

## PHYSIOLOGICAL EFFECTS OF SOME FEED ADDITIVES UNDER DIFFERENT FEEDING REGIMES OF MUSCOVY DUCKS

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**Abstract:** *Hundred fifty, one day old Muscovy ducks were feed NRC diet ad-libitum for 2 weeks then allocated into 3 groups one feed on normal diet, the second feed on diet contain 1.0% red pepper while the 3<sup>rd</sup> one feed on diet contain 2.0% fresh garlic + 0.2% yeast. Each group were subdivided into 3 subgroups one feed ad-libitum, the second feed two times per day(7-10 am & 3-6 pm ) and the third one were eat 3 time per day (7-9 am, 12-2 pm. & 6-8 pm), with ad-libitum supply of water till 11 weeks of age where the performance parameters were evaluated.*

*The study cleared high significant difference ( $P \leq 0.05$ ) between the tested group concerning the type of feed additives specially after addition of 1.0% hot pepper in final body weight, body weight gain, feed conversion ratio, carcass weight, dressing percentage, percentage of edible and non edible part, giblet, total plasma protein, Albumen Globulin, lymphoid organs and kidney function in comparison with normal diet.*

*Concerning the tested regime of feeding, high significant deference ( $P \leq 0.05$ ) in performance parameters were recorded in group feed 2 times/day in comparison with that feed ad-libitum, but there is no difference in these parameters between the last group and that feed for 3 time per day, specially after feeding supplemented diets by pepper or garlic +yeast. The birds feed 3 time/day have mean of 50 gram less in final body weight and mean weight gain and save 686.23 gram diet per bird in comparison with ad-libitum feeding diet contain 1.0% red pepper. This figure was more wide at feeding normal diet as the difference was 121.3 g corresponding to*

consumption of 798.97 gram of diet / duck during 9 weeks. Administration of food for a short periods (not less than 3 times/day) did not interfere with duck performance but it minimize feed loss. Addition of some nutrient as red pepper, garlic & yeast improve the rate of metabolism and maximize the benefits from the swallowed food which proved to compensate the decrease in the amount of feed intake.

## INTRODUCTION

In the present study special feed additives previously described have the ability to improve productive performances in Muscovy ducks were re-evaluated from the aspect of their ability to compensate the effect of daily periodical feeding of Muscovy ducks.

Improving production performance is one of the main goals in poultry and animal production. Feed additives as garlic (*Allium sativum*) (Mohmed et.al 2000) and black seed (*Nigella sativa*) (Osman 2002) were reported to improve the productive performance, health and immunity in poultry. Moreover supplementation by these plants induce hypocholesterolemia, hypo-tipemia and hypoglycemia (Stark and Madar 1993 and El-Ghamry and El-Mallah,2002). Abdalla et al (2004) mentioned that garlic had superior results on duck performance. Moreover El-Ghamry, et al, (2004) tested several combinations of plant supplements in Muscovi duck diets and concluded that addition of fresh garlic 2% + live yeast 0.2% is the best combination to enhance the productive performance with no adverse effects on blood plasma constituents or carcass yield of Muscovy ducks. Azouze (2001) concluded that hot pepper improved body weight gain and feed conversion on the other hand, rate after its addition to broiler diets. Moreover El-Ghamry et al (2004) investigated the effect of hot pepper as natural feed additive in Muscovy ducks and concluded that 1.0% hot pepper gave the best feed conversion rate, higher giblets %, no adverse effects on blood components, and no deleterious effects on kidney function, increased total protein and albumin in plasma of birds and Increase significantly GPT, and concluded that hot pepper is good natural feed additives for improving performance of Muscovy ducklings. The food was administrated as *ad-libitum*, without comment on using special regime of feeding. Application of food for special selected periods during the days and keep it away for another periods especially in ducks may be considered as an important factor in economic feeding if it did not adversely affect on performance. In the present study productive performance of Muscovy ducks was evaluated using 3 types of diets as normal dite constructed according to NRC (1994), diet enriched by1.0% red pepper and the third one was supplemented with

fresh garlic 2% + live yeast 0.2% . These diets were administrated in 3 regimes of feeding as *ad-libitum*, two times per day and 3 times per day for special selected periods. Effect of different diets via different regimes of feeding was estimated from the aspect of its effect on ducks performance as well as economic use of the diet.

