J. Agric. Sci. Mansoura Univ., 29 (11): 6095 - 6104, 2004

THE INFLUENCE OF USING FRESH GARLIC, BLACK AND HOT PEPPER AS NATURAL GROWTH PROMOTERS ON PERFORMANCE, CARCASS CHARACTERISTICS, BLOOD CONSTITUENTS AND ECONOMIC EFFICIENCY OF JAPANESE QUAIL.

El Yamny, A. T.
Department of Animal Production, National Research Center, Dokki, Egypt.

ABSTRACT

Five hundred and twenty five, one-day old, unsexed Japanese quails (coturnix coturnix japonica) were randomly divided into 7 groups (75 birds each), each group contained 3 replicates of 25 birds each. The first group was fed diet with 24% CP and 3011 kcal ME/kg (control), whereas groups (2, 3 and 4) were fed the control diet supplemented with fresh garlic, black pepper and hot pepper at levels 1, 0.05 and 0.05%, respectively. Groups (5, 6 and 7) were fed also the control diet supplemented with fresh garlic, black pepper and hot pepper at levels 2, 0.1 and 0.1%, respectively. All experimental birds were reared under similar management conditions up till 42 day of age.

The results showed that all additives used either in low or high levels improved significantly ($P \leq 0.05$) live body weight which was increased significantly ($p \leq 0.05$) with increasing the level of either garlic, black or hot pepper. Live body weight gain followed the same trend. A significant increase ($P \leq 0.05$) in feed consumption was noticed in groups fed diets supplemented with hot and black pepper at either low or high level and group supplemented wiht garlic at high level. The use of high level of either black or hot pepper improved significantly ($P \leq 0.05$) the feed conversion at 21 day of age, while the addition of all the tested growth promoters at any level improved feed conversion during the period from 21-42 day of age and allover the experimental period.

No significant effect was recorded on dressing, edible giblet and offal percentage. It is worthy to note that either hot pepper, black pepper or garlic at all levels tested improved significantly ($p \leq 0.05$) dressing percentage. Serum content of total protein, albumin, globulin, glucose, creatinine, AST and ALT of treated groups were significantly ($P \leq 0.05$) higher than those of the control group. While, total cholesterol was reduced significantly ($p \leq 0.05$) by feeding garlic, black and hot pepper. From the results of economic efficiency it could be recommended to use either garlic at 1 and 2%, black pepper at 0.05% and hot pepper at 0.05 and 0.1% levels to get the best values of feeding Japanese quail on diets containing 24% CP and 3011 Kcal ME/Kg.

INTRODUCTION

Supplementation of medicinal plants, herbs and spices as feed additives or natural growth promoters are recently used for improving the feed utilization efficiency, reducing blood cholesterol, providing some protection against diseases, increasing the immunity of quail and subsequently improving their productive performance through different modes of action. Garlic, hot pepper and black peper are some of these materials.

Garlic (Allium sativum) is widely distributed and used in all areas of the world. It has antibacterial, antifungal, antitoxic, antioxidant and anti parasitic properties (Prasad and Sharma, 1981; Nafady, *et al.*, 1990; El-Badri and Abu-El Magd, 1992 and Hanafy *et al.*, 1994). Abdo (1998) revealed that garlic at 3% in broiler diets recorded the best findings of growth. Soliman *et al.*, (1999) reported that 3% of fresh garlic leads to preferable performance parameters, and increased immunity and viability of broiler chickens.

Mohamed *et al.*, (2000) reported that garlic increases body weight, feed consumption and egg production in fayoumi hens. El Ghamry *et al.*, (2002) concluded that use of fresh garlic in broiler chickens diets at 2% levels caused better growth performance and livability and the best level of plasma cholesterol and high density lipoprotein (HDL). Unnikrishnan and kuttan (1990) found that oral administration of extracts of black pepper and garlic increased the percentage of life span of mice transplanted intraperitoneally with Ehrlich ascites tumor.

