

HPAI Risk, Bio-Security & Smallholder Adversity

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Fact or Fiction ?

Sector	Market Orientation	Description	Bio-security
1	Commercial	Industrial, integrated	High
2	Commercial	Semi-vertical, integrated	Moderate to high
3	Commercial, local market	Caged or free-roaming	Low
4	Local, home consumption	Village or backyard	None

Source FAO, 2004



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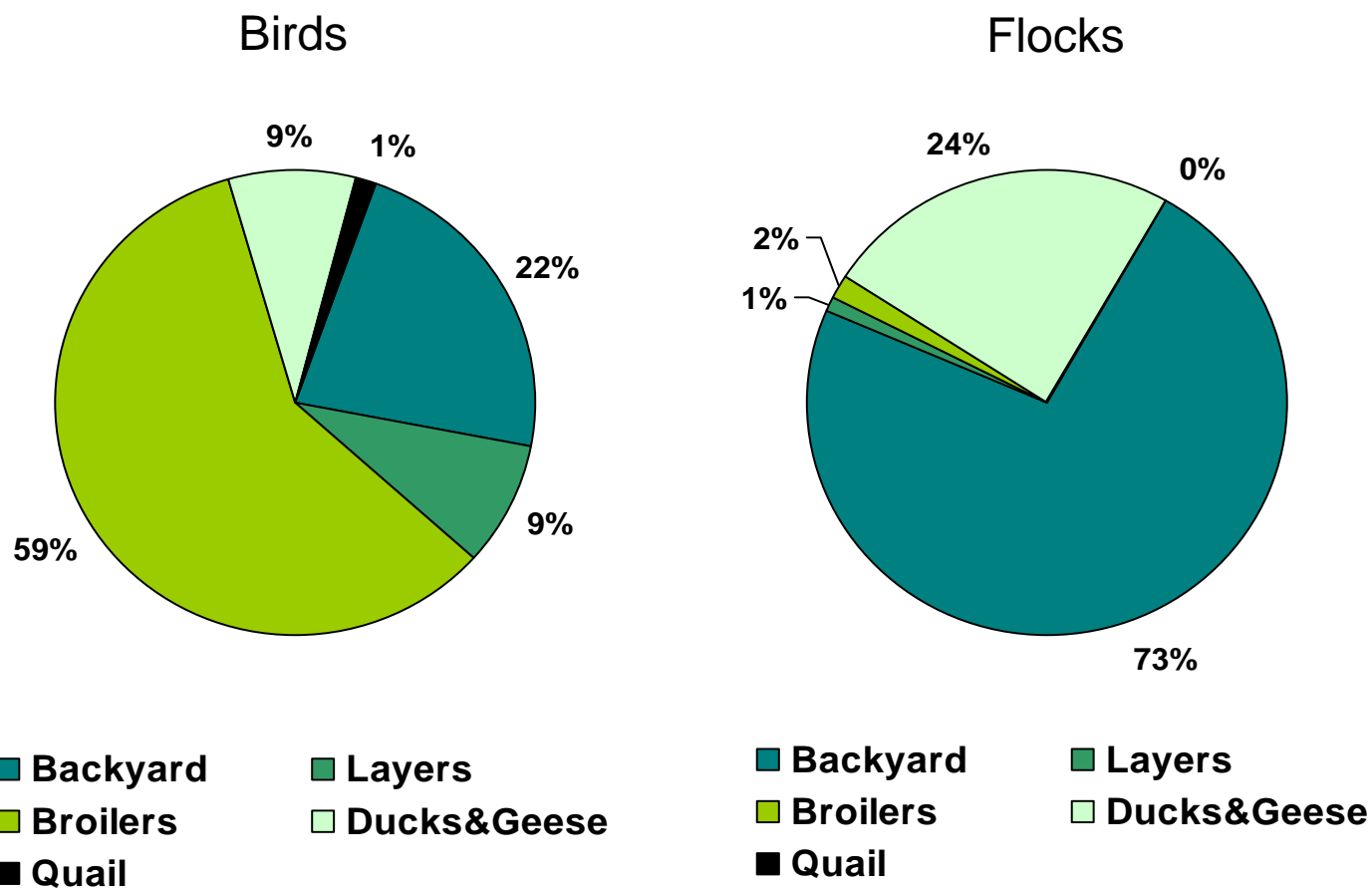


Overview

- Analysis of data of 2004 HPAI wave in Thailand
- Review of literature on pathogen entry and exit in OECD poultry systems
- Insights provided by 2002 ND epidemic in Denmark



