EFFECT OF ADDITION CHAMOMILE FLOWER MEAL TO LAYING JAPANESE QUAIL DIETS ON PRODUCTIVE AND REPRODUCTIVE PERFORMANCE AND SOME PHYSIOLOGICAL FUNCTIONS.

K. Abd El-Galil[1]; Henda A. Mahmoud[1]; Amal M. Hassan[2] and A.S. Morsy[2]

[1]*Animal and Poultry Nutrition Department, Desert Research Center, El-Matariya, Cairo, Egypt.*
[2]*Animal and Poultry physiological Department, Desert Research Center, El-Matariya, Cairo, Egypt.*

(Received 5/12/2010, Accepted 15/3/2011)

SUMMARY

A total number of 180 Japanese quail (120 females and 60 males) at 4 weeks of age were used in an experiment lasted 22 weeks. Experimental Japanese quail (*Coturnix coturnix japonica*) were divided randomly into four equal experimental groups (30 females in each group). The first group was fed the basal diet as control, while the other three groups were feed the chamomile flower meal (CFM). Chamomile flower meal was added to the control diet at levels of 0.25, 0.50 or 0.75 g/kg diet, respectively.

The main objective of the present work was undertaken to establish the utilization of Chamomile flower *(Matricaria recutita L)* as medicinal plant feed additive in laying Japanese quail diets and its effect on productive performance, nutrient digestibility, economic efficiency and some physiological functions. The experimental diets were isocaloric (2900 kcal ME/kg), isonitrogenous (20% CP) and isofibrous. Results obtained could be summarized as follows: The final live body weight and body weight change during the whole experimental period increased significantly (P<0.05) with increasing CFM levels. Age at sexual maturity and first egg weight recorded a non-significant difference among groups, while egg weight, egg number and egg mass during the whole experimental period recorded a significant difference (P<0.05) among groups. Feed intake (g/day) increased significantly (P<0.05) with increasing CFM levels. The level of 0.50 g/kg CFM recorded the best (P<0.05) feed conversion ratio (g feed /g egg mass), while the control diet recorded the worst ones. Hatchability and Fertility percentage recorded a significant difference among groups. Yolk, eggshell and egg shape percentage were significantly increased by increasing CFM, while albumen and Yolk index percentage decreased (P<0.05) by increasing CFM. On the other hand, shell thickness (mm) showed a non significant increase among groups. Digestibility coefficients of OM, CP, CF, EE, NFE and the nutritive values expressed as DCP, TDN % and ME (kcal/kg) were significantly varied (P<0.05) among the different experimental groups. Level of 0.50 g/kg CFM group showed the best net revenue as well as the highest value of economic efficiency among experimental groups. Level of 0.5 g/kg improved (P<0.05) Sperm concentration, sperm motility, total motile sperm, live spermatozoa and semen quality factor. Hydrogen ion concentration (pH) significantly decreased in level of 0.5 g/kg. Cholesterol concentration decreased (P<0.05) in the Japanese quail fed with level of 0.5 and 0.75 g/kg. Concentrations of glucose, albumin, creatinine, ALT and AST did not significantly affected, while the insignificant decrease in creatinine, ALT and AST affected by using different levels of CFM.

In conclusions, From the nutritional, economical efficiency. and some physiological functions stand points of view, it could be concluded that, using dietary medicinal plant such as Chamomile flower (*Matricaria recutita L*) meal at 0.50 g/kg of the diet could improved productive performance and economical efficiency of laying Japanese quail without any side effects on some physiological functions.

Keywords: *Quail, Chamomile meal (CFM), productive performance, egg quality, digestibility, economical efficiency and some physiological function.*

INTRODUCTION

Many attempts have been made by poultry nutritionists to improve their productive performance and feed utilization in order to reduce the cost of feeding by using dietary additives such as antibiotics, probiotics, enzymes and herbal medicinal plants.

Recently, many countries tended to prohibit the using of antibiotics as growth promoters because of their side effect on both birds and human health.