Al Harthi (2002) indicated that 0.2% of black pepper resulted in the best growth and feed conversion than control. *Garland (1993)* and. *Chevalier (1996)* concluded that black pepper improves the digestive function, and it has also antiseptic and antibacterial activity.

The principle pungent material in various types of hot pepper is capsaicin, a compound wich represents an extensively investigated group of compounds called capsaicinoids. The capsaicinoid content of various pepper varieties is generally reported to range from 0.2 to 1% and above 1% in very pungent varieties *(Davide, 1995). MC Elroy et al. (1994)* found that continual dietary capsaicin administration increased resistance to salmonella enteritis colonization and organ invasion throughout the normal growth period without detrimental effects on growth of the broiler chickens.

Capsaicin is the spicy component of hot pepper (Chevaliar, 1996). Al Harthi (2002) indicated that hot pepper at 0.1% insignificantly improved broiler growth by 7.8%, feed conversion ratio by 8.3% and economic efficiency by 8.1% compared to the control diet. However, hot pepper improved body weight gain and feed conversion (Azouz, 2001).

This study aimed to evaluate the effect of supplementation of garlic, hot and black pepper as natural feed additives in Japanese quail diet on performance, carcass characteristics, blood constituents and economic efficiency.

MATERIALS AND METHODS

The present study was carried out at the Department of Animal Production, National Research Center, Dokki, Giza, Egypt. The feeding trial of the work was conducted, however, in Abd El-Monem Ryad Villag experimental station belongs to NRC, Nobaria, Beheira Province.

Birds management

Five hundred and twenty five, one-day old, unsexed Japanese quails were maintained in electrically heated battery cages housed in environmental controlled room. Free access of water and mash form of feed were offered ad

libitum. The birds were divided into 7 groups (75 birds each). Each group contained 3 replicates of 25 birds each.

Diets

All diets contained adequate amounts of nutrients for growing Japanese quail as recommended by the National Research Council (NRC, 1994).
Table (1) show the chemical compostion and calculated analysis of the experimental diets. The chemical analysis of diets were conducted according to A. O. A. C (1990). The first group was fed diet with 24.05 CP and 3011 kcal ME/kg (control), whereas groups (2, 3 and 4) were fed the control diet supplemented with fresh garlic, black pepper and hot pepper at levels 1, 0.05 and 0.05%, respectively. Groups 5, 6 and 7 were fed also the control diet supplemented with fresh garlic, black pepper and hot pepper at levels 2, 0.1 and 0.1%, respectively.

Table (1) Composition and calculated analyses of the control diet

Ingredient	%
Ground yellow corn	52
Protein concentrate (52% CP)*	10
Soybean meal (44% CP)	35
Poultry fat	2
Vitamins & minerals mixture **	0.5
Na Cl	0.4
Dl- Methionine	0.1
Total	100
Chemical analysis:	
Crude protein, %	24.05
Crude fiber, %	3.37
Ether extract, %	3.20
Calculated analysis:	
Metabolizable energy, kcal/kg	3011
Calcium, %	1.15
Available phosphorus, %	0.51
Methionine and cystine, %	0.80
Lysine, %	1.03

*** Protein concentrate contains: ME (kcal/kg) 2416, CP. 52%, CF, 1.57% EE, 6.17%, Ca. 7% available P. 3.5%, Meth. 1.52%, Meth + cystine. 2.11% and lysine 2.98%. Each 1 kg protein concentrate contains: 12000 IU Vit. A acetate; 21000 IU Vit. D_3; 100 mg Vit. E acetate; 21 mg Vit. K3; 10 mg Vit. B_1; 40 mg VitB_9; 15 mg Vit. B_6; 100 mg Vit. B_{12}; 100 mg choline, 50 mg copper, 5 mg iodine, 300 mg iron, 600 mg Mang.; 450 mg Zinc, 1 mg selenium, 1250 mg anti-oxidant, 2500 mg coccidiostats.**

