Plant Archives Vol. 19 No. 1, 2019 pp. 1491-1498 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

EFFECT OF ADDING DIFFERENT LEVELS OF OPTIFEED®, VêO® PREMIUM AND OLEOBIOTEC® TO THE DIETS AS APPETITE STIMULANTS IN THE PRODUCTION AND PHYSIOLOGICAL PERFORMANCE OF MALE BROILER UNDER HEAT STRESS CONDITIONS

A. F. Ali[1], Th. T. Mohammed[2]* and L. K. Al-Bandar[3]

[1]Ministry of Agriculture, Iraq.
[2]Department of Animal Production, College of Agri., University of Anbar, Iraq.
[3]Department of Animal Production, College of Agri., University of Baghdad, Iraq.

Abstract

The present study was conducted to investigate the effect of adding various levels of Optifeed®, VêO® premium and Oleobiotec® to the diets as appetitestimulant on the production and physiological performance of broiler males under heat stress conditions. The experiment was done for 42 days for the period from 30 of August 2018 to 11 of October 2018at the Poultry Research Station of the Livestock Research Department / Agricultural Research Department / Ministry of Agriculture (Baghdad - Abu Ghraib). In this study, 270 -one day broiler male (Ross 308) were reared with mean body weight of 37 g/chick, distributed randomly on 18 pens with dimensions of 2 x 3 m(length x width). The experimental treatments involved six treatments with three replicates for each treatment (per replicate 15 chicks). The treatments were included T1: basal diet as a control with no additions, T2: basal diet + 500 g/ton of Optifeed®, T3:basal diet + 250 g/ton of VêO® premium , T4: basal diet + 250 g/ton of Oleobiotec®, T5: basal diet + 250 g of Optifeed® + 125 g of VêO®premium + 125 g of oleobiotec® /ton of feed, T6: basal diet + 500 gOptifeed® + 250 g VêO® premium + 250 g Oleobiotec® g/ton of feed. The obtained results showed that the supplemented treatments significantly ($p \leq 0.05$) increased the performance characteristics during the period from 22 to 42 dayswhich consist of weight gain, relative growth rate, feed consumption and feed conversion ratio compared with the control treatment that achieved the lowest rate of production performance. Additionally, there were no significant differences between the experimental parameters and the control treatment in the blood cells and biochemistry parameters of the blood plasma ofbroiler male meat during the measured periods.

Key words : Optifeed®, VêO® premium, Oleobiotec®, broiler, heat stress.

Introduction

The deterioration of productive and physiological traits was caused by hot environment in broiler breeding. Stress also causes impaired immunity. Koolhaas *et al*. (2011) suggested that the use of cooling systems in poultry farms to reduce high temperatures during the summer lead to increase the cost of production as well as the use of antibiotics, medicines, painkillers, sedatives and antifreeze were found to have a negative impact on consumer health as it accumulates in poultry products in addition to it is high prices (Qarawi-Al, 2002), so many researchers turned to use medicinal herbs, aromatic plants, essential oils and spicesto reduce the heat stress (Diaa and Ghassan, 2008). Recently, three products or feed additives were produced, the first one was Optifeed® consisting of a mixture of plant extracts (thyme, licorice, Arabic gum, turmeric, Cinnamon, peppers) and soaps as well as vitamin E and natural flavoring agents. The second one is VêO® premium, which consists of orange, lemon, salicylic acid, vitamin E and natural flavoring products. The third product Oleobiotec® consist of essential oils (marjoram oil, thyme oil, cinnamon oil) and three spices (ginger, turmeric and pepper) in addition to BHT as antioxidant. The purpose of the manufacture of such products was to stimulate the appetite to increase the feed consumption, promote

***Author for correspondence :** E-mail : ag.thafer.thabit@uoanbar.edu.iq

the growth, stimulate the process of digestion, enhance immunity and as natural antioxidants based on their ability to stimulate the center of appetite in the brain via smell and taste and discouraging the center of stress because it has good smell and special taste (Fode, 2013). This study aimed to evaluate the effect of adding different levels of Optifeed®, VêO® premium and Oleobiotec® to the diets as appetite stimulant on the production and physiological performance of broiler males under heat stress conditions.

