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：ローレンス　ベロティンドス
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Characteristics of *Escherichia coli* isolated from livestock and related materials in the Philippines
(フィリピンにおいて家畜及び関連材料から分離された大腸菌の特徴)

In the Philippines, the prevalence of AMR pathogen is currently increasing, posing a significant threat to public health. Antimicrobial resistance increases mortality, morbidity, and health costs in humans and animals. The inappropriate use of antibacterial agents leads to the emergence of resistant microorganisms in agriculture and humans. Previous studies found an increasing trend of AMR in food animals in the Philippines. Thus, requires effective antimicrobial resistance surveillance programs. However, the national antimicrobial surveillance in the animal health sector has not yet been established. Therefore, this study aims to investigate the prevalence of AMR in *E. coli*, which is the sentinel organism of AMR in animals intended for human consumption and their food-derived products, to delineate the situation of AMR in the livestock sector. And, finally, to elucidate the mechanism of acquisition of resistance to quinolones and transmission in the Philippines.

In chapter I, the prevalence and AMR profile of *E. coli* were studied. In addition, the molecular characteristics of *E. coli* that are not susceptable to quinolones found in food-producing animals and their food products in the Philippines have also been determined. The results highlighted a high rate of contamination by multidrug-resistant *E. coli* was observed not only in abattoirs,

but also in animal-derived food, from both supermarkets and open markets. The quinolone-resistance determinants of *E. coli* in the Philippines were found to be mediated predominantly by amino-acid substitutions in QRDRs of *GyrA* and *ParC*. In addition, a high prevalence of PMQR genes was detected, which raises concerns about the broad dissemination of drug-resistant strains. Finally, the high diversity of ST within *E. coli* carrying mutations in QRDR and/or PMQR genes indicate that the spread of quinolone resistance strains in the Philippines is not dependent on a specific clone.

In chapter II, prevalence and characteristics of plasmid carrying *qnr* determinants were further investigated. This study highlighted that *qnr*-harboring isolates carried multiple plasmid replicons and concurrently positive for bla_{TEM}. The *qnr* determinants were transmitted horizontally by $\mathrm{IncF}_{\mathrm{repB}}$ plasmid with difference size and contribute to spreading with other ARGs in the Philippines. Significantly, the spread of *qnr* among commensal *E. coli* seems to be high in the food-producing animals and their food products, acting as a reservoir and promoting to MDR development. Colonization of MDR commensal *E. coli* harboring *qnr* in the human gut from food animals presenting antimicrobial burden, possibly limiting therapeutic option.

The findings in this study will serve as preliminary information and guide in strategizing a more effective control of antimicrobial usage in animals and human. According to the findings in this study, it is recommended that the hygiene laws for animal slaughter and food handling be enforced in the Philippines, as a high multidrug-resistant *E. coli* contamination rate was observed not only in abattoirs, but also in animal-derived food, from both supermarkets and open markets. Furthermore, to minimize the emergence and spread of quinolone-resistant *E. coli*, the implementation of a strict monitoring of antimicrobial use and the restriction of quinolone usage for therapeutic and farming purposes is recommended.