PDF - PERFORMANCE CHARACTERISTICS OF BROILER CHICKENS FED GRADED LEVELS OF ONION (ALLIUM CEPA) AND ONION WITH BACTOFORT - researchcub.infoABSTRACT

Two feeding trials were conducted to evaluate growthperformance, carcass characteristics, nutrient digestibility, haematologicaland serum biochemical parameters of broiler chickens fed graded levels of onion(Allium cepa) and onion with Bactofort® as eubiotics. Two hundred and forty(240) day old Ross 308 strain broiler chicks were allotted into five differentdietary treatments with 0, 100, 200, 300 and 400g Allium cepa levels/100kg dietin the first experiment and 0, 15, 30, 45 and 60g Bactofort® levels added to200g Allium cepa/100kg diet in the second experiment. Each treatment had 16birds per pen replicatedthree times in a completely randomized design. Feed andwater were given ad libitum while vaccination and other daily routinemanagements were duly observed throughout the experimental period. Datacollected were subjected to analysis of variance using Statistical AnalysisSystem and means were compared using Dunnett's package. Results of the firsttrial showed an insignificant (P>0.05) difference in performance parametersmeasured during starter period. At the finisher phase, final body weight(2137.47 – 2223.25g) and weight gain (1462.05 – 1548.10g) were significantly(P<0.05) higher in treatments receiving Allium cepa additions compared tothe control (0g Allium cepa addition level) which had2121.53g and 1445.53grespectively while feed intake and feed conversion ratio (FCR) were similar.Mortality was also higher in the control compared to Allium cepa treatmentgroups. 200g Allium cepa addition level had significantly (P<0.05) higherlive weight (2191.78g), dressed weight (1541.11g) and dressing percentage(75.16%) compared to the other treatment groups. However, there were nosignificant (P>0.05) differences in all haematological and serum biochemicalindices across the treatments except for albumin, creatinine, aspartateaminotransferase, alkaline phosphatase and total cholesterol. Percent apparentnutrient digestibilities were also insignificant except for crude fibre andcrude protein. Crude fibre digestibility (87.12%) was better in the treatmentreceiving 200g Allium cepa addition level compared to the control (82.99%). Theproximate compositions of meatwere significant (P<0.05) except ash acrossthe treatment means. The meat quality characteristics were also insignificant.There was a reduction in ceacal and ileal microbial populations of Allium cepatreated group compared to the control. In the second experiment, the treatmentgroup fed Allium cepa based diet (200g/100kg) with 45g Bactofort® addition hadbetter (P<0.05) final weight (2575.00g), weight gain (2529.80g), and FCR(1.89) compared to the rest of the treatment groups. Carcass parameters wereall significant (P<0.05) except for percentages of organs weight anddressing percentage. Treatment groups fed 0 and 60g Bactofort® addition to theAllium cepa based diet (200g/100kg) had significantly (P<0.05) higher totalcholesterol (402.86 and 401.56mg dl-1) and low-density lipoproteins (263.08 and250.08mg dl-1) compared to the other treatment groups. There were significant(P<0.05) differences in all digestibility parameters. The net profit returnwas better in the treatment group fed 45g Bactofort® addition levels to theAllium cepa based diet (200g/100kg). Moreover, gut microbial populations ofcoliform, salmonella and E. coli were lower in the treatment group with 45gBactofort® addition level. It can be concluded that 200g/100kg dietary onionpowder improved performance, meat quality and modulates gut microbiota inbroiler chickens while Bactofort® addition at 45g/100kg Allium cepa based diet,similarly enhance performance, nutrient digestibility and cost efficiency inbroiler production.

CHAPTER ONE

1.0 INTRODUCTION

Cost-effective poultry meat production is reliant on manyvital factors. Securing optimum digestibility and

assimilation of nutrients forimprovement of broiler performance is certainly one of the most importantelements. In this respect, the gastrointestinal tract needs special attention,because any impairment of the secretion of enzymes or disturbance of themicrobiological equilibrium in the gut can negatively affect the digestibilityof the feed, resulting in reduced growth rate or impaired feed conversion ofgrowing birds. Various feed additive concepts, called eubiotics have beenproposed to improve the nutrient utilization and to maintain gut health, whichultimately should result in improved performance (Wenk, 2002). Eubiotics asdescribed by Broz and Paulus (2015) are groups of some feed additives (such asprobiotics, prebiotics, essential oils e.t.c) which are used for the purpose ofmaintaining intestinal eubiosis (optimal balance of microflora in thegastrointestinal tract), thereby resulting in an improved health status andperformance of farm animals.

