Saudi Journal of Biological Sciences (2010) **17**, 219–225

King Saud University

Saudi Journal of Biological Sciences

www.ksu.edu.sa
www.sciencedirect.com

ORIGINAL ARTICLE

Influence of probiotic supplementation on blood parameters and growth performance in broiler chickens

A. Alkhalf [a], M. Alhaj [b], I. Al-homidan [c,*]

[a] *Dept. of Veterinary Medicine, College of Agriculture and Veterinary Medicine, Qassim University, Saudi Arabia*
[b] *Dept. of Veterinary Medicine, College of Agriculture and Veterinary Medicine, Thamar Univesity, Yemen*
[c] *Dept. of Animal Production and Breeding, College of Agriculture and Veterinary Medicine, Qassim University, Saudi Arabia*

Received 9 January 2009; accepted 15 March 2010
Available online 18 April 2010

KEYWORDS

Probiotic supplementation;
Blood parameters;
Growth performance;
Broiler chicks

Abstract Effects of commercial probiotic (Bactocell®) on growth performance and blood parameters were evaluated. A total of 800 one day-old Ross broiler chicks were raised over 42 days. Chicks were wing-banded, weighed individually and randomly allocated into four equally major groups each having two replicates. Chicks of group 1 (control group) were fed the starter and finisher diets that did not supplemented with probiotic. The chicks of groups 2, 3, and 4 were fed the control starter and finisher diets supplemented with 1.6 g, 1 g and 0.8 g of probiotic per kg feed, respectively. Weekly body weight, feed consumption and feed conversion were measured. Blood parameters at 1, 4 and 6 weeks of age including packed cell volume (PCV), haemoglobin (Hb), total protein, albumin, total lipid and cholesterol were determined. All birds were kept under similar environmental, managerial and hygienic conditions. The results of the current study revealed that there was no significant change for Hb and PCV concentrations among different groups at all studied times. Also, total protein, lipids and albumin concentrations were not affected by probiotic supplementation. Chicken fed a diet containing various levels of probiotic showed a significant decrease ($p \leqslant 0.05$) in cholesterol concentration compared to control group. Probiotic supplementation significantly increased the body weight and daily weight gain of broiler chicks at late ages (3–6 weeks). Also, the birds fed on probiotic levels 1 and 0.8 g/kg diet exhibited higher body weight among chicken groups at 6 weeks of age. Improved feed conversion was noticed in birds fed a diet supplemented with probiotic. There was no significant difference in mortality rate among groups. We concluded that use of selected commercial probiotic resulted in improved performance parameters and

* Corresponding author.
E-mail address: homidani@yahoo.com (I. Al-homidan).

doi:10.1016/j.sjbs.2010.04.005

Production and hosting by Elsevier

reduced serum cholesterol in broiler chickens. Moreover, supplementation of the probiotic to broilers in the levels of 1 and 0.8 g/kg diet was found to be better than control and 1.6 g/kg level indicating that increasing dietary probiotic level does not has the best performance.

1. Introduction

The poultry industry during the past two decades has been one of the most dynamic and ever expanding sectors in the world. It helps to fill the gap between requirement and availability of high quality protein for human consumption. The demand for a higher and safer protein source, free of infectious agents, is getting increased. However, during intensive growth, poultry industry has always been confronted with challenges in the form of various diseases. Among these conditions, the major economic losses are due to infectious diseases which could be caused by viruses, bacteria, fungi, protozoa, and the cost of preventive medication. This led to increased use of antibiotics in the poultry industry for therapeutic, prophylactic and growth promotion purposes. The presence of antibiotic residues in poultry meat and eggs may have deleterious effects on human consumers. The residues of antibiotics can cause resistance of human flora and pathogenic microbes to those groups of antibiotics. Moreover, cross-resistance to antibiotics used in the therapy of humans and other animals could also result (Van den Bogaard and Stobberingh, 2000; Caprioli et al., 2000; Edens, 2003; Pelicano et al., 2004). In the modern intensive poultry production, newly hatched chicks have little chance of contact with their mothers and consequently normal microflora is slow in colonizing the intestine (Fuller, 1989). It is during this early period, when a stable gut microflora has not yet been established, that the chick is most vulnerable to colonization by pathogens. Edens (2003) mentioned that with increasing concerns about antibiotic resistance, and the ban on sub-therapeutic antibiotic usage in Europe and the potential for a ban in the United States, there is increasing interest in finding alternatives to antibiotics for poultry production. The so called probiotics can be listed among these products.

