



UNIVERSITI PUTRA MALAYSIA

***ANTIBIOTIC SENSITIVITY OF SELECTED BACTERIA AND
MICROBIOLOGICAL QUALITY OF LACTOBACILLUS-FED
BROILER MEAT IN COMPARISON WITH COMMERCIAL BROILER
MEAT***

STEPHANIE TAN YIN YI

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UNIVERSITI PUTRA MALAYSIA

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BROILER MEAT**

BY

STEPHANIE TAN YIN YI

**A project paper submitted to the
Faculty of Veterinary Medicine, Universiti Putra Malaysia
In partial fulfilment of the requirement for
THE COURSE VPD 4999 – FINAL YEAR PROJECT**

**Universiti Putra Malaysia
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MARCH 2016

CERTIFICATION

It is hereby certified that we have read the project paper entitled “Antibiotic Sensitivity of Selected Bacteria and Microbiological Quality of *Lactobacillus*-Fed Broiler Meat In Comparison With Commercial Broiler Meat” by Stephanie Tan Yin Yi and in our opinion, it is satisfactory in terms of scope, quality and presentation as a partial fulfillment of the requirements for the course VPD 4999 – Final Year Project.

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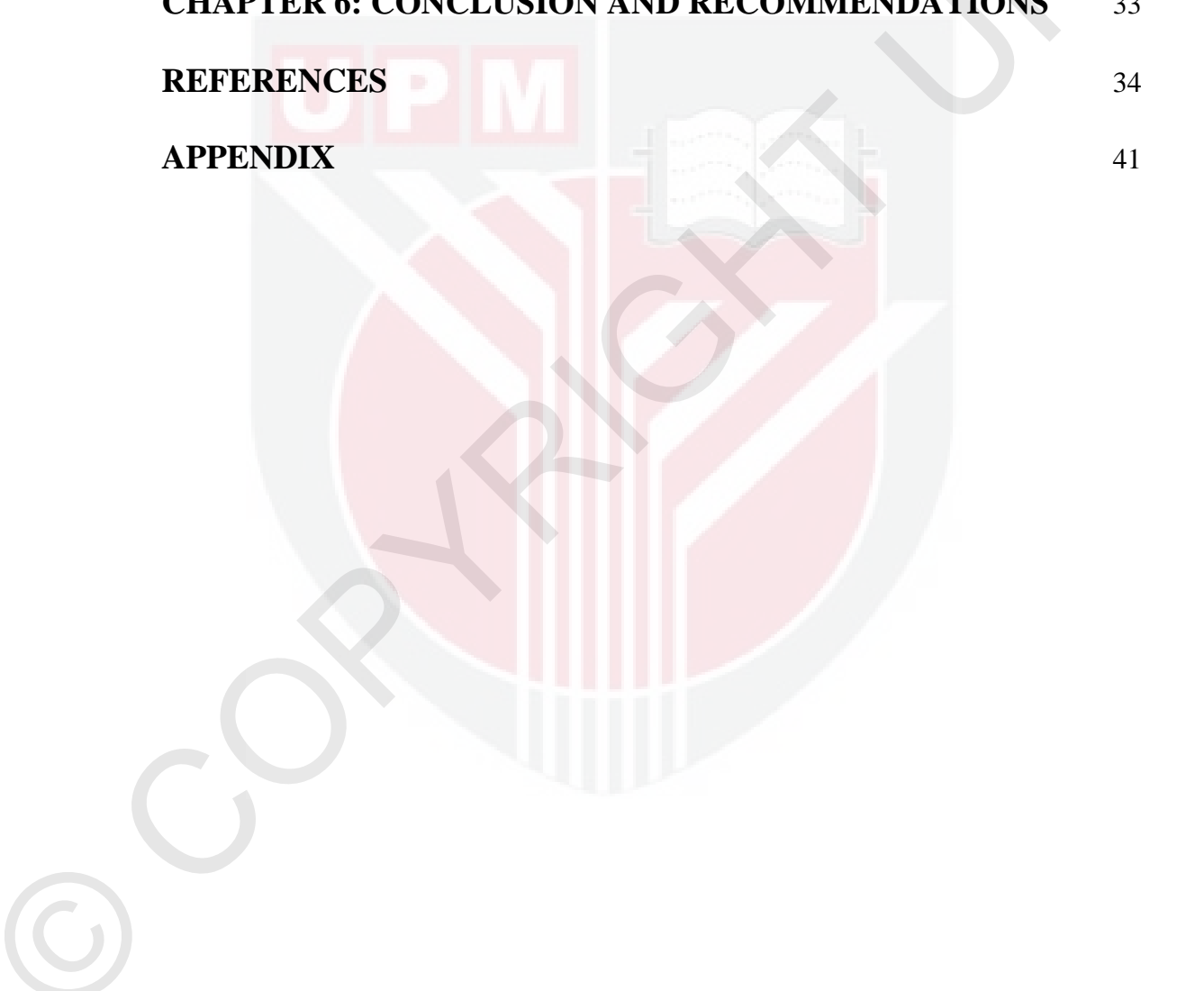
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ABSTRAK

Abstrak dari kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPD 4999 - Projek Ilmiah Tahun Akhir.

