|  |  |  |
| --- | --- | --- |
| A close up of a game  Description automatically generated | Volume 2022, X pages Article ID : EML-xxxxxxxxxxJournal of Express Medical Letters<http://www.htpub.org/Express-Medical-Letters/>ISSN: 2783-4123 | http://jms.procedia.org/upfile/EML_326/EML_poster_133683346687.jpeg |
|  |  |  |

Instructions and Formatting Rules for Full Paper Submission in ENL, Title, 1 or 2 Lines, Single Space, Cambria (Headings) 16pt

First Author a,Second Author b,[[1]](#footnote-1), ,…(Cambria (Headings) 11 pt)

a First Author’s Affiliation and Short Address (Cambria (Headings) 9 pt, Italic)

b Second Author’s Affiliation and Short Address

|  |  |  |
| --- | --- | --- |
| **Article**  |  | **Abstract**  |
| Received: Received in revised form:Accepted:  |  | Each paper should begin with an abstract no more than 200 words, written as a single paragraph. It should be a summary (not an introduction) and complete in itself, indicating the subjects, objectives, method of investigation, and distinct achievements. Abstract should be prepared by 10 point Cambria (Headings) font. |
| Keywords: Maximum 5 wordsCambria (Headings) 8 pt |  |

**Introduction**

With the increase in world population and food shortages, the need to increase the variety and production of poultry products is increasing day by day. In recent years, advances in genetics, food, breeding and marketing in the poultry industry have led to the use of modern methods and systems to achieve the highest production at the lowest cost in the industry. However, the use of modern methods in the field of breeding and adjusting diets has also caused stress and increased diseases in poultry. Therefore, today, to achieve the highest production with the lowest cost, several nutritional measures have been devised. One of these measures is the use of food additives in poultry rations (Nobakht and Mehman Nawaz, 2010). Growth stimulants and food additives are a set of chemical, biological or natural compounds that are added to feed and used to improve growth and feed efficiency and achieve the highest and most economical production (Platel, 2001). Today, increasing resistance and pathogens to antibiotics has accelerated the use of natural alternatives such as medicinal plants that have a high antimicrobial specificity (Nobakht and Mehman Nawaz, 2010). Feed additives are widely used in the breeding of farm animals to increase productivity and provide suitable ecological conditions for the digestive system in order to increase growth rate, reduce feed costs and reduce the risk of disease (Nobakht and Hospitable, 1389). In recent years, the use of plant-based additives in poultry farming has increased. In addition, Iran, with its diverse climatic conditions, is the place of growth diversity of various plants, including medicinal plants (Nobakht and Mehman Nawaz, 2010). The effects of herbs on digestion and intestinal microbial population are broader and different from the effects of antibiotics. Plants and essential oils have extensive antimicrobial activity against pathogenic microbes (Akhtar, 2003). This study was performed on fennel extract on the yield of native chickens. Fennel is one of the medicinal plants in which compounds such as anethole, tannin, limarza oil as well as phenchone, flandren, limonene, camphine, pinene, methyl chavicol, anisic acid, thymohydroquinone and vitamin A are present (mohite 1389 and Hoseini1391). In traditional medicine, fennel seeds are known as invigorating, stomach tonic, appetizing, antispasmodic, sedative and increase milk secretion (Yazerloo et al., 2011). Fennel essential oil is composed of more than thirty types of terpene or terpenoid compounds, the most important of which are anethole, phenchone, limonene and methyl cavicol (Hornok, 1992). Romila (2001) reported that fennel is an aromatic plant that contains a large percentage of linoleic acid and stearic acid. In addition, fennel contains 16.8% of trans anitol, 47.20% of estragole with sweetening compounds and 64.04% of essential oils. Some researchers have reported that consumption of fennel increases weight and improves the nutritional efficiency of broiler diets (Eldeek et al, 2003). Considering the importance of the breeding industry, especially white meat breeding, as well as the use of suitable alternatives to antibiotics used in poultry diets, in this study we evaluate the effect of fennel extract on the function of hepatic and renal blood factors.

