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Histological Changes and Growth Performance Analysis in Broiler Chicken by Using KEPROGAN® As Additive in Feed

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Abstract

The objective of this research was to investigate effect of supplementation of Keprogan on growth of broiler chickens. One day old 200 broiler chickens (Ross) were randomly divided to two dietary treatments each containing 100 chicks. In group 1 chickens were fed on diet containing 0.5% of Keprogan and group 2 (control) was without any supplement. The results of the present study demonstrated that the supplement food fed to broilers Keprogan (T2) resulted in a substantial (P0.05) increase in live body weight, weight gain, feed intake, and feed conversion ratio (FCR) compared to control at day 35 (the end of the experimental period). In contrast to the control group, a significant (P0.05) increase in crypt width was associated with increased villi length.

Keywords: Keprogan, Broiler, Growth performance, Chicken, Feed intake

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1. Introduction

In many parts of the world, chicken meat is a popular source of high-quality animal protein. Because chicken meat is more economical in underdeveloped nations with low meat consumption, it could help to provide a nutritionally balanced diet. The feed business currently uses herbal products primarily as sensory enhancers, flavoring, and appealing components. Though an understanding of their mechanism of action is required for their most effective utilization. For example, KEPROGAN® [1]. Keprogan is a complementary premix for poultry and calf diets. It supports gastro-intestinal tract functioning and gastro-intestinal tract microflora. Keprogan contains butyric acid, which helps in the proliferation and differentiation of intestinal epithelial cells and takes care of an increased barrier function of the intestines against pathogens. Additionally, it lowers the pH in the intestines, enhances enzyme activity, and boosts immune system function. Carvacrol and thymol are essential oils components that promote feed intake and support a healthy gastrointestinal microbiota [2]. Organic hydrocarbons and essential oils act all along the animal digestive tract for increasing appetite and modulating microbial species [3]. Antimicrobial properties of essential oils could be bacteriostatic and/or bactericidal in a dose-dependent manner. Additionally, several studies have demonstrated essential oils antioxidative properties, their effects on digestive physiology and weaning digestion [4], on the gut microbiology [5], and in implementing test models in poultry [6]

The goal of this experiment was to investigate KEPROGAN effect on growth performance, including weight gain, body weight, feed consumption, feed conversion rate, on weekly and histological changes in the colon at 35 days.

2. Materials and methods

2.1. Experimentation with animals and designing

In this study, 200 one-day-old Ross-308 broiler chickens (*Gallus gallus domesticus*) were split into two groups, each with four replications (50 birds per replication). All the replications were kept in pens with sawdust litter on the floor. The stocking density was set at ten birds per square meter. Commercial management methods were used during the study, and the ambient temperature was kept under control. For the duration of the trial, artificial light was delivered on a 23-hour schedule. After hatching, during their second week of age, all birds were vaccinated against Newcastle disease as well as Infectious Bronchitis and Gumboro [7]. The birds in the control group (CONTROL) were fed ad libitum commercial diets. The birds in the second group were fed the same meals as the first, but with the addition of Keprogan [8].

