



UNIVERSITI PUTRA MALAYSIA

***COLISTIN SUSCEPTIBILITY PATTERN OF MULTI DRUG-
RESISTANT ESCHERICHIA COLI FROM POULTRY FARMS IN
MALAYSIA***

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FPV 2016 49

**COLISTIN SUSCEPTIBILITY PATTERN OF MULTI
DRUG- RESISTANT *ESCHERICHIA COLI* FROM
POULTRY FARMS IN MALAYSIA**

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A project paper submitted to the
Faculty of Veterinary Medicine, Universiti Putra Malaysia

In partial fulfillment of the requirement for the
DEGREE OF DOCTOR OF VETERINARY MEDICINE

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CERTIFICATION

It is hereby certified that we have read this project paper entitled “ Colistin Susceptibility Pattern of Multidrug-Resistant *Escherichia coli* from Poultry Farm in Malaysia.”, by Khor Shu Neng and in our opinion it is satisfactory in terms of scope, quality, and presentation as partial fulfilment of the requirement for the course VPD 4999 – Project

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DEDICATIONS

This project paper is dedicated

To my family,

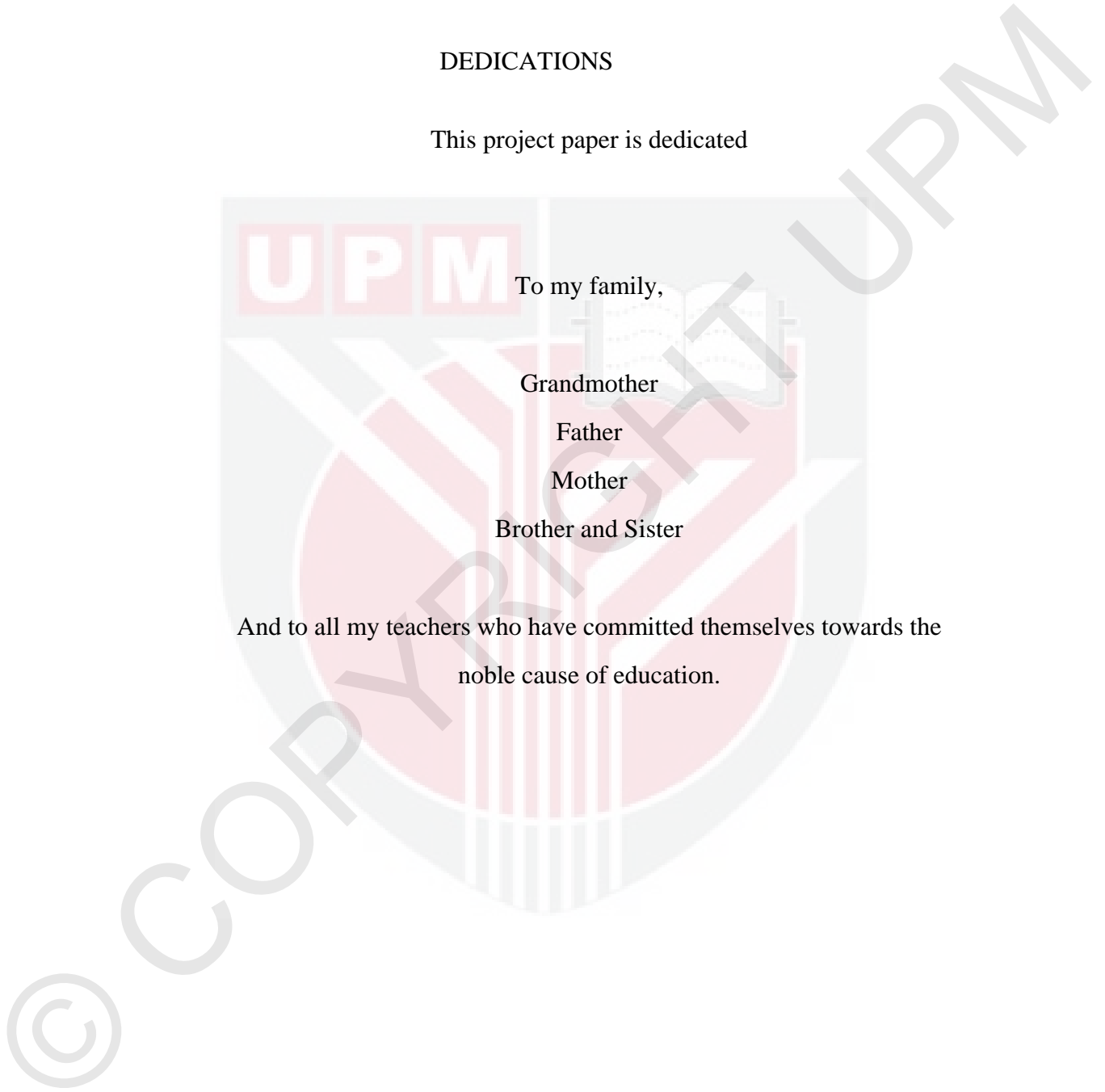
Grandmother

Father

Mother

Brother and Sister

And to all my teachers who have committed themselves towards the
noble cause of education.



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It is with deepest appreciation and gratitude to all those who have made this project paper a reality.

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To my co-supervisor Associate Professor Dr. Latiffah Hassan for her support and encouragement to improve the project, and myself personally.

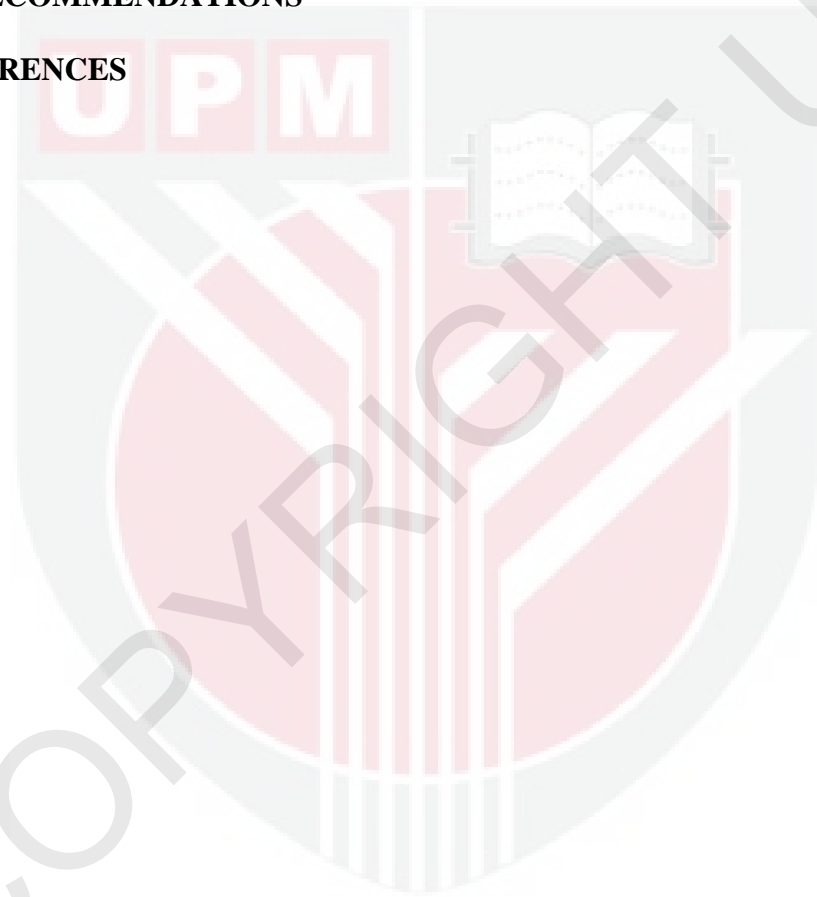
A special thank you to all my classmates of DVM 2016 who assisted me directly or indirectly in this project.

Last but not least, my gratitude for my family; father, mother, brother and dear sister for their love and support throughout my studies.

