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EFFECT OF PHYTOCHEMICALS AND ACTIVE COMPONENTS OF SOME NATURAL FEED ADDITIVES ON GROWTH PERFORMANCE, ANTIOXIDATIVE PROPERTIES AND ECONOMIC EFFICIENCY OF MUSCOVY DUCKLINGS

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ABSTRACT: A total number of three hundred and fifteen of 14 days old Muscovy ducklings were arrangement randomly into 7 experimental groups and allocated into three replicates. The experimental treatments were arranged in one way classification by using three sources of phytogenic plants being Moringa oleifera leaves meal (MLM), Rosmarinus officinalis leaves meal (RLM) and Olea europaea leaves meal (OLM) with two levels of plant addition (1or2%) compared to the commercial diet (control). Results showed the highest value of final live body weights (4185 g) was recorded for diet that supplemented with 1%MLM; while, the lowest weight recorded for diet supplemented with 2% OLM being 3507 g compared with control group. Feed intake (g/bird) decreased significantly for treatment groups compared with the control group. The best feed conversion was recorded by ducklings fed1%MLM compared with the control. The highest digestion coefficient of CP being 80.13% was achieved by the group fed 2%MLM vs. control (74.44%). Ducklings fed diet supplemented with natural additives recorded the highest values of edible giblets% and digestive tract length (cm) but lowest digestive tract weight % compared to the control group. Feeding diets contained 1%RLM,2%RLM and 1%OLM recorded highest values of overall acceptability of ducklings meat compared with the other experimental groups. The highest values of albumin (g/dl) and albumin/globulin ratio were recorded by the groups fed natural feed additives compared to the control group; while the lowest triglycerides value was for the ducklings fed 2%OLM being 250 g/L. Natural feed additives did not affect liver function or kidney function, while; values of total anti- oxidants capacity were significantly increased .Experimental groups fed 1% MLM, 2%MLM, 1%RLM or 1%OLM recorded the highest economic efficiency. It could be concluded that, the use of natural feed additives in Muscovy ducklings diets improved growth performance, increased immune response and improved economic efficiency.

Keywords: Moringa- Rosemary-Olive leaves-ducklings-immunity-and economic efficiency.

INTRODUCTION

Phytogenic feed additives (phytobiotics) or non-antibiotic growth promoters , commonly defined as plant-derived from herbs, spices or other plants which contained certain bioactive chemicals (secondary metabolites) were reported to be responsible for their therapeutic (medicinal) benefits such as saponins, tannins, oxalates, phytates, trypsin inhibitors and cyanogenic glycosides (Soetan and Oyewole, 2009)

The phytobiotics are opening new opportunities and possibilities as a replacement of antibiotics. Moringa leaves which is a good source of vitamins and amino acids, claimed to boost immune systems (Olugbemi et al., 2010); its extract was reported to have antibacterial properties and conclusion was made to investigate it as a phytotherapeutic agent to combat infectious agents ;anti-oxidants, which are known to suppress formation of reactive oxygen species and free radicals (Abhishek et al., 2018). The most important constituents of rosemary leaves are carnosal, carnosic acid, caffeic acid and its derivatives such as rosmarinic acid. These compounds have powerful antioxidant activity. (Attia, 2018) . Olive leaves which contain many substances, such as oleuropein have been shown to possess hypoglycemic and hypocholesteremic activities, to be potent antioxidants with anti-inflammatory properties (Botsoglou et al., 2013).

It is important to note that plants may contain some nutrients or anti-nutritive factors that might affect positively or negatively production parameters (Bunyapraphatsara, 2007). Thus, any plant can be used for its abilities to improve productivity should be investigated in order to determine the limits of its incorporation in poultry feeds. In consequence present study was established to evaluate the effect of moringa, rosemary and olive leaves meal on performance, anti-oxidative properties and economic efficiency of Muscovy ducklings.

