# Highly Pathogenic Avian Influenza H5N8 in The Netherlands; outbreaks, control and biosecurity measures

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# H5N8 in The Netherlands; outbreaks, control and biosecurity

- Background poultry and AI in The Netherlands
- HPAI H5N8 in The Netherlands
- Control measures as applied in The Netherlands
- Biosecurity measures
- Concluding remarks

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# Commercial farms all registered, geographical location is known and animal movements recorded, production concentrated in Central and South Eastern part.

# Poultry production in The Netherlands

- 770 layer farms, housing on average 45,000 hens and producing a total of 10 billion eggs
- 470 broiler farms, housing on average 90,000 broilers and total production of 727,000 tons of meat
- 270 breeder farms also for export eggs, DOC
- Ducks and Turkey production is less common
- Specialized production, strong export orientation
- Many people (>100,000) keep poultry for hobby, but separate from commercial production

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# Poultry production in The Netherlands

- Almost all meat type poultry is kept indoors, in laying hens 20% free range or organic

# HPAI (H7N7) in The Netherlands in 2003

**255 outbreaks**

**30,000,000 animals killed**

**86 cases in humans (1 fatal)**

**Estimated costs of control and production losses:**

**€ 500.000.000**

**In the poultry dense regions virtually all animals had to be killed before the epidemic stopped !**

# Measures taken after 2003 epidemic

- Improved early warning system for AI and serological monitoring LPAI
- Sufficient culling capacity
- Biosecurity incorporated in quality assurance plans of poultry farms
- Contingency and control plans described in detail involving stakeholders
- Separate measures small holders
- Surveillance in wild birds

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# Improved early warning

- Notification in case of:
  - Clinical problems
  - Mortality > 0.5% on two consecutive days (animals > 10 days); > 1.0% in case of meat type Turkeys
  - Reduction of food or water consumption, or of egg production > 5%

Veterinarian can collect cloacal/tracheal swabs to be tested in PCR for exclusion of AI

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# Expert team visits farm

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# Serological monitoring LPAI

- Each farm tested at least once a year for antibodies against LPAI (30 samples)
- Farms having outdoor housing are tested four times/year (RR = 8)
- Turkeys and Ducks are tested each cycle (RR = 8 and 12, resp)

In case of positive serology (H5/H7): expert team visit with clinical inspection and collection of samples for PCR. A PCR positive farm will be culled.

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# Killing poultry by bringing CO2 in the poultry house

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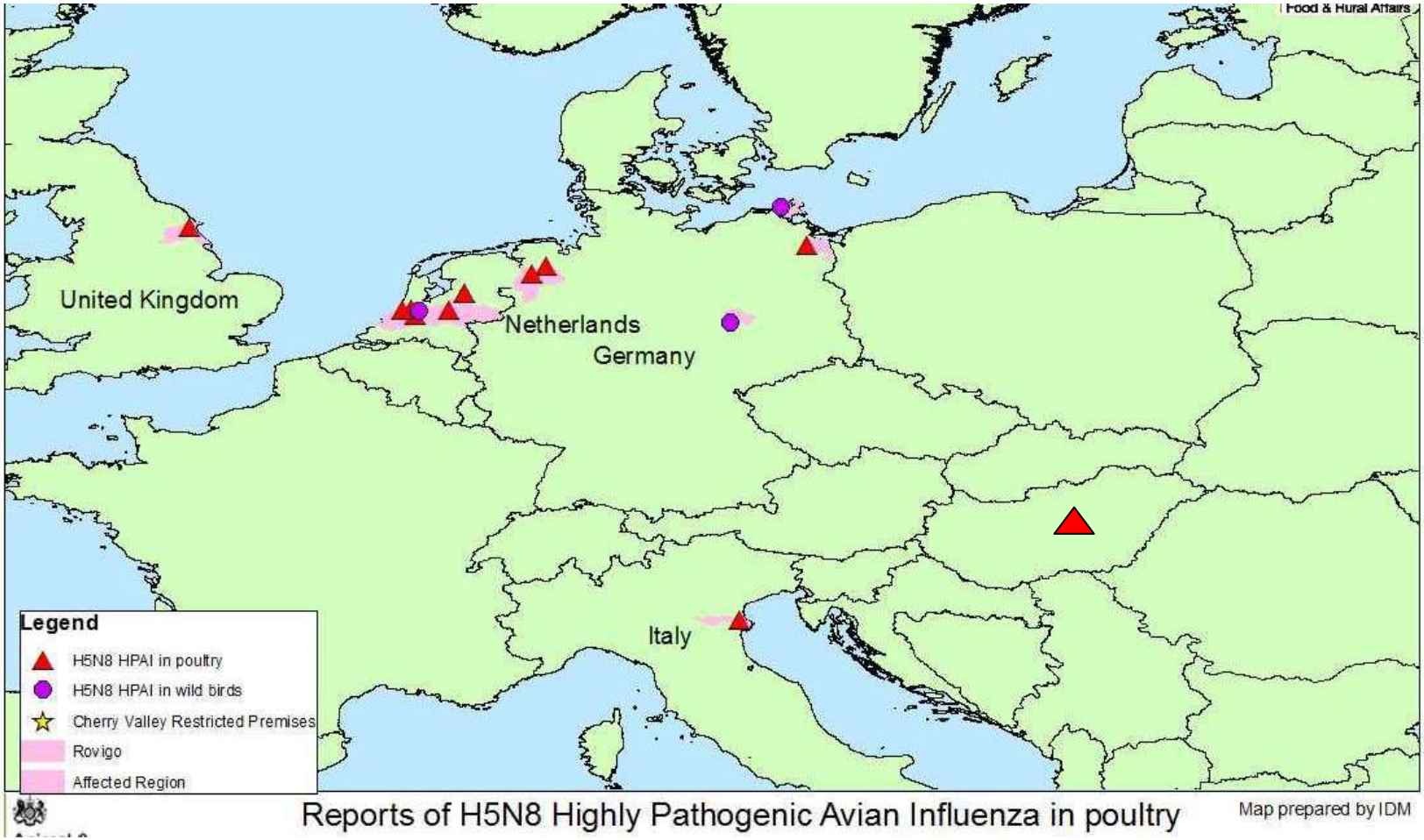
# H5N8 outbreaks in Europe 2014/15

