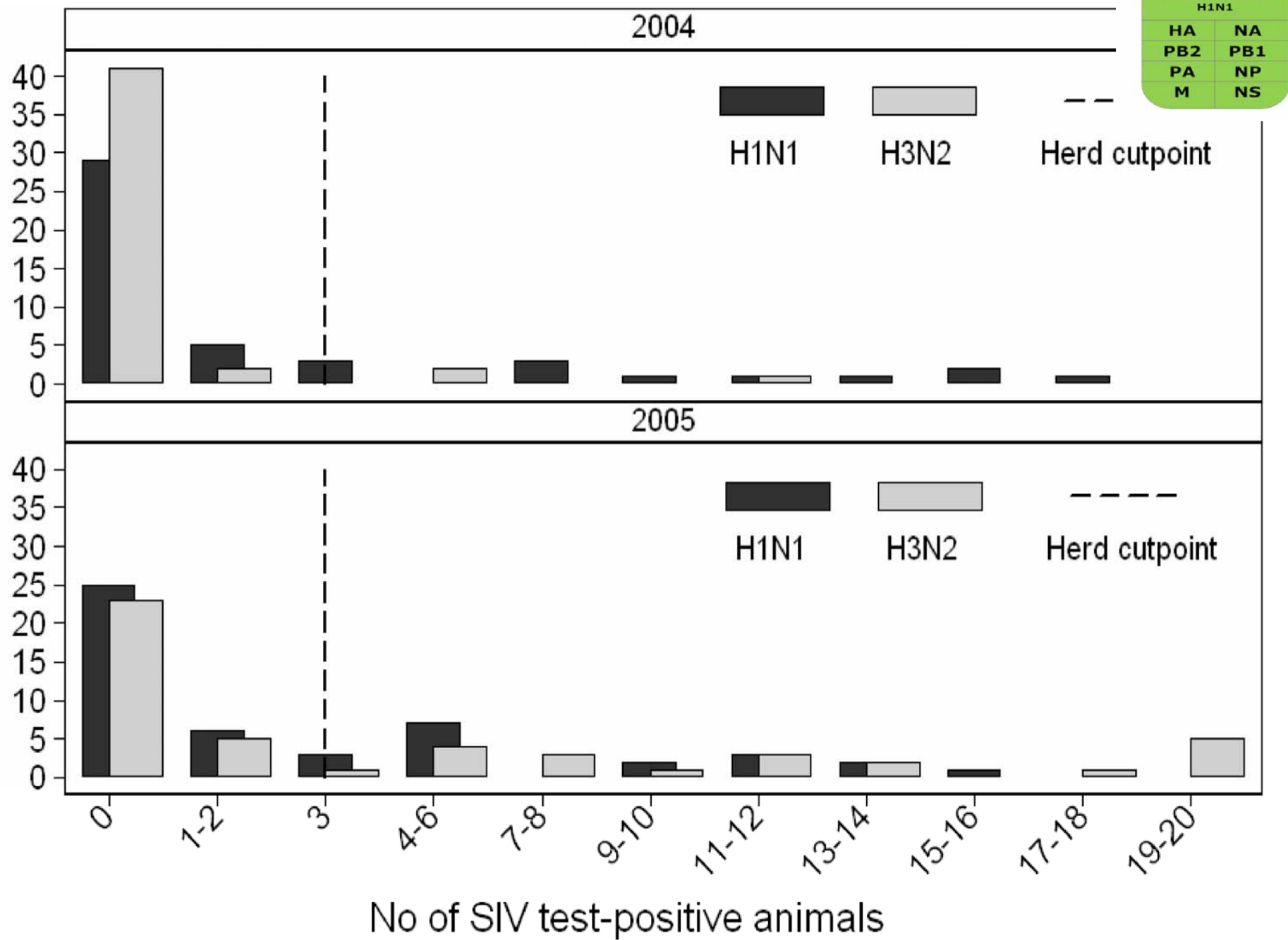
Poljak et al, 2008a; Poljak et al, 2008b, Poljak et al, 2007

