

EFFECT OF SOME ESSENTIAL OIL AND ORGANIC ACIDS ON BLOOD PICTURE , LIPID PROFILE AND INTESTINAL HEALTH IN BROILER CHICKENS

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ABSTRACT

The objective of the present study was to investigate the effect of nutritional additive of associated phytogetic P.E.P. and organic acids supplemented in drinking water on their, blood parameters, lipid profile and intestinal histomorphology in broilers. For this purpose, 240 chicks (Ross-308) one-day old were divided randomly into 6 equal groups each group 40 chicks as follow. G1supplemented with(0.015 cc Essential Oil (EO) with Aromatic Oil (AO) 0.5cc/L) , G2 add (AO 2cc/L) ,G3 was mix (EO 0.06cc with AO 1,5cc/L) ,G4(0.03 EO with1cc AO/L ,G5 0,12cc EO /L and control (G6) group was fed the basal diet ,the results of blood parameters were indicated significant ($P\leq 0.05$) increase in amount of WBC,RBCs, hemoglobin and PCV in groups 3, 4 and 5 compared with the control , also revealed significant increased ($P\leq 0.05$) of HDL-cholesterol concentration in G3 and G4 but decreased in triglyceride, total and low density lipid concentrations were influenced by the dietary treatments in G4,3,2 and VLDL in G3 and 5.also exposed significant ($P\leq 0.05$)increased in the height and thickness of villus and crypt depth in all parts of small intestine of G3,G4 and G5 compare to the control group. In conclusion the mix Essential Oil and Aromatic Oil supplementation to the broiler diet improve blood picture (RBCs .WBCs,Hb and PCV) and enhanced with maintenance the function of the small intestine .

Keywords: Fatty acids, duodenum, prebiotic ,poultry, meat

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تأثير بعض الزيوت العطرية والأحماض العضوية على صورة الدم ومعايير الدهون والصحة المعوية في الدجاج اللحم

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المستخلص

هدفت الدراسة البحث في تأثير الإضافات الغذائية من phytogetic P.E.P والأحماض العضوية في مياه الشرب على مقاييس الدم، ملف تعريف الدهون والأمعاء في دجاج اللحم لهذا الغرض تم استخدام 240 فرخ (روز-308) بعمر يوم واحد تم تقسيمها بشكل عشوائي إلى 6 مجموعات كل مجموعة اربعين فرخ افرخ كالاتي 1G اعطيت 0.015 مل من EO مع 0.5 مل/لتر من 2G,AO إضافة 2 مل/لتر من AO، 3G أعطيت مزيج من 0.06 مل من EO مع 1 مل من AO و 4G أعطيت مزيج من 0.03 مل من EO مع 5 مل/لتر من AO اما 5G أعطيت 12 مل/لتر من EO والسيطرة 6G أعطيت عليقة عادية وأظهرت النتائج فحوصات الدم وجود زيادة معنوية $P\leq 0.05$ في كمية WBC و 5 RBCs و الهيموغلوبين و PCV في المجاميع 4 و 3 و 5. مقارنة مع مجموعة السيطرة ايضا زيادة معنوية ($P\leq 0.05$) في تركيز الكوليسترول الحميد في 3G و 4G ولكن الدهون الثلاثية والمنخفضة الكثافة شهدت انخفاضاً في مجموعات 3 و 4 و 5 أظهرت النتائج وجود زيادة معنوية ($P\leq 0.05$) في ارتفاع وسمك الزغابات وعمق سرداب في جميع أجزاء الأمعاء الدقيقة للمجاميع 4 و 3 و 5 مقارنة لمجموعة السيطرة. نستنتج من الدراسة الحالية استخدام مزيج الزيوت الأساسية والزيوت العطرية كإضافات علفية تحسن من صورة الدم وتعزز وظيفة الأمعاء الدقيقة وصيانتها.