MATERIALS AND METHODS

This experiment was conducted at south Sinai experimental research station (Ras Suder city), Desert Research Center, Egypt. Three hundred and fifteen of 14 days old Muscovy ducklings of genotype R41 (fed on starter diet contained 2800 ME Kcal/kg. and 22%CP from hatching up to 13 days old and grower diet contained 2850 ME Kcal/kg. and 22%CP from14 days up to 35 days old), were distributed in seven experimental groups, each group was allocated into three replicates (15 birds each). The phytogenic plants, namely Moringa oleifera, Rosmarinus officinalis and Olea europaea which were cultivated at Ras Sudr Experimental Station, Southern Sinai Governorate; collected and branches were cut, threshed carefully to separate leaves from twigs then leaves were spread out on a floor and allowed to air-dry for 4 days under shady and aerated conditions. The dried leaves were then removed by hand (manually) and grounded into powder by milling using a locally made Miller machine to obtain a leaf powder. Chemical analyses of the experimental plants , diets and meat were assayed using methods of A.O.A.C (1990). Quantitative phytochemical analyses of anti-nutrients were determined using the methods of Sofowora (1993). All determinations were done in duplicates, while total phenolic was determined according to Singleton et al. (1999).

The experimental diets were supplemented with two levels (1or2%) of Moringa oleifera leaves meal (MLM),

Rosmarinus officinalis leaves meal (RLM) and Olea europaea leaves meal (OLM) compared with the commercial diet (control).The experimental diets (Table 1) were formulated to be iso-caloric and iso-nitrogenous to meet recommendations for Muscovy ducks guide during finisher period (35-70 days). Feed and water were offered ad libitum.

At the end of the experimental period, digestion trial was conducted using 21 males of ducks (three from each treatment) to determine the digestion coefficients of crude protein (CP) and ether extract (EE) of the experimental diets also; three birds from each treatment were selected randomly and held without feed 12 hours, without water about 4 hours before slaughter tests, after that weighed and slaughtered to complete bleeding and then weighed. Carcass parts were weighed and calculated as a percentage of live body weight and measuring organoleptic properties including meat overall acceptability (ISO, 1993).

Blood samples after slaughter were placed in two tubes, one containing lithium heparin to determine hematological parameters and the other without anticoagulant and left to clot. In the laboratory, samples were centrifuged at 1600 rpm for 15 minutes and the resulting serum was stocked at (-20) until use. Serum samples were evaluated for different biochemical parameters (Total protein,(TP, g/dl), albumin,(Alb, g/dl), globulin,(Gl, g/dl), Alanine (ALT) and aspartate (AST) amino transferases (mg/dl), Kidney function, Lipid fractions and Total antioxidant capacity (TAC)) calorimetrically by using commercial kits. Immediately after slaughter, values of red blood cells , packed cell volume ,mean corpuscular hemoglobin, and mean corpuscular hemoglobin concentration were performed using a semi-automate analysis, Mindray BC-5300 wet (Mindray Medical International Co., Ltd.,China).

The economic efficiency was calculated from the input-output analysis based on the differences in feed conversion ratio and feeding cost. The amount of money realized from the sale of ducklings minus the cost of feed consumed for each dietary treatment was estimated as follows:

Feed cost/kg gain=feed conversion x cost of one kg diet. , Net return= price of one Kg meat (LE.)- Cost of Kg feed (LE) and Economical efficiency %= Net return/ price of one Kg meat (LE.)

The Data were statistically analysed according to SAS (2002) using one -way classification according to next model:

$Yijk = U + Ti + eik$

Where:

Yik = Observation.

U = the overall mean.

Ti = experimental treatments (i=1, 2, 3…..and 7).

eik = Random error.

Differences among treatment means were determined by Duncan's New Multiple Range test (Duncan, 1955).

RESULTS

Phytochemicals and active components of Moringa leave meal :

Data in Table 2 showed the phytochemical and active component of Moringa oleifera leaves meal which contained tannins (3.00 mg /100g) Phytic acid (44.50 mg /100g), Oxalates (4.50 mg /100g), saponins (6.35%), Alkaloid (3.10%) and low levels of Flavonoid (2.40 %). Different Authors reported that these components were lower compared with other plant leaves (Enechi and Odunwodu , (2003) and Ray-Yu, et al.(2006)).

Moringa oleifera contain 1-23g of tannin in every 1 kilogram of leaves, which may be interact with the biological utilization

of protein, carbohydrate and lipids **(**Esonu, 2001). Essential volatile oils in moringa leaves like Pentacosane (17.41%) and E-phytol (7.66%). Soetan and Oyewole (2009) reported that the essential oils of Moringa have Antibacterial and anti-properties; and so that it can improve poultry growth performance and reduce cholesterol level resulted in low fat meat (Merck,2005).