**** Each 2.5 kg of vitamins and minerals mixture contain:**
12000.000 IU vitamin A acetate; 2000.000 IU vitamin D; 10.000 mg vitamin E acetate; 2000 mg vitamin k_3; 100 mg vitamin B_1; 4000 mg vitamin B_2; 1500 mg vitamin B_6; 10 mg vitamin B_{12}; 10.000 mg pantothenic acid; 20.000 mg Nicotinic acid; 1000 mg folic acid; 50 mg Biotin; 500.000 mg choline; 10.000 mg copper; 1000 mg iodine, 300.00 mg 300.00 mg iron; 55.000 mg Managanese; 55.000 mg zinc, and 100 mg Selenium.

Performance Traits:

For each group of birds, individual body weight and feed consumption were recorded at one, 21 and 42 day of age. Body weight gain and feed conversion (feed/gain) were calculated during the entire period.

Carcass characteristics and blood serum analysis

At the and of feeding period, sixty three fasted quails (3 from each replicate within each group) were randomly selected and slaughtered to determine dressing % (eviscerated carcass without head, neck and legs), offals (head, legs and feather) and edible giblets (gizzard, liver and heart).
Individual blood samples were collected during exsanguinations and immediately centrifuged at 3500 rpm/15 minutes. Serum were harvested after centrifugation and stored in a deep freezer at –20 oC until time of analysis.
Blood serum biochemical variables were analyzed in Medical Service Unit, National Research Center, Dokki, Egypt.

Serum total protein, albumin (gm/100ml) glucose, creatinine, alanine amino trans ferase (ALT) aspartate amino trans ferase (AST) and total cholesterol were determined by using commercial kits purchased from Bio-Merieux (Motcyl Etios charbon Mierels Rains (France), while globulin (GLB) and albumen globulin ratio (A/G) were calculated.

Economical Efficiency:

Cost of one kilogram feed was calculated based on the prices of feed supplements and that of the control diet. The cost of feed/kg gain was calculated based on the cost of one kilogram feed and feed conversion (feed/gain) ratio. The economic efficiency was expressed as a percent of net revenue/feed cost.

Statistical analysis:

Data were statistically analyzed using the general linear model for analysis of variance of SAS (SAS, 1996). Test of significance for the differences between means of different levels within each classification was done by Duncun's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Quails performance

The effects of dietary treatments on Japanese quail performance are presented in Table (2). The results showed that all tested additives used in low and high levels improved significantly ($p \leq 0.05$) live body weight at 21 and 42 day of age, in which the live body weight values increased significantly ($p \leq 0.05$) with increasing the level of wither garlic, black or hot pepper. Live body weight gain followed the same trend. A significant increase ($p \leq 0.05$) in feed consumption was noticed in groups fed diet supplemented either with hot or black pepper at low and high levels and with garlic at high level only compared with control group either during 21-42 day of age or allover the experimental period (1 – 42 day). The use of of garlic, black and hot pepper improved significantly ($p \leq 0.05$) the feed conversion either at (1-21), (21-42) or (1-42) day of age. These results agree with those reported by Azouz (2001) who found that addition of hot pepper to diets, irrespective of energy level resulted in significantly ($p < 0.05$) the heaviest live body weight and body weight gain. In this respect, Soliman (2002) indicated that supplementing red pepper at either 1.5 or 3% improved the utilization of low

energy diets. El-Ghamry *et al.*, (2004) concluded that hot pepper is a good natural feed additive for improving performance of Muscovy duck. Al Harthi (2002) showed an improvement in growth and feed conversion of chicks fed diet supplemented with 0.05% black pepper, 0.1 or 0.15% hot pepper, 0.05 or 0.1% garlic or 0.15% cenella. when compared with the control diet without supplementation. Abdo (1998) reported that either fresh garlic at 3% or more or 0.3% black seed in broilers diets gave the best findings of growth, meat quality and immunity. Seemingly Soliman et al, (1999) reported that 3% of fresh garlic leads to preferable performance parameters, and increased immunity and viability of broiler chickens.