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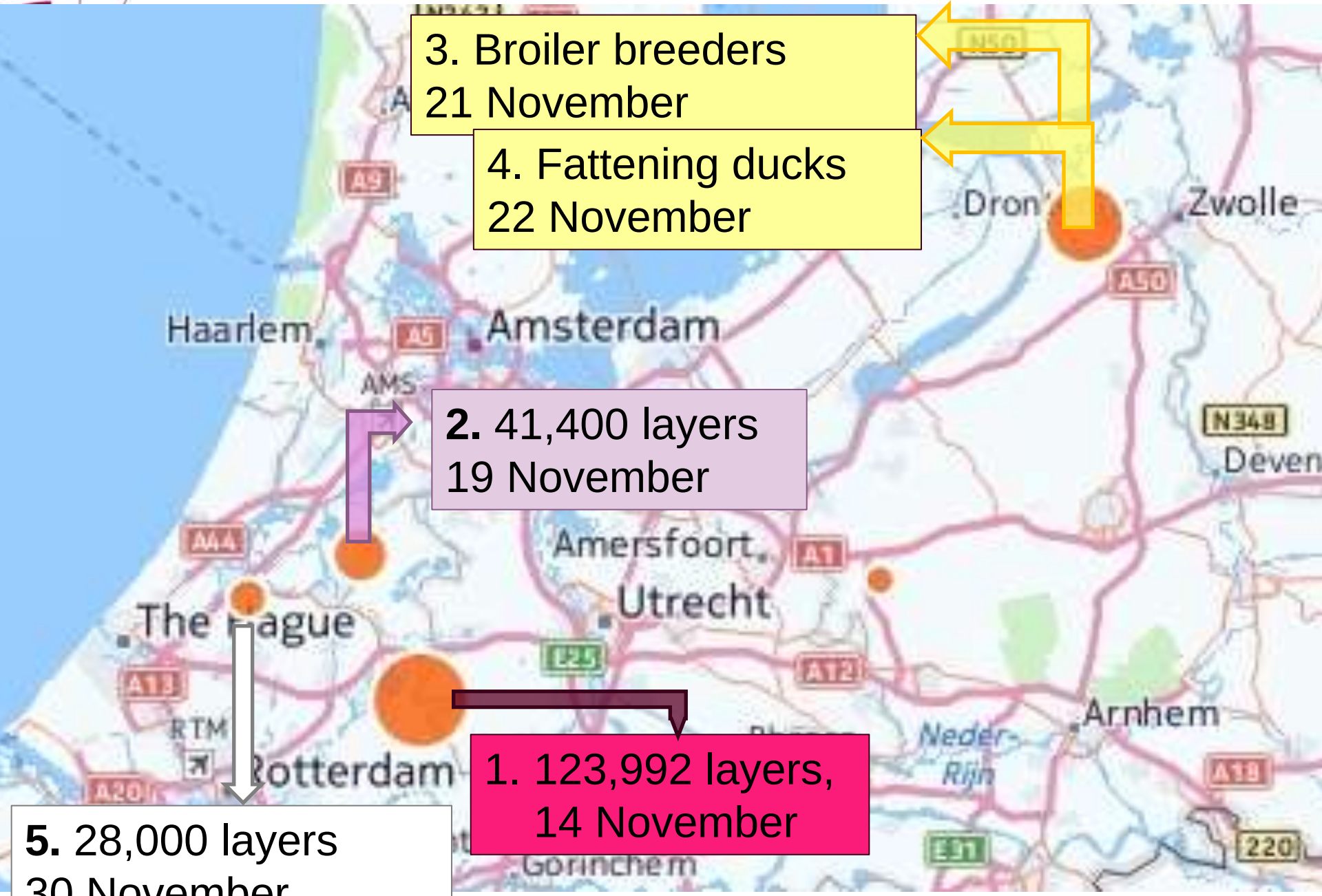
3. Broiler breeders
21 November
4. Fattening ducks
22 November
Dron
Zwolle
Haarlem
Amsterdam
AMS
2. 41,400 layers
19 November
Deven
Amersfoort
Utrecht
The Hague
Rotterdam
RTM
Arnhem
Neder-
Rijn
1. 123,992 layers,
14 November
Gorinchem
5. 28,000 layers
30 November

# Observations on infected farms

- No noticeable drop in egg production, feed or water intake. Sudden death of birds was most striking, first limited number at the end rapidly increasing.
- Ducks showed less pronounced clinical signs and mortality was limited
- Indoor housing
- Located in area’s with many water birds