# Herd level prevalence

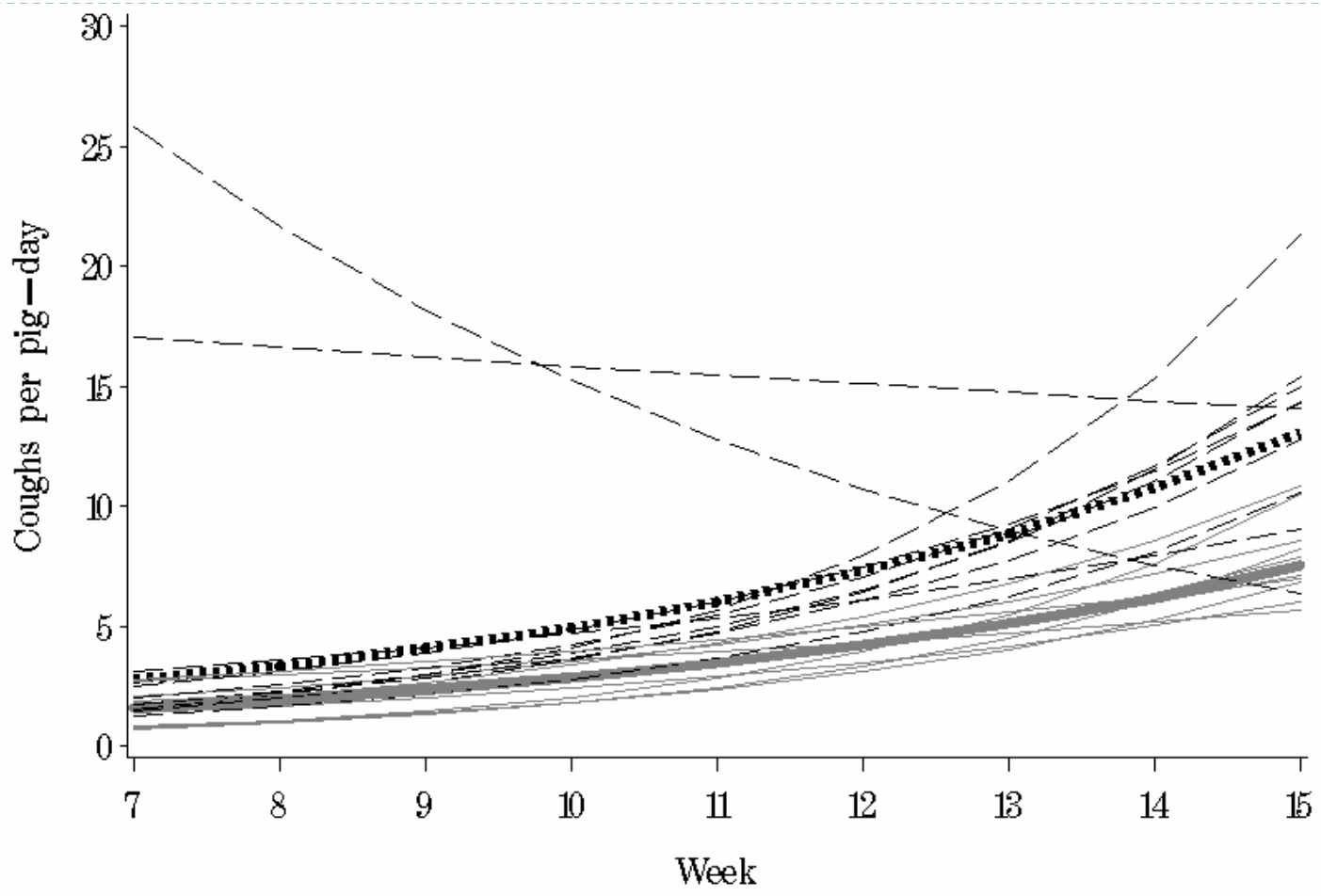
Classical Swine H1N1	
HA	NA
PB2	PB1
PA	NP
M	NS