An alternative approach to sub-therapeutic antibiotics in livestock is the use of probiotic microorganisms (Patterson and Burkholder, 2003). Many definitions of probiotics have been introduced, starting from Fuller (1989) who defined Probiotics as a live microbial feed supplement which beneficially affects the host by improving its intestinal microbial balance. However, according to the currently adopted definition by Food and Agriculture Organization and World Health Organization (2001), probiotics are: live microorganisms which when administered in adequate amounts confer a health benefit on the host. The most important advantage of a probiotic is that it neither has any residues in animal production nor exerts any antibiotic resistance by consumption. Therefore, a lot of researchers have partially replaced antibiotics with probiotics as therapeutic and growth promoting agents. It was reported that probiotics have a good impact on the poultry performance (Mountzouris et al., 2007; Koenen et al., 2004), improve microbial balance, synthesize vitamins (Fuller, 1989), decrease pH and release bacteriocins (Rolfe, 2000), improve feed consumption in layers and broilers (Nahashon et al., 1994). Most of the previous researches on probiotic utilization in poultry focused on the use of multispecies probiotics and various strains of *Lactobacillus*. The present study was planned to investigate the effects of a monospecies commercial probiotic (Bactocell®) on broiler growth performance and blood parameters.

2. Materials and methods

2.1. Experimental design and husbandry

A total of 800, one day-old broiler chicks (obtained from Alwadi Company for Poultry), were grown over 42-day period. The chicks were wing-banded, weighed individually and the randomly assigned to four treatment groups following completely randomized design. There were 100 birds per replicate and two replicates per treatment group. The chicks of each replicate were kept in a separate pen measuring 3 m long and 3 m wide at the Agricultural and Veterinary Experiment Station, College of Agriculture and Veterinary Medicine, Qassim University. Feed and water were provided *ad libitum*. Ventilation, air condition and temperature in each room were controlled by a DicamFSC2.2M master unit (Farm Energy and Control Services Ltd. ''Farmex'', Pinewood, Reading RG 303VR, UK). A probiotic commercially identified as Bactocell® was used as a feed additive in this study. Bactocell was purchased from Lallemand Animal Health Company, France. The bacterial flora in the Bactocell probiotic has mentioned to be *Pediococcus acidilactici* in a concentration of 10^9 CFU/g. Chicks of group 1 (control group) were fed the starter and finisher diets that did not supplemented with probiotic. The chicks of groups 2, 3, and 4 were fed the control starter and finisher diets plus 1.6 g, 1 g and 0.8 g of a commercial probiotic (Bactocell®) per kg of ration, respectively. Diets were formulated to provide the recommended requirements for broiler (without added antibiotics, or growth promoters). The starter diet was replaced by the finisher diet at 4 weeks.

2.2. Haematological and biochemical analyses

Haematological and serum biochemical parameters were examined three times at 7, 28 and 42 days of age. Fresh blood samples were collected from chickens of different groups to measure packed cell volume (PCV) and Haemoglobin (Hb) concentrations. PCV was estimated by the microhaematocrite method using capillary glass tubes. Hb concentration was determined following the cyanhaemoglobin method according to Coles (1986). Total cholesterol content was determined using enzymatic colorimetric method by means of Cholesterol Liquicolor kit (GmbH, Germany). Total protein, albumin, and lipid levels were tested by appropriate commercial diagnostic kits (BioSystems, S.A. Barcelona, Spain) and GmbH, Germany). All parameters were determined in Robert Rielle GmbH Photometer 5010 VST (Germany).