



**UNIVERSITI PUTRA MALAYSIA**

**EFFECTS OF PROBIOTIC IN DRINKING WATER OF BROILER ON  
GROWTH PERFORMANCE AND SMALL INTESTINE VILLUS HEIGHT**

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BY

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## ENDORSEMENT

This project entitled Effects of Probiotic in Drinking Water of Broiler on Growth Performance and Small Intestine Villus Height was prepared by Hanif Hayyi Bin Hanafi and submitted to the Faculty of Agriculture in fulfilment of the requirement of SHW 4999 (Final Year Project) for the award of the degree of Bachelor of Agriculture (Animal Science).

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## ABSTRACT

The purpose of this study is to provide an alternative additive to substitute the use of antibiotics in broiler diet. This experiment was carried out to evaluate the effects of probiotics on the growth performance and intestinal villus height of the broiler. The experiment used 200 Cobb 500 day old male chicks that were obtained from a local hatchery. It was reared for 42 days at *Ladang 2*, UPM. The three treatment conducted were control (C, without probiotics), probiotics added on day 18 (T1) and probiotic added on day 21 (T2). Each treatment consisted of six replicates. Probiotic were added in the drinking water of the chicken once they started to drink from the nipple drinker. Laboratory analysis for the villus height and crypt depth were done on three section of the intestine (duodenum, jejunum, and ileum) after the broilers were slaughtered on day 42. Based on the results obtained, there were no significant difference ( $P > 0.05$ ) on the growth performance across all treatment. However, there were significant difference ( $P > 0.05$ ) in the small intestine villus height and crypt depth at the jejunum region. T1 was significantly higher for both villus height and crypt depth at the jejunum region. At the ileum region only the crypt depth were significant between the treatments. The duodenum region showed no significant difference. T1 reflect a better result when compared to T2 and control in terms of villus height and crypt depth. This study showed that probiotic helped to induce a better gut morphology in terms of villus height and crypt depth although there was not much influence of the probiotics on the growth performance. Birds that are exposed to the probiotic at earlier stage showed better result.

**KEYWORDS:** Broiler, Probiotic, Growth Performance, Villus Height, Crypt Depth

## **ABSTRAK**

*Tujuan kajian ini dijalankan adalah untuk memberi aditif alternatif untuk menggantikan penggunaan antibiotik di dalam diet ayam pedaging dan menilai kesan probiotik terhadap kadar tumbesaran dan ketinggian villus usus kecil ayam pedaging. Kajian ini menggunakan 200 Cobb 500 anak ayam jantan yang dipelihara selama 42 hari di Ladang 2, UPM. Setiap rawatan mempunyai enam replikasi. Tiga rawatan yang digunakan ialah malar (C, tanpa probiotik), probiotik yang diberi pada hari ke 18 (T1), dan probiotik yang diberi pada hari ke 21 (T2). Probiotik ditambah ke dalam air minuman ayam apabila mereka mula minum menggunakan kaedah puting. Analisis makmal untuk ketinggian villus dan kedalaman crypt dilakukan terhadap tiga bahagian usus (duodenum, jejunum dan ileum) setelah ayam disembelih pada hari ke 42. Berdasarkan hasil kajian, tiada sebarang perbezaan signifikan ( $P > 0.05$ ) untuk kadar tumbesaran ayam pada semua rawatan. Namun, terdapat perbezaan signifikan ( $P > 0.05$ ) untuk ketinggian villus dan kedalaman crypt di bahagian jejunum dimana T1 menunjukkan nilai signifikan yang lebih tinggi. Di bahagian ileum, hanya kedalaman crypt menunjukkan perbezaan signifikan antara rawatan. Bahagian duodenum tidak menunjukkan sebarang perbezaan signifikan. T1 mencerminkan hasil yang lebih baik apabila dibandingkan dengan T2 dan malar. Kajian menunjukkan probiotik membantu untuk mendorong morfologi usus yang lebih baik dari segi ketinggian villus dan kedalaman crypt walaupun tidak memberi perubahan terhadap kadar tumbesaran.*

**KATA KUNCI:** Ayam pedaging, Kadar tumbesaran, Ketinggian villus, Kedalaman crypt

## CHAPTER 1

### INTRODUCTION

The poultry sector especially broiler has been the most dynamic and continuously expanding sectors in Malaysia although Malaysia have already reach self-sufficiency in chicken meat since the year of 1981 (JPV, 2006). Poultry, or domestic birds, are raised for their meat and eggs and are an important source of edible animal protein. This highly nutritious meat accounts for about 30% of global meat consumption. Poultry meat is rich in proteins and consist of a well basis of phosphorus, B-complex vitamins and other minerals. In comparison to the other animal protein, the poultry meat contains less fat than most of the commonly eaten red meat such as beef and pork. Poultry liver is especially rich in vitamin A. It has a higher proportion of unsaturated fatty acids than saturated fatty acids. This fatty acid ratio suggests that poultry maybe a more nutritious alternative to red meat (FAO, 2009).