Materials and Methods

The study was carried out at the Poultry Research Station of the Livestock Research Department, Agricultural Research Department, Ministry of Agriculture (Baghdad, Abu Ghraib). The trial period was 42 days for the period from 30 of August 2018 to 11 of October 2018, 270 -one day broiler male (Ross 308) were reared with mean body weight of 37 g/chick. The experimental experiments included 6 treatments each treatment 3 replicates, 15 bird per replicate distributed randomly to the replicates. The broiler was raised in a semi-enclosed hall where the hall was divided into 18 Pen dimensions (2 × 3 m length × width). The heating system was based on the natural heat provided for the length of the trial period, which was at a rate of (35±2^{0}C) during the experiment period without using incubators or desert cooling. The temperature and humidity were recorded every 4 hours (10 am, 2 pm, 6pm, and 10 pm) of each day. The temperature and humidity recorded by the 4 mercury thermometers and 2 electronic thermometers. The continuous lighting system was used for the first seven days of life and on the eighth day of life was reduced to 20 hours /day with a break of two hours every 12 hours and up to 3 days before the end of the experiment. The continuous light system was returned (24 hours light) during the experiment, the chicks were fed on protein and energy-balanced diets. Experiment treatments were as follows: First treatment (T1) basal diet with no additives, basal diet + 500 g/ton of Optifeed®, basal diet + 250 g/ton of VêO® premium, basal diet 250 g/ton of Oleobiotec®, basal diet + 250 g/ton of Optifeed® + 125 g of VêO®premium + 125 g of Oleobiotec® /ton of feedandbasal diet + Add 500 g Optifeed® + 250 g VêO® premium + 250 g Oleobiotec®/ton for treatments T1, T2,T3, T4, T5 and T6, respectively.

All the feed additives used and added to the diet as appetizers are produced by Phodé, a French company specializing in animal nutrition, which was obtained after the company's correspondence, which included Optifeed®, VêO® premium and Oleobiotec®. The productivity characteristics of broiler males were measured by the rate of live body weight and the rate of increasing weight according to Naji and Al-Fayyad (1989) and the relative growth rate, according to Gondwe and Wollny (2005) and feed consumption, feed conversion coefficient according to Al–Zubaidi (1986). Physiological traits were measured by collecting blood samples in the first two periods at the age of 21 days and the second at the end of the experimental period at the age of 42 days by random selectingfor two birds of each replicate (6 birds per treatment)and the blood samples were placed in a tube with a number of the replicate and the treatment and containK-EDTA (Potassium- EthykeneDiamin tetra acid). Blood mass test was according to Arcyr (1965), hemoglobin test was according to Varley *et al*. (1980) as well as the proportion of heterozygous cells (H/L) according to the method of Shen and Patterson (1983) and were calculated and read according to Burton and Guion (1968). The blood samples were placed in the centrifuge at a speed of 3000 cycles/minute for 15 minutes to separate the blood plasma for the purpose of laboratory tests, which included measuring the concentration of blood plasma glucose according to Asatoor and King, (1954) as well as the total protein of blood plasma according to Varley *et al*. (1980) and blood plasma albumin according to Henry *et al*. (1974), blood plasma globulin was according to the equation AI-Omri (2001) while the evaluation of the effectiveness of liver enzymes (AST and ALT) in the manner indicated by Reitman and Frankel (1957) and the estimation of triliccalcirides according to the method demonstrated by Toro and Ackermann (1975). All measurements were made using the analysis kit manufactured Spin react - Spain, as well as a number of ready-made analysis (Kit) manufactured by Biolabo company-France. Statistical Analysis System (SAS) (2012) was used to analyze the data of the study to determine the effect of different coefficients on the characteristics of the randomized design (CRD). The differences between the averages were compared with the Duncan (1955) multidimensional test.

Results and Discussion

Production performance

Table 2 indicated that there are no significant differences ($P \leq 0.05$) in the performance characteristics of the weight increase, the relative growth rate, the feed consumption rate and the feed conversion coefficient between all the addition treatments and the control treatment during the period (21-1), while significant differences between the coefficients and the treatment of control in all productive performance characteristic

Table 1 : Composition and calculated nutrient content of the experimental diets (%).