3. Results and Discussions

Table 1 illustrates the outcomes of the experiment in response to feed intake (FI), body weight (BW), body weight gain (BWG), and feed conversion ratio (FCR) (1, 2, 3 and 4 weeks). In general, performance parameters in chicks given a Keprogan-containing diet outperform chicks in the control group. The important increases in performance measures can be linked to benefits on the gastro-intestinal tract, such as improving feed taste, catalyzing digestive juice secretion, improving intestinal shape, stabilizing the intestinal flora, and reducing inflammation [9]. Increased feed intake and appetite are stimulated by improved palatability of animal feed [10]. Increased mucus secretion in the gut produced by plant-derived chemicals eliminates the likelihood of adherence of bacteria and fungi to the chicken intestine's epithelium [11]. Increased bile and saliva secretions, as well as enhanced particular biochemical reactions of enzymes, may explain some of the improvements in nutrient absorption [9-10]. The modified nutrient sucking may allow for feed density adjustments. Reduced pathogenic microorganisms in the colon may increase epithelial cells' ability to repair villus and, as a result, adhesion and intestinal absorption capacity [10]. As a result of its capacity to bind toxins and prevent diarrhea, it has mostly been studied as a feed supplement to increase growth and health in broilers [12]. Although, it has been hypothesized that silica compounds, such as colloidal silica, may have antioxidant properties in broiler chickens [13]. The effect of an aromatic compound is determined by its essential oils and certain other compounds [14]. Aromatics reported in animal and meat production have antioxidant, keeper, antibacterial, and coccidiostatic characteristics, and they enhance digestive juices production, blood circulation, and immune status [15,16]. However, oregano oil has become one of the most well-known due to its high level of carvacrol and thymol (in Keprogan), as well as y-terpinene, p-cymene, and myrcene to a lesser extent [17] Oregano oil has antioxidant, antibacterial, digestive stimulant, and other in vivo and in vitro characteristics [18,19]. The results of this experiment's length of villi and crypt width showed a significant (P0.05) rise in the highest length of villi with increased crypt width when compared to the control group Table (5). In the same raw, different letters denoted that there were statistically significant differences between treatments at a level (p 0.05). In any event, feed supplements are used with healthy animals not only for nutritional aims but also for additional functionality on a permanent basis in contradiction to veterinary drugs, used just to medicate health problems under the observation of a veterinarian and applied for a limited period only.

It was [20] postulated that one part of the phytogenic effect of Keprogan appears to be irritation of gut tissues, which results in a reduction in intestinal surface area, taking into consideration the various reactions in GIT morphology. On the other hand, good impacts on GIT health (such as a reduction in infection) may encourage greater villus length and gut surface area. As a result, it appears that the overall effect of essential oils on gut morphology is related to the balance struck between tissue irritation and beneficial effects on intestinal health. Essential oil treatment has been proven to produce better results in studies conducted under experimental settings of large-scale chicken production [21,22]. An enhancement in immunological status and a decrease in pathogen microorganisms in the bowel could both explain this phenomenon.

The essential oils carvacrol and thymol stimulate feed intake and support a healthy gastro-intestinal microflora. They also stimulate the production and secretion of the intestinal enzymes. This might be due to retarded gastric emptying and stabilization of the intestinal microbiota and/or higher enzymatic activity, and therefore better absorption of the digestible nutrients. Due to the sophisticated coating and spray-cooling technique [23,24], Keprogan gives a target release effect and is stable during processing.

Table 1. Effect of Keprogan premix to diet based on body weight (gm) (means SE)

Groups / Age by weak	Control	Treatment
1st week	151.94 ± 0.64 B	165.73 ± 0.58 A
2nd week	384.92 ± 0.67 B	399.73 ± 0.77 A
3rd week	815.18 ± 1.28 B	827.50 ± 1.49 B
4th week	1295.98 ± 2.25 B	1339.89 ± 2.19 B
5th week	1895.70 ± 3.00 C	1998.59 ± 2.40 B

Significant variations between treatments at a level (p 0.05) were designated by different letters in the same raw.

Table 2. Effect of Keprogan premix to diet based on body weight (gm) (means SE)

Groups / Age by weak	Control	Treatment
1st week	123.85 ± 0.5 B	130.75 ± 0.60 A
2nd week	240.98 ± 0.72 B	240.69 ± 0.80 B
3rd week	442.25 ± 1.38 B	450.44 ± 2.86 B
4th week	440.57 ± 2.37 C	495.97 ± 2.30 B
5th week	635.74 ± 3.69 C	639.19 ± 2.90 B

Significant variations between treatments at a level (p 0.05) were designated by different letters in the same raw.

Table 3. Effect of Keprogan premix to diet based on body weight (gm) (means SE)

Groups / Age by weak	Control	Treatment
1st week	155.75 ± 0.45	148.0 ± 0.65
2nd week	355.12 ± 1.31	350.75 ± 0.95
3rd week	665.0 ± 3.33 A	635.82 ± 1.15 B
4th week	795.30 ± 1.55 A	785.2 ± 1.95 B
5th week	1150.50 ± 1.85 A	1100.5 ± 1.95 B

Significant variations between treatments at a level (p 0.05) were designated by different letters in the same raw.

Table 4. Effect of Keprogan premix to diet based on body weight (gm) (means SE).