Composition of Thai Poultry Industry



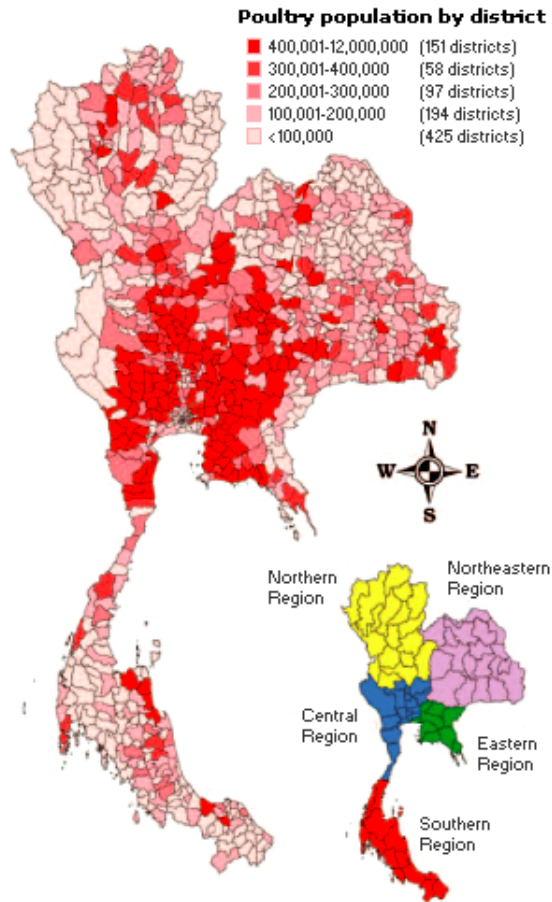
Source: Tiensin et al, 2006



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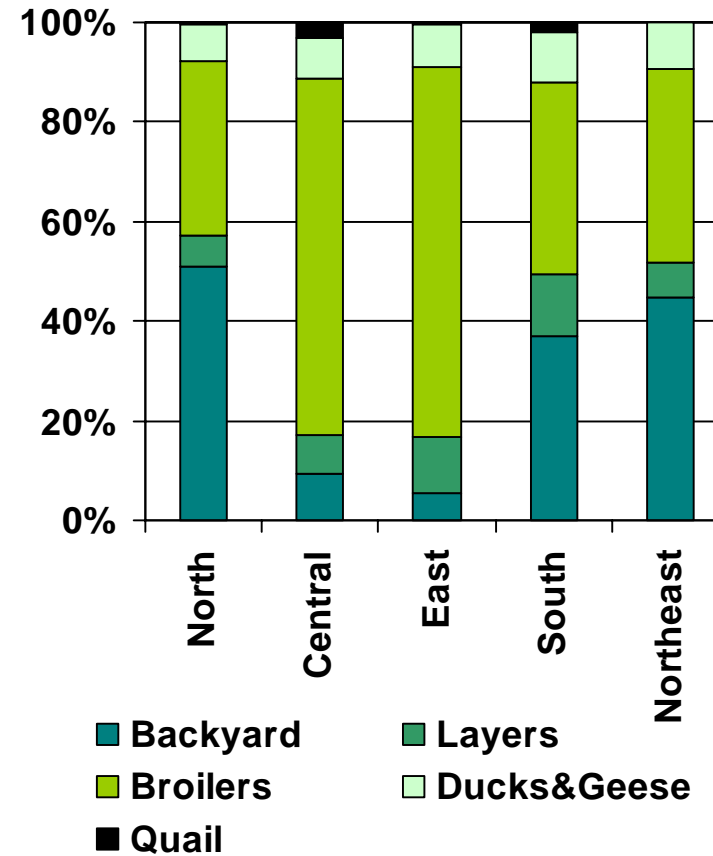