Carcass characteristics

The results of carcass traits of quails are tabulated in Table (3). No significant effect was recorded on both edible giblet (gizzards liver and heart) and offals (blood, feather, legs, head and viscera) percentage due to the dietary treatments. It is worthy to note that either hot pepper, black pepper or fresh garlic at the tested levels improved dressing percentage. This data is in agreement with those published by *Azouz (2001)* and *Zeinab et al. (2003)* who found that dressing % was improved, while abdominal fat % was decreased as a result of using hot pepper at 1.5% in broilers diets.

Blood components:

The results of the blood constituents as affected by tested growth promoters are shown in Table (4). Total protein, albumin, globulin, glucose, creatinine AST and ALT of groups having garlic, black pepper and hot pepper either in low or high levels were significantly ($p \leq 0.05$) higher than the control. These results are in agreement with *Azouz (2001)* who found that red pepper increased significantly ($p \leq 0.05$) blood total protein, at the same time, creatinine levels (Kidneys function) and AST and ALT activity (liver function) improved as a result of addition of hot pepper in diets of broiler chickens. The results show that serum cholesterol level was reduced significantly by feeding either garlic, black pepper or hot pepper. This finding agrees with those obtained by *El Deeb (1994)*, *Shella and Augusti (1995)* and *Ghazalah and Ibrahim (1996)* who found the same results by feeding either garlic or onion. Also, the results of *Azouz (2001)* found that cholesterol was decreased by increasing the level of hot pepper.

Economic Efficiency

The economic efficiency for values quails fed experimental diets during the growth period (1 – 42 days) are summarized in Table (5). The results showed that diet contained 1% garlic had the best value 52.07% while black pepper at level 0.1% recorded the lowest income due to the higher cost of black pepper which reflects on the net income. The other treated groups recorded higher percentage of economic efficiency than the control. In general, it could be recommended to use garlic at levels 1 and 2%, black pepper at level 0.05% and hot pepper at 0.05 and 0.1% levels in Japanese quail diet during the growth period (1-42 day) in order to get higher economic efficiency without adverse effects either on the performance or the physiological parameters.

Table (2) Effect of dietary treatments on the performance of growing Japanese quail