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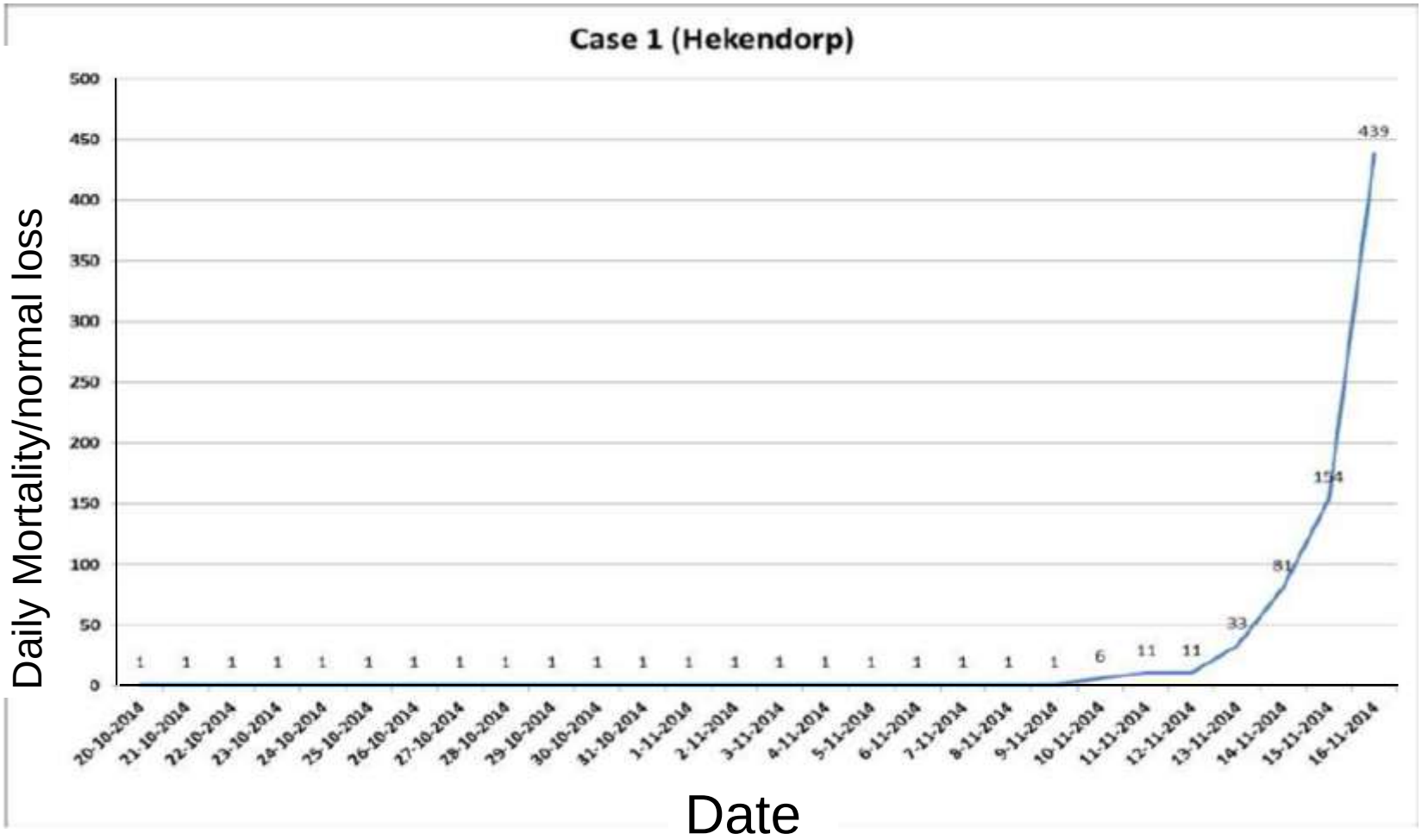
Case 1 (Hekendorp)
Daily Mortality/normal loss
Date
500
450
400
350
300
250
200
150
100
50
0
1
6
11
11
33
81
154
439
20-10-2014
21-10-2014
22-10-2014
23-10-2014
24-10-2014
25-10-2014
26-10-2014
27-10-2014
28-10-2014
29-10-2014
30-10-2014
31-10-2014
1-11-2014
2-11-2014
3-11-2014
4-11-2014
5-11-2014
6-11-2014
7-11-2014
8-11-2014
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10-11-2014
11-11-2014
12-11-2014
13-11-2014
14-11-2014
15-11-2014
16-11-2014

# Observations on infected farms

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- Ducks showed less pronounced clinical signs and mortality was limited.
- Infection still limited to one poultry house; indicates quick detection!
- Indoor housing (only one free range farm in surveillance zones)
- Located in area’s with many water birds

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# H5N8 detected in two fecal samples of wigeons

# Wigeon counts autum 2014

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# Most likely 4 separate virus introductions

- Tracing contacts of infected farms has not given information indicating between farm transmission
- Considerable distance between farms (except 3 and 4)
- Genome sequencing: RNA of the virus isolates is compared