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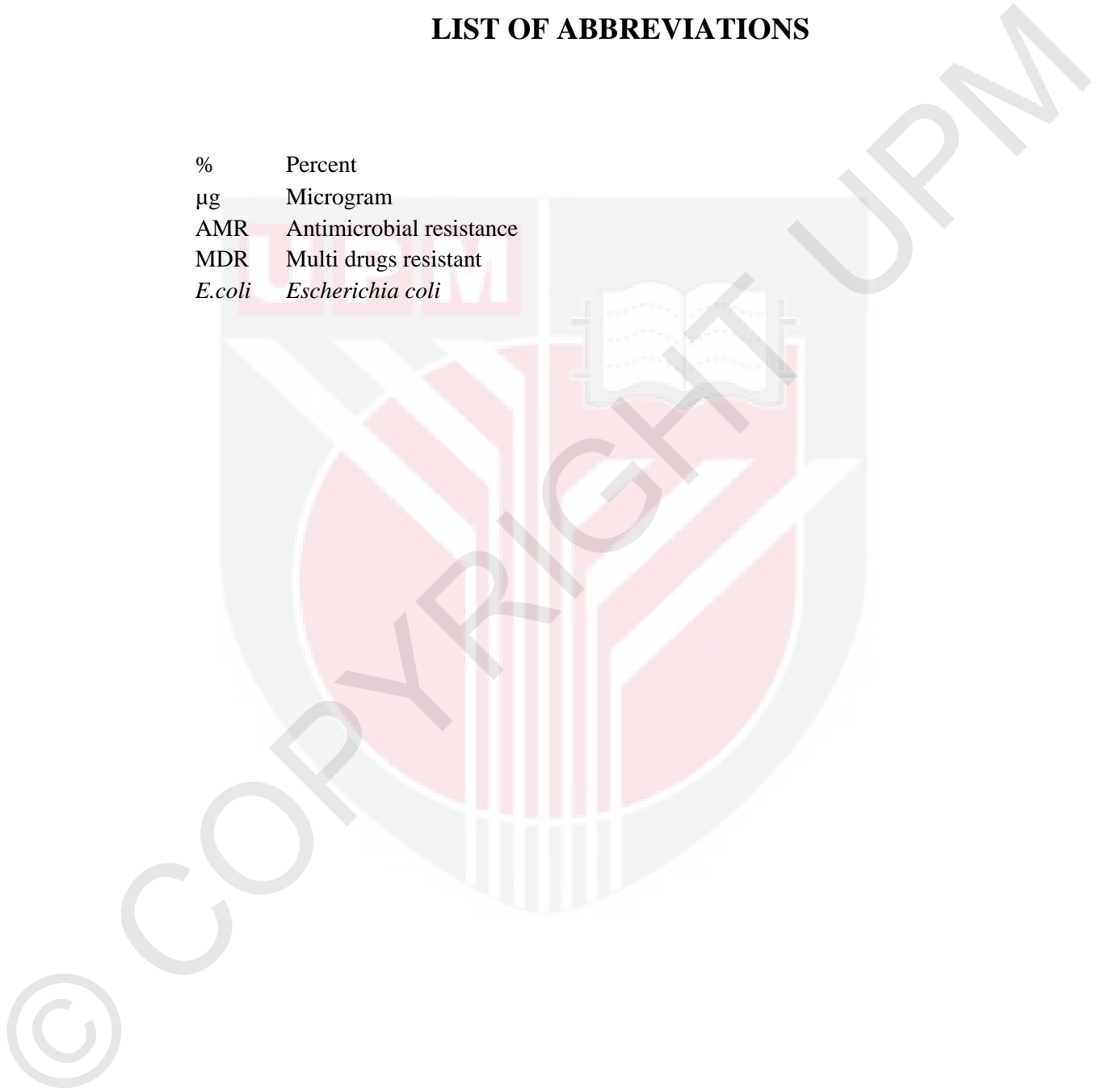
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LIST OF ABBREVIATIONS

| | |
|---------------|--------------------------|
| % | Percent |
| µg | Microgram |
| AMR | Antimicrobial resistance |
| MDR | Multi drugs resistant |
| <i>E.coli</i> | <i>Escherichia coli</i> |