Abd El-Galil (2007), Abaza, (2001), Gill (1999) Khodary *et al.* (1996) and Abdel-Aal and Attia (1993) indicated that addition of herbal parts and plant seeds as natural feed additives improved performance of poultry.

The recent studies have showed that medicinal plants can be used instead of chemical compounds in poultry diets as natural tonic, restoratives (Boulos, 1983), antibacterial and antiparasitic drugs (khodary *et al.*, 1996) to obtain the best performance parameters, immunity and the viability of birds (El- Hindawy *et at.*, 1996 and Osman, 1996).

The natural feed additives as the medicinal plants such as Chamomile flower which are used in the treatment of various diseases in human, this plant not only serves for a medicinal purpose but also contain aromatic substances and essential oils that used in food industries for human (Evans and pharm1975).

The genus, Chamomile (*Matricaria recutita L*) is an annual herb from the asteraceal compositae and native to the Mediterranean, Euro-Siberian, Irano-Siberian regions and cultivated in Germany, West Asia and Egypt

Egyptian chamomile famous by its high quality and therefore large quantities of this plant exported to west Europe quantities. The used parts are the dried flower heads. Cultivated area in Egypt is 5502 feddans /year of which 3927 feddans/year are found in Fayoum. The production quantity in Egypt is 4268 ton/year and in fayoum 2846 ton/year (A.E.P. 1994)

German chamomile (*Matricaria recutita L.*), one of the popular ingredients in herbal teas, has been traditionally used for medicinal purposes of human, Chamomile has moderate antioxidant and antimicrobial activities, and significant antiplatelet activity in vitro. Animal model studies indicate potent anti-inflammatory action, some ant mutagenic and cholesterol-lowering activities, as well as antispasmodic and anxiolytic effects (McKay and Blumberg,2009)

Chamomile contains coumarins, flavonoids and volatile oils (0.24-1.40%). Main component of volatile oils are (-) alpha-bisabolol (up to 50%) (Isaac 1997).And chamazulin (1-15%) (Mann and Staba1986). The effective material of chamomile is Azulene, cynaroside, luteolin, umbeliferone and herniarin (Zeid, 1998).

So, the main objective of the present work was to establish the utilization of Chamomile flower as herbal feed additives in laying Japanese quail diets and its effect on reproductive performance, nutrient digestibility, economic efficiency and some physiological functions.

MATERIALS AND METHODS

The present experiment was carried out at Maryiout Experimental Research Station (South West of Alexandria), which belongs to the Desert Research Center. A total number of 180 Japanese quail (120 females and 60 males) at 4 weeks of age were used in an experiment lasted 22 weeks. Experimental Japanese quail (*Coturnix coturnix japonica*) were kept under similar managerial, hygienic and environmental conditions and were divided randomly into four equal experimental groups (30 females in each group).

Quail were kept in batteries, which were divided into separate cages, where two females were housed in each cage. The first group was fed the basal diet as control (0% CFM), while the other three groups were feed additive the Chamomile flower meal. Chamomile flower meal (CFM) was added to the control diet at level of 0.25, 0.50 or 0.75 g/kg, respectively.

The quail were housed in cages at 4 weeks till 22 weeks of age. The experimental diets (Table 1) were formulated according to N.R.C (1994) and were isonitrogenous (20% crude protein) and isocaloric (2900 kcal ME/kg). Feed and water were available *ad libitum*. Chemical analysis of the experimental diet and dried excreta were assayed using methods of A.O.A.C (1990).

During the experimental period, individual live body weight and feed intake were determined biweekly. Feed conversion ratio (g feed intake / g egg mass) was calculated and the mortality was recorded every day.

Age at sexual maturity was determined at the first egg laying. Eggs were collected daily and weighed for each group, so egg number, egg mass were calculated during the experimental period. At 15 weeks of age, 20 eggs were randomly taken from each group and were used to evaluate egg quality; yolk. Weight and shell weight were recorded. Shell thickness (without membrane) was measured by micrometer. while albumen weight was calculated by subtracting yolk and shell weight from egg weight, Yolk, shell and albumen percentage were calculated as a percentage of egg weight.