Diets Types			Ingredients
Finisher (23-42 day)	**Grower (11-22 day)**	**Starter (1-10day)**	
54.84	50.85	47.5	Yellow corn
10	10	10	Wheat
24	28	32	soybean meal*
5	5	5	Proteins concentration **
4.3	4.15	3	Hydrogenated plant fat
0.4	0.5	0.7	Calcium diphosphate
0.1	0.1	0.1	Salt NaCl
1.1	1.14	1.2	Limestone
0.13	0.13	0.25	Methionine
0.13	0.13	0.25	Lysine
100	**100**	**100**	**Total**
Calculated nutrient content NRC (1994).			
3277	3177	3059	Metabolism Energy (kcal / kg)
19.3	20.9	22.5	Crude protein (%)
3.2	3.4	3.5	Crude Fibers (%)
1.09	1.19	1.38	Lysine%
0.88	0.92	1.08	Methionine + cysteine %
0.9	0.95	1.02	Calcium %
0.38	0.41	0.45	Available phosphorus%

***** Soybean meal used from Argentine origin Crude protein content 48% and 2440 kcal / kg represented energy**.**
****** Proteins used in the production of Dutch Holland (imported) Wafi containing 40% crude protein, 2107 kcal / kg represented energy, 5% raw fat, 2.20% raw fiber, 4.20% calcium, 2.65% phosphorus , 3.85 Lysine, 3.70% methionine, 4.12% methionine + cysteine. It contains a mixture of rare vitamins and minerals that satisfy the bird's needs from these elements.

were recorded and for the period (42-22 day) where the highest ($P<0.05$) increasing weight average was recorded in T5 with mean value of 2000 g, while T4, T2, T6, T3 recorded average of increasing weightreached 1868, 1719, 1659 and 1614, respectively. Additionally, T1 recorded the lowest increase rate of 1487 g compared to all other treatments. The highest relative growth rate was achieved in T4, T5 and T2 with mean values of 110.1, 109.5 and 106.4 respectively, while T3 and T6 had a relative growth rate of 103.8 and 103.3 respectively. Moreover, T1 recorded the lowest relative growth rate (97.5) compared with all other treatments while the highest consumption rate was in T4 during the period from 42-22 days which was 2609 g while T5, T1, T6 and T2 recorded a mean values of 2578, 2498, 2475 and 2444 g respectively meanwhileT3 recorded the lowest feed consumption rate of 2343 g. The highest improvement of feed conversion ratio wasachieved in T5 (1.289) compared to T4, T2, T3, T6 (1.297, 1.421, 1.450 and 1.491 g/fed, respectively). A significant degradation in feed conversion coefficient was noted in T1(1.683 g/g) compared to all the added treatments during the period from 42 to 22 days.

The results indicated in table 2 showed that there was a significant superiority in all performance characteristics for the supplemented treatments during the period (42-22) days compared to the T1, which showed significantly lower production performance than the added transactions that indicates a cumulative effect of the various active substances involved in the composition of all additives used in the experiment, including medicinal herbs, aromatic plants, essential oils, spices, flavoring materials and natural and industrial antioxidants, all acting as appetite stimulants through their effect on the appetite center in the brain via the olfactory axis and pharyngeal to stimulate birds to eat feed, which is located on the same axis of the brain's stress center, where it cannot be stimulated at the same time as theappetite center (Fode, 2013) resulting in an increase in the amount of feed consumed, which reflects the increase in weekly weight gain and final body weight, feed conversion coefficient improvement for all added the treatments, especially T5 despite the exposure of birds to heat stress during the experiment. Previous studies have indicated that medicinal

herbs, aromatic plants, essential oils, plant extracts and spices increase gastrointestinal secretions such as saliva and yellow (Manazanilla *et al*., 2004). Mucous, pancreatic and liver secretions (Platel and Srinivasan, 2004), due totheir content ofthe effective compounds such as calcium, soap, phenol, thymol (Alexander *et al*., 2008), and carafacrool and flavonoids (Evans, 2002). Hernandez *et al.* (2004) demonstrated that these compounds have a biological activity affecting the animal and metabolic representation, which leads to the increase of most digestive secretions digestive system enzymes (such asAmeliz and Tarbesin) and this leads to the maximum benefit of the nutrients available in the bird feed by increasing the permeability of the mucosa of the intestine and thus increase the absorption of nutrients, and this leads to enhance blood flow to all parts of the body and organs, which works to relieve heat stress and improve the health status of the birds.

Physiologicalperformance

Cell blood

Table 3 shows the effect of the addition of appetite stimulants in broiler male diets under heat stress conditions on full blood characteristics for the period of (21) days. The table shows no significant differences between the addition treatments and the control treatment in blood mass measurement, blood hemoglobin G/100 ml and in the proportion of lymphocytes to heterozygous cells L/ H%. This continued to the end of the experiment, where at age (42) days also note that there is no significant difference between the coefficients of addition and treatment control in the measurement of the same cellular characteristics of blood mentioned above, as shown in the table 3.