## MATERIALS AND METHODS

This study was carried out at the Poultry Farm in the Department of animal production, Faculty of Agriculture South Valley University. During the period from January to April 2008. A total number of 150 one day old unsexed Muscovy ducklings were included in the study. They were approximately similar in live body weight at this age. They were distributed randomly and allocated into 3 main groups (50 birds each). Birds were housed on floor in a closed controlled system. Indoor temperature was  $22^{\circ}\text{C}\pm 2^{\circ}\text{C}$  through out the experiment. Feed and water was supplied ad lib. diet were formulated according to NRC (1994) as in table (1). Birds fed on starter diet contain 21.75% crude protein and 2988 kcal/kg metabolized energy during the first 4 weeks of their life, changed to contain 17.98 crud protein and 3010 kca l/kg , for growing during the weeks 5-8 and adjusted finally as 16.40 crude protein and 3000 kcal/kg , from 9-11 weeks of their life. Three forms of these diets were used during the study one for each group (45 birds). The first form (feed to group - a) as that previously described. The second diet (feed to group - b) is the previous basal diet after addition of 1.0% red pepper, while the third diet (feed to group-c) is the basal diet after enrichment by fresh garlic 2% + live yeast 0.2%, both of them are according to El-Ghamry et al. (2004).

Duckling in each main groups (a , b and c) were feed *ad-libitum* during the first 2 weeks of their lives then they were subjected to 3 different feeding regime as each main group were re subdivided into 3 subgroups (15 bird each) . The first sub group (G-1) was kept feeding *ad-libitum.*, the second sub group (G-2) was fed only two times per day (3 hours duration ) at 7-10 clock at morning and 3-6 clock at the evening, while third sub-group (G-3) was fed 3 times per day (2 hours duration) as 7-9 am, 12-2 at noon and 6-8 pm. Birds in each of this 9 groups were allocated into 3 replicates, each of 5 birds for statistical analysis.

The experiment lasted till eleven weeks of age where at this time the live body weight and feed consumption per bird were evaluated. Body weight gain and feed conversation rate were calculated . Six ducks (3 male & 3 females) from each treatment were chosen randomly and slaughtered after 12 hour fastening period at the end of the experiment. Weight of

inedible part (blood, feathers, legs, head, and viscera), giblets (Gizzard, liver, & heart), lymphoid organs (spleen & bursa) was estimated and calculated as a percentage of birds live body weight. Carcass weight and dressing percentage were recorded. In order to measure plasma parameters, heparinized blood samples (10 ml each ) were obtained from the wing vein of another 3 random birds per group, the plasma was separated by centrifugation (at 3500 rpm/15 minutes) and stored at -20 until analysis. Plasma total protein , albumin, transaminases enzyme activities (GOT & GPT), triglycerides , cholesterol , high density lipoprotein (HDL) and low density lipoprotein (LDL), glucose and creatinine were determined colorimetrically using the commercial kits (Bio-Merieux, Franc and Stambio, USA). Globulin (Glb) was calculated by subtracting albumin from the total proteins.

Statistical analysis were carried out using ANOVA test. Analysis of variances were calculated using STATVIEW/SAS 1999. Significance difference of means were estimated at ( $P < 0.05$ ) using Tukey/ Kromer method via  $Y_{ij} = \mu + T_i + e_{ij}$

where  $Y_{ij}$  = observation,  $\mu$  = overall mean,  $T_i$  = treatment ( $i = 1, 2$  and  $3$ ), and  $e_{ij}$  = residual error. , (Duncan, 1955).

## RESULTS AND DISCUSSION

### 1. Effect of different feeding regimes on, body weight gain, feed intake and food conversion rate in growing Muscovy ducks

The data in table (2) cleared the effect of 3 form of diets applied by 3 different feeding regime of Muscovy duckling. Data cleared that there is no significance differences concerning the mean initial body weight among the birds at zero day of experiment as it averaged from 70-75 g. Significant differences ( $P < 0.05$ ) were recorded in final body weight, body weight gain, total feed intake and feed conversion ratio between different groups related to diet composition and feeding regime at the end of the experiment (11 weeks age). The highest collective mean final body weight ( $3723.74 \pm 17.6g$ ) and body weight gain ( $3708.94 \pm 10.3g$ ) were recorded in ducks feed on diet supplemented with 2.0% garlic + 0.2% yeast (G-c). The lowest amount of mean total feed intake ( $10100.51 \pm 121.73g$ ) and the best feed conversation ratio ( $2.78 \pm 0.14kg$ ) were recorded in group feed on diet supplemented by 1.0% red pepper (G-b). In the same time, the lowest values were recorded in group feed on normal diet.

The superiority of diet supplemented with additive in feed conversion rate and weight gain could be understood from the scope

previously described by as Soliman. (2002) and El-Ghamry et al. (2004) as addition of fresh garlic 2% + live yeast 0.2% the best combination could enhance the productive performance , improved body weight , weight gain of Muscovy ducks. Also Azouze (2001) who concluded that hot pepper improved body weight gain and feed conversion rate to broiler diets. Meanwhile, Mohamed et al, (2000) reported that garlic (5mg/hen for 3 days/week) increase body weight gain and feed consumption. This was in the contrary with Ghazalah and Ibrahim (1996) as they mentioned that garlic oile (1.25 mg/100g body weight) reduce body weight in Muscovy ducks.