Table (1): Composition and proximate chemical analysis of basal diet.

Ingredients	%
Yellow corn	61.23
Soybean meal (44% CP)	10.70
Concentrate (52% CP)*	10.00
Corn gluten meal (60% CP)	6.97
Wheat bran	5.47
Dicalcium phosphate	0.50
Limestone ground	4.45
Vit. and min. premix**	0.25
L-lysine	0.16
DI- methionine	0.27
Total	100
Proximate chemical analysis %	
Crude protein	20.29
Crude fiber	3.24
Ether extract	3.35
Calculated values	
Metabolizable energy (kcal/kg)***	2900
Calcium %	2.50
Available phosphorus %	0.30
Methionine %	0.45
Lysine %	1.00
Methionine + Cystin %	0.70
Price /kg diet (L.E)	1.593

* *Protein concentrate contained, 52 %Crude protein, 2.03% Crude fiber, 6.17% Ether extract, ME 2800 (kcal/kg), 1.50 % Methionine, 2.0% Methionine & Cystln, 3.0%Lyslne 7.00% Calcium, 2.93 % Available Phosphorus 2.20 % Nacl.*

** *Each 1 kg Vitamins and minerals premix contains, Vit. A 120000 IU, Vit. D3 20000 IU, Vit.E, 100 mg, Vit.K, 20mg, Vit. B1, 10 mg, Vit. B2, 50mg, Vit. B6,15 mg, Vit. B12, 100 µg, Pantothenic acid 100 mg, Niacin 300 mg, Folic acid 10mg, Biotin 500 IJg, Iron. 300mg, Manganese 600 mg, Choline chlorite 500 mg,. Iodine 10 mg, Copper 100 mg, Selenium 1 mg, Zinc 500 mg and 1200 mg Antioxidant.*

****Calculated according to price of feed ingredients at the same time (2008) of the experiment. Price of one kg chamomile flower meal =10.00 L.E.*

Males were housed individually in cages (one quail per cage) and fed the same diets for females. At 15 weeks of age, males (40 males) were transferred to female cages (two females and one male) for twenty minutes for five days, the eggs were then collected and incubated. Hatchability percentage was calculated for each group.

At the end of the experimental feeding period, digestion trials were conducted using 20 adult quail males (five quail from each treatment) to determine the digestibility coefficients and the nutritive values of the experimental diets as affected by CFM levels. Males were housed individually in metabolic cages.

The digestibility trials extended for 9 days of them 5 days as a preliminary period followed by 4 days as collection period. The individual live body weights were recorded during the main collection period to determine any loss or gain in the live body weights. During the main period, excreta were collected daily and weighed dried at 60°C bulked finally ground and stored for chemical analysis. The faecal nitrogen was determined according to Jakobsen *et al.* (1960). Urinary organic matter was calculated according to Abou-Raya and Galal (1971). Metabolizable energy was calculated according to Titus and Fritz (1971).

The digestion coefficients % of organic matter (OM), crude protein (CP), crude fiber (CF), ether extract (EE) and nitrogen free extract (NFE) of the experimental diets were estimated.

The nutritive values expressed as digestible crude protein (DCP), total digestible nutrients (TDN) and metabolizable energy (ME) were calculated.

Economical efficiency for egg production was calculated from the input / output analysis according to the costs of the experimental diets and selling price of one kg egg. The values of economical efficiency were calculated as the net revenue per unit of total costs.

Five quail from each treatment were chosen randomly for blood samples, Hemoglobin concentration was determined immediately colorimetric ally in fresh blood samples using readymade kits and the rest of the blood was centrifuged for 15 minutes at 3000 rpm to collect plasma before being stored at -20 °C until blood analysis.

The assays of plasma total protein, albumin, globulin (Value of globulin was calculated by subtracting the value of albumin from the value of total protein), glucose, cholesterol, creatinine, Liver enzymes alanine transaminase (ALT) and aspartate transaminase (AST) were determined by the colorimetric methods using readymade kits.