Regional Breakdown



Source: Tiensin et al, 2006

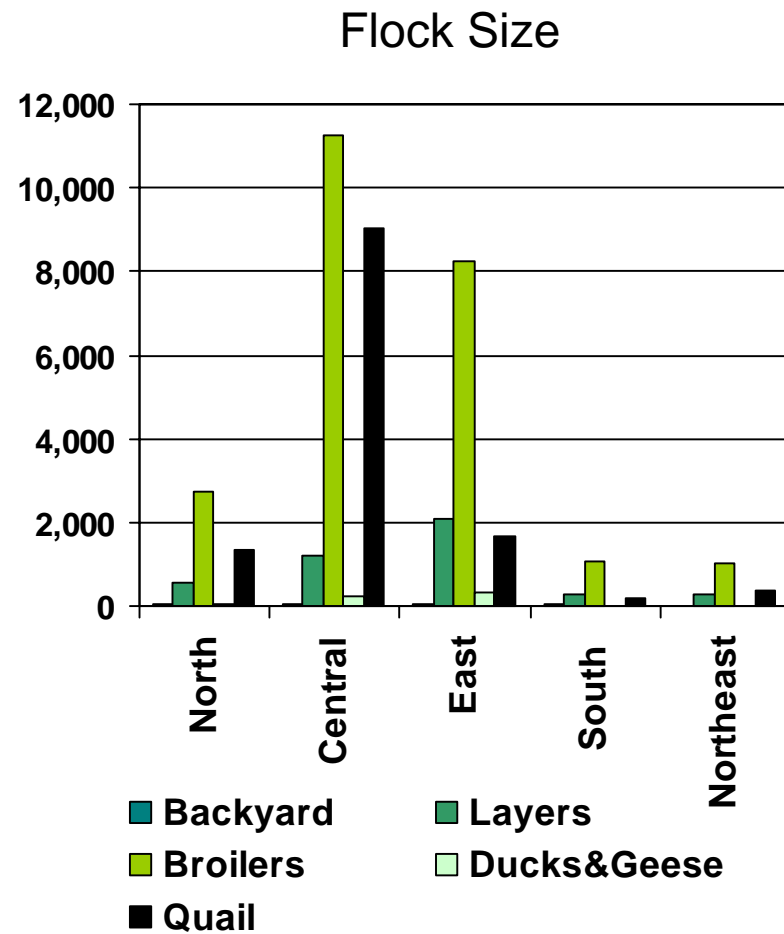
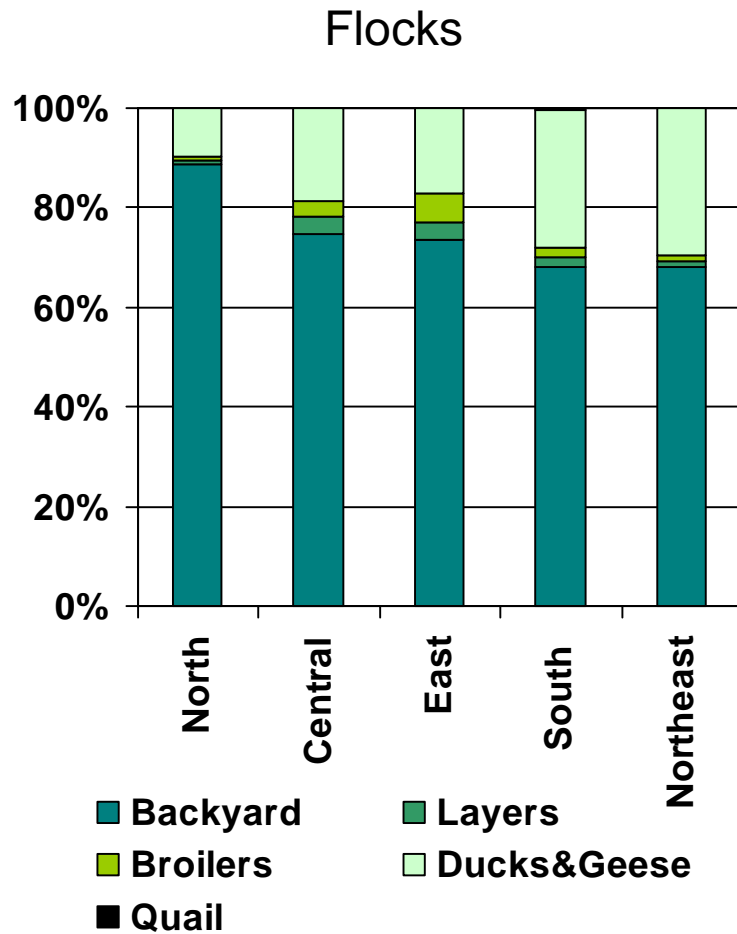
Birds



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Regional Breakdown



Source: Tiensin et al, 2006



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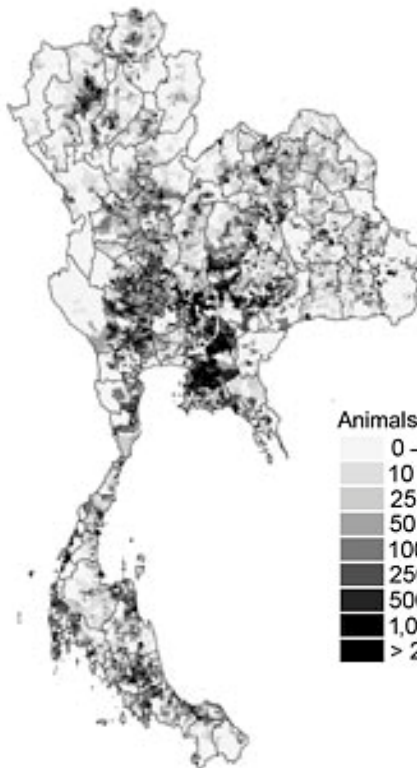


Chicken: Outbreaks & Density

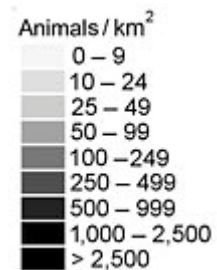
Chicken outbreaks



Broilers and layer hens



Native chickens



Source: Gilbert et al, 2006



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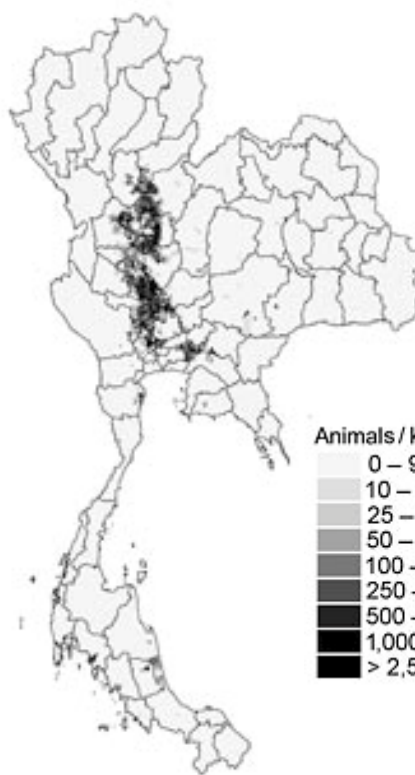


