EFFECT OF DIETARY REPLACEMENT OF ANTIBIOTIC GROWTH PROMOTER WITH HERBAL GROWTH PROMOTER ON PERFORMACE OF BROILER POULTRY BIRDS

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Abstract

The herbal supplement containing combination of natural growth promoting agents was examined for its effect on growth, intestinal morphology and carcass traits. One hundred and twenty day old broiler chicks of nearly similar body weight were equally divided into four groups of thirty birds with three replicates in each group. Group-I was positive control fed with the basal diet without any natural or synthetic source of antibiotics. Group-II was test group fed with the basal diet supplemented with bacteriostatic herbal growth promoter with essential oils (AV/AGP/10) @ 250g/ton of feed (supplied by M/S Ayurvet Ltd., Baddi, India). Group-III was test group fed with the basal diet supplemented with test feed AV/AGP/10 @ 500g/ton of feed. Group-IV was fed with basal diet supplemented with Bacitracin Methylene Dicyticylate @ 100g/ton of feed. The experiment was conducted in mid summer season with average environmental temperature ranging between 42-45°C. At the end of sixth week, significantly higher live body weight (1519.05, 1874.19, 1921.51 and 1720.39gm) with more economical FCR (1.81, 1.74, 1.71 and 1.78) along with marked improvement in digestibility of nutrients from supplementation of herbal growth promoter with equal competence as that of synthetic antibiotic was observed. Significantly affected intestinal morphology with duodenal villous height (976.38, 1137.21, 1210.51 and 965.30 μm), width (112.97, 118.16, 120.06 and 108.97 μm) and crypt depth (172.62, 173.01, 177.02 and 168.45 μm), Ilium villous height (442.05, 554.80, 615.87 and 431.57 μm) width (69.58, 90.35, 105.15 and 63.97 μm) and crypt depth (105.15, 112.42, 113.71 and 112.72 μm), jejunal villous height (716.03, 905.54, 914.26 and 702.45 μm) width (103.50, 115.82, 119.22 and 99.78 μm) and crypt depth (117.53, 128.74, 130.44 and 114.56 μm) was observed at 21st day of study period. However again the same trend was observed with duodenal villous height (817.82, 1009.34, 1016.80 and 999.30 μm), width (87.71, 97.87, 102.57 and 81.40 μm) and crypt depth (146.08, 150.84, 153.13 and 139.19 μm), llial villous height (385.17, 363.94, 374.17 and 353.97 μm), width (51.05, 62.06, 73.10 and 57.92 μm) and crypt depth (64.51, 70.70, 73.54 and 69.84 μm), jejunal villous height (556.46, 719.89, 727.06 and 527.23 μm), width (79.77, 84.03, 87.43 and 73.52 μm) and crypt depth (77.92, 87.85, 94.31 and 72.50 μm) at 42nd day of study period. The values of carcass yield (978.41, 1373.10, 1465.90 and 1175.12gm) revealed significant improvement after supplementation of herbal growth promoter. Satisfactory growth rate, FCR, carcass yield along with improved intestinal morphology (better digestibility and absorption of nutrients) can be achieved by complete replacement of synthetic antibiotic with herbal growth promoter AV/AGP/10. The efficacy of AV/AGP/10 as a bacteriostatic herbal growth promoter & gut function modulator may be attributed to the constituent herbs of the product namely Allium sativum, Trigonella foenum graecum, Zingiber officinale & many more.

Introduction

The practice of feeding livestock with antibiotics has been in use for over fifty years. Antibiotics affect microflora by altering the metabolism of microorganisms, and suppressing microbial growth in the gut (Gadd, 1997). Usage of antibiotics has negative effects on animal’s health and production such as residua in tissues, long withdrawal period, and development of resistance in microorganisms, allergies, genotoxicity (Markovicv, 2005) and harmful effects on human health by development of microbial resistance to specific products (Botsoglu and Fletouris, 2001; Williams and Losa, 2001; McCarteney, 2002). Due to such consequences, plant extracts or phytopigenic feed additives have shown some capacity to replace or could be considered as potential alternatives to AGP. Phytopigenic feed additives are plant extracts derived from herbs or spices, which have beneficial effect on animal production and health. A large variety of the plants have properties...
which could potentially improve feed intake, digestion, feed conversion and body weight gain (Lovkova et al. 2001, Williams and Losa 2001, Ertas et al. 2005). The mode of action of these feed additives is not completely clear. They have antimicrobial, antiviral, antioxidant and many other biological activities (Ertas et al. 2005, Cross et al. 2007). They act as a digestibility enhancers, stimulating the secretion of endogenous digestive enzymes (Williams and Losa 2001). These traits made phytogenic additives a promising group of growth promoters that are already being used in practice. In poultry, the growth-promoting effect of antibiotics was noticed in the early 1950s (Joerger, 2003). The positive effect on growth was mainly related to the “microflora-management” theory based on three mechanisms (Dibner and Richards, 2005; Niewold, 2007).

The first mechanism is the control of gut microbiota. It results in decreased competition for nutrients and a reduction in microbial metabolites depressing growth. The second mechanism is the reduction of gut size. A lower production of luminal short-chain fatty acids (SCFA) derived from microbial fermentation reduces mucosa cell proliferation and induces thinner villi lamina propria and gut wall, providing enhanced nutrient digestibility. The third mechanism is the reduction in opportunistic pathogens and subclinical infection. The present study was performed to evaluate efficacy of polyherbal coded formulation AV/AGP/10 (supplied by M/S Ayurved Limited, Baddi, India) in comparison to synthetic antibiotics in improving overall growth, intestinal morphology and carcass traits.