Method

This study was performed in the hospital of Babol Veterinary School in poultry breeding hall for 21 days. Before the beginning of the breeding period and the incubation stage, disinfection and preparation of the hall were performed. To prepare, the hall was cleaned of the remnants of the previous period and the interior and the surrounding area were first washed with water and disinfected using the disinfectants available in the market (formalin, Vitex, etc.) and the floor was also sprayed with lime. All the tools and equipment used in the previous stage of breeding that could be moved were removed and after washing with water and disinfectant solution, they were transferred to the breeding hall. After closing all the pores of the hall, disinfection was done with formalin, then straw was used as a substrate, and to ensure the effect of formaldehyde gas, the room temperature was increased to 25 ° C before gasification. In the 24 hours before the arrival of the chickens, the room temperature reached about 18-20 degrees. To prevent flooding and to prevent unevenness under the drinking fountains, the straw was spread evenly in the hall, manual drinking fountains and bucket eating were placed at the required level. Indoor temperature regulation was controlled by thermometers placed in the hall. The room temperature was considered to be 18-20 ° C. Humidity was considered to be 50 to 60%. In addition to natural light, lamps were used in the hall for lighting. The lighting program of the hall was considered as 16 hours of lighting and 8 hours of blackout. In this study, 30 native chickens (5 months) were selected and the dose of fennel used in gavage was 75 mg / kg. live chicken weight and were orally 800 mg / kg, which were randomly divided into 3 treatments of 10 each. And is as follows:

The first treatment (control treatment) in which the animals were fed with normal water and food and did not receive any substance or medicine.

The second treatment (fennel extract recipient treatment) in which they received fennel extract as gavage.

 Third treatment (fennel extract recipient treatment which was mixed) This treatment was fed with the extract.

In the first week of rearing, due to the reduction of displacement stresses, all chickens received normal diets without fennel. Fennel extract was used orally and by gavage on days 1, 3, 5, 7, 9, 11 and 13. In all three blood sampling periods, in days 1, 8 and 15, 5 samples were randomly taken from each treatment through the wing vein at a rate of 5 cc. Fennel extract was also mixed with oil when mixing feed components. Poultry diets are mainly based on production indicators such as growth, egg production and feed efficiency, so ignoring the criteria for immune and physiological responses is ignored if nutrients are on the immune system and parameters. The physiological functions of the body are influential. The chemical components and compounds of the diet used in the breeding period, which are prepared according to the standard tables of nutritional needs of broilers (NRC, 1994) and in Table 1 and 2 shown. The diets were the same in terms of metabolizable energy, crude protein, electrolyte balance (Na+,K+,Cl-) and other nutrients.

Table 1: Diet constituent items

|  |  |
| --- | --- |
| From the first day to the 21st day | Components (percentage) |
| 7/41 | Corn |
| 1/23 | Soybean meal 44% crude protein |
| 5/1 | Oil |
| 6/8 | Calcium carbonate |
| 20 | Wheat |
| 35/0 | Salt |
| 7/0 | Vitamin supplement |
| 19/0 | Methionine |
| 45/1 | DCP |
| 46/2 | Barley |

Table 2: Chemical components of the diet

|  |  |
| --- | --- |
| From the first day to the 21st day | Percentage of chemical composition |
| 2730 | Energy |
| 16 | Crude protein |
| 6/3 | Calcium |
| 6/0 | Available phosphorus |
| 85/0 | Lysine |
| 72/0 | Methionine + cysteine |
| 44/0 | Methionine |
| 87/0 | Calcium |
| 18/0 | Sodium |
| 15/3 | Fiber |
| 3/8 | Calcium to phosphorus ratio |
| 292 | Electrical balance |

Fennel essential oil was purchased from Barij Essence Company. During three stages (day 0, before feeding the essential oil, day 8 and day 16), five birds were selected from each treatment (group) and blood was taken from them through the wing vein. Blood sampling from this site reduces the risk of hematoma. Blood samples were placed in tubes without anticoagulant at room temperature for 20 minutes to coagulate. After centrifugation (for 10 minutes at 3000 rpm), the serum was separated from the clot by a sampler and placed in a microtubule. 2.5 ml numbered bags were placed separately. Isolated serum samples were stored in a freezer at -20 ° C until the measurement of serum parameters was measured. Measurement of serum parameters including aspartate aminotransferase (ALP), alkaline phosphatase (ALP), alanine aminotransferase (ALT), uric acid, creatine kinase and HDL were performed by a biochemical autoanalyzer (Abbott alcyon300 - Made in USA) with the help of Biochemical kits of Pars Azmoun Company and the results were statistically analyzed. The obtained information is analyzed with SPSS software version 19. In the descriptive statistics section, the mean and standard deviation of data in three treatments of control, gavage and feed in three different sampling days were calculated. Then, one-way ANOVA test was used to evaluate the differences and the Duncan test was used to compare the scores of the three treatments.