Ducks: Outbreaks & Density

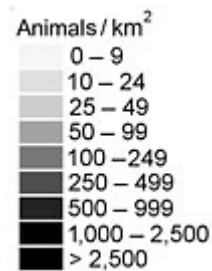
Duck outbreaks



Free-grazing ducks



Meat and layer ducks



Source: Gilbert et al, 2006

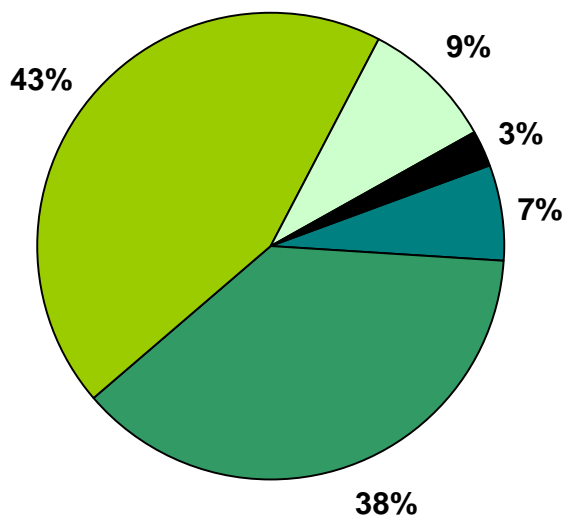


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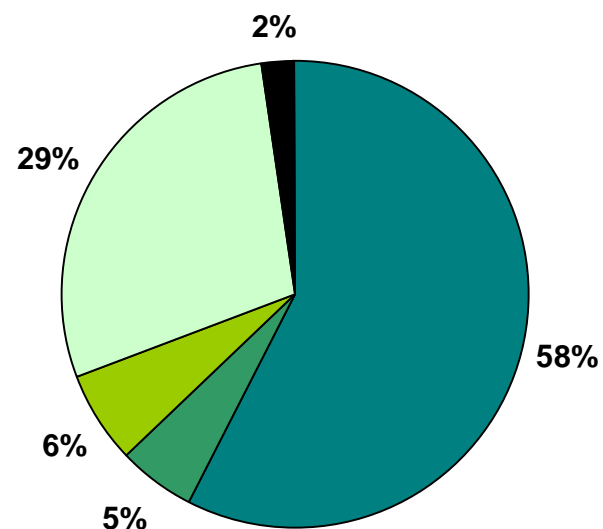
HPAI Outbreaks 2004