Moreover, chicken meat is currently the cheapest source of animal protein which make the demand for the meat is continuous and increasing. However, 70% of poultry price is come from the poultry feed cost. Thus in order to meet all the increasing demand as well as to optimize the production a lot of improvement has been done in broiler sector especially by manipulating their nutrition aspect. This lead to the use of feed additives such as antibiotics and growth promoters which cause public disapproval and concern due to their residual effect in meat tissues.

Several antibiotics were used as growth promoters or performance accelerators. Toxins produced by pathogens in the gut not only affect the digestion but

also damage the architecture of the villi, affecting the absorption nutrients. Antibiotic growth promoters act by suppressing the microbial load in the gut of the birds. Thinning of the intestine walls is observed due to the addition of antibiotics to the feed, leading to improved efficiency in absorption of nutrients. In addition glucose sparing effect is observed due to the prevention of lactic acid production and amino acid sparing due to the prevention of production of toxic amines such as putrescine and cadaverine, in the caecum. The antibiotics commonly used are avilamycin, flavomycin, virginiamycin, zinc bacitracin, lincomycin, oxytetracycline and chlortetracycline. The use of antibiotics as feed additives is now greatly being discourage. Several antibiotics have been forbidden in several countries for two main reason:

- Antibiotics residues in the products may affect humans
- Antibiotics resistant strains of microbes may develop

Reduction in digestibility, feed efficiency and the life of the birds has led to demands in several European countries for reconsidering the legislation on the use of antibiotic feed additives.

Thus as an alternative approach to replace sub-therapeutic antibiotics usage as feed additives in broiler, probiotics microorganism and minerals supplementation have been introduce (Patterson and Burkholder, 2003). According to Choct (2002), the use of probiotic has become a field of science, medicine and business that is growing rapidly and it is seen as potential alternatives to the in-feed antibiotics (IFA). There are many different type or strain of probiotics that can be used such as *Bifidobacterium bifidium*, *Streptococcus facium*, *Streptococcus lactis* and *Saccharomyces cerevisiae*. However the more commonly used are the *Lactobacillus*

*sp.* strain. The addition of the cultures which are either pure or a mixture may produce variable results based on previous findings. Kalavathy *et al.*, (2003) found an improvement in body weight gain (BWG) and feed conversion ratio (FCR) of broilers fed with a mixture of different *Lactobacillus* strains from day 1 to day 42 of age. A consistent improvement of BWG of broilers fed with culture of lactobacillus has been reported by (Awad *et al.*, 2009).

Probiotics may act in tandem with receptors on the intestinal epithelium, with nutrients, produce antibacterial substances and stimulation of immunity. Probiotics in feed also may help to restore intestinal flora and integrity of intestinal structure mainly villus for absorption of nutrients. The gut of newly hatched chick is sterile. Only later does it get microbes from the environment. In normal condition, with the increase in the age of the chick, the gut microflora stabilizes to a native state for instance a balance exists between host favorable and host harmful microflora. Harmful microbial population become high or increase due to stress, disease condition and antibiotic treatment. This direct fed microbial or probiotics which can be administered via water or feed, helps in maintaining host favorable bacteria and prevents harmful bacteria in the gut. By using the supplemented direct fed microbial or probiotics as mention above it is believe that it will contribute to a positive impact to the broiler sector as well as the food safety to the consumer.

## **1.1 Objectives**

### **1.1.1 General Objective**

The purpose of this study was to provide alternative additive to substitute the use of antibiotics as additive in broiler diet.

### **1.1.2 Specific Objective**

This experiment was carried out to evaluate the effects of probiotics on growth performance and histological part of intestinal villus height and crypt depth of the broiler.

## **1.2 Research Hypothesis**

The supplemented probiotics will provide higher villus height as well as result in better growth performance to the broiler.

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