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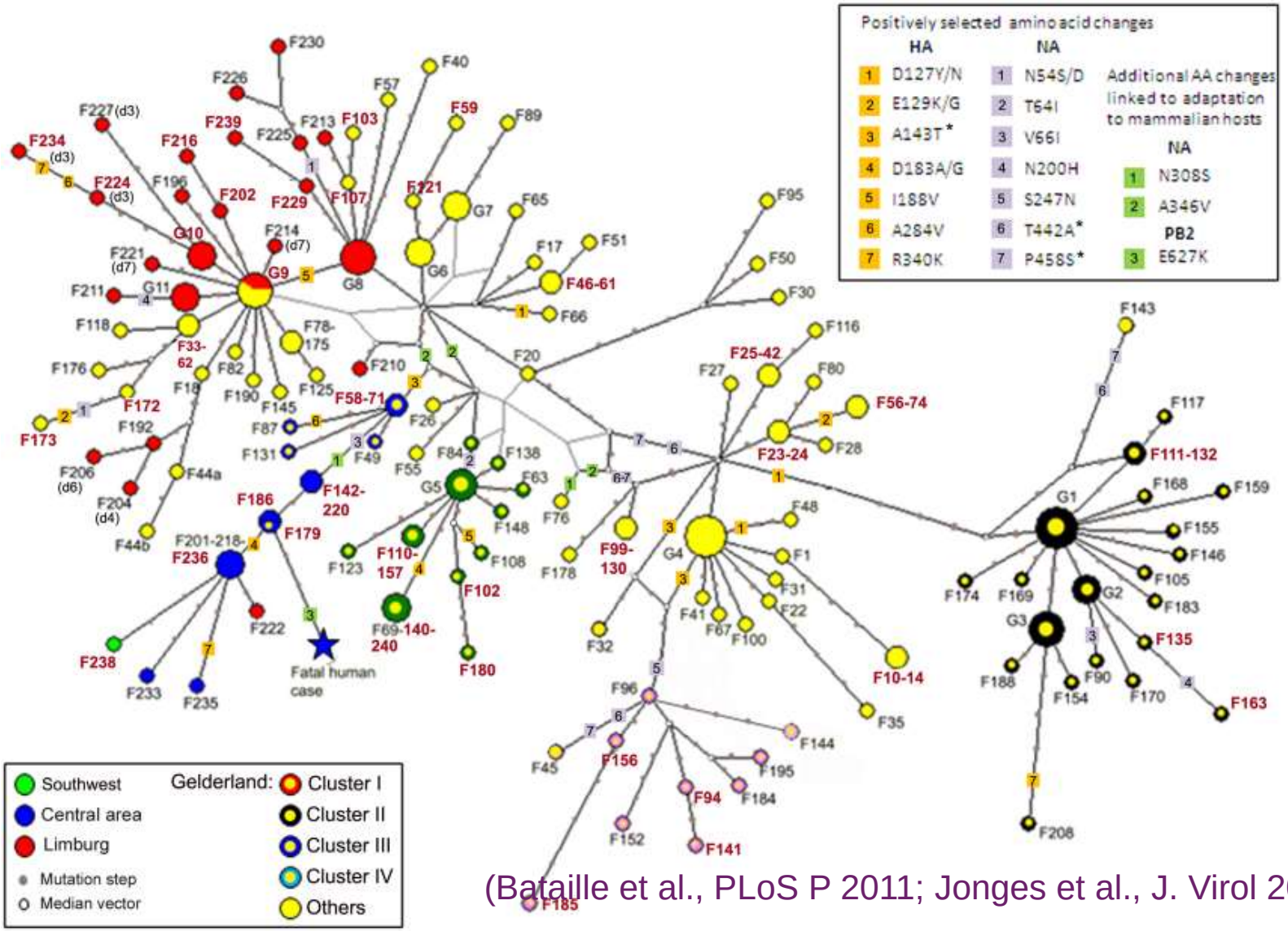
# Network of genetic variants HPAI H7N7 epidemic Netherlands 2003




(Bataille et al., PLoS P 2011; Jonges et al., J. Virol 2011)

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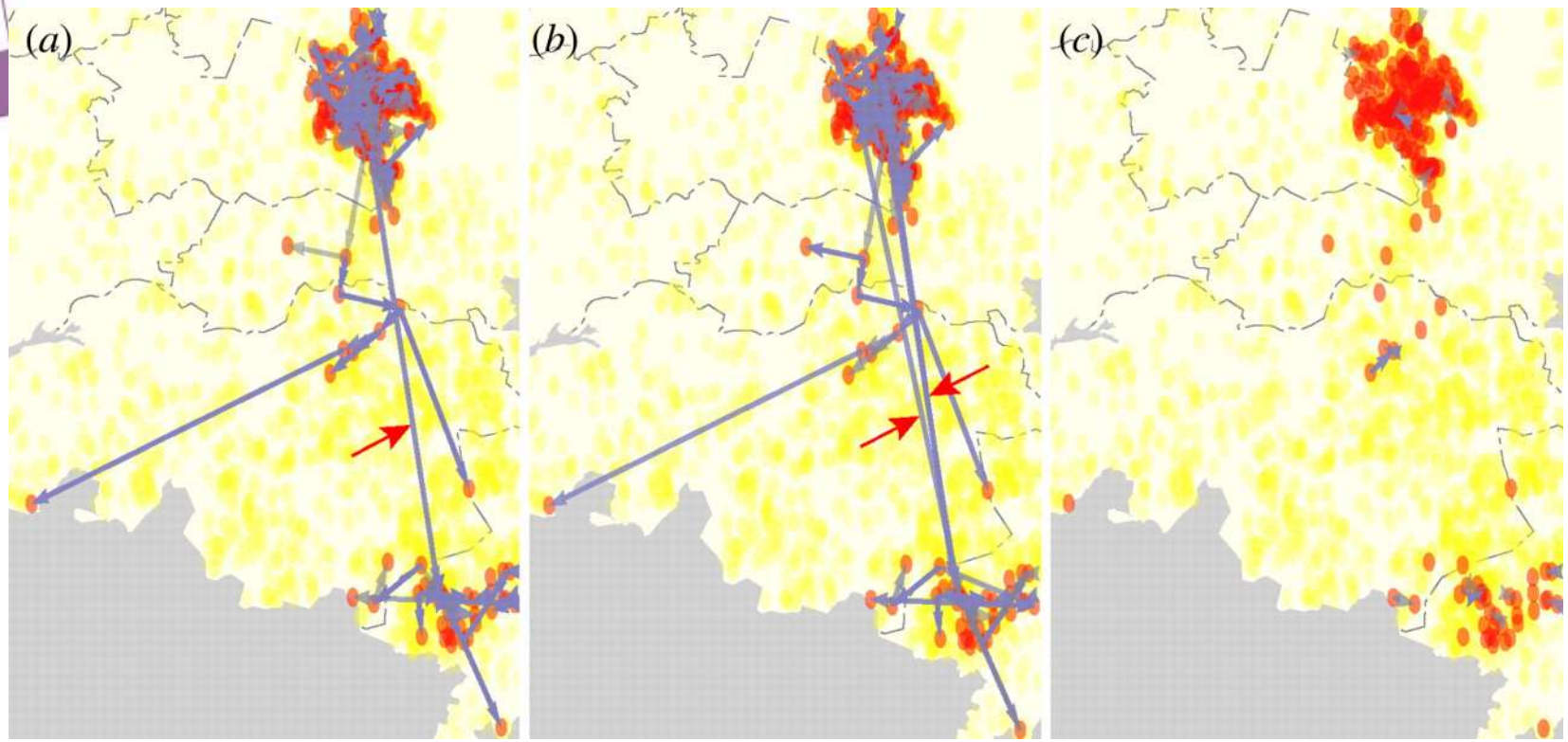
# By combining temporal, spatial, wind, contact and genetic data most transmission links could be explained for H7N7 HPAI in 2003