**KEPEKAAN BAKTERIA TERTENTU TERHADAP ANTIBIOTIK DAN
KUALITI MIKROBIOLOGI DAGING AYAM PEDAGING
LACTOBACILLUS BERBANDING DENGAN DAGING AYAM PEDAGING
KOMERSIAL**

Oleh

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2016

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Penggunaan probiotik sebagai pengganti antibiotik dalam makanan ternakan ayam telah diperkenalkan sejak beberapa tahun kebelakangan ini. Penggunaan probiotik dipercayai memberikan kesan peningkatan kesihatan yang sama tanpa menyebabkan perkembangan kerintangan antibiotik, terutamanya antibiotik penting. Pembekalan probiotik juga dipercayai menghasilkan daging yang lebih baik dari segi kualiti mikrobiologi. Projek ini adalah untuk mengkaji Standard Plate Count (SPC), Coliform Plate Count (CPC) dan kepekaan antibiotik bakteria tertentu dalam ayam

pedaging *Lactobacillus* untuk dibandingkan dengan ayam pedaging komersial. Dua puluh ayam pedaging *Lactobacillus* dan dua puluh lima ayam pedaging komersial telah diperoleh daripada tujuh pasar raya yang terletak di Selangor dan Kuala Lumpur. Pemencilan bakteria *Salmonella sp.*, *Escherichia coli* dan *Staphylococcus aureus* telah dilakukan pada sampel daging ayam. Empat (20%) sampel daging ayam pedaging *Lactobacillus* didapati positif mengandungi *Salmonella sp.*; 11 (55%) sampel didapati positif mengandungi *E. coli*, dan hanya satu (5%) sampel didapati positif mengandungi *Staphylococcus aureus*. Untuk daging ayam pedaging komersial, satu (4%) sampel didapati mengandungi *Salmonella sp.*, 10 (40%) sampel mengandungi *E. coli*, dan satu (4%) sampel mengandungi *Staphylococcus aureus*. Perbezaan dalam prevalen ketiga-tiga bakteria tersebut antara dua jenis daging adalah tidak ketara. Ujian kepekaan antibiotik telah dijalankan terhadap semua isolat bakteria. Untuk *Salmonella sp.*, semua isolat daripada kedua-dua jenis daging menunjuk kerintangan terhadap ceftriaxone dan oxytetracycline. *E. coli* daripada kedua-dua jenis daging menunjuk kerintangan terhadap ceftriaxone, ampicillin, streptomycin dan oxytetracycline manakala kerintangan terhadap ciprofloxacin hanya terdapat dalam satu isolat daripada daging ayam pedaging komersial. Isolat *Staphylococcus aureus* daripada daging ayam pedaging komersial menunjuk kerintangan terhadap oxytetracycline manakala isolat daripada daging ayam pedaging *Lactobacillus* adalah sensitif kepada semua antibiotik. Perbezaan dalam kepekaan antibiotik ketiga-tiga bakteria antara dua jenis daging ayam pedaging adalah tidak ketara, kecuali kepekaan ampicillin dalam *E. coli* yang didapati lebih rendah dalam daging ayam pedaging komersial, berbanding dengan isolat daripada

daging ayam pedaging *Lactobacillus*. Min SPC adalah 17×10^4 dan 44×10^4 cfu per gram dalam daging ayam pedaging *Lactobacillus* dan daging ayam pedaging komersial. Min CPC adalah 23×10^3 dan 30×10^3 cfu per gram dalam daging ayam pedaging *Lactobacillus* dan daging ayam pedaging komersial. Berbanding dengan daging ayam pedaging komersial, SPC daging ayam pedaging *Lactobacillus* adalah lebih rendah secara signifikan ($P < 0.05$). Walau bagaimanapun, perbezaan dalam CPC antara dua jenis daging adalah tidak berbeza secara signifikan ($P > 0.05$). Projek ini mencadangkan bahawa kualiti mikrobiologi daging ayam pedaging *Lactobacillus* dan daging ayam pedaging komersial adalah setanding.

Kata kunci: *Lactobacillus*, ayam pedaging, *Salmonella sp.*, *Escherichia coli*, *Staphylococcus aureus*, kepekaan antibiotik, kualiti mikrobiologi

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfillment of the course VPD 4999 – Final Year Project.