Materials and Methods

One hundred and twenty day old broiler chicks of nearly similar body weight were equally divided into four groups of thirty birds with three replicates in each group. Group-I was positive control fed with the basal diet without any natural or synthetic source of antibiotics. Group-II was test group fed with the basal diet supplemented with bacteriostatic herbal growth promoter with essential oils (AV/AGP/10) @ 250g/ton of feed (supplied by M/S Ayurved Ltd., Baddi, India). Group-III was test group fed with the basal diet supplemented with test feed AV/AGP/10 @ 500g/ton of feed. Group-IV was fed with basal diet supplemented with Bacitracin Methylene Dicycylate @ 100g/ton of feed. The experiment was conducted in mid summer season with average environmental temperature ranging between 42-45°C. The chicks of all the four groups were housed separately under same roof and maintained on ad libitum broiler starter and finisher ration and clean drinking water throughout the experiment. The chicks were vaccinated for Lasota and IBD vaccines on 7th and 14th day of age, respectively. The booster dose of IBD vaccine was given on 21st day. The performance was assessed by gain in weight, feed conversion ratio, carcass yield and intestinal morphology. The samples of intestine was collected at 21st and 42nd day period for morphological studies. At the end of sixth week carcass yield was studied.

Growth and carcass parameters: At the end of sixth week, significantly higher live body weight (1519.05, 1874.19, 1921.51 and 1720.39gm) with more economical FCR (1.81, 1.74, 1.71 and 1.78) (Saki et al., 2012; Gunal et al., 2006 and Peric et al., 2010) along with marked improvement in digestibility of nutrients from supplementation of herbal growth promoter with equal competence as that of synthetic antibiotic was observed. The values of carcass yield (978.41, 1373.10, 1465.90 and 1175.12gm) revealed significant improvement after supplementation of herbal growth promoter. Many experiments investigating the effects of herbs, plant extracts and essential oils on broiler performance yielded contradicting results. Some of the authors reported a significant positive effect of phytogenics on broiler performance (Lovkova et al. 2001, Williams and Losa 2001, Ertas et al. 2005, Cross et al. 2007) while in other trials different phytogenic additives and essential oils did not affect body weight gain, feed intake or feed efficiency in broilers (Cross et al. 2002, Demir et al. 2002, Ocak et al. 2008). It has been suggested that the different results of the trials are due to differences in the composition of phytogenic preparations, different methods used to extract the essential oils form the herbs and the level of the application in feed (Cross et al. 2007).
Intestinal morphology: Significantly affected intestinal morphology with duodenal villous height (976.38, 1137.21, 1210.51 and 965.30 μm), width (112.97, 118.16, 120.06 and 108.97 μm) and crypt depth (172.62, 173.01, 177.02 and 168.45 μm), Ilium villous height (442.05, 554.80, 615.87 and 431.57 μm), width (69.58, 90.35, 105.15 and 63.97 μm) and crypt depth (105.15, 112.42, 113.71 and 112.72 μm), jejunal villous height (716.03, 905.54, 914.26 and 702.45 μm), width (103.50, 115.82, 119.22 and 99.78 μm) and crypt depth (117.53, 128.74, 130.44 and 112.72 μm) was observed at 21st day of study period. However, again the same trend was observed with duodenal villous height (817.82, 1009.34, 1016.80 and 999.30 μm), width (87.71, 97.87, 102.57 and 81.40 μm) and crypt depth (146.08, 150.84, 153.13 and 139.19 μm), ilial villous height (285.17, 363.94, 374.17 and 353.97 μm), width (51.05, 62.06, 73.10 and 57.92 μm) and crypt depth (64.51, 70.70, 73.54 and 69.84 μm), jejunal villous height (556.46, 719.89, 727.06 and 527.23 μm), width (79.77, 84.03, 87.43 and 73.52 μm) and crypt depth (77.92, 87.85, 94.31 and 72.50 μm) at 42nd day of study period. Similar trend of the results were observed by Saki et al. 2012, Gunal et al. 2006 and Peric et al. 2010. The short chain fatty acids which are by products of bacterial fermentation stimulate the proliferation of epithelial cells of the bowe (Ichikawa et al., 1999). The morphology of intestinal villi and crypts has been associated in chickens with intestinal function and growth. Adverse changes in the content of the digesta, such as high population of pathogenic bacteria, parasites or damaging substances, could lead to changes in the surface of intestinal mucosa, because of their close proximity. A lower villus height/crypt depth ratio has been associated with the presence of toxins, poor nutrient absorption, increased secretion in the gastrointestinal tract, diarrhoea, reduced disease resistance and lower overall performance. A large crypt indicates a fast tissue turnover and a high demand for new tissue (Xu et al. 2003). Satisfactory growth rate, FCR, carcass yield along with improved intestinal morphology (better digestibility and absorption of nutrients) can be achieved by complete replacement of synthetic antibiotic with herbal growth promoter AV/AGP/10. The efficacy of AV/AGP/10 as a bacteriostatic herbal growth promoter and gut function modulator may be attributed to the constituent herbs of the product namely Allium sativum, Trigonella foenum graecum, Zingiber officinale & many more.

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References


15. Markovicv R. The effect of different growth promoters in broiler nutrition on performance and health status. Master Thesis. Faculty of Veterinary Medicine, University of Belgrade, Belgrade, Serbia. 2005