Ypma, et al. Proc. R. Soc. B 2012, JID 2013; Hagenaars, in prep.)

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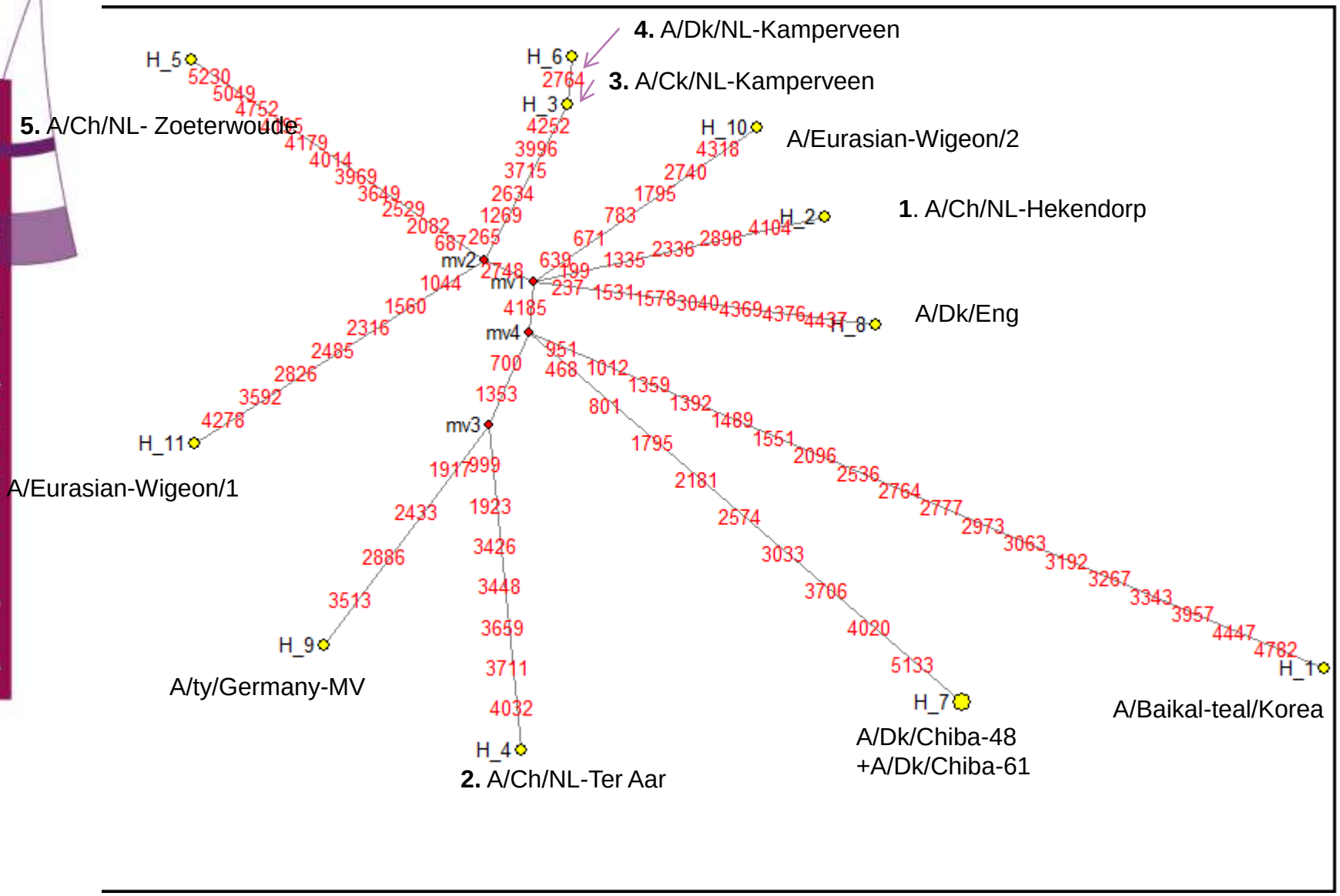
# Genetic network HPAI H5N8 2014 indicates separate introductions from common sources

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# Circumstantial evidence supports virus introduction by wild birds

- Several wild birds species can be infected without obvious clinical disease
- Virus in Europe most closely related to virus isolated from wild birds in Japan and Siberia, common ancestor < 6 months
- Virus present in wild birds in Europe
- Infected farms located in regions with wetlands and many water birds (except UK)
- No contacts traced between infected farms