Items	Control	Low level			High level		
		Garlic 1%	Black Pepper 0.05%	Hot pepper 0.05%	Garlic 2%	Black pepper 0.1%	Hot pepper 0.1%
Body weight (g)							
1 day	8.33 ± 0.03	8.37 ± 0.09	8.40 ± 0.05	8.36 ± 0.03	8.40 ± 0.06	8.41 ± 0.11	8.43 ± 0.33
21 days	81.54 ± 1.00 d	82.79 ± 1.26 d	87.44 ± 0.08 bc	87.43 ± 1.12 bc	86.09 ± 0.94 c	89.34 ± 0.49 ab	91.34 ± 0.61 a
42 days	178.38 ± 1.16 e	186.08 ± 1.55 d	190.00 ± 1.15 c	192.53 ± 0.75 bc	192.49 ± 1.20 bc	195.70 ± 1.24 b	199.26 ± 0.50 a
Body weight gain (g)							
1-21 day	73.21 ± 0.96 c	74.42 ± 1.34 c	79.04 ± 0.98 b	79.07 ± 0.41 b	77.97 ± 0.81 b	80.93 ± 0.57 ab	82.91 ± 0.61 a
21-42 day	97 ± 0.35 e	103.29 ± 0.35 dc	102.38 ± 0.38 d	105.09 ± 0.37 bc	106.40 ± 0.48 ab	106.37 ± 0.75 ab	107.91 ± 1.09 a
1-42 day	170.05 ± 1.13 e	177.71 ± 1.63 d	181.60 ± 1.18 c	184.16 ± 0.75 bc	183.96 ± 1.12 bc	187.29 ± 1.30 b	190.82 ± 0.49 a
Feed consumption (g)							
1-21 day	231.66 ± 2.72 c	235.67 ± 4.09 c	249.66 ± 3.17 b	250.66 ± 3.18 b	246.33 ± 2.84 b	254.66 ± 1.20 ab	260.33 ± 2.60 a
21-42 day	533.33 ± 6.57 c	538.00 ± 3.60 c	531.66 ± 4.05 c	551.33 ± 1.33 b	552.33 ± 4.66 b	559.66 ± 3.18 ab	567.0 ± 4.16 a
1-42 day	765.00 ± 7.00 c	773.66 ± 7.36 c	781.33 ± 5.17 c	802.00 ± 2.08 b	798.66 ± 6.38 b	814.33 ± 4.33 ab	827.33 ± 1.66 a
Feed conversion (g feed /g gain							
1-21 day	3.16 ± 0.01 ab	3.17 ± 0.06 a	3.16 ± 0.01 ab	3.17 ± 0.01 a	3.16 ± 0.01 ab	3.15 ± 0.01 bc	3.14 ± 0.01 c
21-42 day	5.49 ± 0.05 a	5.25 ± 0.02 b	5.19 ± 0.02 b	5.25 ± 0.01 b	5.18 ± 0.02 b	5.26 ± 0.01 b	5.25 ± 0.01 b
1-42 day	4.49 ± 0.04 a	4.36 ± 0.01 b	4.30 ± 0.01 b	4.35 ± 0.01 b	4.34 ± 0.01 b	4.35 ± 0.01 b	4.33 ± 0.01 b

* Data followed by unlike letters differ significantly at 0.05 level of probability ± SE

Table (3) Effect of dietary treatments on carcass characteristics of growing Japanese quail

Items	Control	Low level			High level		
		Garlic 1%	Black Pepper 0.05%	Hot pepper 0.05%	Garlic 2%	Black pepper 0.1%	Hot pepper 0.1%
Body weight (g)	184.16 ± 0.56	185.74 ± 0.38	189.13 ± 0.54	187.06 ± 2.63	187.73 ± 1.82	189.99 ± 0.85	189.66 ± 4.97
Dressing %	71.20 ± 0.05 b	71.83 ± 0.42 ab	71.42 ± 0.05 ab	71.93 ± 0.41 ab	71.97 ± 0.35 ab	71.40 ± 0.17 ab	72.10 ± 0.40 a
Edible giblets %	9.92 ± 2.33	9.26 ± 0.02	9.27 ± 0.02	9.25 ± 0.01	9.25 ± 0.01	9.25 ± 0.01	9.26 ± 0.01
Liver %	3.28 0.01	3.30 ± 0.01	3.29 ± 0.01	3.30 ± 0.01	3.28 ± 0.01	3.30 ± 0.01	3.29 ± 0.01
Offal %	17.91 ± 0.02	18.00 ± 0.06	17.99 ± 0.01	17.96 ± 0.08	17.88 ± 0.08	17.86 ± 0.02	17.93 ± 0.03

* Data followed by unlike letters differ significantly at 0.05 level of probability ± SE

Table (4) Effect of dietary treatments on some metabolic responses of growing Japanese quail