The supplemental substances (Optifeed®, VêO® premium and Oleobiotec®) contain effective substances that increase metabolism, supply the body with nutrients, oxygen, and add phenols such as Thymol and Carvacrol, which are highly effective antioxidants and thus protect blood cells from oxidative damage as antioxidant activity increases through the transport of oxygen necessary to form hemoglobin (Al-Gheshi, 2011). These compounds, in addition to being antimicrobial and fungal, have been shown to stimulate cells to secrete a substance similar to interferon, preventing viruses from attacking the cells of the body, increasing antibody production (IgG), and the ability to increase macrophages by direct effect on cytokines. Increases the fighting ability of macrophage cells and enhances the activity of T cells, which is responsible for cellular immunity. In addition, it has the ability to inhibit the RNA transcriptase, which is responsible for the proliferation of intracellular viruses, thus giving evidence that these compounds play a direct role in biting viruses (Rahel, 2014).The additives also contain flavonoids and terpenoids, which are phenolic compounds within the spices and essential oils that act as an anti-inflammatory (Choi, 2002) and act as adjuvants to maintain blood cells (Mohammed, 2012). Cinnamaldehyde, an active substance that plays a major role in supporting and enhancing the function of the immune system in the chicken body, is considered to be antibacterial and pathogenic (Mastura *et al*., 1999; Haraguchi *et al*., 1996; Ammar *et al*., 1992). Hanan and Ahmed (2016) showed no significant differences in blood mass, hemoglobin, red and white blood cells, hemoglobin concentration in the cell and cell volume of Oleobiotec® in capsules at 50,100, 150 ppm. Nidaullah *et al*. (2010) detected that the adding two different levelsof cinnamon powder and turmericto broiler diet did not significantly affect the concentration of cell volume. In addition, Zomrawi *et al*. (2013) revealed that adding levels of ginger powder (0, 1, 1.5 and 2%) to Hubbaralbroiler diet had insignificant differences in cellular and biochemical blood characteristics. Furthermore,Sadeghi et al. (2012) noted that using water extract of thyme, turmeric and cinnamon alone, and mixed (5 g/l)in broilers (Ross 308) at the age of 21-1 days, did not have a significant effect on the volume of blood cells while, Saeed (2011) showed that the use of water extract of balsamic and bilberry in the drinking water of broioers (Ross) at the age of (21-1) days was significantly higher in both the volume of blood cells and the concentration of blood hemoglobin with low proportion of heterozygous cells to lymphocytes in coefficients Added control. Tollba *et al*. (2010) have shown that the addition of Repaxo to the diet, a mixture of essential oils for aromatic plants, including cinnamon, red pepper, thyme, and turmeric, a high concentration of hemoglobin and the volume of red blood cells. There were significant differences in hemoglobin and blood mass, as well as in the study by Kassie Al and Jameel (2009) on the Arbor-Acres broilers when adding cinnamon oil and thyme separately to the animals in percentages (100, 200) ppm whereinsignificant differences in blood mass and hemoglobin was noted in the supplemented treatment with 200 ppm of those oils compared with birds of the control treatment. As for the H-L lymphocytes, the obtained results showed that no significant differences between the parameters. All of the treatments have been subjected to thermal stress because the H/L ratio is higher than the normal limit of 4.0%, which was reflected in the improvement in the feed conversion coefficient and the rate of increase in weight as shown in table 2 compared

Table 2 : Effect of addition Optifeed®, VêO® premium and Oleobiotec® to broiler male diets on production performance under heat stress conditions.