Results

Creatine Kinase

The highest level of creatine kinase was observed on the first day in the second treatment, which received the extract by gavage, and the lowest level was observed in the control treatment, but no significant difference was observed between treatments (P <0.05).

Table 3: Changes in creatine kinase on the first day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 60/844 |
| Feed treatment | 5 | 60/786 |
| Control treatment | 5 | 60/261 |
| Sig. |  | 466/0 |

Figure 1: Changes in creatine kinase on the first day

On the second day, the highest amount of blood creatine kinase was observed in the second treatment, which received the extract by gavage, which was significantly different from other treatments. (P> 0.05)

Table 4: Changes in creatine kinase on the third day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 20/115 |
| Feed treatment | 5 | 80/147 |
| Control treatment | 5 | 40/141 |
| Sig. |  | 437/0 |

Figure 2: Changes in creatine kinase on the third day

Alkaline phosphatase (ALP)

The highest amount of alkaline phosphatase on day one was related to the control treatment, if no significant differences were observed between treatments one and two (P <0.05).

Table 4: Alkaline phosphatase changes on the first day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 40/59 |
| Feed treatment | 5 | 00/86 |
| Control treatment | 5 | 80/62 |
| Sig. |  | 093/0 |

Figure 3 Alkaline phosphatase changes on the first day

On the second day, the amount of alkaline phosphatase decreased in the control treatment. But in general, no significant difference was observed between treatments (P <0.05).

Table 5: Alkaline phosphatase changes on the second day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 80/65 |
| Feed treatment | 5 | 60/71 |
| Control treatment | 5 | 40/57 |
| Sig. |  | 311/0 |

Figure 4: Alkaline phosphatase changes on the second day

On the third day, there was no change in the amount of alkaline phosphatase in the two treatments one and two and no significant difference was observed between the treatments (P <0.05).

Table 6: Alkaline phosphatase changes on the third day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 80/100 |
| Feed treatment | 5 | 60/129 |
| Control treatment | 5 | 40/80 |
| Sig. |  | 194/0 |

Figure 5: Alkaline phosphatase changes on the third day

Aspartate Aminotransferase (AST)

On the first day, the amount of aspartate aminotransferase did not differ significantly between the three treatments (P <0.05).

Table 6: Changes in aspartate aminotransferase on the first day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 00/241 |
| Feed treatment | 5 | 80/272 |
| Control treatment | 5 | 00/241 |
| Sig. |  | 421/0 |

Figure 6: Changes in aspartate aminotransferase on the first day

On the second day, the amount of aspartate aminotransferase increased in treatments one and two and a significant difference was observed between treatments one and two with the control treatment (P> 0.05).

Table 4-8- The rate of changes in aspartate aminotransferase on the second day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 20/197 |
| Feed treatment | 5 | 00/200 |
| Control treatment | 5 | 60/137 |
| Sig. |  | 909/0 |

Figure 4-8 - Changes in aspartate aminotransferase on the second day

The highest amount of aspartate aminotransferase on the third day was related to the treatment of receiving fennel extract orally, if no significant difference was observed between treatments (P <0.05).

Table 4-9 Changes in aspartate aminotransferase on the third day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 80/178 |
| Feed treatment | 5 | 00/240 |
| Control treatment | 5 | 20/163 |
| Sig. |  | 056/0 |

Figure 4-9 - Changes in aspartate aminotransferase on the third day

Alanine aminotransferase (ALT)

The highest amount of alanine aminotransferase on the first day was related to the treatment of receiving fennel extract orally, if no significant difference was observed between treatments (P <0.05).

Table 4-13 The rate of alanine aminotransferase changes on the first day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 20/5 |
| Feed treatment | 5 | 80/6 |
| Control treatment | 5 | 80/5 |
| Sig. |  | 289/0 |

Figure 4-13 The rate of alanine aminotransferase changes on the first day

On the second day, in the treatment of fennel extract orally, alanine aminotransferase showed a significant difference compared to other treatments (P> 0.05).