Phytochemicals and active components of Rosemary leave meal :

The active components of Rosemary leaves meal were 1,8-cineole (25.43%), Limonene(12.87%) ,α-pinene (11.18%) and total phenolic content was 9 .25 g. (Table3). Umit et al. (2011) found that main active components of rosemary were 43.96% 1,8-cineole,25.33% α-pinene , 11.09% camphene and total phenolic was 6.25 g GAE/100g. Ghazalah and Ali (2008) reported that camphor (11-16%), pinene (15-20%) and cineole (30-35%).were the main active components of rosemary. Lu and Fo (2001) found that total phenol values were ranged from 9.51 to- 9.53 g/100 g. and added that there is a positive correlation between antioxidant activity and the total phenolic content of the plants . Rosemary leaves content of volatile oil and total phenol content differences according to climatic effects ,harvest time and type of distillation influence the qualitative composition of the volatile oil produced (Umit et al. ,2011).

Phytochemicals and active components of Olive leave meal :

The Oleuropein (24.5%), Caffeic acid (0.02%), Luteolin-7-o- were determined as main active components for Olive leaves meal while the total phenolic, Flavonoids and Tannins content were 19.70, 0.29 and 0.52%, respectively (Table 4).

Ducklings' performance:

The effects of dietary treatments on ducklings performance, digestibility coefficients some slaughter characteristics and organoleptic properties of ducklings are presented in Table 5. Initial body weights of all groups were statistically insignificant different and ranged between 115 to 124 g. Values of final body weights and body gain that recorded for the group supplemented with 2%MLM, 1%MLM, 1%OLM or 1%RLM were higher ($P<0.05$) compared with the other three groups supplemented with 2%RLM, 2%OLM and their control.

Feed intake decreased ($P<0.05$) by 10.82, 13.32, 13.51, 12.22, 13.09 and 14.49%for the groups received 1%MLM, 2%MLM, 1%RLM ,2%RLM, 1%OLM and 2%OLM ,respectively compared with the control. The reduction in feed intake by the higher levels of leaves meals in poultry diet could be due to the reduced palatability of these diets. Kakengi et al.(2007) reported that chicks consuming low quantity of the feed may be because of unpalatability of feedstuffs. However, Abhishek et al. (2018) concluded that increased feed intake with increased level of MLM level might be due to faster passage rate of excreta due to increasing level of fiber content in the diet. Ducks fed diet supplemented with 1%MLM recorded improvement in feed conversion during all experimental periods compared to control, with insignificant differences between the supplemented groups.

There was improvement in digestion coefficient of EE for all phytogenic additives compared with the control group. On the other hand; adding 2%MLM to the basal diet recorded higher ($P<0.05$) digestion coefficient of CP vs. the control with insignificant differences between the other treated groups. There was ($P<0.05$)

increase in edible giblets% and digestive tract length (cm) along with decrease in digestive tract weight % of ducklings fed diets contained the experimental feed additives vs. control group. Ducklings fed 2% MLM, 2% RLM or 1% OLM recorded the lowest lipid % of meat while the highest value of lipid in meat was recorded for the ducklings fed 2%OLM. The highest ($P<0.05$) overall acceptability of ducklings meat was recorded for the groups fed 1%RLM, 2%RLM or 1%OLM compared with the other experimental groups. Wenk (2002) reported that rosemary decreased digestive tract thickness and decreased gastric pH which stimulates favorable micro-organism and the synthesis of catabolic enzymes that help in the digestion and absorption of amino acids, sugars and fatty acids. Additionally, Franciosini et al. (2016) found that RLM could improve broilers performance as a result of improving the immune function and balancing gut micro flora that is essential for the digestion process and protection against enter pathogenic organisms.

Blood parameters:

Data concerning effect phytogenic plant on Complete blood count (CBC) (Table 6) revealed that the highest ($P<0.05$) value of Granulocytes was recorded for the ducklings fed control diet, however the lowest was recorded for the group fed diet contained 1% OLM. On the other hand, ducklings fed diet contained 1% MLM recorded the highest value of Haemoglobin (Hgb. ,13.03 g/L) and the lowest was for the group fed 2% RLM (11.0 g/L). The highest ($P<0.05$) value of RDW was for the control group (7.66) and the lowest was for the group fed 2% OLM or 2% RLM (4.00), this increased in lymphocytes in ducks may be to the effect of antibacterial, antiviral and antifungal of studied plants on ducks immunity system; meanwhile, the improvement in haemoglobin %, packed cell volume %, RBCs count, serum total protein and its fractions may be related to its effect on the haemopoietic tissue and the stimulating effect on the liver exhibiting an anabolic action favoring protein synthesis (Bonomi et al., 2002).Generally, improving digestion ,metabolism and possess bacterial and immune-stimulant of birds reflect the action of the active substances of herbs (Ghazalah and Ali, 2008).Data concerning the effect of phytogenic plant on blood biochemical (Table 7) revealed that the highest ($P<0.05$) values of albumin (g/dl) and albumin/globulin ratio values was recorded for the group fed 1% RLM compared to the control group the effective role of rosemary in increasing immunity may be due to its role in developing and protecting cells and inhibiting non-enzymatic oxidation as it showed an increase in the globulin fraction (Ghazalah and Ali, 2008). The increase in blood globulins may be related to high activity of large bursa which is primary site for synthesis of gamma immunoglobulin (Abdo, 1998).

On the other hand**,** Abd El Azim et al. (2009) demonstrated that ducks fed on diet contained 1.0% red pepper, recorded the highest values for total protein and albumin/globulin ratio vs. their control group.

The total cholesterol and Triglycerides `are two important indicators of the body's lipid levels. The high-density lipoprotein cholesterol is a serum protein that is rich in phospholipids; which can eliminate free cholesterol in liver tissue cells and remove intracellular cholesterol organizations). and then LDL-C transport cholesterol to the cells throughout the body and facilitate liver bile acid; thus, LDL-C plays an

important role in cholesterol metabolism. (Wang et al., 2002). Triglycerides values decreased (P<0.05) from 454.33 to250.0 g/L for control and 2% OLM group, respectively. According to Lanksy et al., (1993) Plant leaves which are rich in fibrous content reduced plasma content of total cholesterol and LDL and thus reflect the hypo-cholesterolemic properties and may block intestinal cholesterol absorption.

The total antioxidants capacity is a comprehensive health indicator that measures the body's antioxidative system features, the amount of TAOC can reflect the condition of the antioxidant defense system in terms of external stimuli compensatory capacity and free radical metabolism in the body (Zheng, 2007). Values of TAO (P<0.05) increased with using phytogenic plant additive and with increasing the level of plant addition (Table 4 and Figure 1). The oleoresins were not as effective as α-tocopherol acetate (200 mg/kg), but it may be concluded that at least part of the ingested ant oxidative compounds were retained in the muscle and that they were still active in the meat. However, investigations into effects of dietary administered secondary plant metabolites on muscle and adipose tissues of farm animals are still rare and knowledge about effects of secondary plant metabolites in feed and guts, their bioavailability by means of extent of absorption and metabolism, and the extent to which they might be retained in animal tissues is not readily available (Govaris et al., 2010).

Economic efficiency:

Results in Table 8 reflect that economic efficiency and relative economic efficiency (0.77and 113%) were obtained for the groups supplemented with 1% MLM, 2%MLM, 1%RLM or 1%OLM. Similar findings were obtained by Du et al. (2007) who reported that performance of broilers given with moringa leaf meal, revealed the improvement of profit vs. their control group.

CONCLUSION

Based on the results of this study, it may be concluded that supplementing ducks diet with 1%RLM, 2%RLM or 1%OLM may improve their performance, immune response ,resistance and welfare.

Table(1): Composition of the experimental diets at finisher period (35-70 days)

Ingredients (%)	Diets (35 -70days)						
	Control	MLM		RLM		OLM	
		1%	2%	1%	2%	1%	2%
Yellow corn	61.80	61.80	61.30	61.00	60.50	62.00	61.50
Soybean meal (44%)	20.00	20.00	20.30	20.00	20.50	20.50	21.00
Corn gluten meal (60%)	4.50	4.50	4.00	4.50	4.50	4.50	4.10
Wheat bran	7.80	6.80	6.50	7.60	6.60	6.10	5.50
Moringa leaves meal	0.00	1.00	2.00	0.00	0.00	0.00	0.00
Rosemary leaves meal	0.00	0.00	0.00	1.00	2.00	0.00	0.00
Olive leaves meal	0.00	0.00	0.00	0.00	0.00	1.00	2.00
Vegetable oil	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Limestone	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Dicalcium Phosphate	2.05	2.05	2.05	2.05	2.05	2.05	2.05
NaCl	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Vit& Min Premix*	0.30	0.30	0.30	0.30	0.30	0.30	0.30
DL- Methionine	0.15	0.15	0.15	0.15	0.15	0.15	0.15
L-Lysine-HCl	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Total	100	100	100	100	100	100	100
Calculated analysis**							
ME, K cal/kg	2920	2935	2931	2920	2932	2933	2921
Crude protein (%)	18.03	18.09	18.04	18.00	18.11	18.09	18.00
Crude fiber (%)	3.68	3.72	3.85	3.89	4.06	3.69	3.81
Calcium (%)	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Av. Phosphorus (%)	0.51	0.50	0.50	0.50	0.50	0.50	0.49
Lysine (%)	0.88	0.87	0.87	0.88	0.88	0.88	0.89
Methionine%	0.47	0.47	0.46	0.47	0.47	0.47	0.46
Methionine & Cystine	0.81	0.81	0.79	0.81	0.81	0.81	0.80