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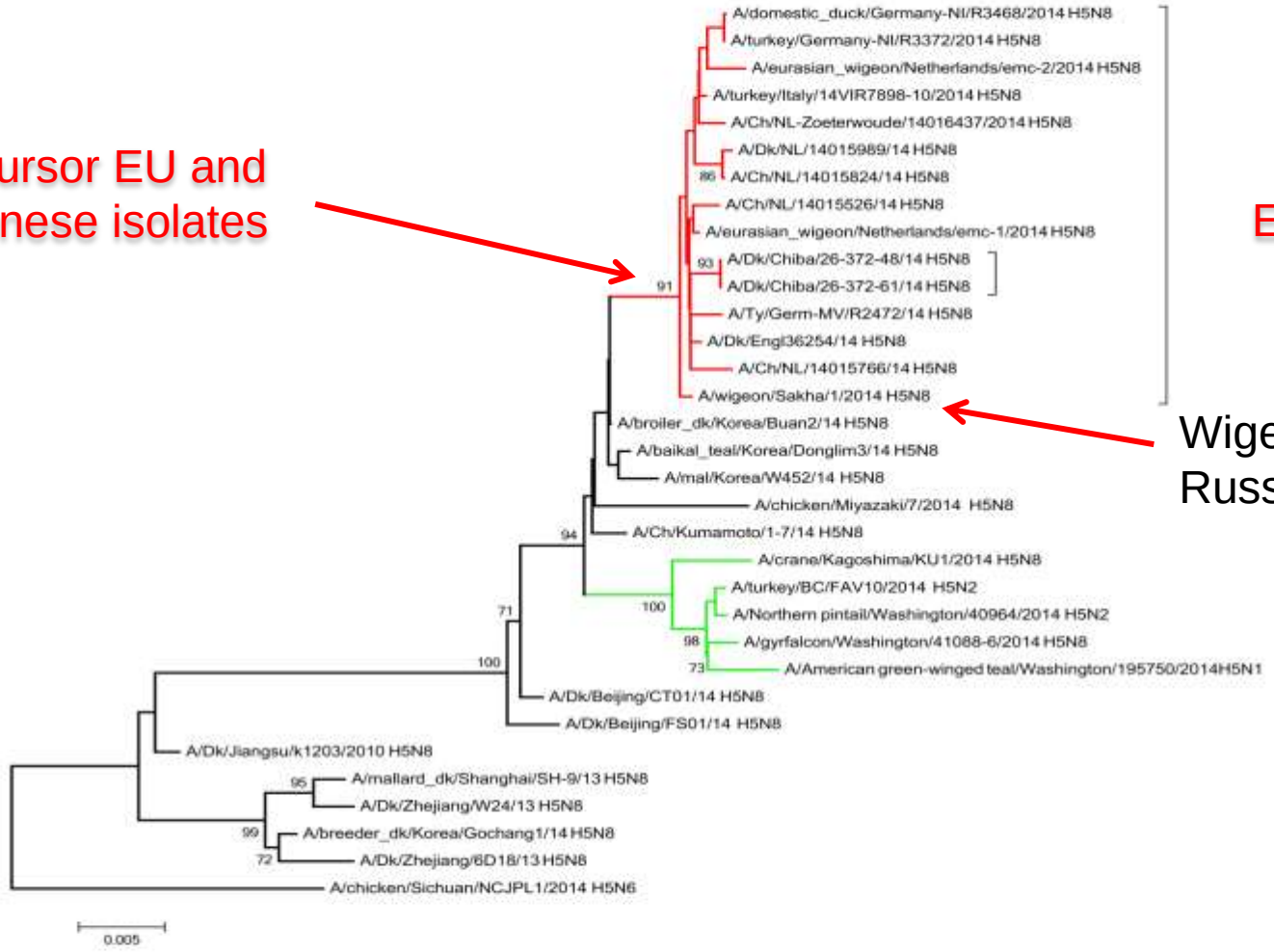
Precursor EU and Japanese isolates




Eurasian

Wigeon shot in East Russia in Sept. 2014

Eurasian/ N. American

Adapted from Bouwstra et al, EID 2015, in press

H5N2 and H5N8 virus detections in poultry and wild birds in 2014.The almost simultaneous detection of closely related viruses in Asia, Europe, and North America suggests linkage with wild bird migration via a large region in Russia.