Table 4-14 The rate of alanine aminotransferase changes on the second day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 20/6 |
| Feed treatment | 5 | 00/7 |
| Control treatment | 5 | 60/5 |
| Sig. |  | 439/0 |

Figure 4-14 The rate of alanine aminotransferase changes on the second day

On the third day, the amount of alanine aminotransferase was not different in any of the treatments and no significant difference was observed between the treatments (P <0.05).

Table 4-15 - The rate of alanine aminotransferase changes on the third day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 80/5 |
| Feed treatment | 5 | 60/6 |
| Control treatment | 5 | 80/4 |
| Sig. |  | 299/0 |

Figure 4-15 The amount of alanine aminotransferase changes in the third day

**HDL**

The highest level of HDL on the first day was related to treatment two, if no significant difference was observed between treatments (P <0.05).

Table 4-13 The rate of HDL changes on the first day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 60/48 |
| Feed treatment | 5 | 60/33 |
| Control treatment | 5 | 80/44 |
| Sig. |  | 264/0 |

Figure 4-13 The rate of HDL changes on the first day

Although HDL level increased on the second day compared to the first day in treatment one, no significant difference was observed between treatments (P <0.05).

Table 4-14- The rate of HDL changes on the second day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 20/31 |
| Feed treatment | 5 | 60/41 |
| Control treatment | 5 | 20/31 |
| Sig. |  | 292/0 |

Figure 4-14- The rate of HDL changes on the second day

On the third day, the amount of HDL decreased compared to the second day in each treatment, but the highest amount of HDL on the second day was related to the treatment of fennel recipient orally, if no significant difference was observed between treatments (P <0.05).

Table 4-15 The extent of HDL changes on the third day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 90/35 |
| Feed treatment | 5 | 60/37 |
| Control treatment | 5 | 40/36 |
| Sig. |  | 292/0 |

Figure 4-15 - The rate of HDL changes on the third day

Uric acid

The highest amount of uric acid in the first day was related to the control treatment and a significant difference was observed compared to other treatments (P> 0.05).

Table 4-16 The rate of uric acid changes on the first day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 50/7 |
| Feed treatment | 5 | 08/8 |
| Control treatment | 5 | 44/10 |
| Sig. |  | 298/0 |

Figure 4-16 The rate of uric acid changes in the first day

On the second day, uric acid decreased in all three treatments, but the highest amount of uric acid was related to the control treatment, although no significant difference was observed between treatments (P <0.05).

Table 4-17 The rate of uric acid changes on the second day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 22/7 |
| Feed treatment | 5 | 00/6 |
| Control treatment | 5 | 88/7 |
| Sig. |  | 076/0 |

Figure 4-17 The rate of uric acid changes on the second day

On the third day, the uric acid level continued to decrease. However, the highest amount of uric acid on the third day was related to the treatment of fennel extract in the form of gavage, but no significant difference was observed between treatments (P <0.05).

Table 4-18 The rate of uric acid changes on the third day

|  |
| --- |
| Duncan test results |
| Treatment name | number of samples | The average value of each treatment |
| Gavage treatment | 5 | 32/6 |
| Feed treatment | 5 | 28/5 |
| Control treatment | 5 | 52/5 |
| Sig. |  | 243/0 |

