



Title	Virological and epidemiological studies for the control of highly pathogenic avian influenza [an abstract of dissertation and a summary of dissertation review]
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Citation	北海道大学. 博士(獣医学) 甲第13499号
Issue Date	2019-03-25
Doc URL	http://hdl.handle.net/2115/74772
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Type	theses (doctoral - abstract and summary of review)
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File Information	NGUYEN_THANH_LAM_abstract.pdf (論文内容の要旨)



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学位論文内容の要旨
Abstract of the dissertation

博士の専攻分野の名称：博士（獣医学）

氏名：グエン タン ラム

Name: NGUYEN THANH LAM

学位論文題名
The title of the doctoral dissertation

Virological and epidemiological studies for the control of
highly pathogenic avian influenza
(高病原性鳥インフルエンザの制御に関するウイルス学的及び疫学的研究)

Aim of this thesis study is to investigate evolutionary and epidemiological dynamics of Asia-origin H5 highly pathogenic avian influenza viruses (HPAIVs) which are considered as representative model for other HPAIVs.

Regarding H5 HPAI, despite intensive efforts on vaccination campaigns for disease control, viruses have persisted in some enzootic countries for many years. Chapter I of the thesis provided conclusive laboratory evidence regarding direct contribution of vaccination in chickens to antigenic drift of H5 HPAIVs and update of a matched vaccine strain even could not prevent the emergence of antigenically drifted variants. Therefore, mass vaccination in poultry has limitation for the control and prevention of H5 HPAIVs.

In Chapter II, to detect antigenically drifted H5 HPAIVs, particularly the spreading 2.3.4.4 HPAIVs, an advanced rapid diagnostic kit, New Linjudge Flu A/H5 IC, was developed to replace of our original Linjudge Flu A/H5. Diagnosis efficacy of the New Linjudge Flu A/H5 exhibited greater than the original kit regarding sensitivity. In addition, the applicability of the New Linjudge Flu A/H5 was demonstrated through detecting antigens from the swabs and organs of naturally infected birds and experimentally infected chickens with H5N6 HPAIVs belonging to the genetic clade 2.3.4.4. This study revealed suitability of the New Linjudge Flu A/H5 for surveillance of H5 AIVs in domestic and wild birds in the field.

In the field setting, Chapter III systematically elucidated distinct virological and epidemiological characterizations of currently circulating H5 HPAIVs in Vietnam through longitudinal active surveillance program. This study has provided multiple important results towards recent H5 HPAIVs in Vietnam: (i) this study highlights importance of surveillance and public sharing for the monitoring and control of H5 HPAIVs; (ii) Domestic ducks and Muscovy ducks are likely important species for virus detection in active surveillance; (iii) clade 2.3.2.1c and 2.3.4.4 H5 HPAIVs are currently predominant in Vietnam and show distinct phylogeographic evolution; (iv) these predominant viruses exhibited large antigenic distance from its progenitor viruses and commercial poultry vaccines currently used in Vietnam, meaning that vaccine and vaccination might be less effective for the control of recently circulating H5 HPAIVs; (v) importantly, the present study discovered phylodynamics of H5 HPAIVs and highlights necessity of preventive control of transboundary spillovers to Vietnam.

Chapter IV of the thesis study is to investigate epidemiology of recent outbreak occurrence of H5 HPAIVs in poultry in Vietnam. A total of 139 H5 HPAI outbreaks were reported during the period 2014 to 2017. Consistent with previous studies, Muscovy ducks, geese and presence of recent provincial H5 HPAI outbreak occurrence were positively associated with an increased risk of H5 HPAI outbreak reports. These indicators could be considered as stable predictors for early morning and target for monitoring H5 HPAVs in Vietnam.

With obtained results, this study comprehensively elucidated some of virological and epidemiological aspects of H5 HPAIVs which are causing huge damage to poultry industry and zoonotic concerns worldwide. Therefore, findings of this study carry novelty and significances to provide new insights of basic knowledge and leads to better control and prevention of HPAI.