Prebiotics are non-digestible feed components thatbeneficially affect the host by selectively altering the composition andmetabolism of the gut microbiota (Huyghebaert et al., 2011). Prebiotics mayprovide energy for the growth of favourable endogenous bacteria in the gut,such as bifidobacteria and lactobacilli, thus improving the host microbialbalance (Das et al., 2012). Prebiotics are found naturally in a variety offoods and can also be synthesized enzymatically. Commonly used prebiotics areoligosaccharides i.e., fructo-oligosaccharides (FOS), mannan oligosaccharides(MOS), lactulose, inulin (Brijesh et al., 2013). Inulin is present insignificant quantities in vegetables such as onions, artichokes, asparagus,leeks, and garlic. A substantial amount of FOS is also found in suc vegetablesand some cereals such as barley, and wheat (Espinosa-Martos et al., 2006;Judprasong et al., 2011).

The genus Allium includes about 550 species. A few of theseare important as food plants and as drugs in human medicine, notably onion(Allium cepa L.) and garlic (Allium sativum L.). Onion is a bulbous plantwidely cultivated in almost every country of the world withChina, India andUnited States leading in production (Ebesunun et al., 2007). Most of the plantparts contain compounds with proven antibacterial, antiviral, anti-parasitic,antifungal properties and have antihypertensive, hypoglycemic, antithrombotic,anti-hyperlipidemic, anti-inflammatory and anti-oxidant activity (Lampe, 1999).Administration of onion extract in rabbits significantly reduced serum, liverand aorta triglycerides and serum and liver proteins as reported by Sebastianet al. (1979). Aji et al. (2011) observed the beneficial influence of onionbulbs on growth performance of broiler chickens.

Probiotics are single or mixed culture of livingmicroorganisms which when administered in adequate numbers exert healthbenefits for the host by improving the host intestinal microbial balance,enhancing of colonization resistance against pathogens and improving the immuneresponses (Brisbin et al., 2010; Cencic and Chingwaru, 2010; Das et al., 2012).The species of microorganisms currently being used in probiotic preparationsare varied, and lactose fermenting bacteria (LAB) i.e., Lactobacillusbulgaricus, Lactobacillus acidophilus, Lactobacillus casei, Lactobacillushelveticus, Lactobacillus lactis, Lactobacillus salivarius, Lactobacillus plantarum,Streptococcus thermophilus, Enterococcus faecium, Enterococcus faecalis,Bifidobacterium spp., are the most common types of bacteria used asprobiotics(Khaksefidi and Rahimi, 2005; Kabir, 2009). Recently, the emphasishas been on selection and preparation of mixed strains of microorganisms asprobiotics (Chateau et al., 1994).

Khaksefidi and Rahimi (2005) reported lower numbers ofColiform and Campylobacter in the gut of broiler chickens fed probiotics (mixedstrains). Competition with pathogenic E. coli has also been documented (Watkinset al., 1982), and an increase in production ofantibodies at the systemic andlocal (intestinal) level

(Haghighi et al., 2006). The combination of prebioticsand probiotics (symbiotic) has not been well studied, but their beneficialeffects might be additive or even synergistic (El-banna et al., 2010).

1.1 Justification

Antibiotic feed additives have been used in the poultryindustry for many years to improve the productivity in terms of weight gain andfeed conversion ratio by helping to control infections in the gut mucosa.However, the use of dietary antibiotics has resulted in common problems such asthe development of drug-resistant bacteria (Van Boeckel et al., 2015), drugresidues in the body of the birds and imbalance of normal micro flora(Andremont, 2000; Kabir, 2009). As a consequence, it has become necessary todevelop alternatives using either beneficial microorganisms or non-digestibleingredients that enhance the growth of beneficial micro organisms. Intensivestudies have been conducted to find alternatives and to solve this problem,some components such as probiotics, prebiotics, organic acids and phytogenicfeed additives are introduced instead of antibiotics (Patterson and Burkholder,2003; Ricke, 2003). The beneficial influence of onion bulbs on growthperformance of broiler chickens as a substitute for antibiotics has also beenreported (Aji et al., 2011). Factors such as tolerance to bile and lowgastrointestinal pH are needed to be considered in using any probioticmaterial. Resistance to bile and acidic gastrointestinal conditions are theimportant characteristic that enables Lactose-fermenting bacteria to surviveand grow in the intestinal tract (Jin et al., 1998). It has been suggested thatprobiotics and prebiotics are much more efficient when used in combinationsthan singly (Alloui et al., 2013)

1.2 Aim and Objectives of the Experiments

The aim of this study was to evaluate the effect of dietaryaddition of Onion (Allium cepa) and Onion with Bactofort® on performance ofbroiler chickens. The specific objectives were to determine:

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