Figure 4-18- The rate of uric acid changes on the third day

Discussion

The use of medicinal plants with specific therapeutic effects and fewer side effects is a good alternative to chemical drugs and the tendency to use them is expanding in the world. The use of herbs with antimicrobial and gastrointestinal effects in feeding broilers can raise concerns about increased production costs as well as the potential for bacterial resistance and consequent endangerment of public health when using stimulants. Reduce antibiotic growth. Livestock nutrition plays an essential role in maintaining health, reproduction and reproduction in livestock and poultry farms. Among nutritional factors, antioxidants play an important role in improving the growth, reproduction and immune system of poultry (Suteu et al, 2007). This fact may be due to the role of antioxidants in reducing the harmful effects of free radicals and toxic metabolites in animals. The antioxidant system includes the enzymes superoxide dismutase, catalase, and glutathione peroxidase, which neutralize superoxide, hydrogen peroxide, and organic peroxide radicals within cells, as well as non-enzymatic agents including vitamins E, carotene, and carotene. C, polyphenols, uric acid, bilirubin, etc. as antioxidants are involved in neutralizing many free radicals and reactive oxygen species. In addition, a number of nutrients such as vitamins, trace elements, amino acids and their derivatives, and plant phenols have antioxidant effects (Tampieri et al, 2005). Fats and oils play a valuable role in poultry nutrition. In addition to producing energy, they also play a role in the production of cell membranes and precursors of compounds such as prostaglandins, eicosanoids and some body hormones (Woods et al, 2009). Various studies on the effects of various fats on poultry have shown that these nutrients cause changes in function, weight of various organs, triglycerides and lipoproteins, amount and composition of meat fatty acids and ventricular fat. In broilers (Ortiz et al, 2006). On the other hand, in recent years, much attention has been paid to research related to reducing the amount of fat, cholesterol and changing the composition of fatty acids in the meat of various livestock, especially chicken. In a study conducted on broiler chickens fed with fennel powder, the results of this study had an effect on feed intake and had a significant increase in feed intake during the growing period (Kalantar and Dakhili, 2010). Fennel extract, due to its anethole, reduces or stops gastrointestinal spasms and intensifies the secretion of gastrointestinal leachate, thereby increasing the efficiency of digestive activities, thus increasing food intake, and increasing food intake increases nutrient intake. As a result, production is improved (Nasimi et al., 2010). Mirzavand et al. 2012 investigated the effects of mint, parsley, dill, coriander, garlic and basil on broilers and reporting serum cholesterol of plant extract groups showed a significant difference compared to control groups, but triglycerides, HDL and LDL did not differ significantly. They did not have. The results of this study were consistent with the results of our study and it was shown that no significant difference in HDL levels was observed in the tested treatments, although fennel could affect the amount of HDL. Mostafazadeh et al. 2011 showed that the use of safflower in the diet of broiler chickens had no effect on the concentration of albumin, total protein and uric acid in the blood. This study was consistent with our studies and showed that there was no significant difference between the tested treatments and the control treatment. However, fennel extract could have some effect on blood uric acid levels on different days. The production of free radicals weakens the immune system of poultry so that the cell wall of many cells in the body, such as lymphocytes and macrophages, become very sensitive to oxidative damage. Immune cells have products such as vitamins A, E, ascorbic acid, superoxide dismutase, glutathione reductase, glutathione peroxidase and catalase to prevent free radical damage, which leads to an imbalance between these products and free radical scavenging systems. It leads to oxidative stress, which is associated with cell damage. Free radical damage is an important mechanism of cellular damage (Kumar et al, 2006). Fennel increases blood estrogen and high levels of estrogen in plasma increase bone growth, stimulate protein and yolk fat in the liver, and increase liver size (El-Ghalid et al, 2009). Aspartate aminotransferase is one of the most important enzymes in the group of aminotransferases that catalyze alpha-acid to amino acids by transferring amine units. Assaying aspartate aminotransferase activity is a basic method for diagnosing and evaluating liver cell disorders or muscle damage. In general, the increase in aspartate aminotransferase has a high correlation with the amount and severity of cell damage (Stone and Harrison 2001). Jimo et al. (2012) reported that the use of different levels of garlic (zero, 0.5, 1, 1.5, 2 and 2.5 g / kg diet) reduced the serum levels of AST and ALT in broilers. The researchers attributed the hepatoprotective effect of garlic to its high antioxidant potential to prevent liver damage. The results of this study were not consistent with our study and it was shown that fennel extract could increase the amount of these enzymes compared to the control treatment. Fennel extract was able to increase the AST level on different days, although this increase was small and there was no significant difference between the treatments. Also, fennel extract caused a slight increase in ALT, which was a significant difference between the treatments. Not tested. One of the reasons for this increase can be considered the stresses caused during feeding to the animal, although we need to examine other liver indicators to further investigate liver damage in poultry. During a study using sage and thyme with levels (zero and 200 mg / kg diet), no significant change was observed in the activity of liver enzymes in broilers (Fani Maki et al., 2013). The results of this study were consistent with our study and showed that fennel could not significantly affect the activity of liver enzymes and no significant difference was observed.