Concerning the tested feeding regimes, Feed conversion ratio was significantly increased ( $P \leq 0.05$ ) for group feed 3 time/day, Final body weight and body weight gain were highest in subgroups feed *ad-libitum* with weak significant difference with the group feed 3 time/day. The lowest amount of total feed intake was recorded in group fed 2 times/day flowed by that of 3/times per day as both of them differed significantly with the group feed *ad-libitum*. It is worthy to mentione that administration of food for special period among the day appear less adequate as two time but there is no great significant difference in the estimated parameters between the group feed *ad-libitum* and that feed for 3 restricted time per day. Data in table (2-b) cleared High significant deference in the estimated parameters ( $P \leq 0.05$ ) between the groups fed on supplemented diet and that of normal diet. The supplement of diet with 1.0% red pepper appear to be the best additive as there is only 50 gram less in final body weight and mean weight gain , corresponding to 686.23 gram less in the consumed food by the group fed 3 times/day than that fed *ad-libitum*. Also, there is 57.11 g and 56.24 gram for the two previous parameters in group feed diet contain garlic + yeast , corresponding to 684.59 gram diet less. In feeding normal diet, the difference between group feeding *ad-libitum* (G-1a) and that feed 3 times/day (G-3a), is more wide as (G-1a) has 121.3 g & 121.27g in final body weight and mean weight gain more than (G-3a) and they consumed 798.97 gram of diet / duck more also during 9 weeks in comparison with that of (G-3a).

No doubt, administration of feed for short period proved to minimize the amount of feed loss as the birds still pick up the food remnants after removal of the diet it was considered as important approache specially if did not adversely effect on the productive performance of the ducks during special period.

## 2. Effect of different feeding regime on carcass yields:

Administration of 3 forms of diet by 3 regimes of feeding as in tables (4, 5 and 6) reflect significant changes ( $P \leq 0.05$ ) on the carcass characters. Highest carcass weight was associated with high live body weight, this was recorded in group feed on diet supplemented with 1.0% red pepper (G-b), followed by that in G-c in comparison with that of the control (G-a). The highest values were recorded in groups feed *ad-libitum* and that feed 3 times per day with significant difference between them and that of the group feed 2 times /day. Dressing % of different treated groups ranged between 63.38 and 69.97 with non significant difference compared to the control group per each treatment. Giblets, heart, Gizzard and liver percentage were significant higher in group feed on diet supplemented by 1.0% red pepper (G-b) followed by that of G-c and both of differed significant different ( $P < 0.05$ ) with G-a. Feeding on diet supplemented by garlic 2% & 0.2% yeast (G-c) improved lymphoid organs relative weight of ducks in comparison with the other groups. Significantly high carcass traits in group fed on hot pepper comes in agreement with Zeinab et al (2003) as dressing percentage was improved while abdominal fat percent was decreased as a result of red pepper 1.5% treatment. Moreover addition of red pepper to diet significantly decreased feed intake and improved feed conversion (Soliman, 2002). Birds did not suffer from irritations in their mouth at feeding on hot pepper as the receptor for the pungent stimuli might be deficient or absent in birds (Furuse et al., 1994), as birds have been considered to be relatively insensitive to the irritant and long inhibitory effects of capsaicin on sensory neurons (Mc Elroy et al., 1994) Addition of red pepper is known to affect energy metabolism by activating the sympathetic nervous system which decrease feed intake (Roben et al, 1996)

## 3. Effect on blood plasma:

Data in tables (7, 8 and 9) cleared that Ducks in G-b fed on diet supplemented with 1.0% red pepper, had the highest significant ( $P < 0.01$ ) values for total protein, albumin & globulin, followed by G-a while the lowest values were in G-c. Significant difference ( $P < 0.01$ ) for albumin/globulin ratio was recorded in G-c in comparison with the other 2 groups. No significant difference was recorded between different groups concerning changes in GOT, glucose and creatinine level. Plasma cholesterol, Triglycerides, total cholesterol, HDL and LDL were significantly decreased ( $P < 0.05$ ) in G-c, fed on diet contain 2% garlic + 0.2% yeast, than the other two groups specially in the sub-group (G-3c) feed 3 time per day. This was in agreement with El-Ghamry and El-Mallah, (2002) and Soliman et al. (2003) as they mentioned that the best cholesterol, HDL, and LDL

were recorded after feeding active yeast. No great difference could be detected between the sub-group (G-3) that feed 3 times per day and that feed ad-libitum (G-1) for the three tested diets, while the low values were usually recorded in groups fed 2 times/day in comparison with the other sub-groups.

It is worthy to mention that, administration of diet for special selected time during the day saves an amount of diet but it slightly reduces the rate of performance using normal (NRC) diet. This effect on performance was minimized after supplementing the diet by addition of 1.0% red pepper or by 2.0% garlic + 0.2% yeast. This may be explained as the time of feed restriction gives the bird enough time for maximum metabolism of the swallowed food and use all of the nutrient in the diet and decrease the amount of undigested food in the feces of the bird.