Region



■ Northeast ■ North ■ Central
■ East ■ South

Flock Type



■ Backyard ■ Layers
■ Broilers ■ Ducks&Geese
■ Quail

Source: Tiensin et al, 2006

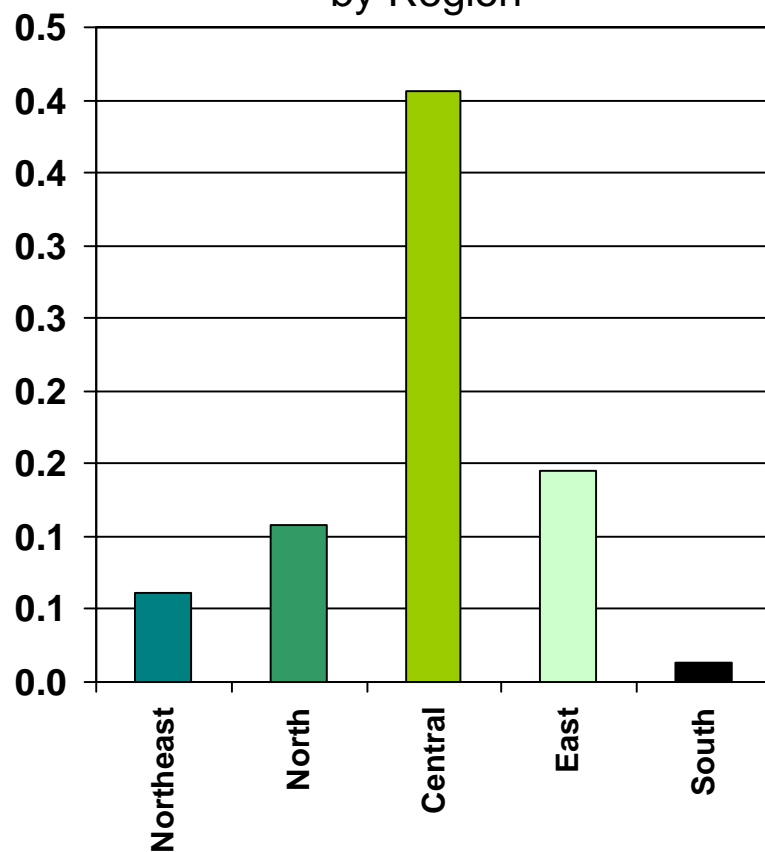


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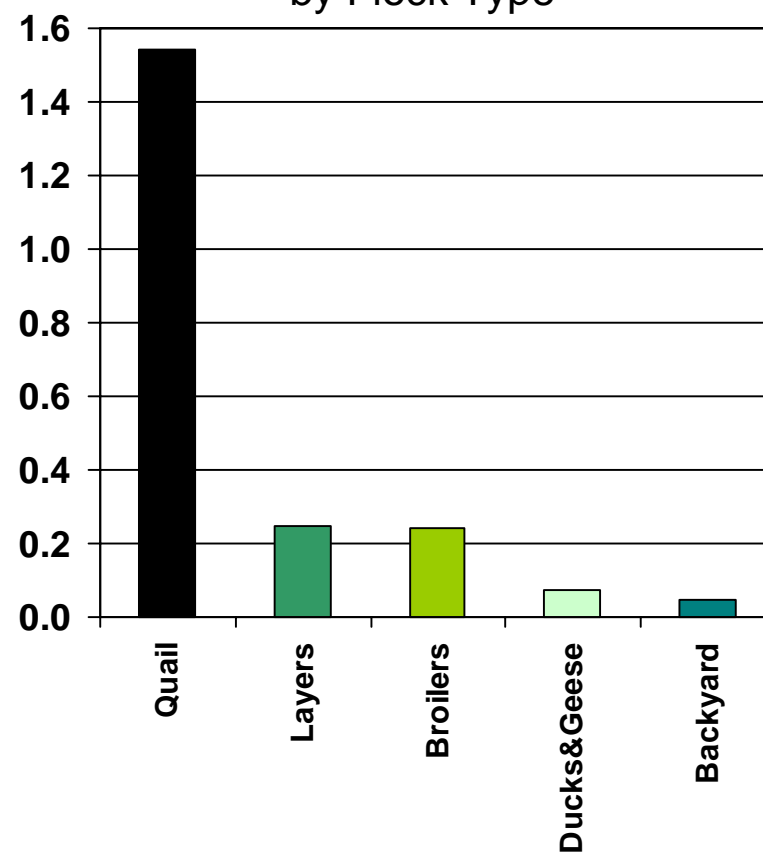


HPAI Risk 2004

Cumulative Incidence (Crude Risk, %) by Region



Cumulative Incidence (Crude Risk, %) by Flock Type



Source: Authors, based on Tiensin et al, 2006



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'Relative' HPAI Risk 2004

Region \ Flock Type	Backyard	Layer	Broiler	Duck	Quail
Northeast	Ref	+	ns	-	+
North	+	++	++	+ ns	++
Central	+	++	++	++	++
East	+	++	+ ns	+ ns	nil*
South	+	ns	+ ns	ns	ns