P- value			Treatments							Traits
	SEM*	General Mean	T6	T5	T4	T3	T2	T1	Period	
N.S**	51.9	738	740	788	728	711	720	743	1-21 day	Weight Gaing/bird
N.S	1.05	181.7	181.7	182.6	181.2	181.1	181.5	182.0		Relative growth rate
N.S	45.7	927	940	987	946	880	885	922		feed consumption g/bird
N.S	0.0475	1.257	1.272	1.252	1.304	1.239	1.232	1.240		Feed conversiong bird / g W. G
0.0001	57.1	1725	c 1659	a2000	b 1868	c 1614	c 1719	d 1487	22-42day	Weight Gain g/bird
0.0496	4.56	105.1	ab103.3	a109.5	a 110.1	ab103.8	a 106.4	b 97.5		Relative growth rate
0.0237	83.5	2491	abc2475	ab2578	a 2609	c 2343	bc2444	abc2498		feed consumption g/bird
0.0001	0.0530	1.455	b1.491	c1.289	b 1.397	b1.450	b 1.421	a 1.683		Feed conversion g/g W.G

* SEM: Average standard error, **N.S: Not significant at significant level (P≤0.05). T1: basal diet (control), T2: basal diet with 500 g / t feed Optifeed®, T3: basal diet with 250 g / t feed VêO® premium, T4: basal diet with 250 g / ton feed Oleobiotec®, T5: basal diet with 250 g feed Optifeed® +125 g VêO® premium +125 g Oleobiotec®/t feed, T6: basal diet with 500 g feed Optifeed® +250 g VêO® premium + 250 g Oleobiotec®/t feed.

Table 3 : Effect of adding Optifeed®, VêO® premium and Oleobiotec® to broiler male dietson blood cells under heat stress conditions.

P- value			Treatments							Traits
	SEM*	General Mean	T6	T5	T4	T3	T2	T1	Period	
N.S**	1.31	28.5	28.0	29.3	28.3	27.3	30.0	28.3	21 day	**PCV%[1]**
N.S	0.405	8.96	9.06	9.27	8.85	8.52	9.21	8.84		**HP g/100 ml[2]**
N.S	0.117	0.613	0.740	0.550	0.603	0.556	0.623	0.610		**H/L ratio[3]**
N.S	27.3	26.3	26.0	26.3	27.3	27.3	26.3	27.3	42 day	**PCV%**
N.S	8.52	8.20	8.10	8.09	8.45	8.52	8.20	8.52		**HP g/100 ml**
N.S	0.618	0.618	0.581	0.590	0.715	0.596	0.618	0.618		**H/L ratio**

* SEM: Average standard error.**N.S: Not significant at significant level (Pd"0.05).T1: - basal diet (control)T2: - basal diet with 500 g / t feed Optifeed®.T3: - basal diet with 250 g / t feed VêO® premium.T4: - basal diet with 250 g / ton feed Oleobiotec®.T5: - basal diet with 250 g feed Optifeed® +125 g VêO® premium + 125 g Oleobiotec ® / t feed .T6: - basal diet with 500 g feed Optifeed® +250 g VêO® premium + 250 g Oleobiotec ® / t feed.1. Packet cell volume, 2. Hemoglobin, 3. Heterophil/ Lmphocyte ratio.

with the treatment of control-free additives that were used in the experiment and the substances added to reduce the alkalinity of the respiratory and also worked on the expansion of blood vessels, Reduce high temperature (Jebur *et al*., 2018) noted that the addition of vitamin E, C and aspirin to broiler gravy under heat stress conditions indicates no significant differences between the supplemented treatments and the control in H / L ratio.

Blood Biochemistry

Table 4 shows the effect of adding Optifeed®, VêO® premium and Oleobiotec® to broiler male diet on the biochemical parameters under thermal stress conditions at 42 days. There was no significant difference between the addition treatments and the control treatment in the measurement of each glucose concentration of blood plasma, 100 mg/100 ml blood, triglyceride, g/100 ml blood, liver enzymes (AST, ALT), IU/L, total blood plasma protein g/100 ml blood, albumin g/100 ml blood, and Globulin g/100 ml of blood. As shown in the table above, the blood glucose was not significantly higher than normal. It may be due to the ability of the additives and its natural oxidants, vitamin E and BHT to protect the pancreas, especially beta cells in the islets of langerhans, which are responsible for the secretion of insulin from free

Table 4 : Effect of addition Optifeed®, VêO® premium and Oleobiotec® to broiler male diets on the plasma Biochemistry parameters under heat stress conditions at the age of 42 days.