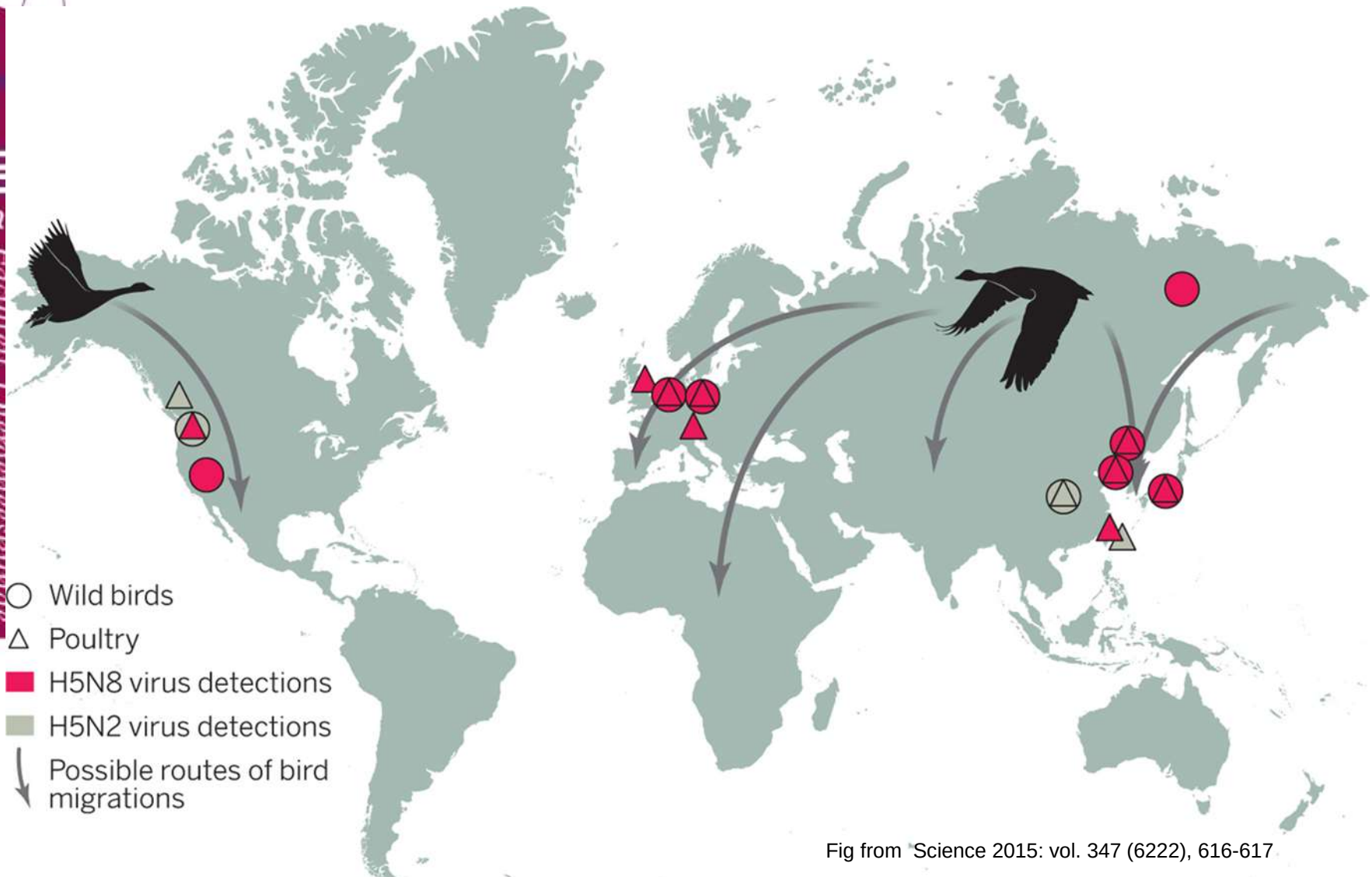



Fig from Science 2015: vol. 347 (6222), 616-617

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# Minimal control measures of 2005/94/EC

- Culling of all poultry on the infected holding
- Epidemiological enquiry; contact holdings for upward and downward tracing
- Surveillance zone of 10 km
  - Census of holdings
  - Confinement of all birds
  - Stand still
- Protection zone of 3 km
  - Clinical inspection

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# Additional Measures

- Nation wide stand still for 2,5 days at start and 4 days after introduction in new region
- Culling of dangerous contacts
- Clinical inspection in 10 km zone
- Compartmentalization of the country
- Only animal movement to slaughter inspection by vet
- Ban on bird/hobby poultry fairs and exhibitions
- Ban on hunting

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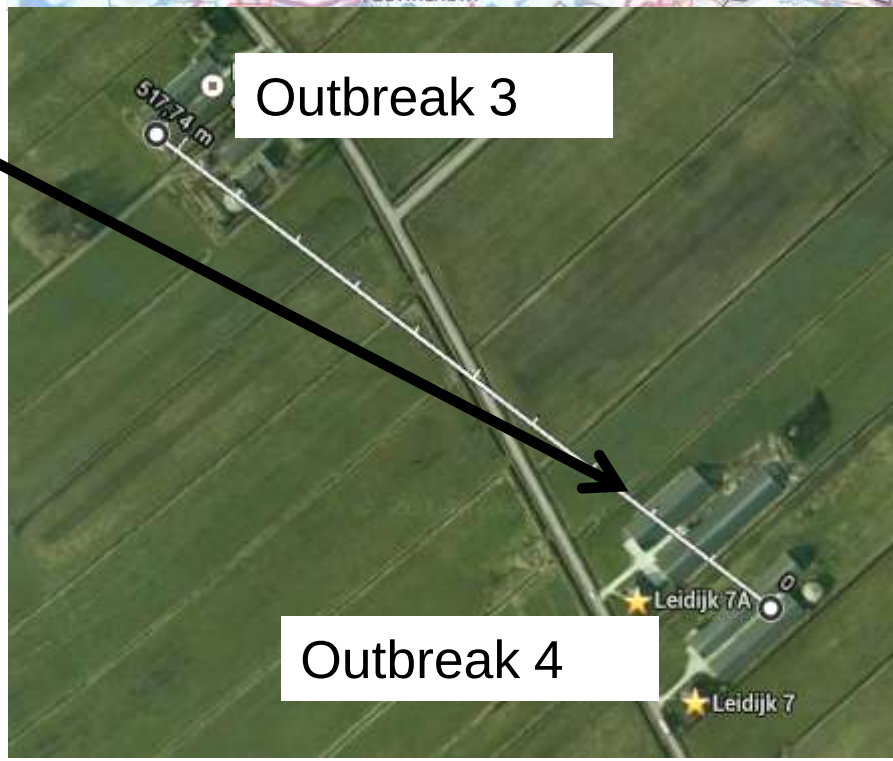
# Example culling contact

- Outbreaks 3 and 4 were in close vincinity
- Brother of owner fattening duck farm (outbreak 4) owned a broiler farm close to outbreak farm.
- Broiler farm was culled