For conclusion, restricted feeding for 3 separate times per day did not interfere with duck performance but it minimized feed loss as the birds still pick up the food remnants after removal of the diet. Addition of some nutrient as red pepper, garlic & yeast improves the rate of metabolism and maximizes the benefits from the swallowed food which proved to appear as more economic in duck performance.

**Table (1)** the formula and the chemical composition of the used starter and grower diets.

Ingredients	Starterdiet(0-4 weeks)	Growerdiet(5-8 weeks)	Growerdiet(9-11 weeks)
Yellow corn (Kg)	63.0	72.00	75.0
Soybean meal 44% (Kg)	25.75	21.15	20.0
Protein concentrates(52%)	10.00	5.00	2.00
Wheat bran	--	--	0.50
Bone meal	0.35	1.00	1.50
Corn oil	0.75	--	--
Limestone (Kg)	--	0.50	0.50
Premix* (Kg)	--	0.15	0.20
Sodium chloride	--	0.15	0.25
DL-methionine	0.05	0.05	0.05
Total (Kg)	100.0	100	100.0
Calculated analyses			
Crud protein %	21.75	17.98	16.40
Metabolizable energy	2988	3010	3000
Calcium	1.0	0.94	0.82
Available phosphorus	0.49	0.40	0.40
Methionine	0.42	0.40	0.37
Lysine	1.08	1.00	0.85

\* Premix supplied / kg of diet : Vit. A 12000 IU, Vit. D3 2200 IU, Vit. E, 10 mg, Vit. K3, 2 mg, Vit. B1, 1 mg, Vit. B2, 4 mg, Vit. B6 1.5 mg, Vit. B12, 10 mcg, , 1.0 mg Pantothenic acid, 20 mg Nicotinic acid, 1.0 mg Folic acid, Biotin 50 mcg; Chlorine 500 mg; Copper 10 mg; Iodine 1.0mg; , Iron 30 mg; Manganese 55 gm, Zinc 50 gm ; Selenium 0.1 mg and Cobalt 0.1 mg.

**Table (2):** Effect of different feeding regimes on, body weight gain feed intake, And food conversion rate in growing Muscovy ducks (Mean  $\pm$  SE)

Feeding Regimes	Initial body weight (g) at hatching day	Final body weight (g) at 11 weeks old	Body weight gain (g) at 11 weeks old	Total feed intake (g) from 0-11 weeks	* Feed conversion ratio (Kg) from 0-11 weeks
<b>G-1(a): Feed <i>ad-libitum</i></b>	73.22 $\pm$ 2.22	3663.43 $\pm$ 25.1 <sup>b</sup>	3590.21 $\pm$ 11.3 <sup>b</sup>	11454.20 $\pm$ 124.6 <sup>ab</sup>	3.19 $\pm$ 0.14 <sup>a</sup>
<b>G-2(a): feed 2 times/day</b>	74.10 $\pm$ 1.11	3459.32 $\pm$ 20.2 <sup>c</sup>	3385.22 $\pm$ 22.3 <sup>c</sup>	9866.35 $\pm$ 121.2 <sup>c</sup>	2.91 $\pm$ 0.12 <sup>b</sup>
<b>G-3(a): feed 3 times /day</b>	73.13 $\pm$ 1.4	3542.13 $\pm$ 12.5 <sup>bc</sup>	3469.0 $\pm$ 15.4 <sup>c</sup>	10655.23 $\pm$ 125.5 <sup>b</sup>	3.07 $\pm$ 0.24 <sup>ab</sup>
<b>Collective mean</b>	<b>73.48 <math>\pm</math> 1.58</b>	<b>3554.96 <math>\pm</math> 19.3</b>	<b>3481.48 <math>\pm</math> 16.3</b>	<b>10658.59 <math>\pm</math> 123.79</b>	<b>3.06 <math>\pm</math> 0.16</b>
<b>G-1(b): Feed <i>ad-libitum</i></b>	74.15 $\pm$ 1.0	3789.25 $\pm$ 8.25 <sup>a</sup>	3715.10 $\pm$ 8.22 <sup>a</sup>	10665.55 $\pm$ 102.5 <sup>bc</sup>	2.87 $\pm$ 0.10 <sup>bc</sup>
<b>G-2(b): feed 2 times/day</b>	73.21 $\pm$ 0.9	3599.24 $\pm$ 16.25 <sup>bc</sup>	3526.03 $\pm$ 22.2 <sup>b</sup>	9656.65 $\pm$ 109.5 <sup>c</sup>	2.74 $\pm$ 0.13 <sup>c</sup>
<b>G-3(b): feed 3 times /day</b>	73.22 $\pm$ 1.3	3738.32 $\pm$ 6.33 <sup>ab</sup>	3665.10 $\pm$ 15.5 <sup>ab</sup>	9979.32 $\pm$ 153.2 <sup>c</sup>	2.72 $\pm$ 0.18 <sup>c</sup>
<b>Collective mean</b>	<b>73.52 <math>\pm</math> 1.1</b>	<b>3708.94 <math>\pm</math> 10.3</b>	<b>3635.41 <math>\pm</math> 15.3</b>	<b>10100.51 <math>\pm</math> 121.73</b>	<b>2.78 <math>\pm</math> 0.14</b>
<b>G-1(c): Feed <i>ad-libitum</i></b>	74.09 $\pm$ 1.3	3779.55 $\pm$ 15.18 <sup>a</sup>	3705.46 $\pm$ 17.11 <sup>a</sup>	11335.25 $\pm$ 122.35 <sup>ab</sup>	3.06 $\pm$ 0.25 <sup>ab</sup>
<b>G-2(c): feed 2 times/day</b>	74.11 $\pm$ 0.50	3669.24 $\pm$ 25.11 <sup>b</sup>	3595.13 $\pm$ 25.5 <sup>b</sup>	10785.55 $\pm$ 125.6 <sup>bc</sup>	3.0 $\pm$ 0.12 <sup>ab</sup>
<b>G-3(c): feed 3 times /day</b>	73.22 $\pm$ 1.92	3722.44 $\pm$ 12.55 <sup>ab</sup>	3649.22 $\pm$ 32.7 <sup>ab</sup>	10650.66 $\pm$ 150.3 <sup>bc</sup>	2.92 $\pm$ 0.11 <sup>bc</sup>
<b>Collective mean</b>	<b>73.81 <math>\pm</math> 1.24</b>	<b>3723.74 <math>\pm</math> 17.82</b>	<b>3649.94 <math>\pm</math> 25.1</b>	<b>10923.82 <math>\pm</math> 132.75</b>	<b>2.99 <math>\pm</math> 0.16</b>
	<b>Non sig.</b>	<b>P&lt;0.05</b>	<b>P&lt;0.05</b>	<b>P&lt;0.05</b>	<b>P&lt;0.05</b>