P- value			Treatments						Traits
	SEM*	General Mean	T6	T5	T4	T3	T2	T1	
N.S**	14.2	189	191	194	182	190	193	184	**Glucose (mg/100 ml)**
N.S	24.8	141	142	150	144	143	145	121	**Triglyceride(mg/100 ml)**
N.S	2.46	9.29	10.91	9.85	11.08	7.16	9.01	7.72	**ALT (U/L)**
N.S	6.46	79.7	82.3	83.1	78.8	75.3	81.1	77.5	**AST (U/L)**
N.S	0.346	3.19	3.06	3.30	3.27	3.08	3.23	3.22	**Totalprotein**(g/100 ml)
N.S	0.153	1.22	1.15	1.28	1.22	1.20	1.23	1.24	**Albumin (mg/100 ml)**
N.S	0.260	1.97	1.91	2.02	2.05	1.88	1.99	1.98	**Globulin(g/100 ml)**

* SEM: Average standard error, **N.S: Not significant at significant level (P ≤0.05). T1: basal diet (control), T2: basal diet with 500 g / t feed Optifeed®, T3: basal diet with 250 g / t feed VêO® premium, T4: basal diet with250 g / ton feed Oleobiotec®, T5: basal diet with 250 g feed Optifeed® +125 g VêO®premium +125 g Oleobiotec ® / t feed, T6: basal diet with 500 g feed Optifeed® +250 g VêO® premium + 250 g Oleobiotec® / t feed.

radicalsdamage and improve its functioning, ensuring insulin availability in a blood glucose-focused concentration without increasing its concentration of normal levels by continuing to enter glucose into the cells.Whelan and Rust (2006) reported that BHT contributes to the maintenance of liver cells and increases its effectiveness in the process of metabolizing excess glucose by switching to the glycogen (table 4). Although, there were no significant differences in blood plasma glucose, triglyceride, liver enzymes (ALT, AST), total protein, albumin, and globulin. However, there is an increase in arithmetic in the traits mentioned in favor of addition factors, especially the fifth treatment (T5) compared to the control treatment.High blood glucose may be due to the inclusion of Optifeed®, VêO® premium, and Oleobiotec® substances that are similar to Glucocorticoids work which is responsible for increasing the glucose level of blood plasma in birds as a result of the composition of carbohydrates from non-carbohydrate sources through a process called Gluconeogenesis where it is responsible for the completion of corticosteroid hormone (Mohammed *et al.*, 2018a) which in turn affects many liver enzymes including AST And ALT, which have a role in the formation of sugar glucose from non-carbohydrate sources are dependent on the amino acids available in the additives. The low activity of these two enzymes evidence of low effectiveness of hormone corticosteron, also indicated lower bird exposure to stress in the coefficients compared to control treatment (Karadas *et al*., 2014).

For triglycerides, the reason for their lack of concentration in plasma was due to the ability of substances to inhibit the process of triglyceride production in the liver (Jebur *et al*., 2018 and Sevcikova *et al*., 2008). As for the enzymes of the liver (AST and ALT), the activity of the index of liver efficiency and activity, where the rise of enzymes of the transport of amino groups evidence of the existence of stress indicators because of the transformation of proteins to glucose (Sturkie, 2000), causing increased activity of these enzymes in the serum or plasma blood (AI-Daraji *et al*., 2008). Therefore, the added materials have worked on the safety of cellular membranes of the damage of peroxides, which cause changes in their function and synthesis and consequently lead to the reduction of the secretion of these two enzymes outside the cells and lack of activity in blood plasma, as one of the reasons for increasing the activity of these enzymes was cell damage and leakage of enzymes and the most important organs that are rich of these enzymes were liver, heart, and skeletal muscle. Tollba *et al*. (2010) indicated that there were no significant differences in the activity of AST and ALT in the chicken plasma supplemented withrepaxo in the diets which was a combination of essential oils of thyme, cinnamon and papachus plants compared to the control treatment. Lee *et al*. (2003) used a commercial feed product containing Thymol and Cinnamaldehyde in broiler chicks and did not have significant differences in AST and ALT activity compared to control and Cinnamaldehyde treatment. As for the total protein of blood plasma, albumin and globulin, there were no significant differences between the treatments. Hanan and Ahmed (2016) showed no significant differences in total protein, albumin, and blood plasma globules given to Oleobiotec® in the form of capsulate 50, 100 and 150 ppm and decreased activity of liver enzymes AST and ALT, while Abbas *et al*. (2016)

indicated significant differences in the increase of total protein, albumin, and blood plasma globulin, added to the diets of ®Oleobiotec with a concentration of 5, 7.5 and 10 g/kg feed compared with the treatment of control, and the increase of chlorine and albumin in the blood plasma was evidence of increased immune status of birds.

