Retrospective cohort study to validate the rationale for the distance of control zones implemented during outbreaks of Highly Pathogenic Avian Influenza

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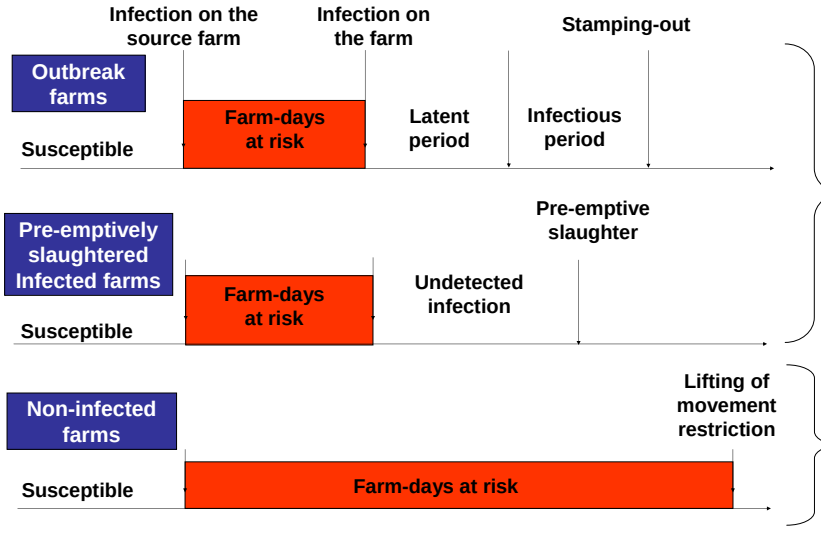
INTRODUCTION

When an outbreak of exotic disease is identified, animal hygiene authority immediately designates control zones and implements control activities. For outbreaks of Highly Pathogenic Avian Influenza (HPAI) in Korea, control zones, which are designated as contaminated, protection, and surveillance zones, are established for areas within 0.5km, 0.5~3km, and 3~10km radius of the infected farm, respectively. In this study, the rationale for the distance of control zones for HPAI was analyzed using a combined data sets from two previous HPAI epidemics, recorded in years 2003/2004 & 2006/2007.

MATERIALS & METHODS

Time lines



Study design

- Retrospective cohort study
- Combined data sets of two HPAI epidemics in Korea

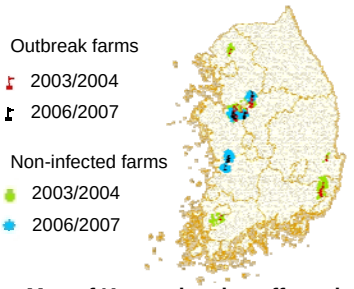
Study Population

45 farms confirmed as having HPAI virus infection (outbreak farm)

1,786 poultry farms located in the control zones during the two HPAI epidemics

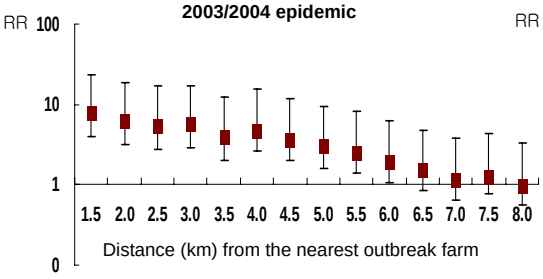
Statistical analysis

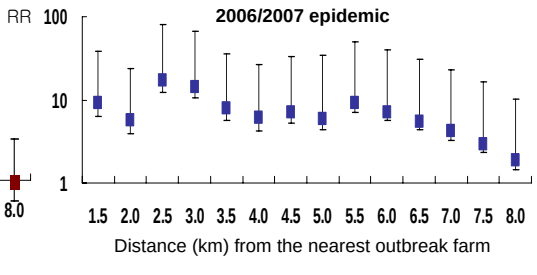
- Survival analysis
- Kaplan-Meier curve
- Cox regression model

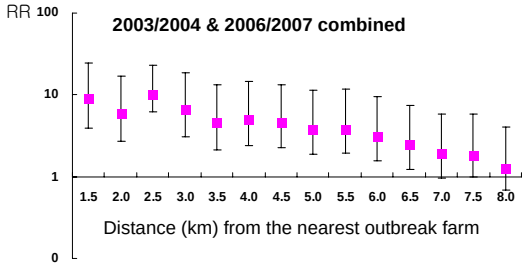


Map of Korea showing affected areas during two HPAI epidemics

RESULTS



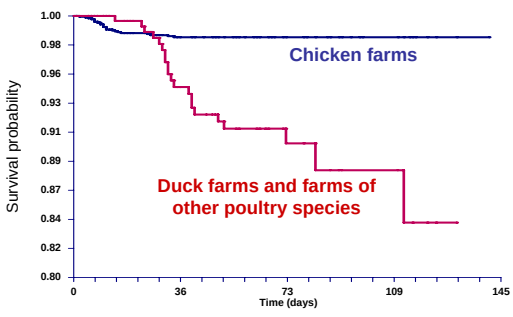




- In a poultry farm located within 1.5km radius of an outbreak farm, the risk of HPAI outbreak was 8.82 times higher compared to those outside such distances.
- Risk related to the distance from the HPAI outbreak farm had a tendency to decrease according to distance and was effective up to 7km.

Table 1. Relative risk (RR) of HPAI outbreak for poultry farms according to distance from the nearest outbreak farm

Distance (km)	RR	95% confidence interval
≤ 1.0	immeasurable	
1.5	8.82	(4.85 ~ 16.04)
2.0	6.10	(3.35 ~ 11.11)
2.5	9.99	(3.77 ~ 12.97)
3.0	6.52	(3.45 ~ 12.31)
3.5	4.61	(2.45 ~ 8.64)
4.0	4.97	(2.55 ~ 9.69)
4.5	4.52	(2.28 ~ 8.96)
5.0	3.84	(1.94 ~ 7.61)
5.5	3.81	(1.90 ~ 7.79)
6.0	3.11	(1.54 ~ 6.30)
6.5	2.45	(1.21 ~ 4.96)
7.0	1.91	(0.95 ~ 3.87)
7.5	1.85	(0.86 ~ 3.97)
8.0	1.27	(0.59 ~ 2.74)



- Initially, the risk of HPAI was higher in chicken farms compared to duck farms and farms of other poultry species.
- This risk, however, became higher and was observed for a longer period in duck farms and farms of other poultry species.

CONCLUSIONS

✓ Surveillance should be intensified for poultry farms with higher risk, such as farms within 7 km, and duck farms and farms of other poultry farms.

✓ The rationale for the current 10km radius control zone was proved to be appropriate for HPAI outbreaks in Korea.

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