No of herds

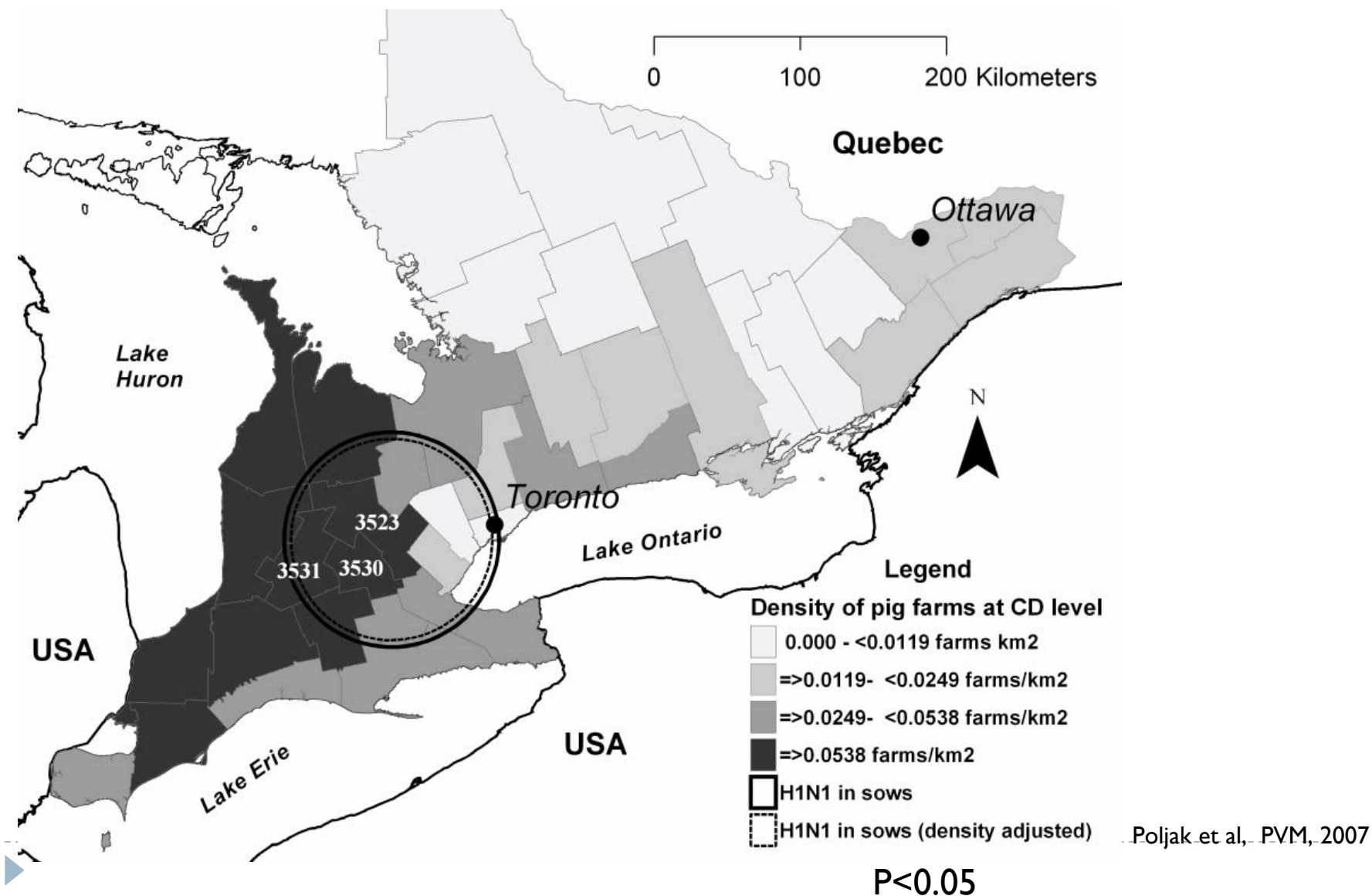


# Within-herd spread

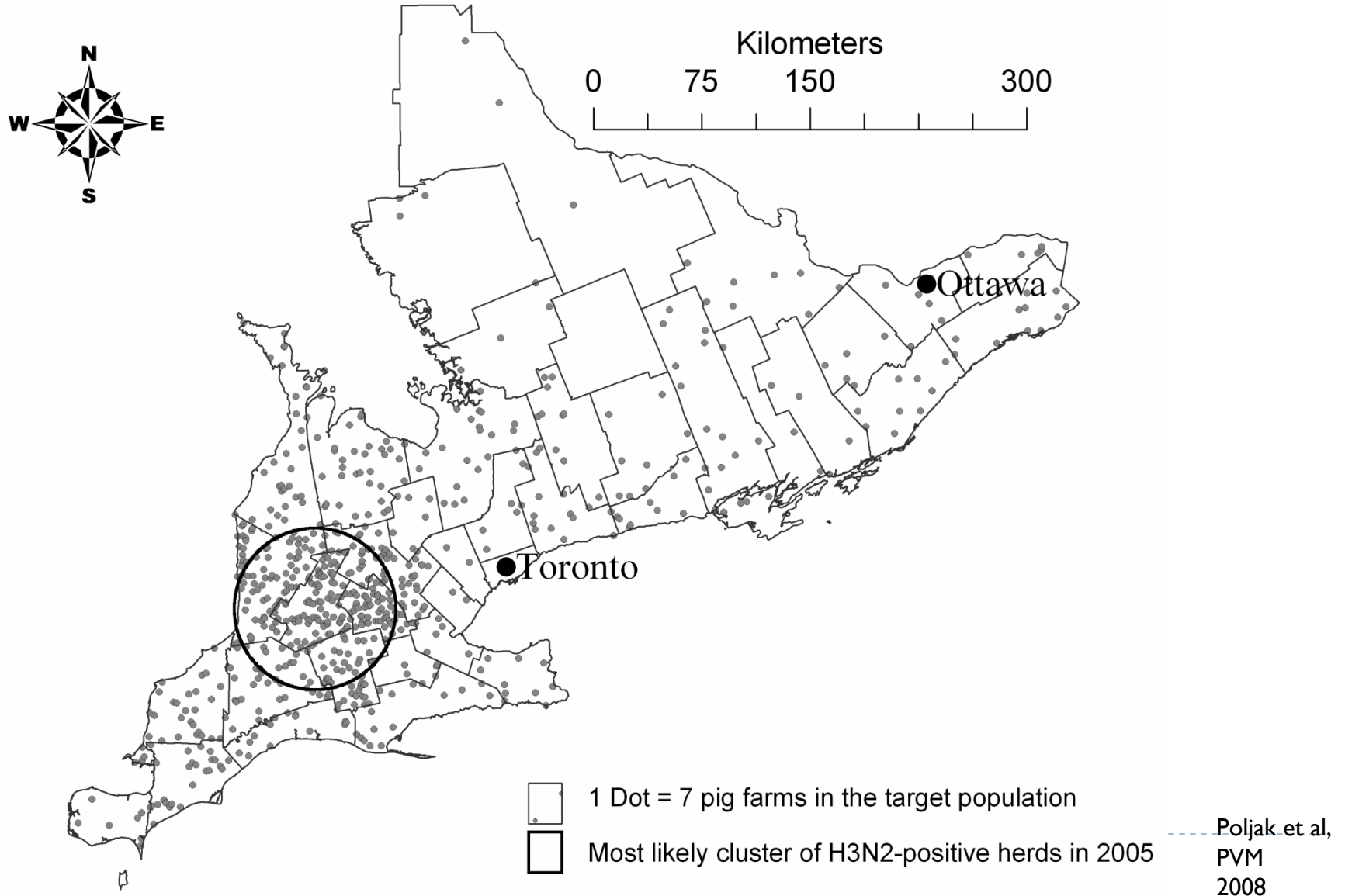


HA	NA
PB2	PB1
PA	NP
M	NS

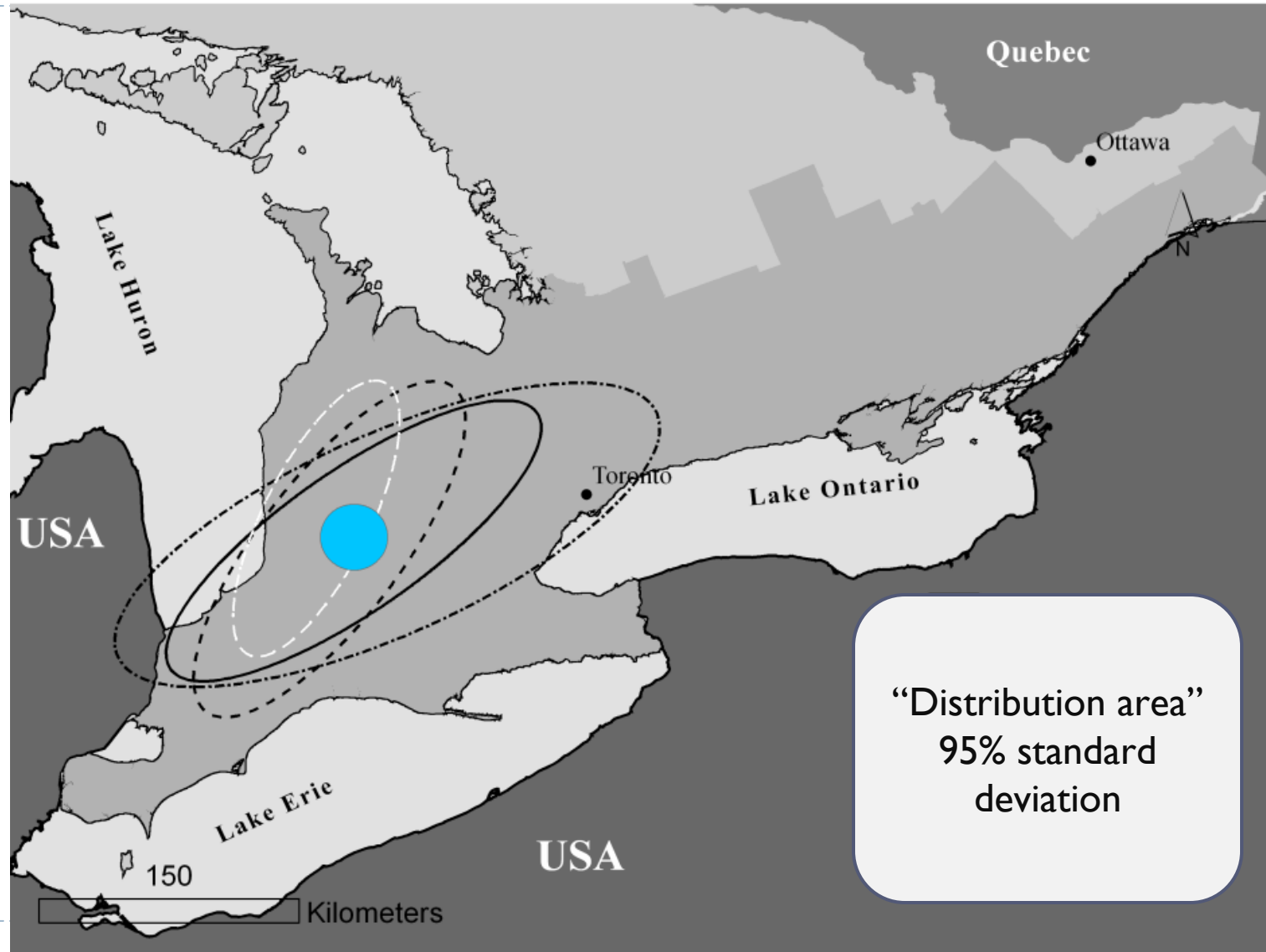
# Most likely cluster of H1N1 – 2001