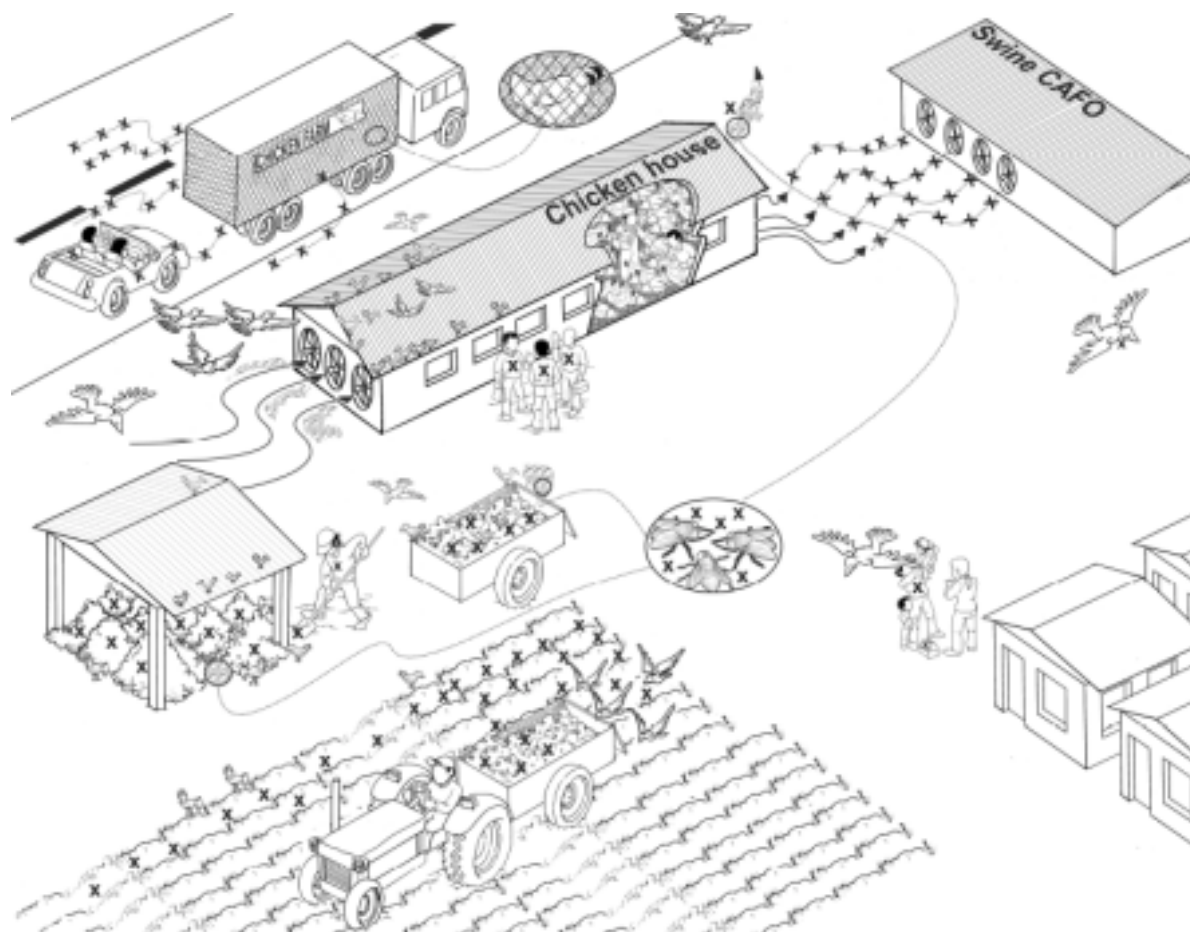
* no outbreak, so no estimate of risk

Source: Authors, based on Tiensin et al, 2006

- Backyard flocks in NE region taken as reference group (lowest risk)
- With the exception of the South,
 - quail always at significantly, and substantially higher risk than backyard poultry
 - layers always at higher risk than backyard poultry
- In the hardest hit Central region, all flock types at higher risk than backyard poultry



Challenges to Bio-Security



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Challenges to Bio-Security

Entry Routes

- Air
 - 100 ml/bird/min = 60.5 million l per cycle of 10,000 broilers
- Feed
 - 100 g/bird/day = 42,000 kg per cycle of 10,000 broilers
- Water
 - 250 ml/bird/day = 100,000 l per cycle of 10,000 broilers
- Insects & rodents
 - 30,000 flies per broiler cycle (Denmark, summer)

- 7 / 10 Campylobacter-free broiler flocks became infected by time of slaughter (Bull *et al*, 2006)

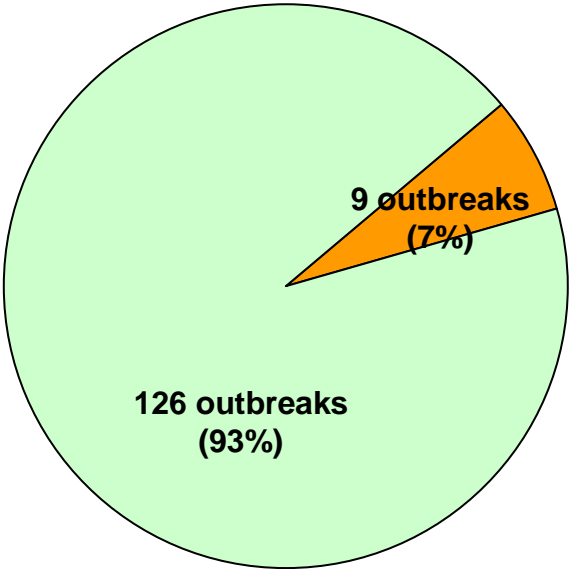
Exit Routes

- Air
- Wastes
 - 40 – 50 g/bird/day = 20,000 kg per cycle of 10,000 broilers
- Insects & rodents