الكلمات المفتاحية : احماض دهنية، الاثنى عشري، بربايوتيك، اللحم

INTRODUCTION

The diffuse of antibacterial resistance in zoonotic pathogen bacteria, which carries a risk to human health. This leads to increased searching about replacements to antibacterial with similar effect against microbes and growth supporting, its therapeutic characteristics where no encouraging of impedance of the bacteria whatsoever, and make any undesirable outcome for an animal (6, 20, 26) This state obliges the world to limit using antibiotic growth promoting in animal feed and replacement by some "feed additive" such as "probiotics, prebiotics, organic acids enzymes and phytogetic" Phytogetic complexes are definite as plant-derivative ordinary biology active composite in the company of helpful properties which has a positive impact on the growing of the animals and the healthiness, and are frequently utilized fundamental oils, plants and herbaceous extracts, several complexes which derived from herbs are familiar for their antimicrobial and antioxidants characteristics (2,13). These have positive effect in improved feed conversion ratio of broiler due to morphological alterations in the digestive system (16). The phytogetic feed additives (PFA) derivative from herbs, spices or aromatic plants (1,9) phytogetic additive (P.E.P.). feed additive based on a combination of essential oils creating from different nutrient material which are fragrant volatile compounds have inflammatory activity and encouragement of saliva secretion, liver and intestine enzymes activities. (5). These acids and their salts are usually considered as harmless and used as natural feed additives in animal production as alternatives to antibiotic growth promoters, organic acids (OA) have demonstrated progressive effects in Poultry production, due to their potential To lower the intestinal pH and enhance the bacterial development thus given that healthier intestinal for the bird to make the most of nutrient absorption (18). The inclusion of formic and citric acids, in the poultry feed has been appeared to enhance poultry performance (22). Addition of organic acids in feed develops the growth performance by improving the nutrient absorption and decrease the populace of pathogenic bacteria

in the digestive tract also, the short chain organic acid like acetic, propionic and butyric acid have well role in the energy metabolism. (23).

MATERIALS AND METHODS

A total of 240 broilers chicks (Ross-308) one day old were divided into six groups to each group 40 chicks as follow G1 supplemented with mix (0.015cc EO and OA 0.5cc/l), G2 add OA (2cc/l,) G3 was mix (EO 0.06cc with OA 1.5cc/l) ,G4(0.03 EO with OA 1cc /l, G5 0.12cc EO /l and G 6 is control throughout the duration of the experiment. Groups received EO (P.E.P) and organic acids (BIOTONIC® LIQUID.) supplemented with (7% citric acid, 2% fumaric acid, 3% lactic acid and propionic acid 7%) in drink water method from first day to the termination of the experiment. Blood samples were taken at 42 day of age from via Heart puncture of 10 birds for each group. It is collected for hematological analyses were including (Pcv, Hb, RBC and percentage of monocytes, eosinophils and basophils) and for biochemical analyses lipid profile tests which including Total Cholesterol, Triglycerides, high density lipoprotein cholesterol on an auto analyzer kit according to Grove (7) low density lipoprotein cholesterol and very-low density lipoprotein cholesterol depending on Fried Ewald formula (25) Histopathological examination Small intestines of chickens (10 bird for each groups) after slaughter and were fixed in 10% neutral buffered formalin and passing them with different concentration of ethyl alcohol, zylene, paraffin and stained with Hematoxylin and Eosin stain (15) The histomorphometric examination which include measure the height and width of villi, in addition to crypt depth via ordinary microscopy, and the measurement was done using a public domain image analysis software,

Statistical analysis system

It was adopted to experimental data analyzed using the least significant difference LSD (21).

RESULTS AND DISCUSSION

The results of hematological testes were revealed significant ($P \leq 0.05$) increase in count of WBC, RBCs, hemoglobin and PCV in groups 3 (25.9, 9.8 and 29.8), 4 (23.90, 1.9, 9.7 and 31.2) and 5 (26.2, 1.8, 9.5 and 29.2). compared with the control in Table (1), the

supplemented with phytogetic by drinking water in different concentration lead to significant increased in blood parameters including blood cells both red and white cells , Hb and Pcv of broilers and these more obvious in mix high concentration of EO and OA.,these result from that adding phytogetic diet, could inhibit the nutritional stress in broiler chickens or may be attributed to increased iron absorption (4), also dietary supplementation with phytogetic stimulates immune functions as previously recorded by

Soltan *et al.* (24) were reported in broiler chickens administrated with thirty or sixty cc of P.E.P /1000L also are in agreement with the results of Hammad (8) and Ruberto *et al.*(19) whom found that phytogetic ,and organic acids increased creation and multiplying of WBC in chickens. The results of this study are in agreement with another study using grains of anise which enhanced blood pictures and augmented the phagocytic action and lymphocyte amounts (8,24).