\* Within each column means super scribed with different letters are significantly different (P<0.05).



**Table (3)** Mean difference between Group feed ad-libitum and that feed 3 times per day in some parameters/duck

Type of diet	Difference in Final body weight (gram)	Difference in Body weight gain (gram)	Difference in feed Intake (g ram)
Normal diet	121.3 ±14.5g	121.27± 11.5g	798.97±21.5 g
Diet contain 1.0% red pepper	50.93±2.2 g	50.0 ±2.6g	686.23±18.6 g
Diet contain 2% garlic+0.2% yeast	57.11±6.3 g	56.24±6.2 g	684.56±23.5 g

**Table (4)** Effect of normal diet on carcass yields of Muscovy ducks (at 11 weeks old)( X ± SE )

	Normal diet (a)		
	G-1(a)	G-2 (a)	G-3 (a)
Live body weight (Kg)	3.66± 0.025 <sup>b</sup>	3.45±0.02 <sup>c</sup>	3.54±0.012 <sup>bc</sup>
Carcass weight (Kg)	2.55±0.04 <sup>a</sup>	2.20±0.12 <sup>c</sup>	2.42±0.22 <sup>b</sup>
Dressing %*	69.67±0.40 <sup>a</sup>	63.76±0.33 <sup>b</sup>	68.36±0.25 <sup>a</sup>
Edible part (%)	78.78±0.51 <sup>a</sup>	76.95±0.20 <sup>ab</sup>	77.54±0.33 <sup>a</sup>
Inedible parts %**	21.22± 0.44 <sup>ab</sup>	23.05±0.33 <sup>a</sup>	22.46±0.26 <sup>a</sup>
Giblets (%)	5.77±0.08 <sup>b</sup>	5.29±0.05 <sup>c</sup>	5.65±0.25 <sup>b</sup>
Heart (%)	0.67±0.06 <sup>bc</sup>	0.62±0.05 <sup>c</sup>	0.66±0.04 <sup>bc</sup>
Gizzard (%)	3.22±0.15 <sup>bc</sup>	3.05±0.20 <sup>c</sup>	3.20±0.12 <sup>bc</sup>
Liver (%)	1.88±0.07 <sup>b</sup>	1.62±0.06 <sup>c</sup>	1.79±0.12 <sup>bc</sup>
Lymphoid organs:-			
Spleen (%)	0.08±0.01 <sup>bc</sup>	0.07±0.02 <sup>c</sup>	0.07±0.04 <sup>c</sup>
Bursa (%)	0.12±0.01 <sup>c</sup>	0.11±0.02 <sup>c</sup>	0.11±0.03 <sup>c</sup>