ANTIBIOTIC SENSITIVITY OF SELECTED BACTERIA AND MICROBIOLOGICAL QUALITY OF *LACTOBACILLUS*-FED BROILER MEAT IN COMPARISON WITH COMMERCIAL BROILER MEAT

By

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2016

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The use of probiotics to replace antibiotics in poultry feed had been introduced in recent years. It is believed that probiotics may give the same overall health effect to livestock, without the undesirable development of antibiotic resistance to vital antibiotics. It is also believed that chickens fed with probiotics may have better overall microbiological quality. This study was performed to evaluate the Standard Plate Count (SPC), Coliform Plate Count (CPC) and antibiotic sensitivity of selected bacteria of *Lactobacillus*-fed broiler meat, and to compare them with those of commercial broiler meat. Twenty *Lactobacillus*-fed broiler meat and twenty-five commercial broiler meat were purchased from seven retail outlets

within Selangor and Kuala Lumpur. Bacterial isolation of *Salmonella sp.*, *Escherichia coli* and *Staphylococcus aureus* were performed on the meat samples. Four (20%) of the *Lactobacillus*-fed broiler meat samples were found to be positive for *Salmonella sp.*; 11 (55%) samples were positive for *E. coli*, and only one sample (5%) was positive for *Staphylococcus aureus*. For commercial broiler meat, one sample (4%) was positive for *Salmonella sp.*; 10 samples (40%) were positive for *E. coli*, and one sample (4%) was positive for *Staphylococcus aureus*. The difference in the prevalence of all three bacteria between the commercial and *Lactobacillus*-fed chickens was not significantly different. All isolates were subjected to antibiotic sensitivity test. For *Salmonella sp.*, all isolates from both types of meat were found to be resistant to ceftriaxone and oxytetracycline. *E. coli* from both types of chicken were resistant to ceftriaxone, ampicillin, streptomycin and oxytetracycline, while resistance towards ciprofloxacin was observed in one isolate from commercial broiler meat. *Staphylococcus aureus* isolate from commercial broiler meat was resistant to oxytetracycline, while the isolate from *Lactobacillus*-fed broiler meat was susceptible to all antibiotics. The antibiotic sensitivity of *Salmonella sp.*, *E. coli* and *Staphylococcus aureus* isolates between the two types of broiler meat were similar, with the exception to ampicillin sensitivity of *E. coli* that was significantly lower from commercial broiler meat, as compared to isolates from *Lactobacillus*-fed broiler meat. The mean SPC in *Lactobacillus*-fed broiler meat and commercial broiler meat were 17×10^4 and 44×10^4 cfu per gram of chicken meat respectively. The mean CPC were 23×10^3 and 30×10^3 cfu per gram of meat in *Lactobacillus*-fed broiler meat and commercial broiler meat respectively. SPC of *Lactobacillus*-fed

broiler meat was significantly lower than that of commercial broiler meat ($P < 0.05$). However, the difference in CPC between the two types of broiler meat was not significant ($P > 0.05$). This study suggests little difference in the microbiological quality of commercial and more expensive *Lactobacillus*-fed broiler meat.

Keywords: *Lactobacillus*, broiler meat, *Salmonella sp.*, *Escherichia coli*, *Staphylococcus aureus*, antibiotic sensitivity, microbiological quality



CHAPTER 1

INTRODUCTION

1.1 Introduction

Broiler meat is a popular source of protein for all ethnic groups in Malaysia. According to USDA GAIN: Malaysia Broiler Meat Sector 2014 report, per capita consumption for broiler meat in Malaysia would reach over 40 kilograms per year and is among the highest in the world. Therefore, poultry production is considered a vital part of Malaysia's livestock production industry.

In poultry production, bacterial diseases can significantly affect its productivity. Therefore, large amounts of antimicrobial agents are being used in poultry production for therapeutic and prophylaxis purposes (Akbar *et al.*, 2014). This practice had led to the emergence and development of antibiotic-resistant bacteria and presence of antibiotic residues in meat. This issue should not be taken lightly, as resistant bacteria can be carried by food animal and transmitted to humans through food consumption, direct contact, and environmental spread (Aidara-Kane, 2012).

In recent years, public awareness of antibiotic resistance had increased. Therefore, a trend to reduce the use of antibiotics in the livestock industry is now seen worldwide. It has also led to the development of interest towards the use of probiotics to substitute antibiotics in feed. In recent studies, it had been reported that

chickens fed with probiotic produced better carcass microbiological quality (Fritts *et al.*, 2000; Khaksefidi & Rahimi, 2005).

Being a product recently introduced commercially in Malaysia, there is a lack of study to ascertain the microbiological quality of *Lactobacillus*-fed broiler meat. Differences in microbiological quality between *Lactobacillus*-fed broiler meat to the commercial broiler meat should be investigated, especially when the market price of such broiler meat is significantly more expensive. Since *Salmonella sp.*, *Escherichia coli* and *Staphylococcus aureus* are among pathogenic bacteria that can cause food poisoning in human, high prevalence of such bacteria, especially antibiotic resistant strains in poultry meat is of public health concern. Therefore, in this study, the microbiological quality of *Lactobacillus*-fed broiler meat, in terms of the Standard Plate Count (SPC), Coliform Plate Count (CPC), prevalence of selected bacteria and their antibiotic sensitivity, was assessed in comparison with those of commercial broiler meat.

1.2 Objectives

The objectives of this project are:

- i) To determine the SPC and CPC per gram of meat from *Lactobacillus*-fed poultry meat and to compare them with commercial broiler meat.
- ii) To evaluate the antibiotic sensitivity of selected bacteria isolated from *Lactobacillus*-fed poultry meat and to compare them with those isolated from commercial broiler meat.

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