Table 1. Blood parameters of chicken broiler fed different concentrations of EO (P.E.P.) and organic acid

| Parameters | G1 | G2 | G3 | G4 | G5 | G6 |
|-----------------------------|-----------|------------|-----------|------------|-----------|-----------|
| WBC 10^6 /mm ³ | 23.0±1.9b | 23.90±1.3b | 25.9±1.5a | 23.90±0.4b | 26.2±3.3a | 21.9±1.8b |
| RBc 10^3 /mm ³ | 1.5±0.9b | 1.7±0.5 a | 19±0.1a | 1.9±0.2a | 1.8±0.1a | 1.4±0.2c |
| Hb (g/dl) | 8.4±0.6 b | 9.2±0.2a | 9.8±0.9a | 9.7±0.4a | 9.5±0.9a | 8.0±0.5b |
| PCV (%) | 26.8±15b | 27.7±18b | 29.8±1.9a | 31.2±2.1a | 29.2±4.1a | 22.4.±16c |
| Monocyte% | 7.2±0.4b | 7.3±0.6b | 8.4±0.3a | 8.2±0.1a | 8.5±5.1a | 6.9±0.4 b |
| Basophil % | 0.5±0.4a | 0.5±0.0 a | 0.6±0.8 a | 0.5±0.5a | 0.7±0.5a | 0.4±0.5a |
| Eosinophil % | 9.5±0.3a | 9.6±0.3a | 11.7±1.0a | 10.7±1.1a | 11.8±1.5a | 9.4±0.3b |

Means with the different letters in rows were differed significantly (P≤0.05)

The results of biochemical testes showed a significant reduction (P≤0.05)in TC of treatment group 3 (128.17), 4(128.72) and 5(138.93), compared with the control group at the end of the experiment also shows significant decrease (P≤0.05) in TG concentration of treatment groups 3(64.84) and 5(67.08) which compared with TG concentration of control group, also there's significant (P≤0.05) increased in HDL concentration in groups 3,4 and 5compare to the group 5(control),while there's significant (P≤0.05)decreased in concentration of LDL61.29±2.3, 41.82±2.16, 41.66 and 62.97) and VLD (12.96 and 13.42) in groups2,3,4 and 5 respectively , these result confirmed the significant role of phytogetic (P.E.P) and organic acids in lowering of the TC. Those results were the same of Krimpen *et al.* (12), although their results recorded lesser level of total cholesterol compared with the results of oil of Mexican oregano supplement, its caused significant increased both of total cholesterol and HDL while another study was showed that essential oils reduced total cholesterol, decreased vldl while increased Hdl (10).Different results were offered by Seifi *et al.*(22) who establish no influence of vital oils in the diet on total cholesterol and high density lipid when studying. The reduction in

the overall cholesterol levels by addition of phytogetic essential performances and aromatic acids may have attributed to the antioxidant possessions of the phenolic components holding which have the ability to increase the production of nitric oxide which has the capability to reason vasodilation, resulting in the clearance and stoppage of the removal of extra cholesterol in the blood vessels. These are in agreement with Lee *et al.* (14) who reported that EO oil supplementation resulted in a decline in the total cholesterol and triglyceride levels, but high density lipid was increased (5) , the result showed effect of phytogetic. and organic acids on the duodenum, there's significant (P≤0.05) increased in the height and thickness of villus and crypt depth in of G3,G4 and G5 compare to the control group (Tables2 and 3) ,also there's significant (P≤0.05) increased in the villus height , thickness of G3,G4 compare to the control group while there's significant (P≤0.05) increased in crypt depth of G3,G4 and G5 compare to the control group (Table 4) at last There's significant increased the villus height and thickness of G2,G3and G4 compare to G5(cont.),but there's significant (P≤0.05) increased in crypt depth of G3,G4 and G5 compare to the control group as (Table5). The histomorphological variations.in birds fed

organic acid based diets improved the villus height in the small intestine and this result agreement with Perić *et al.* (17) which institute addition phytogetic additives resulted in a significant improved villous characteristics

,this reflex that weightier birds are generally have extended villi, superior thickness and greater villus surface area as compared to brighter ones (2,11).