Items	Control	Low level			High level		
		Garlic 1%	Black Pepper 0.05%	Hot pepper 0.05%	Garlic 2%	Black pepper 0.1%	Hot pepper 0.1%
Total protein (gm/100ml)	2.82 ± 0.02 b	2.87 ± 0.01 a	2.89 ± 0.02 a	2.89 ± 0.01 a	2.86 ± 0.02 ab	2.85 ± 0.01 ab	2.87 ± 0.01 a
Albumin (gm/100ml)	1.22 ± 0.01 b	1.23 ± 0.01 ab	1.24 ± 0.01 ab	1.24 ± 0.01 ab	1.23 ± 0.01 ab	1.26 ± 0.01 a	1.24 ± 0.01 ab
Globulin (gm/100ml)	1.60 ± 0.01 b	1.63 ± 0.01 ab	1.66 ± 0.03 a	1.65 ± 0.01 a	1.62 ± 0.01 ab	1.69 ± 0.01 a	1.63 ± 0.01 ab
A/G ratio	0.76 ± 0.01 ab	0.75 ± 0.01 b	0.74 ± 0.01 b	0.74 ± 0.01 b	0.76 ± 0.01 ab	0.78 ± 0.01 a	0.76 ± 0.01 ab
Glucose (gm/dl)	176.0 ± 0.57 c	186.33 ± 0.88 b	186.00 ± 1.00 b	186.76 ± 0.88 b	193.00 ± 0.88 a	195.00 ± 0.57 a	195.00 ± 1.73 a
Creatinine	0.25 ± 0.01 d	0.26 ± 0.01 cd	0.28 ± 0.01 abc	0.28 ± 0.01 abc	0.26 ± 0.01 cd	0.28 ± 0.01 ab	0.29 ± 0.01 a
AST (U/L)	37.60 ± 0.15 b	38.40 ± 0.28 ab	38.33 ± 0.23 ab	38.67 ± 0.12 ab	38.33 ± 0.87 ab	38.93 ± 0.03 a	38.43 ± 0.29 ab
ALT (U/L)	6.70 ± 0.01 b	6.84 ± 0.01 a	6.85 ± 0.01 a	6.85 ± 0.06 a	6.87 ± 0.02 a	6.83 ± 0.01 a	6.85 ± 0.02 a
Total cholesterol (mg/dL)	121.00 ± 0.57 a	118.67 ± 0.34 b	118.5 ± 0.31 b	119.23 ± 0.53 b	119.23 ± 0.43 b	119.0 ± 0.25 b	119.5 ± 0.23 b

*Data followed by unlike letters differ significantly at 0.05 level of probability ± SE

Table (5): Effect of dietary treatments on economic efficiency of growing Japanese quail

Items	Control	Low level			High level		
		Garlic 1%	Black Pepper 0.05%	Hot pepper 0.05%	Garlic 2%	Black pepper 0.1%	Hot pepper 0.1%
Price of 1 kg of Experimental diet (b),L.E	1.800	1.810	1.860	1.830	1.820	1.920	1.840
Feed gain ratio (a)	4.49	4.36	4.30	4.35	4.34	4.35	4.33
Feed cost of kg weight gain (a × b), L.E	8.082	7.891	7.998	7.960	7.898	8.352	7.967
Market price of 1 kg live weight gain(c), L.E	12	12	12	12	12	12	12
Net revenue [C – (a × b)]	3.918	4.109	4.002	4.04	4.102	3.648	4.033
Percent of net revenue / feed cost.(Econ. eff.),%	48.47	52.07	50.03	50.75	51.93	43.67	50.62

REFERENCES

Abdo, Z. M. A. (1998). The effect of using some natural growth promoters and fats on broiler performance and immunity. PH. D. Thesis Faculty of Agriculture, Cairo University.

A. O. A. C. (1990). Association of Official Analytical Chemists. Official Methods of Analysis. 15th Ed., Poublished by the A. O. A. C. Washington, D. C. USA.

Al-Harthi, M. A. (2002). Performance and carcass characteristics of broiler chicks as affected by different dietary types and levels of herbs, and spices as non classical growth promoters. Egypt. Poult. Sci. 22: 325-343.

Azouz, H. M. M. (2001). Effect of hot pepper and fenugreek seeds supplementation on broiler diets. Ph. D. Thesis, Faculty of Agric., Cairo University, Egypt.

Chevalier, A. (1996). The encyclopedia of medicina plants. Published by DK publishing Inc, USA.