Semen was collected from 5 sexually mature males from each treatment chosen randomly (at 15 weeks of age) by subjected the males to massages as follows: Squeezing the cloacal gland to remove foam, making an abdominal massage at the level between the pelvic bone, semen ejaculation and semen collection by using a calibrated micropipette. The ejaculate volume was recorded by using a calibrated micropipette.

A dilute eosin solution (5%) was used for evaluating sperm concentration by the Neubauer haemocytometer slide according to Smith and Mayer (1955). Total sperm output was calculated by multiplying ejaculate volume and spermatozoa concentration.

Assessment of dead and abnormal spermatozoa was performed using an eosin--nigrosin blue staining mixture (Blom, 1950), then calculated as a percentage out of randomly chosen 100 sperm counted.

A drop of freshly collected semen was placed on a slide and the percentage of motile sperm was estimated by visual examination under low-power magnification (10 x) using a phase-contrast microscope according to Melrose and Laing (1970). Motility estimated according to Sedki (1999) as follows: Fast forward progressive movement = 90-100 %, Good forward progressive movement = 70-80 %, Slow forward progressive movement = 50-60 %, Twitching (no forward progressive movement) = 10-40 %, No movement in the microscopic field = 0 %. Total number of motile sperm (TMS) calculated by multiplying percentage of motile sperm and total sperm output.

Semen quality factor (SQF), calculated according to the following pattern was used:

SQF = (sperm concentration × ejaculate volume × live spermatozoa)/100.

Hydrogen ion concentration (pH) of semen was determined immediately after collection using pH paper (Universalindikator pH 0-14 Merck, Merck kgaA, 64271 Darmstadt, Germany).

Statistical analysis was carried out using General Linear Model (GLM) procedures by SAS program (1996) using simple one way analysis of variance according to this model:

$$Y_{ij} = \mu + T_i + e_{ij}$$

Where: Y_{ij} = Represented observation in j^{th} Chamomile flower meal, μ=Overall mean.

T_i = Effect of j^{th} Chamomile flower meal (j = 0,0.25,0.5or0.75 g).

e_{ij} = Random error.

Duncan's New Multiple Range Test (Duncan, 1955) separated differences among treatment means.

RESULTS AND DISCUSSION

Live body weight and body weight change

Data for live body weight and body weight change during the whole experimental period of quail females is summarized in table (2). The final live body weight and body weight change during the whole experimental period varied significantly (P<0.05) among the experimental groups.

Final live body weight was improved with increasing the CFM level in the diet. Birds, gradually fed diets supplemented with 0.75 g/kg CM recorded 3.87 % higher than that of the control group, while 0.25 or 0.50 g/kg CM resulted in 0.90% and 3.17% higher than that of the control group, respectively.

It is clear that Live body weight change during the whole experimental period was increased by increasing CFM levels in the experimental diets. The supplementation with 0.25, 0.5 or 0.75 g/kg CFM level increased live body weight change by3.66, 6.50and 8.08% more than that of the control group, respectively.

The increase in body weight change may be due to the increase in feed intake and the improvement in nutrients digestibility of diets. This positive effect may be attributed to the biological function of medicinal plant components that have been essential for growth (Boulos, 1983; Bradley, 1992 and Leung and Foster, 1996). Ibrahim *et al.* (1998) reported that adding natural additives to broiler diets caused a significant increase in broiler performance.

Table (2): The productive performance ($\overline{X}\pm SE$) of laying quail as affected by Chamomile flower meal supplementation.