Table 2. Lipid profile of chicken broiler fed different concentrations of EO (P.E.P.) and organic acid (Mean ± SE)

| Lipid Profile | G1 | G2 | G3 | G4 | G5 | G6 |
|----------------------|-------------------|-------------------|------------------|-----------------|-----------------|------------------|
| Cholesterol mg/dl | 149.37±1.96 AB | 141.68±1.48 AB | 128.17±1.1 C | 128.72±0.9 C | 138.93±0.9 B | 160.60±2.54 A |
| Triglycerides mg /dl | 84.47±1.04 A | 75.70±1.30 A | 64.84±0.85 BC | 70.18±1.34 B | 67.08±0.86 B | 90.28±0.78 A |
| HDL mg/dl | 61.85±0.87 B | 65.16±0.48 A | 75.18±1.05 A | 73.03±0.77 A | 62.55±0.57 B | 63.71±0.55 B |
| LDL mg/dl | 70.83± 1.72 A | 61.29±2.3 B | 41.82±2.16 C | 41.66±2.54 C | 62.97±2.69 B | 76.73±2.77 A |
| VLDL mg/dl | 16.79±0.27 A | 15.53±.25 A | 12.96±0,17 C | 14.03±0.26 B | 13.42±0.10 C | 18.86±0.46 A |

Capital letters in rows were differed significantly (P≤0.05)

Table 3. Histomorphological of duodenum in chicken broiler fed different concentrations of EO (P.E.P.) and Organic Acid (Mean ± SE)

| Duodenum | Villi height µm | Villus thickness µm | crypt depth µm |
|----------|--------------------|------------------------|-------------------|
| G1 | 992.7±70b | 115.9±4b | 164.5±42 b |
| G2 | 1010.6±31a | 125.8±5b | 173.4±11 b |
| G3 | 1239.8±44a | 181.4±8a | 197.5±14 a |
| G4 | 1223.3±45a | 165.1±5a | 189.3±22 a |
| G5 | 1065.4 ± 13a | 142.8±3a | 194.4 ± 26 a |
| G6 | 866.3±18b | 105.8±6b | 145.5±86 b |

Small liter in column were differed significantly (P≤0.05)

Table 4. Histomorphological of Jejunum in chicken broiler fed different concentrations of EO (P.E.P.) and Organic Acid (Mean ± SE)

| Jejunum | Villi height µm | Villus thickness µm | crypt depth µm |
|---------|--------------------|------------------------|-------------------|
| G1 | 667.60 b | 92.5±4 b | 118.2±6 b |
| G2 | 672.20 b | 96.4±9 b | 123.6±9 b |
| G3 | 766.20 a | 103.2±5 a | 140.1±7 a |
| G4 | 758.00 a | 100.7±9 a | 136.3±6 a |
| G5 | 688.50 b | 91.9±4 b | 131.4±8 a |
| G6 | 606.20 b | 85.8±3 b | 101.9±6 b |

Small liter in column were differed significantly (P≤0.05)

Table 5. Histomorphological of ileum in chicken broiler fed different concentrations of EO (P.E.P.) and Organic Acid (Mean ± SE)

| ileum | Villi height µm | Villus thickness µm | crypt depth µm |
|-------|--------------------|------------------------|-------------------|
| G1 | 556±4 b | 112.5±4 b | 80.20±6 b |
| G2 | 650.9±7 a | 125.4±9 a | 90.60±9 b |
| G3 | 694.4±11 a | 133.2±5 a | 114.20±7 a |
| G4 | 616.12±9 a | 132.7±9 a | 116.40±6 a |
| G5 | 590.2±6 b | 118.9±4 b | 99.60±8 a |
| G6 | 552.3±8 b | 99.8±3 b | 81.90±6 b |

Small liter in column were differed significantly (P≤0.05)

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