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Effect of Thyme and/or Formic Acid Dietary Supplementation on Broiler Performance and Immunity

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Abstract

An experiment was conducted to evaluate the effects of thyme, formic acid (FA) and thyme plus formic acid in broiler ration on performance, carcass traits, blood biochemical parameters, intestinal microbial load, and histological picture of intestine as well as immunity parameters of broilers.

A number of 480-day old broiler chicks were divided into 4 groups with three replicates of 40 chicks each.

Experimental groups included T1, control group with no thyme or formic acid supplementation, T2 group which was fed on basal diet supplemented with thyme (1g/kg diet), T3 group received the basal diet supplemented with formic acid (5g/kg) and T4 group was fed on basal diet supplemented with thyme (1g/kg) plus formic acid (5g /kg).

The results showed that the use of thyme or formic acid or formic plus thyme had significant effects on growth performance and carcass traits of broilers ($P < 0.05$).

The highest % of breast and thigh was observed in group T4, while an improvement in villus height was observed in all supplemented groups compared to control group but the highest was observed in T4. It is concluded that using of thyme or formic acid in broiler feeds have significant effects on performance and immunity parameters.

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1. Introduction

The use of feed additives has been an important part of achieving success in poultry production. Common feed additives used in poultry diets include antimicrobials, antioxidants, emulsifiers, binders, pH control agents and enzymes. The over use of antimicrobial products ended up with a lot of problems both for animals and costumers. Bacterial resistance to antimicrobial agents is an example of these problems (Javed et al., 2006). Because of this problem, a ban on the use of antibiotics was implemented (Kamel, 2001). There is a wide spread use of antibiotic alternatives like organic acids, probiotics, medicinal plants and organic acids, and despite of higher price of this method, these products have more fans among costumers (Ipu et al., 2006). Research on the use of herbal mixtures in broiler diets has produced inconsistent results (Fritz et al., 1993). Some authors state significant positive effects on performance (Ertas et al., 2005 and Peric et al., 2008), while others stated no effect on gain, feed intake or feed conversion (Cross et al., 2007 and Ocak et al., 2008).

Thyme (*Thymus vulgaris*) is a member of *Lamiaceae* family, with the main components of phenols, thymol (40%) and carvacrol (15%) (Mikaili et al., 2010). It is used traditionally for several medicinal purposes: respiratory disease, antimicrobial, antinociceptive etc (Demir et al., 2008). Thymol and carvacrol are the main antibacterial active substances, so this plant can be used instead of commercial antibiotics. The beneficial value of thyme in poultry industry has been reported (Demir et al., 2008). Ground thyme has been shown to inhibit the growth of *S. typhimurium* when added to media (Aktug and Karapinar, 1986). The essential oil of the thyme has been shown to inhibit the growth of *E. coli* in media (Marino et al., 1999).

Organic acids have been used for more than 30 years to prevent bacterial and fungal destruction of feedstuffs (Giesen, 2005; Freitag, 2007). Besides, they are utilized as an alternative for antibiotic growth promoters (AGPs) in animal nutrition (Guathier, 2005; Hernández et al., 2006; Steiner, 2006). Organic acids have an antimicrobial effect because they diffuse through the bacterial cell membrane, and then dissociate into anions and protons thus disturbing the electron-balance inside the cell (Philipsen, 2006). Several studies have reported that both dietary formic and propionic acids reduce *Salmonella* and *E. coli* in small intestinal, cecal, and fecal contents of chickens (Izat et al., 1990a, 1990b; Al-Tarazi and Alshawabkeh, 2003; Moharrery and Mahzonieh (2005). High ambient temperature causes significant economic losses in the broiler industry owing to decreased body weight, poor feed conversion ratio and increasing mortality. Heat-stress leads to panting, decreases the partial pressure of CO₂ in blood and causes respiratory alkalosis (Bottje and Harrison, 1985; Teeter et al., 1985). Therefore, acidifiers have been used to alleviate negative effects of heat stress and to improve broiler performance by altering acid-base balance.

The objective of this study was therefore, to investigate the effects of using thyme (1g/ kg diet), formic acid (5g/kg diet) and combination of both additives on performance, carcass traits, and blood biochemical and immunity parameters of broilers.

2. Materials and Methods

2.1. Experimental design

A total of 480 day-old broiler chicks (Cobb 500) were obtained from Pyramid Poultry Company in Giza. Chicks were divided into a 4×3 completely randomized design with 4 treatments of 3 replicates each of 40 chicks. Birds were housed in an open house system bedded with a layer of wood shaving with a constant lighting program during the whole experimental period (five weeks). Birds were provided continuously with clean drinking water. All birds were kept under standard hygienic conditions and subjected to prophylactic vaccination program against viral diseases. The birds were fed on a basal diet formulated according to the breed producer requirements. Birds were fed either on corn-soybean meal basal diets (starter- grower and finisher) without any supplementation (T1) and served as control group. Birds of (T2) were fed on basal diets supplemented with thyme (1g/kg diet). While birds in (T3) were fed on the basal diets to which formic acid was added (5g/kg) and birds in (T4) were fed on basal diet supplemented with thyme (1g/kg) plus formic acid (5g /kg).

Calculated and chemical analyses of different diets were performed according to AOAC (1990). Diet composition and chemical analysis are shown in table (1). Birds in different experimental groups were weighted initially then weekly till the end of the five weeks experimental period. Body weight development, weight gain, feed intake, feed conversion ratio were calculated.

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