References

AI-Daraji, H. J., W. K. AL-Hayani and H. A. AI-Mashhadani (2008). Effect of adding different levels of anisumpimpinellaanisum seeds and oil to the diet in the specific qualities of eggs and some immunological properties of white lumens. *Journal of Iraqi Poultry Science*, **3 (1)** : 120-100.

AI-Omri, M. R. (2001). *Secret chemistry*. The scientific part (K2) Dar al-Kitab for printing and publishing, University of Mosul.

Al – Zubaidi, S. S. A. (1986). *Poultry Management*. University of Basra Press.

Al-Gheshmi, S. M. (2011). Effect of adding different levels of Thymus Vulgaris, which are ground to the diet in some blood parameters of meat breeds. *Qadisiyah Journal of Veterinary Medicine Sciences*. **2**:10.

Al-Kassie, G. A. M. and Y. J. Jameel (2009). The effect of adding Thyme vulgaris and Cinnamomuimzeylanicum on productive performance in broilers. Proceeding of 9th Veterinary Scientific Conference, College Vet. Med., Univ. Baghdad, Iraq. *Poult. Sci.* **43** : 378-383.

Al-Qarawi, J. B. H. (2002). An evaluation of drugs used in the control of stressful stimuli in domestic animals : A review. *Aeta vet. Bron*., **71** : 205- 216(Internet).

Ammar, N., S. Gaafar and R. Khalil (1992). Anti – inflammatory effect of natural steroidal sapogenins on oral aphthus ulcers. *Egyptian Dental Journal*, **38** : 89-98.

Asatoor, A. M. and E. J. King (1954). Simplified colorimetric blood sugar method. *The Biochemical Journal*, **56**(325th Meeting), xliv.

Burton, R. and C. W. Guion (1968). The differential leucocyte blood count: its precision and individuality in the chicken. *Poultry science*, **47(6)** : 1945-1949.

Choi, W. S., B. S. Park, S. K. Ku and S. E. Lee (2002). Repellent activities of essential oils and monoterpenes against *Culex pipienspallens*. *J. Am. Mosq. Control Assoc*., **18(4)** :348-51.

Diaa, K. I. and Y. B. Ghassan (2008). Effect of the addition of water extract and powder for the *Anthemis nobilis* (Chamomile) in drinking water and on the meat broiler subjected to heat stress on some physiological characteristics. *Journal of Iraqi Poultry Science*, **3(1)** : 141-155.

Duncan, D. B. (1955). Multiple range and multiple F tests. *Biometrics*, **11(1)** : 1-42.

Fode (2013). Functional Additives for better performance. fodeLabotariesLushtech. France.

Gondwe, T. N. and C. B. A. Wollny (2005). Evaluation of the growth potential of local chickens in Malawi. *Int. J. of Poult. Sci*., **4(2)** : 64-70.

Hanan, A. N. and A. A. Ahmed (2016). The Effect of The Drenching Vegetable Preparation Oleobiotec® in The Productive Performance of Broiler Ross 308. Animal Resources Dep., College of Agric., Tikrit Uni. 16-(1)16.

Haraguchi, H., T. Saito, H. Ishikawa, H. Date, S. Ataoka, Y. Tamura and K. Mizutani (1996). Antiperoxidative components in *Thymus vulgaris*. *Planta Med.*, **62(3)** : 217-221.

Henry, R., D. C. Cannon and J. W. Winkelman (1974). Clinical chemistry: principles and techniques,2ed, Harper and row.

Jebur, S., T. Mohammed and A. K. Firas (2018). Effect of Vitamin E, C and Aspirin in the Performance, Lipid Peroxidation and Blood Biochemistry Traits of Broiler in Heat Stress. *The Eurasia Proceedings of Science, Technology, Engineering & Mathematics*, **3** : 145-151.

Karadas, F., V. Pirgozliev, S. P. Rose, D. Dimitrov, O. Oduguwa and D. Bravo (2014). Dietary essential oilsimprove the hepatic antioxidative status of broiler chickens. *British poultry science*, **55**: 1-6.

Koolhaas, J. M., A. Bartolomucci, B. Buwalda, S. F. de Boer, G. Flügge, S. M. Korte, P. Meerlo, R. Murison, B. Olivier, P. Palanza, G. Richter-Levin, A. Sgoifo, T. Steimer, O. Stiedl, G. van Dijk, M. Wöhr and E. Fuchs (2011). Stress revisited: A critical evaluation of the stress concept. *Neuroscience & Biobehavioral Reviews* **35** : 1291-1301.