**Table (5)** Effect of diet contain 1.0% hot pepper on carcass yields of Muscovy ducks (at 11 weeks old) ( X ± SE )

	Diet contain 1.0% hot pepper (b)		
	G-1(b)	G-2 (b)	G-3 (b)
Live body weight (Kg)	3.78 ±0.08 <sup>a</sup>	3.59±0.016 <sup>bc</sup>	3.73±0.06 <sup>ab</sup>
Carcass weight (Kg)	2.63±0.22 <sup>a</sup>	2.28±0.20 <sup>c</sup>	2.61±0.25 <sup>a</sup>
Dressing %*	69.57±0.52 <sup>a</sup>	63.50±0.66 <sup>b</sup>	69.97±0.33
Edible part (%)	78.89±0.33 <sup>a</sup>	76.95±1.35	77.86±2.35 <sup>ab</sup>
Inedible parts %**	21.11±0.32 <sup>b</sup>	23.05±0.66 <sup>a</sup>	22.14±0.53 <sup>ab</sup>
Giblets (%)	6.76±0.18 <sup>a</sup>	6.12±0.2 <sup>a</sup>	6.66±0.2 <sup>a</sup>
Heart (%)	0.75±0.15 <sup>a</sup>	0.69±0.06 <sup>b</sup>	0.74±0.12 <sup>a</sup>
Gizzard (%)	3.8±0.22 <sup>a</sup>	3.4±0.22 <sup>b</sup>	3.73±0.14 <sup>a</sup>
Liver (%)	2.21±0.07 <sup>a</sup>	2.03±0.08 <sup>ab</sup>	2.19±0.12 <sup>a</sup>
Lymphoid organs:-			
Spleen (%)	0.08±0.01 <sup>bc</sup>	0.08±0.02 <sup>bc</sup>	0.08±0.04 <sup>bc</sup>
Bursa (%)	0.13±0.01 <sup>bc</sup>	0.12±0.05 <sup>bc</sup>	0.13±0.05 <sup>bc</sup>

**Table (6)** Effect of diet contain Garlic 2% + Yeast 0.2% on carcass yields of Muscovy ducks (at 11 weeks old) ( $X \pm SE$ )

	Diet contain Garlic 2% + Yeast 0.2% (c)		
	G-1(c)	G-2 (c)	G-3 (c)
Live body weight (Kg)	3.77 ±0.015 <sup>a</sup>	3.66±0.025 <sup>b</sup>	3.72±0.12 <sup>ab</sup>
Carcass weight (Kg)	2.58±0.05 <sup>a</sup>	2.32±0.35 <sup>bc</sup>	2.52±0.23 <sup>a</sup>
Dressing % *	68.43±0.33 <sup>a</sup>	63.38±0.66 <sup>b</sup>	67.74±0.25 <sup>ab</sup>
Edible part (%)	79.28±0.55 <sup>a</sup>	76.55±1.56 <sup>ab</sup>	78.33±0.65 <sup>a</sup>
Inedible parts % **	20.72±0.44 <sup>c</sup>	23.45±0.66 <sup>a</sup>	21.67±0.13
Giblets (%)	5.67±0.11 <sup>b</sup>	5.27±0.12 <sup>c</sup>	5.57±0.20 <sup>b</sup>
Heart (%)	0.66±0.05 <sup>bc</sup>	0.60±0.13 <sup>c</sup>	0.65±0.02 <sup>bc</sup>
Gizzard (%)	3.33±0.22 <sup>bc</sup>	3.11±0.05 <sup>c</sup>	3.30±0.07 <sup>b</sup>
Liver (%)	1.68±0.08 <sup>bc</sup>	1.56±0.06 <sup>c</sup>	1.62±0.05 <sup>c</sup>
Lymphoid organs:-			
Spleen (%)	0.09±0.02 <sup>b</sup>	0.08±0.05 <sup>bc</sup>	0.09±0.01 <sup>b</sup>
Bursa (%)	0.16±0.03 <sup>b</sup>	0.15±0.04 <sup>b</sup>	0.16±0.03 <sup>b</sup>

\* Dressing percentage was calculated as percentage carcass weights relative to live body weight

\*\* Inedible parts include blood, feathers, legs, head and viscera.

Within each row means super scribed with different letters are significantly different ( $P<0.05$ ).