Conclusion

The results of this study showed that the use of herbal supplements (fennel) as gavage and with food in the factors of creatine, aspartate aminotransferase, alkaline phosphatase, alanine aminotransferase, HDL and uric acid in some days is significantly different but in No significant differences were observed on other days. Although fennel extract was able to change the amount of these factors, but this change was not significant.

Although not many studies have been performed on native chickens, the differences in the results of the present study with studies on broilers in addition to different breeds can be due to the different plant forms used in the studies, the amount of plant consumed and the duration of use. Extract or age of the animal.

**References**

* Abd El-Latif, S.A., Saleh, S. N., Allam, T.S., and. Ghazy, E.W., 2013. The effects of rosemary (Rosemarinus afficinalis) and garlic (Allium) essential oils on performance, hematological, biochemical and immunological parameters of broiler chickens. British Journal of Poultry Sciences, 2 (2): 1624.
* Alcicek,A. M. Bozkurt. M, Cabok. M (2003) derived from selected herbs growing wild in turkey on broiler performance. *South African* *Journal of Animal Science*, 6 pp: 89-94.
* Allen, P. C. (2003). Dietary suppiementation with Enchinacea and deviopment of immunity to callege infection with coccidia. Parasital Resarch. (90):75-78.
* Botsoglu, N. A. P. Florou- Paneri, E. Christaki, D.J. Fletouris and A.B. Spais. (2002). Effect of dietary oregano essential oil on performance of chickens and on iron – inducedlipid oxidation of breast, thigh and abdominal fat tissues. BR. Poult. Sci., 43: 223-230.
* Cross, D. E., Svoboda, K. H. K., Mcdevitt, R. and Acamovic, T. (2002): Effects of Thymus vulgaris L. Essential oils as an in vivo dietary supplement on chickenintestinal microflora. Prooceedings of 33rd International Symposium on.
* D. Jamroz, A. Wiliczkiewicz, T. Werteleck, J. Orda j. Sukorupinska. (2005). Use of active substances of plant origin in chicken diets based on maize and locally growen cereals. British Puoltry Science, 46 pp: 485-493.
* EL-Deek, A. A., Y. A. Attia, and M. M. Hannfy. 2003. Effect of anise (Pimpinella anisiumj), ginger (Zingiber officinale roscoe) and Fennel (Foeniculum vulgare) and their mixture of performance of Broilers. Arch. Geflugelk., 67: 92-96.
* Garcia، V.، P. C. Gregori، H. F.، M. D. Megıas and J. Madrid (٢٠٠٧). "Effect of Formic Acid and Plant Extracts on Growth، Nutrient Digestibility، Intestine Mucosa Morphology، and Meat Yield of Broilers." J. Appl. Poult Res١٦: ٥٥٥-٥٦٢
* Ghazalah, A.A. and A.M. Ali, (2008). Rosemary leaves as a dietary supplement for growth in broiler chickens. International Journal of Poultry Science. 7: 234-239.
* Giannenas I, Florou Paneri P, Papazahariadou M, Christaki E, Botsoglou NA, Spais AB (2003) Effect of dietary supplementationwith oregano essential oil on performance of broilers after experimental infection with *Eimeria tenella*. Arch. Tierernahr. 57:99-106.
* Griggs JP, Jacob JP (2005). Alternatives to antibiotics for organic poultry production. J. appl. Poult. Res., 14: 750-756.
* Gulcin I, Kufrevioglu OI, Oktay M and Buyukokuro ME, (2004). Antioxidant, antimicrobial, antiulcer and analgesic activities of nettle (*Urtica dioica* L.). Journal of Ethnopharmacology 90: 205–215.
* Gunal, M., Yayli, G., Kaya, O., Karahan, N., and Sulak, O. (2006). the effect of antibiotic growth promoter, probiotic or organic acid supplementation on performance, intestinal microflora and tissue of broiler. *International Journal of Poultry Science*. 5(2):149-155.
* Halliwell, B., and Gutteridge, J.M.C. 2007. Free radicals in biology and medicine. 4. Oxford: Clarendon. 823.