Lee, K. W., H. Everts, H. J. Kappert, M. Frehner, R. Losa and A. C. Beynen (2003). Effects of dietary essential oil components on growth performance, digestive enzymes and lipid metabolism in female broiler chickens. *British Poul. Sci*., **44**: 450 – 457.

Mastura, M., S. Khozirah, R. Mawardi and A. A. Manaf (1999). Anticandidal and antidermatophytic activity of *Cinnamomum* species essential oils. *Cytobios*, **98** : 17-23.

Mohammed, Th. T. (2012). The effect of adding different levels of artificial antioxidants and natural antioxidants in the diet on production and physiological performance in laying hens. (*Doctoral dissertation*), College of Agriculture/ University of Anbar.

Mohammed Th. T., S. M. Farhan, A. A. Majid, Z. J. Mohammed Saeid and F. M. Abdulateef (2018a). Effect of vitamin C and natural antioxidants on the production performance and antioxidant status of laying hens through heat. *J. Res. in Ecology*, **6 (2)** : 2364-2375.

Mohammed Th. T., Z. J. Mohammed Saeid, Z. T. M. Al-Dhanki and F. M. H. AL-Khalani (2018b). Effect of adding the antioxidants on some biochemical blood plasma traits of brown layer during hot season in Iraq. *Plant Archives*, **18 (2)**.

Nidaullah, H., F. R. S. Durrani, I. U. Ahmad Jan and S. Gul (2010). Aqueous exract from different medicinal plants as anticoccidial, growth promotive and immunostimulant in broilers. *Journal of Agriculture and Biological Science,* **5(1)** : 53- 59.

NRC (1994). *Nutrient Requirements of poult*. 9 rev. ed. National Academy Press, Washington. DC.

Rahel, I. (2014). Look at organic oils and their role in immunity. Faculty of Veterinary Medicine, Beni Suef University.

Reitman, S. and S. Frankel (1957). A colorimetric method for the determination of serum glutamic oxalacetic and glutamic pyruvic transaminases. *American Journal of Clinical Pathology*, **28(1)** : 56-63.

Sadeghi, G. H. A., S. H. Karimi, S. H. PadidarJahromi S. H. Azizi and T. Daneshmand A. (2012). Effects of cinnamon, thyme and turmeric infusions on the performance and immune response in of 1- to 21-day-old male broilers.

Saeed, J. M., I. H. Ismail, M. A. Al-Badi, A. B. Muhammad and A. A. Shalih (2011). The use of some plant extracts as catalysts for growth in broilers. *Tikrit University Journal of Agricultural Sciences*, **2**:11.

SAS Institute INC. (2012). SAS/STAT User's Guide: Version9.1. (Cary, NC, SAS Institute, Inc.).

Sevcikova, S., M. Skrivan and G. Dlouha (2008). The effect of lycopene supplementation on lipid profile and meat quality of broiler chickens. *Czech J. Anim. Sci*., **53** : 431-440.

Shen, P. F. and L. T. Patterson (1983). A simplified Wright's stain technique for routine avian blood smear staining. *Poultry Science*, **62(5)** : 923-924.

Sturkie , P. D. (2000). *Avian physiology*. New York ,Heiderberg, Berlin, Springer Verlag.

Tollba, A. A. H., S. A. M. Shabaan and M. A. A. Abdel-Mageed (2010). Effects of using aromatic herbal extract and blended with organic acidson productive and physiological performance of erformance of poultry.2-The Growth During Cold Winter Stress. *Egypt. Poult. Sci*., **30(I)** : 229-248.

Toro, G. and P. G. Ackermann (1975). *Practical clinical chemistry*. Little Brown & Company.

Varley, H., A. H. Gowenlock and M. Bell (1980). Practical clinical biochemistry, vol. 1. William and Helnemann Med. Books Ltd., London, UK.

Whelan, J. and C. Rust (2006). Innovative dietary sources of n-3 fatty acids. *Annu. Rev. Nutr*., **26**:75-103.

Zomrawi, W. B., K. A. A. Abdel Atti, B. M. Dousa and A. G. Mahala (2013). The Effect of Dietary Ginger Root Powder (*Zingiber officinale*) on Broiler Chick Performance, Carcass Characteristic and Serum Constituents. *J. Anim. Sci. Adv*., **3(2)** : 42-47.