HOKKAIDO UNIVERSITY

Title	Studies on the control of avian influenza and Newcastle disease [an abstract of dissertation and a summary of dissertation review]
Author(s)	Augustin, Tshibwabwa TWABELA
Degree Grantor	北海道大学
Degree Name	博士(獣医学)
Dissertation Number	甲第14623号
Issue Date	2021-06-30
Doc URL	https://hdl.handle.net/2115/82410
Rights(URL)	https://creativecommons.org/licenses/by/4.0/
Type	doctoral thesis
File Information	Augustin_TWABELA_abstract.pdf, 論文内容の要旨

Hokkaido University Collection of Scholarly and Academic Papers : HUSCAP

（様式５）Form 5

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：オーガスティン　シブワブワ　タワベラ
Name：Augustin Tshibwabwa TWABELA

学位論文題名
The title of the doctoral dissertation

Studies on the control of avian influenza and Newcastle disease
（鳥インフルエンザおよびニューカッスル病の制御に関する研究）

The current thesis study aims to contribute to the control of avian influenza (AI) and Newcastle disease (ND). These two avian diseases are important given their devastating character in bird populations impacting to food safety and economic loss, also threatening some endangered bird species. AI has also the zoonotic potential of pandemic threat.

In chapter I, important information about an H5N8 high pathogenicity avian influenza virus (HPAIV) that was detected for the first time in the Democratic Republic of Congo (DRC) in 2017 was provided. These viruses were classified in the clade 2.3.4.4b together with those detected in Eurasia suggesting the same origin of these HPAIVs. No antigenic difference was noticed between the DRC HPAIVs and other viruses in the same genetic clade 2.3.4.4, and no reassortment events were observed in the DRC isolates. However, these isolates increased the virulence in Muscovy duck than other HPAIVs in the same genetic clade. Therefore, continuous surveillance in poultry and wild bird population is recommended for the control of avian influenza viruses in the region.

Chapter II described the Newcastle disease virus (NDV) isolated in the DRC in 2018 and 2019 that caused high mortality of poultry in the backyard farms. From those outbreaks, three NDVs were isolated from chickens. Given that there is a lack of

information about NDV circulating in the DRC, this study provided the genetic and virological characteristics of the NDVs. Among the NDVs isolated in the DRC, two were classified as a new variant of NDV, the other one was classified in genotype VII. No antigenic difference was observed between the DRC isolates and the vaccine strains used in DRC, and the experimental assessment revealed that the vaccine used for Newcastle disease (ND) in the DRC still effective to protect chickens against the newly isolated NDVs. Further epidemiological studies are required to elucidate the endemicity of the ND in the DRC.

HPAIVs are threatening not only the poultry industry, but wild bird populations are also exposed and the HPAIVs can cause high mortality in susceptible wild birds. Chapter III evaluated two human antiviral drugs namely baloxavir marboxil (BXM) and peramivir (PR) that can be used for the treatment of some valuable captive wild birds against HPAIV infection. The drug efficacy was assessed by infecting chickens as an animal model with an HPAIV, followed by the treatment immediately or delayed. BXM was effective to protect completely all infected chickens in the simultaneous treatment while PR partially protected chickens. The metabolism of BXM was assessed in chicken and Pekin ducks and the blood concentration was similar in these two bird species suggesting that BXM can be used in other bird species.

The results obtained from chapter I and II provided the essential information about AI and ND isolated in the DRC; chapter III provided an alternative way to protect some wild captive birds that can be killed by HPAIV infection. Together the data will contribute to the control and prevention of AV and ND in different situations.