ABSTRAK

CORAK KENCENDERUNGAN *COLISTIN* KETAHANAN PELBAGAI
ANTIBIOTIK *ESCHERICHIA COLI* DARI LADANG AYAM YANG BERBEZA DI
MALAYSIA

oleh

Khor Shu Neng

2016

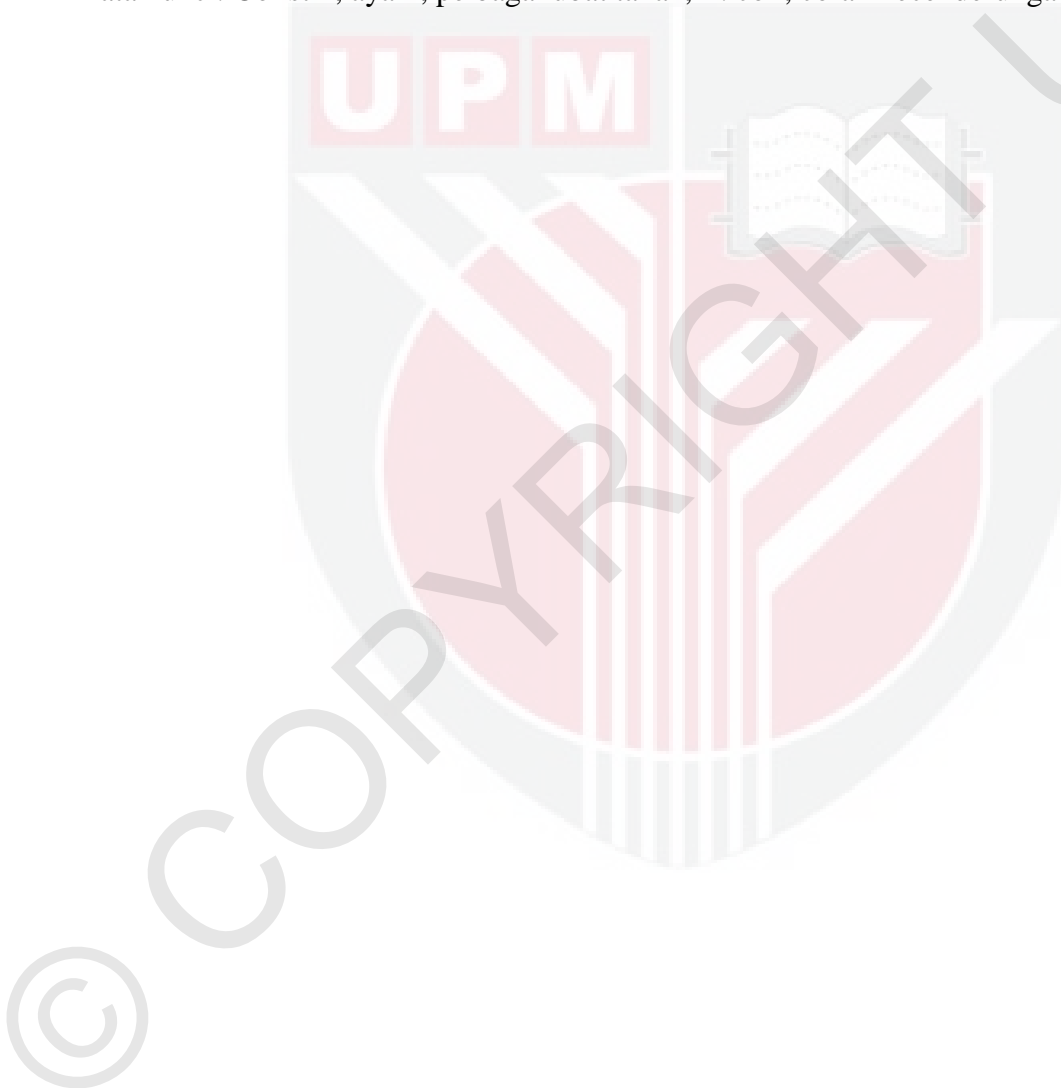
Penyelia: Prof. Datin Paduka Dr. Aini Ideris

Penyelia Bersama: Prof. Madya Dr. Latiffah Hassan

Colistin adalah antibiotik amat penting dalam perubatan manusia. Walau bagaimanapun, mekanisme rintangan colistin yang plasmid-pengantara dalam haiwan dan manusia telah ditemui meluas di China pada tahun 2015, dan sejak itu telah dikesan di negara-negara lain pada masa penulisan ini. Industri ternakan ayam sangat penting di Malaysia. Oleh itu, kajian ini bertujuan untuk menggambarkan corak kecenderungan colistin daripada ketahanan pelbagai antibiotik *Escherichia coli* dari ladang ayam di Malaysia. Dengan kerjasama makmal swasta, data 1 Januari 2014 hingga 1 Disember 2015 untuk 69 profil kecenderungan pelbagai antibiotik *Escherichia coli* yang tertakluk kepada ujian kepekaan antibiotik dengan menggunakan kaedah Kirby-Bauer cakera penyebaran telah diambil. Antibiotik utama dinilai dalam kajian ini adalah colistin. Data dianalisis dengan menggunakan perisian SPSS versi 20. Berdasarkan keputusan dihasilkan, pelbagai antibiotik *Escherichia coli* menunjukkan kecenderungan tertinggi