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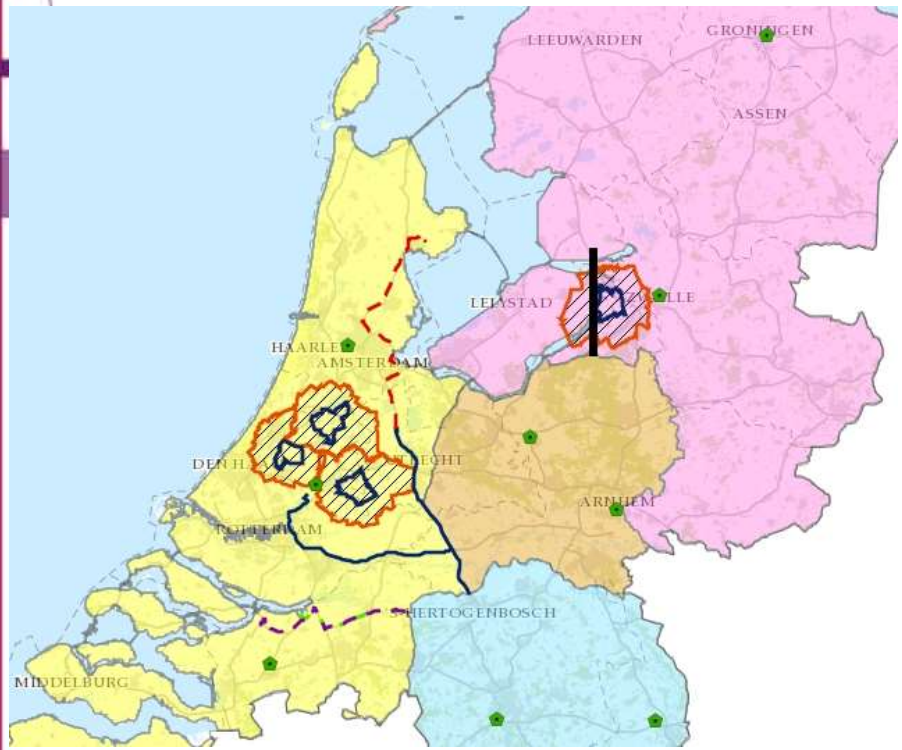
# Compartmentilization to prevent introduction of the virus into regions with a high poultry density



Poultry dense regions are red

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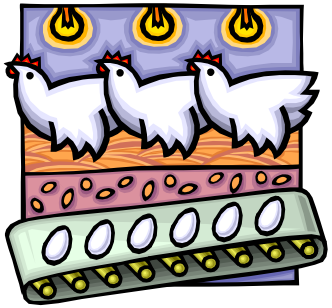
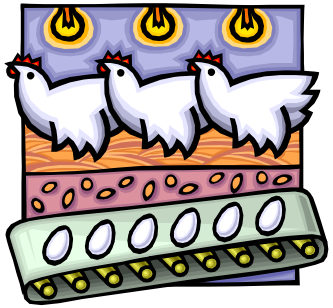
# Spread through movement of infected birds or indirect (faeces and other excreta of infected birds)





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# Observed biosecurity risk factors on outbreak farms (1)

- Premises and surroundings (water) bird friendly
- Water birds in the surroundings of the farms and other birds on the premises
- Bird faeces on the courtyard, sometimes even on poultry house near air inlet
- Feeding system breeding farm had been outside (should have gone to slaughterhouse)

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# Observed biosecurity risk factors on outbreak farms (2)

- Many signs of pests (rodents) on farms
- Large parts of the yard unpaved and untidy
- Cracks and holes in sheds

- → pests can enter poultry sheds and introduce faeces of infected birds

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# Observed biosecurity risk factors on outbreak farms (3)

- Disinfecting, change of clothing and footwear before entrance shed not always done
- Dogs & cats
- Litter and roughage storage accessible to birds
- Rainwater from roofs on yard
- Selling eggs at the farm (many movements from yard into poultry house)

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# Compulsory Biosecurity Measures

- Confinement of commercial poultry in the entire country
- Only absolutely necessary visitors allowed and they should be registered at the farm
- One – One movement of trucks (feed, animals, etc.), cleaning and disinfection before next trip
- Improved on farm biosecurity measures

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# Improved on farm biosecurity measures

- Biosecurity instructions were developed and communicated to farmers in close cooperation with industry and farmers organizations
- Farmers organizations were committed and played important role in communicating the biosecurity instructions
- Biosecurity measures were implemented in (private) on farm (audited) quality assurance programs

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# Improved on farm biosecurity measures: general

- Separate farm from home, block entrance yard
- Admit people and vehicles only when absolutely necessary
- Make premises unfriendly to birds
- Regularly clean and disinfect your courtyard
- Stick to biosecurity measures yourself !
- Do not use materials from other poultry farms (e.g. disposable egg trays)
- Make a health check multiple times a day when new poultry has been introduced

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# Improved on farm biosecurity measures: courtyard and shed

- Close access to courtyard and sheds
- Disinfectant footbath at entrance courtyard and entrance of each shed
- Separate coverall and footwear on yard
- Do not admit pets in shed
- Pest control and make shed inaccessible for birds
- Disinfect footwear before entrance in shed
- Facility at the entrance of shed to change coverall and footwear before poultry contact, wash hands

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# Conclusions H5N8 The Netherlands

- Outbreaks were detected quickly thanks to good awareness and early warning system
- Separate introductions, indicating effective control of between farm spread
- Most risk factors on outbreak farms were associated with internal biosecurity (from courtyard to shed) and wild birds
- Confinement of all commercial poultry in outbreak periods
- Cooperation of stakeholders is essential to implementation of biosecurity measures

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# Thank you for your attention


## Acknowledgements

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