



# HOKKAIDO UNIVERSITY

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博士の専攻分野の名称：博士（獣医学）

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学位論文題名  
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Studies on the control of influenza and classical swine fever  
(インフルエンザと豚熱の制御に関する研究)

The current thesis study aims to contribute to the control of influenza and classical swine fever (CSF) as a representative transboundary diseases (TDs) in animals and humans. Due to the susceptibility of poultry and pigs to the TDs, the importance of implementing a better control strategy for these diseases is increasing globally.

In chapter I, essential information about the early diagnosis of avian influenza was provided. Wild waterfowl play an important role in virus spread in poultry farms. Therefore, the early detection of avian influenza virus (AIV) infections mainly caused by high pathogenicity avian influenza virus (HPAIV) is the key action in poultry. In the study, the novel kit was evaluated which was developed using an isothermal nucleic acid amplification approach for the human usage to detect influenza A and B viruses. The findings suggested that the kit can be used for poultry, especially chicken, to detect viral RNA of all subtypes of AIVs, including low pathogenicity avian influenza virus (LPAIV) and HPAIV, with high sensitivity and specificity. This kit is applicable for influenza diagnosis in both the laboratory and field conditions lacking satisfied laboratory facilities and well-trained personnel.

Chapter II focused on the contribution for zoonotic diseases, in terms of spillover infection with influenza A virus. Under the effort of zoonosis control, the development of an effective vaccine against such non-human influenza viruses in humans is crucial to engage with the one health concept. In this study, the variant H3N2 vaccine was prepared using the strategy of serial passages in mice and chicken embryos to increase vaccine yield, and its protective potency was evaluated in mice. The results obtained that the vaccine can protect against swine-origin H3N2 infection. The model established in this study could be applied for future preparation of an effective vaccine for humans against variant H3N2 infection. The outcomes can be used for better preparation and control of future pandemics.

In chapter III, the implication of the surveillance and implementation of oral vaccination was evaluated against CSF in wild boar in Gifu prefecture, Japan. The role of wild boar was assessed under the classical swine fever virus (CSFV) spread among the population. Moreover, to provide a better understanding about CSFV infection modes, CSFV infection forms were estimated based on the quantitative analysis. It was suggested that wild boars with acute, persistent, and chronic infections were the main actors in carrying and maintaining CSFV among the population. The implementation of the oral vaccine in wild boar led to an increase in the number of individuals with vaccine responses. Overall, this study provided quantitative information from the investigations of virological and epidemiological assessments that can be used to improve further surveillance activity and control measures.

These findings provided an important vision for the contribution of TD control focusing on influenza and CSF as representative diseases. This information is critical to construct comprehensive control measures for the eradication of TDs involving the early detection, preventive strategy with vaccine development, and a better evaluation system for preventive actions.