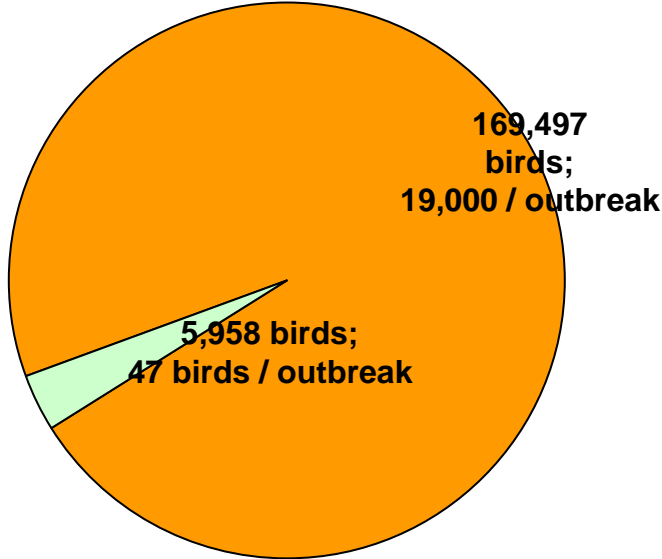
Denmark, 2002 Newcastle Epidemic

Affected Holdings



Commercial Backyard

Affected Birds



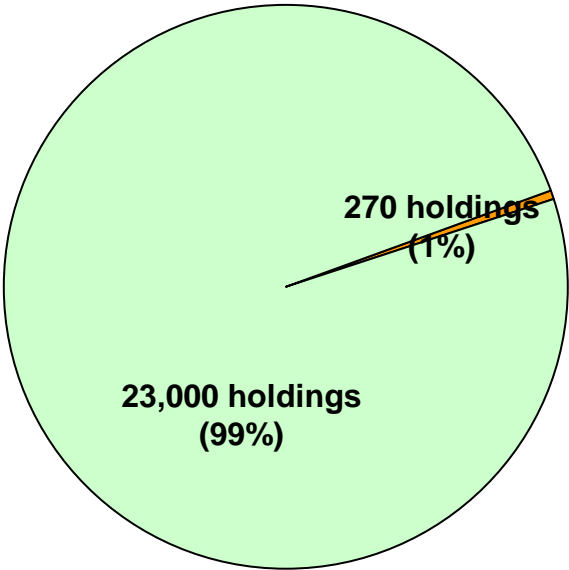
Commercial Backyard

Source: DVFA, 2003



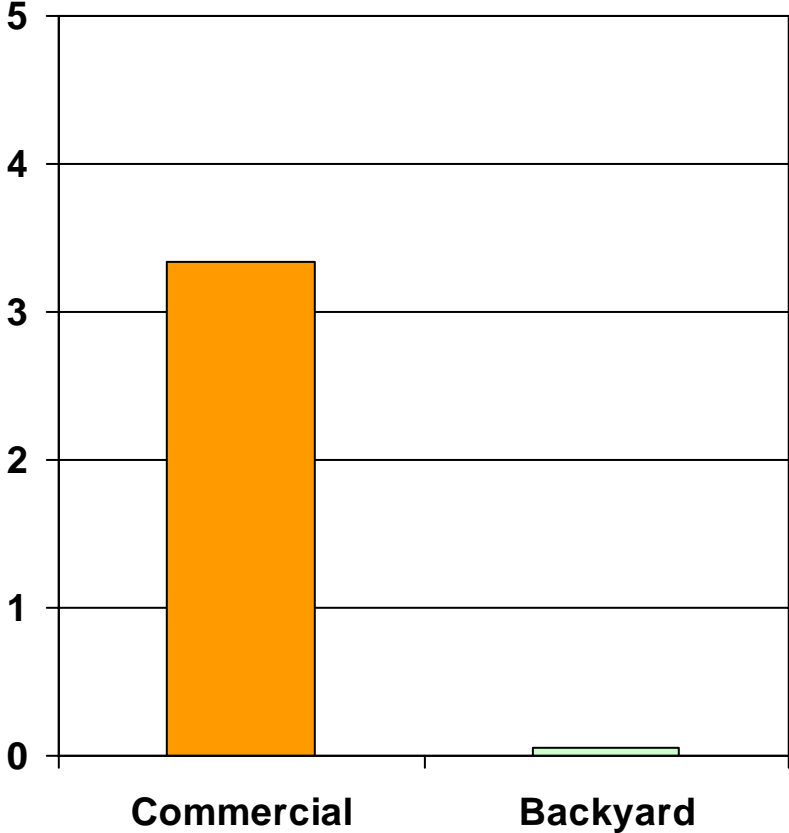
Denmark, 2002 Newcastle Epidemic

Holdings at Risk



■ Commercial □ Backyard

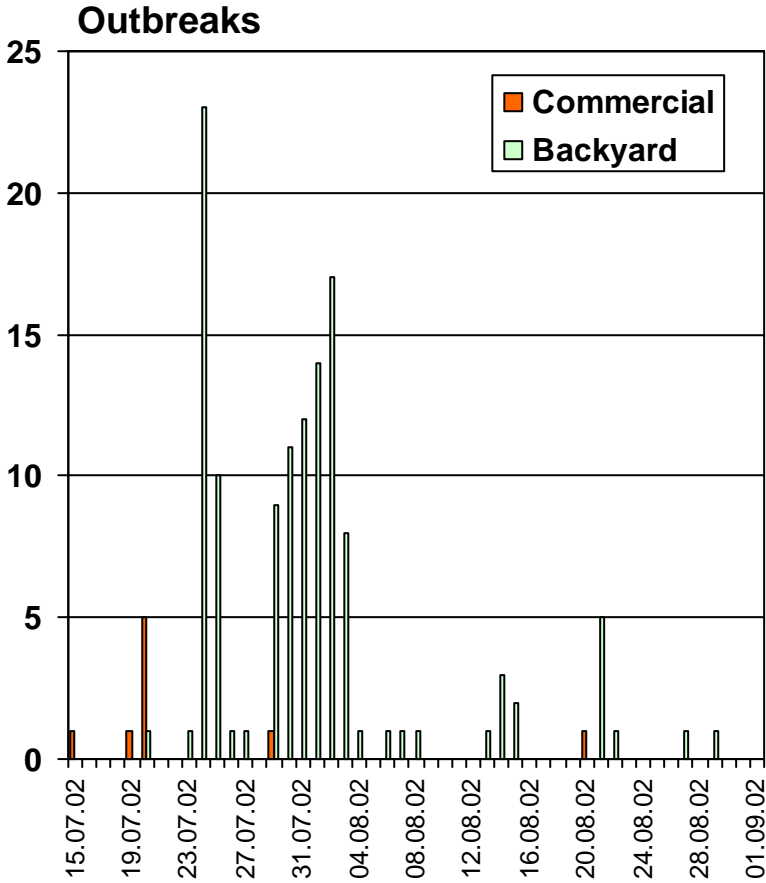
Cumulative Incidence / Risk (%)