* Each3 kg Vitamins and minerals contain: Vit. A120000IU, Vit. D_3 22000 IU, Vit.E100 mg, Vit.K_3 20mg, Vit. B_1 10 mg, Vit. B_2 50mg, Vit.B_6 15 mg, Vit.B_{12} 100 µg, Pantothenic acide 100mg, Niacin 300mg,Folicacid10mg,Biotin500µg, iron300mg,Manganese 600 mg, Choline chloride 500 mg, Iodine 10 mg, Copper 100 mg, Seleneium 1 mg, and Zinc 500 mg 1.
**According to, NRC , 1994.

Table (2): Phytochemicals and active components of Moringa leave meal (% on DM basis)

Items	
Phytochemicals components :	
Total phenolic g	6.11
Tannin (mg /100g)	3.00
Phytic acid (mg /100g)	44.50
Phytic- P (mg /100g)	12.88
Oxalate (mg /100g)	4.50
Saponin (%)	6.35
Alkaloid (%)	3.10
Flavonoid (%)	2.40
Active components of essential oil % :	
Pentacosane (%)	17.41
E- phytol (%)	7.66

MLM contains: 20%CP, 15.55%CF, 3.13%EE and 2831 kcal.ME/kg.

Table (3): Phytochemicals and active components of Rosemary leaves meal (% on DM basis).

Items	
Phytochemicals components:	
Total phenolic g	9.25
Active components of essential oil % :	
1.8 cineole	25.43
Limonene	12.87
β - pinene	11.18
comphene	3.72
p-cymene	2.96
β-caryophyllene	3.89

RLM contains: 7.12%CP, 25.46%CF, 3.40%EE and 2971 kcal.ME/kg.

Table (4): Phytochemicals and active components of Olive leaves meal (% on DM basis).

Items	
Phytochemicals components:	
Total phenolic	19.7
Flavonoids	0.29
Tannins	0.52
Active components of essential oil %:	
Oleuropein	24.5
Caffeic acid	0.02
Luteolin-7-O-glucoside	0.04
Apigenine-7-O-glucoside	0.07
Quercetin	0.027

OLM contains: 5.99%CP, 16.55%CF, 6.78%EE and 1672 kcal.ME/kg.

Table (5): Effect of some natural feed additives on performance, digestibility coefficients some slaughter characteristics and organoleptic properties of ducklings.

Items	Treatments							±SE
	Control	1% MLM	2% MLM	1% RLM	2% RLM	1% OLM	2% OLM	
Initial body weight(g)	115	124	120	120	118	121	116	3.68
Final body weight(g)	3418^{c}	4185 ^{a}	4013^{ab}	4021^{ab}	3842 ^{b}	4033^{ab}	3508^{c}	76.98
Body weight gain(g)	3303^{c}	4061 ^{a}	3893^{ab}	3901^{ab}	3724 ^{b}	3912 ^{ab}	3392 ^{c}	108.3
Total feed intake(g)	10173^{a}	9072^{b}	8818^{bc}	8799^{bc}	8930^{bc}	8841^{bc}	8699^{c}	78.89
Feed conversion ratio	3.08^{a}	2.23^{c}	2.27^{c}	2.26^{c}	2.40^{bc}	2.26^{c}	2.56^{b}	0.04
Digestibility Coefficients:								
CP	74.44^{b}	78.52^{ab}	80.13^{a}	76.21^{ab}	77.28^{ab}	78.91^{ab}	76.98^{ab}	0.85
EE	65.33^{b}	70.31^{ab}	70.56^{ab}	73.17^{a}	70.25^{ab}	75.39^{a}	70.34^{ab}	1.15
Slaughter characteristics %								
Edible giblets% *	4.02 ^{c}	4.59^{b}	4.82^{a}	5.05^{a}	5.03 ^{a}	4.99^{a}	4.99 ^{a}	0.08
Digestive tract weight %	4.47^{a}	4.05^{b}	4.07^{b}	4.02^{b}	4.01^{b}	4.03^{b}	4.00 ^{b}	0.12
Digestive tract length(cm)	138 ^{c}	160^{b}	175^{a}	172^{ab}	171 ^{ab}	169^{ab}	170^{ab}	3.76
Meat composition:								
Lipid%	2.91 ^{ab}	2.40 ^{ab}	1.69 ^{c}	2.99 ^{ab}	1.92 ^{c}	2.00 ^{bc}	3.41 ^{a}	0.39
Organoleptic properties of meat:								
Overall acceptability	7.00 ^{b}	6.33 ^{c}	7.00 ^{b}	8.00 ^{a}	8.00 ^{a}	8.00 ^{a}	7.00 ^{b}	0.14