kepada colistin (90%). Ini diikuti oleh fosfomycin (57%) dan tidak menunjukkan kecenderungan untuk amoxicillin / asid Clavulonic, amoxicillin dan tilmicosin. Di samping itu, tidak ada hubungan yang ketara antara corak kecenderungan colistin dan kedua-dua tahun atau corak rintangan kepada antibiotik yang lain. Penggunaan berhemat colistin dalam ternakan amat disyorkan untuk mencegah penyebaran rintangan colistin.

Kata kunci: Colistin, ayam, pelbagai ubat tahan, E. coli, corak kecenderungan



ABSTRACT

Abstract of the project presented to the Faculty of Veterinary Medicine in partial requirement for the course VPD 4999-Project

**COLISTIN SUSCEPTIBILITY PATTERN OF MULTIDRUG- RESISTANT
ESCHERICHIA COLIFROM DIFFERENT POULTRY FARMS IN MALAYSIA**

By

Khor Shu Neng

2016

Supervisor : Prof. Datin Paduka Dr. Aini Ideris

Co-supervisor : Associate Prof. Dr. Latiffah Hassan

Colistin is a critically important antibiotic in human medicine. However, the plasmid-mediated colistin resistance mechanism in animal and human was discovered widespread in China in 2015, and has since been detected in other countries at the time of writing. As poultry livestock industry is important in Malaysia, this study aimed to describe the colistin susceptibility pattern of multidrug-resistant *Escherichia coli* (MDR *E. coli*) from different poultry farms in Malaysia. With the cooperation of a private laboratory, data from 1st January 2014 to 1 December 2015 for 69 antimicrobial susceptibility profile of MDR *E. coli* which was subjected to antibiotic sensitivity testing by using Kirby-Bauer disk diffusion method was retrieved. The major antibiotic evaluated in this study was colistin. The data was analysed by using SPSS version 20. Based on the results generated, MDRE. coli showed highest susceptibility to colistin (90%). This was followed by fosfomycin (57%). The MDR *E. coli* showed total non-susceptibility to amoxicillin/clavulanic acid, amoxicillin and tilmicosin. In addition, there is no significant association between colistin susceptibility pattern and both

years or resistance pattern to other tested antibiotics. Prudent use of colistin in livestock is highly recommended to prevent spread of colistin resistance.

Key words: Colistin, poultry, Multidrug-resistant, E. coli, Susceptibility pattern



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1.0 INTRODUCTION

Colistin is the only effective drug in human medicine in the context of treatment of infections caused by MDR *Pseudomonas aeruginosa*, *Acinetobacter baumannii* and *Escherichia coli* (Schorr, 2009). Due to the critical importance of colistin for use in human medicine, there is a need to focus on the possible consequences of veterinary use of colistin for human public health (WHO, 2014).

Despite the abundant use of colistin in veterinary medicine for over 50 years, available information on colistin resistance transmission via horizontal gene transfer or sustained clonal expansion has not been reported (EMA, 2012). However, during a routine surveillance project which was carried out in 2015 on antimicrobial resistance in commensal *Escherichia coli* from food animals in China, a major increase of colistin resistance was observed. This report the emergence of the first plasmid-mediated polymyxin resistance mechanism, MCR-1, in Enterobacteriaceae for both animals and human (Liu *et al.*, 2015).

There is evidence which revealed that antimicrobial resistant genes can transfer from food animal to human by mobile plasmid (Geidamet *al.*, 2012). Thus, since the amount and pattern of antimicrobials for food animals is the major determinant for the propagation of resistant bacteria in the animal reservoir (Aarestrup *et al.*, 2008), the resistant bacteria in livestock has important public health significant in order to prevent failure of critically important drugs for human medicine.

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