Davide, K. J. (1995). Natural toxic compounds of foods: formation and change dueing processing and storage. CRC press, Inc., Florida, USA.

Duncan, D. B. (1955). Multiple Range and multiple F-Test. Biometrics, 11: 1-42.

El-Badri, A. A.; and Abu El-Maged (1992). Occurrence of duck trichomoniasis at Qena Governorate Egypt. Assiut veterinary-Med. J. 27 : 257-260.

El-Deeb, M. A. (1994). Effect of feeding garlic n quantitative and qualitative productivity of laying hens. Egyptian. J. Anim. Prod., 31: 289-303.

El Ghamry, A. A.; G. M., El-Mallah; and A. T., El-Yamny (2002). The effect of incorporating yeast culture nigellasativa seeds and fresh garlic in broiler diets on their performance. Egypt. Poult. Sci. vol. 22(II) : (445-459).

EL Ghamry, A. A.; H. M. Azouz and A. T. El Yamny (2004). Effect of hot pepper and fenugreek seeds supplementation to low energydiets on Muscovy ducklings performance, Egypt. Poult. Sci. Vol. 24 (III) : (613-627).

Garland, S. (1993). The complete book of herbs & herbs and spices. Published by Frances Lincoln Limited, 1993. The Reader's Digest Associations, Inc. Hong Kong.

Ghazalah, A. A. and F. A. A. Ibrahim (1996). The possibility of using some edible and aromatic oils in the nutrition of Muscovy ducks. Egypt. Poult. Sci., 16 (11) 305-328.

Hanafy, M. S. M.; S. M. Shalaby; M. A. A. El-Fouly; M. I. Abd-El-Aziz; and F. A. Soliman (1994). Effect of garlic on lead contents in chicken tissues. Deutche-Tierarztliche-Wochenschrift, 101 (4) : 157-158.

Mc Elroy. A.; J. G. Manning; L. A. Jaeger; M. Toub; J. D.Williams; and B. M. Hargis (1994). Effect of prolonged administration of dietary Caspian on broiler growth and salmonella enteritidis susceptiblility. Avian Diseases, 38: 329-333.

Mohamed, F. R.; S. M. S. Siam; and A. K. Alm El-Din,(2000). The influence of garlic and onion on productive performance and some physiological traits in laying hens. Egypt. Poult. Sci. 20: 123-144.

N. R. C. (1994). National Research Council. Nutrient Requirements of Poultry. 9th Ed. National Academy press, Washington, DC.

Nafady, A.; T. Y. Abd-El-Motelib; B. Salem; and K. El-zanaty, (1990). Aspergillosis in pigeon and role of thiabendazole or garlic juice for prevention of infection. Assiut-Vet. Med. J., 22(44): 192-197.

Prasad, G.; and V. D. Sharma (1981). Anitfungal property of garlic (Allium sativum L) in poultry feed substrate. Poultry Sci. 60 (3): 541-545.

SAS. (1996). SAS, Procedure Guide. Version b.12 Ed. "SAS Institute Inc., Cary, NC, USA.

Sheela, C. G. and K. T. Augusti (1995). Antiperoxide effects of S-allyl cysteine sulphoxide isolated from Allium Sativum Linn in Cholesterol diet fed rats. Indian J. Exp. Biol. (33) 5: 337-341.

Soliman, A. Z. M. (2002). The bioefficacy hot red pepper in paractical layer diets varying in their energy diets varying in their energy content. Egypt. Poult. Sci, 22: 931-951.

Soliman, A. Z. M.; A. A. Ghazalah; S. H. El-Samra; A. Atta; and Z. M. A. Abdo, (1999). The synergistic effect of either black seed or garlic with fat on broiler performance and immunity. Egypt. J. Nut. And feeds. 2: Special issue, 603-620.

Unnikrishnan, M. C.; and R. Kuttan, (1990). Tumor reducing and anticarcinogenic activity of selected spices. Cancer Lett. 51 (1) 85-89.