a,b,….: Means within the same row showing different letters are significantly different.

* Edible giblets = liver, heart and gizzard weights

Table (6): Effect of some natural feed additives on Complete Blood Count of ducklings at 70 days of age.

Parameters	Treatments							±SE
	Control	MLM		RLM		OLM		
		1%	2%	1%	2%	1%	2%	
*WBC ($X10^9$/L)	10.17	10.93	10.50	10.00	10.30	9.40	9.63	0.64
Lymphocytes	85.20	90.54	90.24	88.06	88.91	90.01	89.71	2.60
Granulocytes	5.40 [a]	3.40 [ab]	3.19 [ab]	3.70 [ab]	3.21 [ab]	2.38 [b]	2.90 [ab]	0.59
RBC ($\times10^{12}$/L)	1.96	2.08	2.10	1.96	1.88	2.05	1.91	0.08
Hgb (g/L)	11.70 [b]	13.03 [a]	12.30 [ab]	11.60 [b]	11.00 [b]	11.97 [ab]	11.48 [b]	1.00
PCV (%)	27.08	31.27	29.48	27.79	27.74	26.91	27.57	1.53
MCV (fI)	143.66	147.67	139.33	142.66	146.67	141.00	143.00	4.41
MCH (pg)	59.84	60.23	59.02	60.69	58.99	59.65	60.12	1.02
MCHC (g/dl)	43.53	39.83	42.13	42.17	40.10	43.00	41.50	0.02
RDW	7.66 [a]	4.33 [b]	4.66 [b]	4.67 [b]	4.00 [b]	4.67 [b]	4.00 [b]	3.28
PLT	119.00	127.67	168.00	127.33	114.67	125.33	125.67	6.36
MPV%	10.02	10.47	11.32	12.05	11.66	11.68	11.92	0.31
PDW	16.60	15.80	17.27	19.00	18.13	18.47	18.67	1.23

a,b,….: Means within the same row showing different letters are significantly ($P<0.05$) different. *WBC=White Blood Cells, RBC =Red blood cells , PCV=Hematocrit , MCV =mean corpuscular volume , MCH =mean corpuscular hemoglobin, MCHC =Mean corpuscular hemoglobin concentration , RDW=Red Cell Distribution Width , PLT =Platelets, MPV=mean platelet volume, PDW =Platelet Distribution Width

Table (7): Effect of some natural feed additives on some blood biochemical constitutes of ducklings.