* Hinton, P. M., Hampson, D. J., Linton, A. H. (1985). The effects of oxytetracycline on the intestinal Escherichia coli ora of newly weaned pigs, Journal of Hygiene (London). 95: pp: 77 – 85.
* Jafari, B., Kamerani, M. and Rezazadehreyhani, Z. 2011. Influence of different level of Spearmint (Mentha spicata) extracts on different parameters of Laying Hens. Annals of Biological Research, 2:517-.125
* Jang, I.S., Y.H. Ko, S.Y. Kang and C.Y. Lee. (2007). Effect of commercial essential oil on growth performance, digestive enzyme activity and intestinal microflora population in broiler chickens. Anim. Feed. Sci and Tech., 134: 304-315.
* Kleijnen, J., Knipschild, P. And ter Riet, G.T. (1989) Garlic, onions and cardiovascular risk factors. A review of the evidence from human experiments with emphasis on commercially available preparations. Br J Clin Pharmacol. 28:535-44.
* Knarreborg, A. M., Simon, A., Engberg Jensen B. B., and Tannoek, G. W. (2002). Effects of dietary fat source and subtherapeatic levels of antibiotics on the bacterial community in the ileum of broiler ciickens at varios agas. Applied and enviromentel microbiology abbreviation. (68):5918-5924
* Krosmayer. A. (2007). Experimental studies of the gastrointestinal effects of essential oils in comparison to avilamycin in weaned piglels. *PhD dissertation.Universitat for Bodenkultur* Wien.
* Krosmayer. A. (2007). Experimental studies of the gastrointestinal effects of essential oils in comparison to avilamycin in weaned piglels. *PhD dissertation.Universitat for* *Bodenkultur* Wien.
* Kumar, V., R.S. Cortan and S.L. Robbins. (2006)Evaluation of Chenopodium ambrosioides as a potential source of antifungal, antiaflatoxigenic and antioxidant activity. (2006), International J. of Food Microbiology, 115: 159 - 64.
* Lee, K., Everts, W., and Beyen, A.C. 2006. Dietary carvacrol lowers body gain but improves feed conversion in female broiler chickens. Journal. Applied Poultry Research, 12: 394-399.
* Lieber, C. S. 1997. Role of oxidative stress and antioxidant therapy in alcoholic and nonalcoholic liver diseases. Advance Pharmacology, 38, 601628.
* M. Cabuk, M. Bozkurt, A. Alcicek, Y. Akbas, and Y. Kucukyilmaz. (2006). Effect of herbal essential oil miture on growth and intestinal organ weight of broiler from young and old breeder flocks. South African Journal of animal Science, 36pp: 34-41.
* Ma, YJ., Xu, JG., Lin, JY., (2008), <<Effects of anetholtrithione on hepatic lipid peroxidation induced by aluminum in rats>>, Industrial Health and Occupational Diseases ;34(6):325-8.
* Mandrekar, P and Szabo, G. 2009. Signalling pathways in alcoholinduced liver inflammation. Journal of Hepatology, 50(6), 1258-.6621.
* Mcartney E, (2002). The natural empire strikes back. Poultry International Journal 41: 36-51-.F. Hernandez, J. Madrid, V. Gracia, J. Orego, and M. D. Megias. (2004). Influence of two plant extracts on broilers performance, digestibility, and digestive organ size. Poultry Science, 83 pp: 169-174.
* Moawad, K. M. 2007. Possible prophylactic effects of vitamin E or lycopene treatment on renal toxicity induced by CCl4 administration in albino rats. World Zool. 19-28.
* Modiry, A., A. Nobakht and Y. Mehmannavaz. (2010). Investigation the effects using different mixtures of Nettle (*Urtica dioic*), a Menta pulagum (*Oreganum vulgare*) and Zizaphora (Thymyus vulgaris) on performance and carcass traits of broilers.
* Naz. R. K. (1999). Endocrine Disruptors: Effects on male and female reproductive systems. CRC Press Inc. pp 90.
* Patterson, J. A., and Burkholder, K. M. (2003). Application of prebiotics and probiotics in Poultry production. Poultry science. (82):627-631.
* Ramakrishna Rao, R. R., K. Platel, and K. Srinivasan. 2003. In vitro influence of spices and spice-active principles on digestive enzymes of rat pancreas and small intestine. Nahrung, 47:408–412.