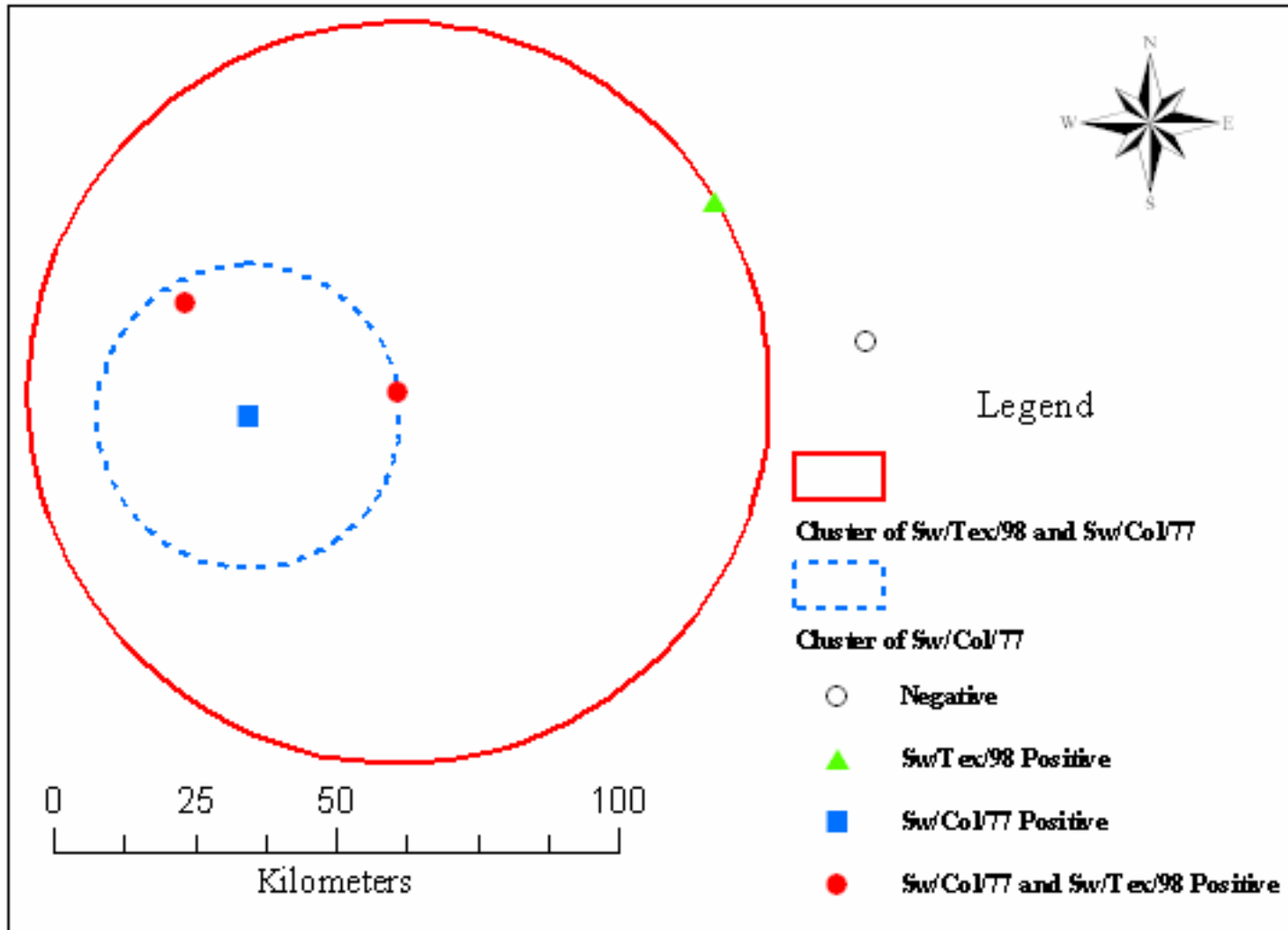
# Most likely cluster of H3N2 – 2005



# Things to consider: Animal movement



# Most likely cluster of H3N2 – 2003

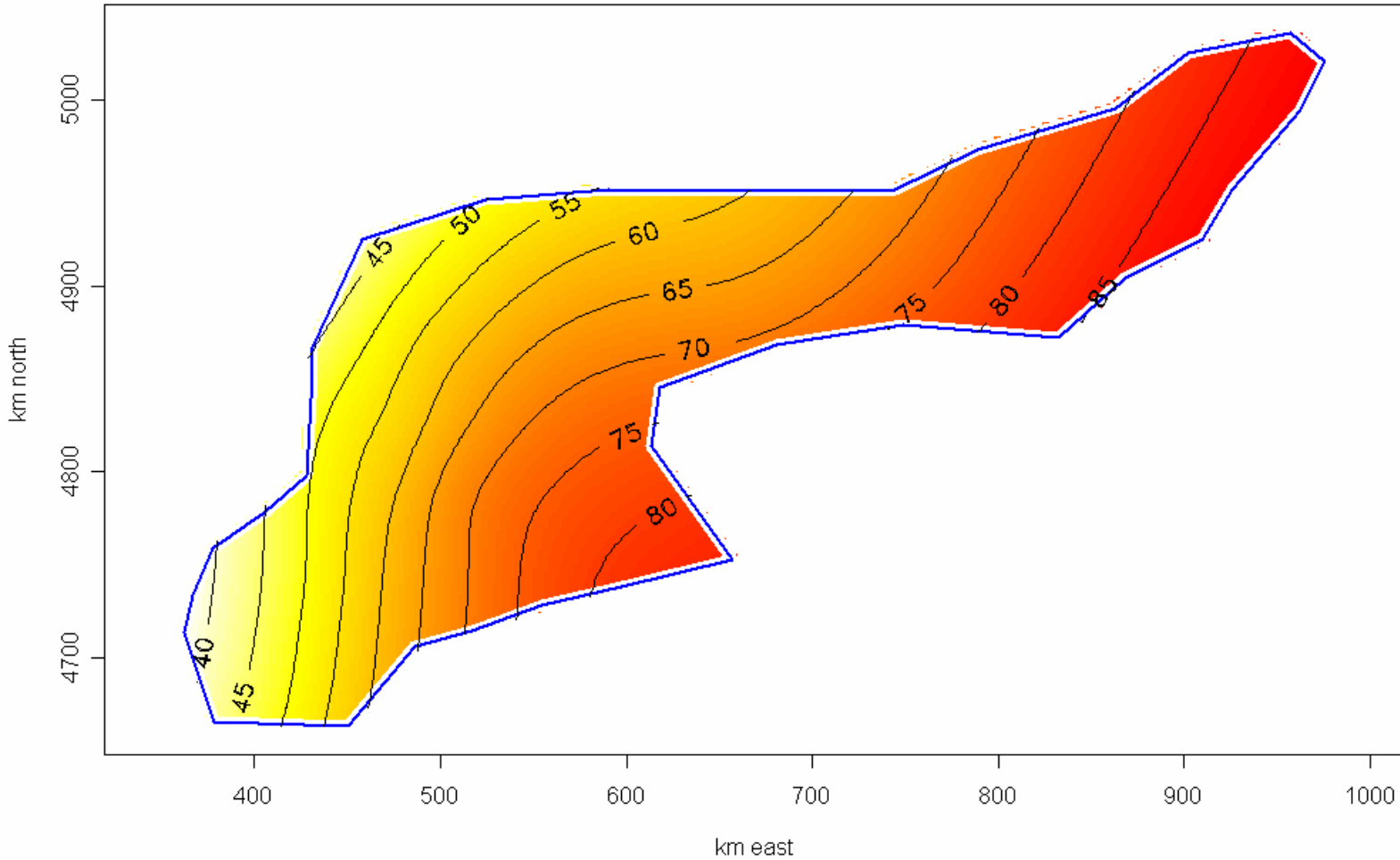


P<0.05

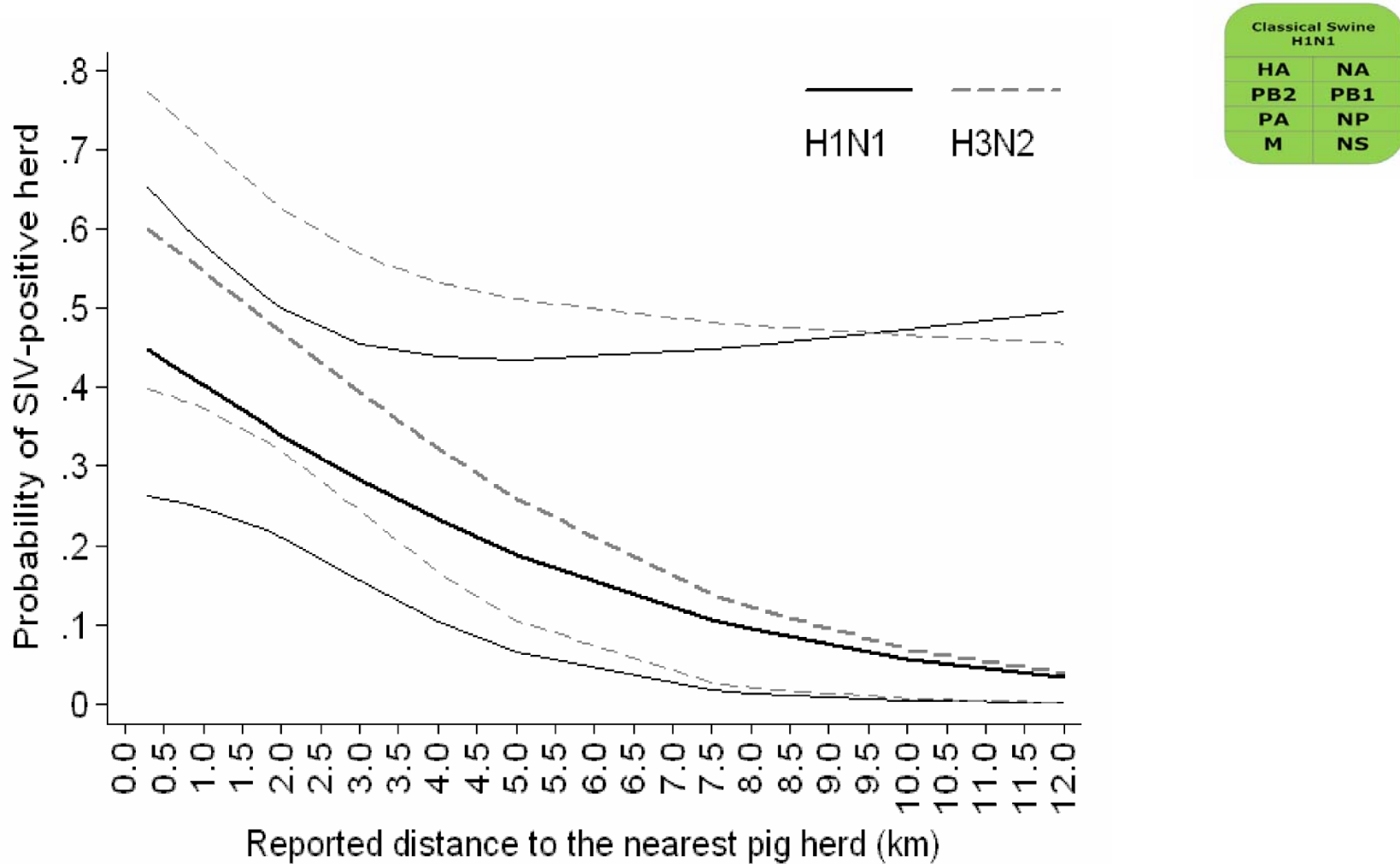
# Things to consider:

## Spread of circovirus (not zoonotic) consistent with Atlantic flyway

---



# Distance to nearest farm as a risk factor



Classical Swine H1N1	
HA	NA
PB2	PB1
PA	NP
M	NS

# Conclusions

## ▶ Area-level

- ▶ H1N1 was present in Ontario swine herds
  - ▶ Similarly to any other swine-producing region
- ▶ From 2005, two subtypes co-circulate
- ▶ Incursion of rH3N2 was relatively late

## ▶ Within-herd level

- ▶ Typical outbreak
  - ▶ fast spread, high morbidity, very low mortality
- ▶ But,
  - ▶ Influenza virus could spread slowly in a herd

## ▶ Spread

- ▶ Direct spread through movement
- ▶ Local spread

- ▶ Environmental exposure

---

- ▶ **Ontario Swine Sentinel Project**

- ▶ **Bob Friendship**

- ▶ **PRRS Mapping Project**

- ▶ **Cate Dewey**

- ▶ **AHL**

- ▶ **Funding**

- ▶ **Ontario Pork**

- ▶ **OMAFRA**

- ▶ **MOH**



# **Thank you**

---

**Questions?**