Parameters	Treatments							±Se
	Control	MLM		RLM		OLM		
		1%	2%	1%	2%	1%	2%	
Protein fractions:								
Total protein (g/dl)	5.40	5.47	5.57	5.47	5.37	5.43	5.40	0.06
Albumin (g/dl)	2.53 ^{c}	2.57 ^{c}	3.03 ^{ab}	3.10 ^{a}	2.87 ^{b}	2.93 ^{b}	2.87 ^{b}	0.03
Globulin (g/dl)	2.87 ^{a}	2.90 ^{a}	2.53 ^{b}	2.37 ^{b}	2.50 ^{b}	2.50 ^{b}	2.53 ^{b}	0.03
Albumin/globulin ratio	0.88 ^{c}	0.89 ^{c}	1.20 ^{ab}	1.32 ^{a}	1.15 ^{ab}	1.17 ^{ab}	1.13 ^{b}	0.01
Lipid fractions:								
Cholesterol(g/L)	184.67	266.67	183.00	191.67	187.33	191.33	240.67	26.86
Triglycerides	454.33 ^{a}	374.00 ^{ab}	253.33 ^{b}	296.67 ^{ab}	401.67 ^{ab}	344.67 ^{ab}	250.00 ^{b}	46.19
*HDL-C	142.00	150.00	163.00	114.67	114.00	137.00	162.33	3.76
Liver function:								
ALT(I.U./L)	33.67	37.33	40.00	39.67	33.00	34.00	35.67	2.33
AST(I.U./L)	32.33	35.00	35.33	34.00	34.67	32.33	38.33	0.33
Kidney function:								
Urea (mmol/L)	38.67	37.00	37.67	38.67	39.33	37.33	39.33	0.67
Creatinine (.mol/L)	1.17	1.13	1.23	1.30	1.23	1.03	1.23	0.07
Total antoxidant capacity:								
TAC	0.28 ^{e}	0.30 ^{e}	0.32 ^{d}	0.34 ^{d}	0.38 ^{c}	0.42 ^{b}	0.46 ^{a}	0.03

a,b,….: Means within the same row showing different letters are significantly (P<0.05)different.

*HDL-C = high-density lipoprotein cholesterol , TAC = total ant oxidative capacity U/mL .

Table (8): Economic efficiency of ducklings as affected by some natural feed additives.

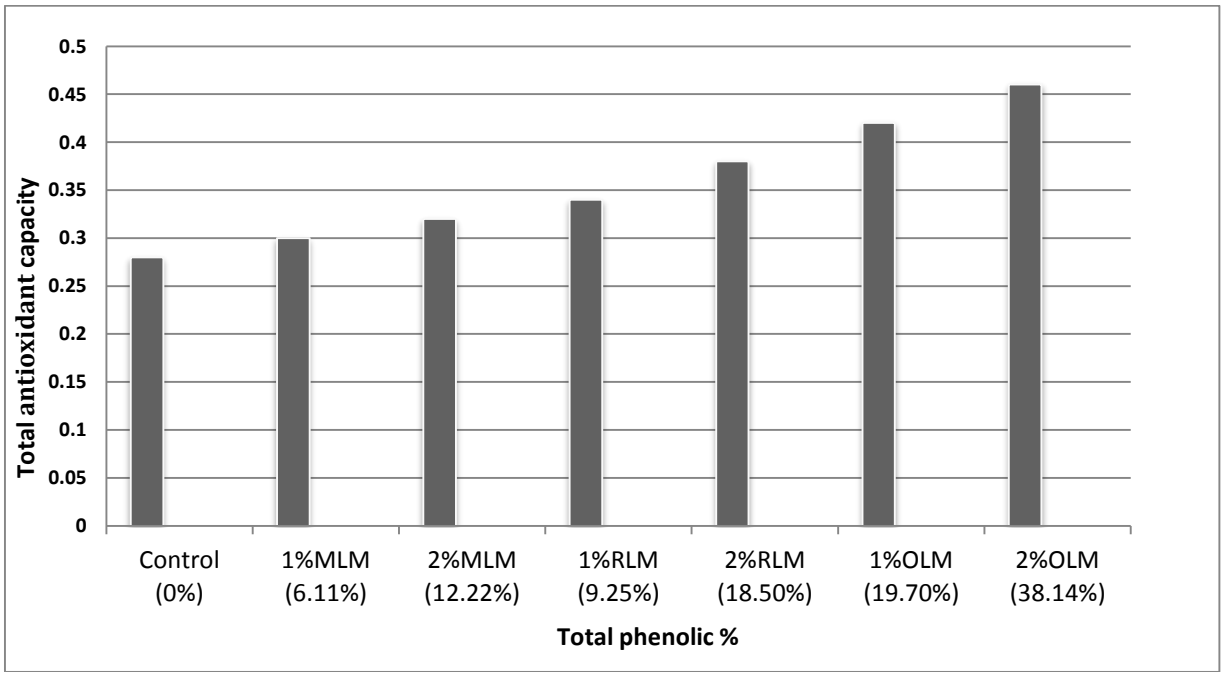
Items	Treatments						
	Control	**1% MLM**	**2% MLM**	**1% RLM**	**2% RLM**	**1% OLM**	**2% OLM**
Feed conversion ratio	3.08	2.23	2.27	2.26	2.40	2.26	2.58
Cost of Kg feed (LE)	5.25	5.23	5.16	5.22	5.19	5.24	5.24
Feed cost of kg meat (LE)	16.18	11.67	11.70	11.81	12.47	11.85	13.41
Market price of one Kg meat (LE.)	50	50	50	50	50	50	50
Net return (LE).*	33.82	38.33	38.30	38.19	37.53	38.15	36.59
Economic efficiency % (EE) of feed **	0.68	0.77	0.77	0.76	0.75	0.76	0.73
Relative economic efficiency of feed***	100	113	113	113	111	113	108