**Table (7)** Effect of normal diet on Plasma constituents of Muscovy ducks (at 11 weeks old) ( $X \pm SE$ )

	Normal diet (a)			
	G-1(a)	G-2 (a)	G-3 (a)	G-3 (c)
Total protein (g/dl)	2.80±0.03 <sup>bc</sup>	2.64±0.03 <sup>bc</sup>	2.75±0.05 <sup>bc</sup>	2.33±0.05 <sup>c</sup>
Albumin (g/dl)	1.27±0.02 <sup>b</sup>	1.21±0.03 <sup>b</sup>	1.26±0.03 <sup>b</sup>	1.13±0.08 <sup>c</sup>
Globulin (g/dl)	1.53±0.05 <sup>b</sup>	1.43±0.02 <sup>b</sup>	1.49±0.03 <sup>b</sup>	1.20±0.03 <sup>c</sup>
Albumin / globulin ratio	0.83±0.02 <sup>b</sup>	0.84±0.01 <sup>b</sup>	0.84±0.03 <sup>b</sup>	0.94±0.16 <sup>a</sup>
GOT (IU/L)*	37.70±0.03	37.50±0.04	37.85±0.03	36.80±0.02
GPT (IU/L)	6.90±0.32 <sup>b</sup>	6.85±0.32 <sup>b</sup>	6.88±0.66 <sup>b</sup>	5.00±0.16 <sup>c</sup>
Glucose (G/dl)*	188.00±2.25	182.33±1.25	185.22±1.66	198.33±3.10
Creatinine (mg/dl)*	0.28±0.02	0.28±0.03	0.28±0.02	0.28±0.04
Triglycerides (mg/dl)	69.11±0.75 <sup>b</sup>	69.22±0.65 <sup>b</sup>	69.33±0.33 <sup>b</sup>	56.22±1.66 <sup>c</sup>
Total cholesterol (mg/dl)	125.00±2.75 <sup>b</sup>	124.12±1.99 <sup>b</sup>	125.23±2.44 <sup>b</sup>	122.66±1.33 <sup>bc</sup>
HDL (mg/dl)	32.90±0.58 <sup>bc</sup>	32.41±0.32 <sup>bc</sup>	32.70±0.41 <sup>bc</sup>	36.55±0.44 <sup>a</sup>
LDL (mg/dl)	84.05±3.22 <sup>a</sup>	83.5±2.33 <sup>a</sup>	84.0±2.54 <sup>a</sup>	67.59±2.42 <sup>cd</sup>

**Table (8)** Effect of diet contain 1.0% hot pepper on Plasma constituents of Muscovy ducks (at 11 weeks old) (  $\bar{X} \pm SE$  )

	Diet contain 1.0% hot pepper (b)		
	G-1(b)	G-2 (b)	G-3 (b)
<b>Total protein (g/dl)</b>	2.95± 0.04 <sup>b</sup>	2.90±0.06 <sup>b</sup>	2.94±0.05 <sup>b</sup>
<b>Albumin (g/dl)</b>	1.38±0.02 <sup>b</sup>	1.31±0.03 <sup>b</sup>	1.39±0.04 <sup>ab</sup>
<b>Globulin (g/dl)</b>	1.57±0.01 <sup>ab</sup>	1.58± 0.02 <sup>ab</sup>	1.55±0.01 <sup>ab</sup>
<b>Albumin / globulin ratio</b>	0.87± 0.01 <sup>b</sup>	0.82±0.11 <sup>b</sup>	0.89±0.04 <sup>ab</sup>
<b>GOT (IU/L)*</b>	37.80±0.02	37.22±0.03	37.88±0.06
<b>GPT (IU/L)</b>	7.80±0.05 <sup>a</sup>	7.66±0.33 <sup>a</sup>	7.82±0.04 <sup>a</sup>
<b>Glucose (G/dl)*</b>	210.12±2.23	200.33±2.66	208.26±2.33
<b>Creatinine (mg/dl)*</b>	0.28±0.03	0.28±0.02	0.28±0.04
<b>Triglycerides (mg/dl)</b>	72.20±1.15 <sup>ab</sup>	69.16±1.36 <sup>b</sup>	71.20±2.25 <sup>ab</sup>
<b>Total cholesterol (mg/dl)</b>	136.12±2.50 <sup>a</sup>	129.13±2.42 <sup>ab</sup>	134.24±3.21 <sup>a</sup>
<b>HDL (mg/dl)</b>	33.88±0.75 <sup>b</sup>	33.60±0.52 <sup>b</sup>	33.46±0.66 <sup>b</sup>
<b>LDL (mg/dL)</b>	80.25±2.50 <sup>b</sup>	82.3±3.66 <sup>b</sup>	81.1±2.50 <sup>b</sup>

**Table (9)** Effect of diet contain Garlic 2% + Yeast 0.2% on Plasma constituents of Muscovy ducks (at 11 weeks old) (  $\bar{X} \pm SE$  )