Source: DVFA, 2003



Denmark, 2002 Newcastle Epidemic



Source: DVFA, 2003

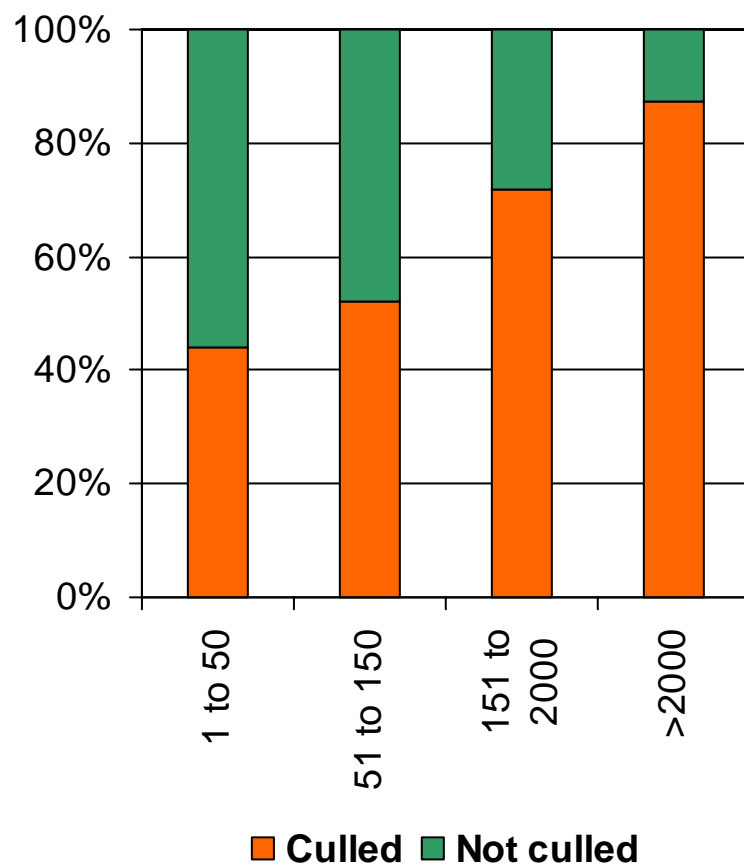


Source: DVFA, 2003

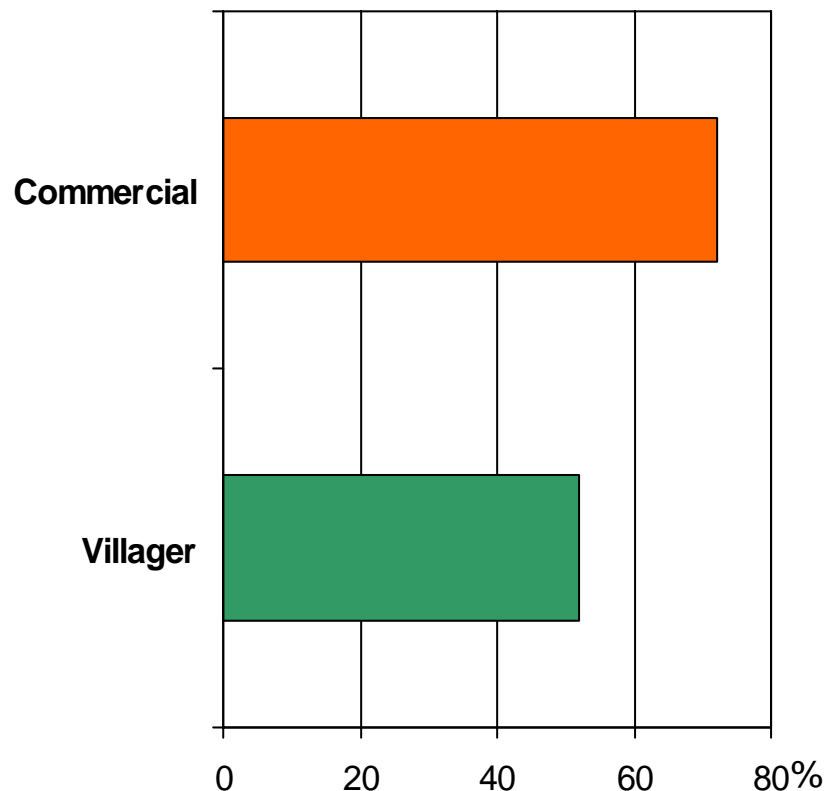


Viet Nam: Risk Factors for HPAI Cull

Risk of Cull by Flock Size



Risk of Cull by Source of DOCs



Source: GSO Survey 2004



Conclusions

- No empirical evidence that backyard poultry (Sector 4) are at higher risk of HPAI than those kept in Sectors 1 to 3;
- Empirical evidence that pathogens CAN overcome **standard** bio-security of 'modern' poultry systems;
- Farm-level HPAI risk is a result of (a) risk mitigation and (b) risk propagation measures
- In Sectors 1 to 3, (a) may not compensate for (b)
- Who is a risk for whom???



References & Further Reading

Bull S, Allen V, Domingue G, Jorgensen F, Frost J, Ure R, *et al.* (2006). *Appl Env Microbiol*; **72**: 645-652.

Danish Veterinary and Food Administration (2003). Report at www.uk.foedevarestyrelsen.dk/Forside.htm

Gilbert M, Chaitaweesub P, Parakamawongsa T, Premashthira S, Tiensin T, Kalpravidh W, *et al.* (2006). *Emerg Infect Dis*; **12**: 227-234.

Tiensin T, Chaitaweesub P, Songserm T, Chaising A, Hoonsuwan W, Buranathai C, *et al.* (2005). *Emerging Infectious Diseases*; **11**: 1664-1672.

PPLPI Research Report:

[Evidence-based Policy for Controlling HPAI in Poultry: Bio-security Revisited](#)



For more information please visit the PPLPI website:

www.fao.org/ag/pplpi.html

www.fao.org/ag/againfo/projects/en/pplpi/publications.html



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