Zeinab, M. A.; A. Z. M. Abdo Soliman; and S. B. Olfat (2003). Effect of hot pepper and marioram as feed additives on the growth performance and the microbial population of the gastroinstesal tract of broilers. Egypt Poult. Sci., 23: 91-113.

تأثير استخدام الثوم الطازج والفلفل الأسود والحار كإضافات غذائية طبيعية علـــى الأداء الإنتاجى ومواصفات الذبيحة ومكونات الدم والجدوى الاقتصادية للسمان اليابانى

أحمد تهامى اليمنى
قسم الإنتاج الحيوانى – المركز القومى للبحوث – الدقى – الجيزة.

إستخدم فى الدراسة عدد ٥٢٥ طائر سمان يابانى عمر يوم غير مجنس وزعت عشوائياً على سبع مجموعات بكل مجموعة ٧٥ طائر وبكل مجموعة ٣ مكررات. غذيت المجموعة الأولى على عليقة بها ٢٤% بروتين و ٣٥١١ كيلو كالورى طاقة ممثلة [مجموعة الكونترول] بينما غذيت المجموعات [٢، ٣، ٤] على عليقة الكونترول مضاف إليها الثوم الطازج ،الفلفل الأسود ، الفلفـل الحار [١%، ٠,٠٥%، ٠,٠٥%] على الترتيب والمجموعات [٥، ٦، ٧] على عليقـة الكـونترول مضاف لها أيضا الثوم الطازج ،الفلفل الأسود ،الفلفـل الحـار بمسـتوى [٢%، ١,٠%، ٠,١%] بالترتيب وذلك حتى عمر ٤٢ يوم وقد أظهرت النتائج ما يلى:

أدى المستوى العالى والمنخفض من الإضافات إلى تحسن معنوى [$P > 0.05$] فى وزن الجسـم وقد لوحظ أنه بزيادة مستوى الإضافة فى حدود التجربة يزيد وزن الجسم وكذا معدل الزيادة فـى وزن الجسم.

- أظهرت النتائج زيادة معنوية فى معدل استهلاك العليقة فى المجموعات التى استخدم فيها كل من الفلفل الأسود ،الحار بالمستوى العالى والمنخفض والثوم بالمستوى المرتفع فقط.
- تحسن معدل التحويل الغذائى معنوياً باستخدام كل من الفلفل الأسود ،الحار بالمستوى العالى عند عمر ٢١ يوم بينما أدى إضافة كل من الثوم ،الفلفل الأسود ،الحار إلى تحسن معدل التحويـل الغذائى فى الفترة من ٢١ – ٤٢ يوم وكذلك من بداية التجربة التى نهايتها.
- أظهرت نتائج الذبح عدم وجود اختلافات معنوية فى وزن الجسم الصافى والأجـزاء المأكولـة والأجزاء الغير مأكولة نتيجة لإضافة كل من الثوم ،الفلفل الأسود ،الحار ولكن الإضافة حسنت من نسبة التصافى للذبيحة.
- كان مستوى البروتين الكلى ،الألبيومين ،الجلوبيولين ،الجلوكوز ، ALT ،AST فى سيرم الدم للمجموعات المعاملة أعلى معنويا [$P \leq 0.05$] من مجموعـة الكـونترول بينمـا انخفـض الكوليسترول بصورة معنوية ($P \leq 0.05$) بالتغذية على كل من الثوم ،الفلفل الأسود ،الحار.
- يمكن من نتائج الكفاءة الاقتصادية التوصية باستخدام الثوم بمستوى ١، ٢،% والفلفـل الأسـود بنسبة ٠,٠٥% والفلفل الحار بنسبة ٠,٠٥، ٠,١% للحصول على أعلى النتائج من تربية السمان اليابانى على علائق تحتوى ٢٤% بروتين خام، ٣٠١١ ك كالورى طاقة ممثلة.