	Diet contain Garlic 2% + Yeast 0.2% (c)		
	G-1(c)	G-2 (c)	G-3 (c)
<b>Total protein (g/dl)</b>	2.35±0.20 <sup>c</sup>	2.30±0.02 <sup>c</sup>	2.33±0.05 <sup>c</sup>
<b>Albumin (g/dl)</b>	1.16±0.04 <sup>c</sup>	1.10±0.03 <sup>c</sup>	1.13±0.08 <sup>c</sup>
<b>Globulin (g/dl)</b>	1.25±0.05 <sup>c</sup>	1.20±0.11 <sup>c</sup>	1.20±0.03 <sup>c</sup>
<b>Albumin / globulin ratio</b>	0.92±0.02 <sup>a</sup>	0.91±0.06 <sup>a</sup>	0.94±0.16 <sup>a</sup>
<b>GOT (IU/L)*</b>	36.60±0.03	36.00±0.04	36.80±0.02
<b>GPT (IU/L)</b>	4.50±0.05 <sup>d</sup>	5.20±0.06 <sup>c</sup>	5.00±0.16 <sup>c</sup>
<b>Glucose (G/dl)*</b>	201.10±2.35	198.22±2.66	198.33±3.10
<b>Creatinine (mg/dl)*</b>	0.28±0.04	0.27±0.03	0.28±0.04
<b>Triglycerides (mg/dl)</b>	54.00±1.25 <sup>c</sup>	58.11±1.33 <sup>d</sup>	56.22±1.66 <sup>c</sup>
<b>Total cholesterol (mg/dl)</b>	122.00±2.52 <sup>bc</sup>	125.00±2.33 <sup>b</sup>	122.66±1.33 <sup>bc</sup>
<b>HDL (mg/dl)</b>	38.75±0.55 <sup>a</sup>	33.56±0.30	36.55±0.44 <sup>a</sup>
<b>LDL (mg/dL)</b>	66.25±2.35 <sup>d</sup>	70.33±3.35 <sup>c</sup>	67.59±2.42 <sup>cd</sup>

Within each row means super scribed with different letters are significantly different (P<0.05).

\*The difference in GOT , Glucose and Creatinine between groups are non significant

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## الملخص العربي

### التأثير الفسيولوجي لبعض الإضافات الغذائية تحت النظم الغذائية المختلفة على بعض الصفات في البط المسكوفي

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أوضحت دراسات سابقة أن إضافة الفلفل الأحمر أو الثوم بمفرده أو مع الخميرة له اثر جيد على معدلات انتاج اللحم ورفع معدلات التحول الغذائي للبط المسكوفي ، وفي هذه الدراسة تمت محاولة الاستفادة من قدرة هذه الإضافات على تمكين الطائر من الحصول على أعلى فائدة ممكنة من الغذاء الذي يتلعه وتقليل معدلات التهامه أطعمة قد لا يستفيد منها وذلك بمقارنة 3 أنواع من العلائق {العليقة الأساسية ، عليقة أساسية مضاف إليها الفلفل الحار بنسبة 1%} ، (و عليقة أساسية مضاف إليها الثوم الطازج بنسبة 2%) ، + (الخميرة الحية بنسبة 0.2%) { حيث تم تغذية البط بعد عمر أسبوعين على كل عليقة باستخدام 3 أنظمة تغذية شملت تقديم الطعام طوال اليوم ، تقديمه مرتين في اليوم لفترة 3 ساعات متصلة (7-10) صباحا و 3-6 عصرا (و تقديمه 3 مرات في اليوم لفترة 2 ساعة متصلة (7-9) صباحا ، 2-12 ظهرا و 6-8 مساء (وقد تم تقديم الماء دون انقطاع في كل الحالات.

وفيما يخص وجود الإضافات الغذائية أوضحت النتائج وجود فروق معنوية ( $P \leq 0.05$ ) في معدلات التحول الغذائي والوزن الحي و مواصفات الذبيحة ، دون تسجيل خلل في مكونات بلازما الدم أو في وظائف الكبد والكلية في الطيور المغذاة على العلائق المحسنة مقارنة بالعليقة العادية .

وفيما يخص أنظمة التغذية على فترات كان هناك نقص معنوي ( $P \leq 0.05$ ) في الصفات السابقة بين المجموعة المغذاة لفترتين في اليوم مقارنة بتلك التي تتغذى حتى الشبع صاحبة بالطبع نقص في كمية الغذاء المبتلع لكل طائر خلال فترة التجربة (11) اسبوع . (بينما لم يكن هناك فروق كبيرة في القياسات السابقة بين المجموعات التي تم تغذيتها 3 مرات يوميا مقارنة بتلك التي تغذت حتى الشبع بل كان هناك عائد اقتصادي خاصة في المجموعات التي تغذت على العلائق المدعمة بالإضافات الغذائية حيث لم يزد الفرق بين المجموعتين عن 50 جرام في متوسط وزن الجسم قابلة توفير في كمية الغذاء المبتلع بلغت 686.7 جرام أثناء فترة التغذية لكل الطائر، الأمر الذي يوضح ان وجود الإضافات الغذائية المختارة عوض النقص الناتج عن التهام المزيد من الطعام حيث أن الإطعام على فترات (لا تقل عن 3 يوميا (أدى إلى تقليل معدلات الفقد في الغذاء ومكن الجسم من الحصول على أعلى استفادة من الطعام الذي تناوله بما يعود بالفائدة الاقتصادية على مربى البط المسكوفي كما هو موضح بالبحث.