*Net return= price of one Kg meat (LE.)- Cost of Kg feed (LE)

Economic efficiency %= Net return/ price of one Kg meat (LE**).

***Relative economic efficiency% of the control, assuming that relative EE of the control = 100.

Fig. (1): Effect of total phenolic content in natural additives on total antioxidant capacity



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العربى الملخص

تأثير المواد الكيميائية النباتية والمواد الفعالة لبعض الإضافات الغذائية الطبيعية على النمو ،الخصائص المضادة للأكسدة و الكفاءة الاقتصادية للبط المسكوفي.

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تهدف الدراسة الحالية الي دراسة تاثير المواد الكيميائية النباتية و المواد الفعالة لبعض الاضافات الغذائية الطبيعية على الخصائص المضادة للأكسدة ، مكونات الدم و الكفاءة الاقتصادية للبط المسكوفي.،حيث استخدم عدد 350 كتكوت بط مسكوفي قسمت الي 7 مجاميع تجريبية تضمنت ثلاث مصادر من الاضافات النباتية وهي :مسحوق اوراق المورينجا ، مسحوق اوراق الروزماري و مسحوق اوراق الزيتون مع مستويين من الاضافة 1% أو 2%. أظهرت النتائج أن:

-أعلى قيمة لوزن الجسم الحي النهائي (4185 جم) سجلتها ا لمعاملة المضاف اليها 1%مسحوق اوراق المورينجا بينما اقل وزن حي كان للمعاملة المحتوية على 2% مسحوق اوراق الزيتون لتكون 3507جم مقارنة بالكنترول.

-حدث انخفاض معنوي في الماكول للمعاملات مقارنة بالكنترول.

-افضل معدل تحويل غذائي تم تسجيله للمجموعة المغذاه على علائق تحوي 1% مسحوق اوراق المورينجا في حين ان اعلى معامل هضم للبروتين كان 81,30% وسجلتها المجموعة المغذاه على 2% مسحوق اوراق المورينجا مقارنة بالكنترول

-الطيور المغذاه على الاضافات النباتية الطبيعية سجلت اعلى نسبة من وزن الاحشاء الماكولة و اعلى طول للقناه الهضمية مع اقل وزن نسبي للقناه الهضمية

-المعاملات الغذائية التي احتوت على 1% مسحوق اوراق الروز ماري أو 2% مسحوق اوراق الروز ماري أو 1% مسحوق اوراق الزيتون سجلت اعلى قيم للقبول العام لتذوق لحم البط مقارنة بالكنترول

- سجلت المعاملات المحتوية على اضافات طبيعية اعلى قيم للالبيومين ونسبة الالبيومين/ الجلوبيولين مقارنة بالكنترول، في حين ان اقل قيمة للجلسريدات الثلاثية كان للمعاملة المحتوية على 2% مسحوق اوراق الزيتون

-جميع المعاملات المضاف اليها اضافات طبيعية لم يكن لها تاثير على وظائف الكبد او الكلى في حين ان المقدرة الكلية على مقاومة الاكسدة زادت بزيادة % اضافة مسحوق النباتات التجريبية

-افضل كفاءة اقتصادية تم تسجيلها للمجاميع المضاف اليها 1% مسحوق اوراق المورينجا ، 2% مسحوق اوراق المورينجا، 1% مسحوق اوراق الروزماري و 1% مسحوق اوراق الزيتون

وبصفة عامة:احتواء الاضافات الغذائية النباتية على بعض المواد الكيميائية النباتية و المواد الفعالة ليس له اي تاثير سلبي لذا فان استخدامها في علائق البط المسكوفي حسنت النمو ، الاستجابة المناعية و الكفاءة الاقتصادية.