Groups / aging	Control	Treatment
1st week	1.29 ± 0.004 A	1.24 ± 0.004 B
2nd week	1.55 ± 0.005 A	1.44 ± 0.004 B
3rd week	1.57 ± 0.001 A	1.48 ± 0.002 B
4th week	1.80 ± 0.003 A	1.60 ± 0.003 B
5th week	1.84 ± 0.003 A	1.79 ± 0.002 B

Significant variations the interval between treatments at a certain dose (p 0.05) were designated by different letters in the same raw.

Table 5. showed the length of villi and crypt width of intestinal chickens

Parameter / Groups	length of villi	crypt width
Control	1970.96± 166.55 A	254.12± 9.66 A
Treatment	1343.69± 32.98 B	340.50± 8.48 B

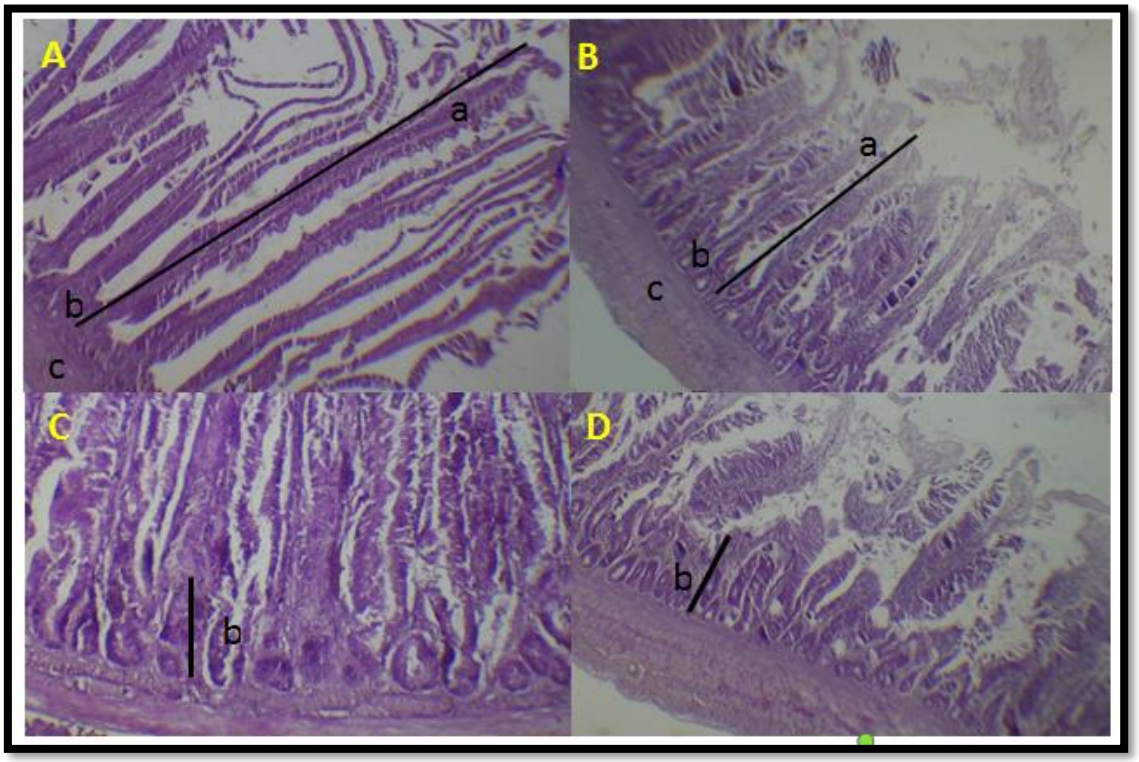

Figure 1(A,B,C,D): Cross section of intestine broiler chicken (A,C) that represented treated groups that shown highest length of villi (a) with increase crypt width (b) ,while (B,D) that shows the low of length villi (a) with decrease in crypt width (b) when comparison with treated groups .so the (c) letter smooth muscle. H&E stain , (A,B)40X.(C,D) 100X.

4. Conclusions

The essential oils carvacrol and thymol stimulate feed intake and support a healthy gastro-intestinal microflora and the better absorption of the digestible nutrients may occur as a result of increased enzyme activity, delayed stomach emptying, and intestinal microbiota stabilisation..

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