* S. Burt. (2004). Essential oils: their antibacterial properties and potential applications in food. (a reviw). International journal of Food Microbiology. 4 pp: 223- 253.
* Saleh, N., Allam, T., EL-Latif, A.A., and Ghazy, E., 2014. The effects of dietary supplementation of different levels of thyme (Thymus vulgaris) and ginger (Zingiber officinale) essential oils on performance, hematological, biochemical and immunological parameters of broiler chickens. Global Veterinaria, 12 (6): 736-744
* Saleh, N.,Allam,T.,EL-Latif,A.A., and Ghazy, E., 2014. The effects of dietary supplementation of different levels of thyme (Thymus vulgaris) and ginger (Zingiber officinale) essential oils on performance, hematological, biochemical and immunological parameters of broiler chickens. Global Veterinaria, 12 (6): 736-744.
* Siddiqui, M. N.,and Sayed, M,. 2015. Effect of dietary black cumin (Nigella sativa L.) extract supplemented diet on growth performance, serum metabolites and carcass traits of commercial broiler. J. Anim. Sci. Adv.58:1380-1385
* Soltan, M.A., R.S. Shewita, and M.I. El-Katcha.2008. Effect of dietary anise seeds supplementation on growth performance , immune response, carcass traits and some blood parameters of broiler chickens. Int.J. *Poult. Sci*. 11:1078-1088.
* Stone, R.M. and Harrison, T.R. (2001). Harrison’s principles of internal medicine (15th edition). New York: Mc Graw -Hill International Editions.
* Sturkie, P. D. 1995. Avian physiologhy. 4th ed. Springer Verlag. New York. Pages: 689.
* Sultan, M., H.N. Bhatti., and Z. Iqbal. (2005). Chemical analysis of essential oil of Ginger (Zingiber officinale). Pakistan Journal of Biological Science. 8(11):1576-1578.
* Suteu, R., Altuntas, I., Buyukvanli, B., Akturk,O., Koylu, H., Delibas, N. (2007). The effects of diazozin on lipid peroxidation and antioxidant enzymes in rats erythrocytes: role of vitaminsE and C. Toxicol Ind Health, 23, 13-17.
* Tampieri, M.P., Galuppi, R., Macchioni, F., Carelle, M.S., Falcioni, L., Cioni, P.L., Morelli, I. (2005). The inhibition of *Candida albicans*by selected essential oils and their major components. Mycopathology, 159, 339- 345.
* Thrall MA, Weiser G, Allison RW and Campbell TW (2012) Veterinary hematology and clinical chemistry. 2nd Edition, John Wiley and Sons, Ames, IA, USA
* V. H. Konjufca, G. M. Pesti, and R. T. Bakalli. (1997). Modulation of cholesterol levels in broiler meat by dietary garlic and copper. Poulltry Science, 76 pp: 126-71.
* Vozarova, B., Stefan, N., Lindsay, RS., Saremi, A., Pratley, R E., Bogardus, C., Tataranni P, A., (2002), <<High alanine aminotransferase is associated with decreased hepatic insulin sensitivity and predicts the development of type 2 diabetes>>; Diabetes: 51: 1889-1895.
* Wei, A., and Shibamoto, T. 2007. Antioxidant activities and volatile constituents of various essential oils. J. Agricchulture. Food Chemistery. 55: 1737-.2471
* Windisch W, Schedle K, Plitzner C, Kroismayr A.(2008) Use of phytogenic products as feed additives for swine and poultry. JAnim Sci. 2008 Apr;86(14 Suppl):E140-8.
* Windisch W, Schedle K, Plitzner C, Kroismayr A.(2008) Use of phytogenic products as feed additives for swine and poultry. JAnim Sci. 2008 Apr;86(14 Suppl):E140-8.
* Woods, V.B., Fearon, A.M. (2009). Dietary sources of unsaturated fatty acids for animals and their transfer into meat, milk and eggs: A review. Livest Sci, 126, 1-20.
* Zhang, K.Y., F. Yan, C.A. Keen and P.W. Waldroup. 2005. Evaluation of microencapsulated essential oils and organic acids in diet for broiler chickens. International Journal Poultry Science, 4(9): 612-619.
1. Corresponding author at:Biotechnology R & D Insititute, Can Tho University, Can Tho, Vietnam

Email address: ttngon@ctu.edu.vn

Fax: +84 988076677 [↑](#footnote-ref-1)