Items	Levels of Chamomile flower meal (g/kg)				Sig
	Control (0)	0.25	0.50	0.75	
Initial live body weight(g)	117.53±3.32	114.99±3.20	116.91±3.05	116.58±4.01	ns
Final live body weight (g)	247.78^{b}±5.91	250.01^{ab}±5.71	255.63^{ab}±4.51	257.36^{a}±6.08	*
Live body weight change(g)	130.25^{b}±2.26	135.02^{ab}±2.71	138.72^{a}±2.52	140.78^{a}±3.32	*
Age at sexual maturity/bird/day	49.22 ±0.30	49.01±0.27	48.79±0.29	48.51±0.38	ns
First egg weight (g).	11.17 ±0.20	11.14 ±0.19	11.10±0.22	10.59±0.25	ns
Egg weight (g)	11.65^{b}±0.09	12.33^{a}±0.07	12.29^{ab}±0.05	12.00^{ab}±0.11	*
Egg number/ bird/ day	0.67^{b}±0.06	0.67^{b}±0.05	0.68^{ab}±0.03	0.69^{a}±0.05	*
Egg mass (g)/ bird/day	7.81^{b}±0.08	8.26^{ab}±0.02	8.36^{a}±0.03	8.28^{ab}±0.05	*
Feed intake (g)/ bird/day	29.21^{b}±0.11	29.64^{ab}±0.08	29.88^{ab}±0.07	30.10^{a}±0.10	*
Feed conversion ratio	3.70^{a}±0.06	3.59^{ab}±0.05	3.57^{b}±0.02	3.64^{ab}±0.03	*
Morality rate %.	0.00	0.00	0.00	0.00	
Hatchability %	77.09^{b}±3.82	78.68^{ab}±2.16	79.89^{a}±2.01	79.10^{ab}±3.11	*
Fertility %	89.43^{b}±4.36	91.39^{ab}±3.05	93.76^{a}±3.15	92.04^{ab}± 4.07	*

^{a,b} Means within a row with different superscripts are significantly different.
*Sig. = Significance, *= (P< 0.05), n.s = not significant.*

Age at sexual maturity

Sexual maturity age ranged from 49.22 to 48.51day, showing that CFM in laying quail diets did not affect this trait as shown in table (2).

Weight of first egg

Results on first egg weight recorded a decrease among groups. It was noticed that there was a decrease in weight of first egg with the increase of CFM in the diets. It is worthy noting that feeding quail on 0.75 g/kg.CFM recorded the lowest values that may be attributed to early sexual maturity compared to other experimental groups (Table 2).

Egg weight

Egg weight during the whole experimental period significantly (P<0.05) among the experimental groups. It is worth noting that supplementation of diet by 0.25, 0.50 or 0.75 g/kg of CFM recorded an increase in egg weight amounted to 5.84, 5.49or3.00% compared to the control group, respectively.

Level of 0.25 g/kg recorded the highest egg weight (12.33g) while Level of 0.75 g/kg CFM recorded the lowest egg weight (12.00g),compared to other treated groups of CFM level as shown in table (2).

Egg number and egg mass

Results in table 2 indicate that egg number and egg mass (Em) during the whole experimental period significantly varied ($P<0.05$) among the experimental groups. It is worthy noting that egg number was higher in birds receiving 0.50 and 0.75 % CFM attributed to other experimental groups, It is clear that supplementation of diet by 0.50 or 0.75 g/kg CFM increased egg number by1.49 or 2.99 % than that of the control group, respectively. This may be due to the differences in earlier sexual maturity and attributed to the biological function of medicinal plant components. Khodary *et al.*(1996) stated the efficiency of medicinal plants and some plant seeds as natural tonic, restoratives, antibacterial and anti-parasitic drugs in improving the productive performance in poultry.

Egg mass recorded maximum values for 0.50g/kg of CFM diet, while minimum values recoded for 0.25 g/kg CFM level.

It is worthy noting that feeding quail on 0.25, 0.50 or 0.75 g/kg of CFM resulted in 5.80, 7.00 and 6.00 % higher in egg mass than that of the control group, respectively.

The increase in egg mass with the 0.50 or 0.75 g/kg of CFM level was expected in view of the increase in egg number and vice versa with the 0.25 g/kg of CFM level.

Feed intake and feed conversion ratio

On the basis of the whole experimental period there was a significant difference ($P<0.05$) among the experimental groups for daily feed intake trait. The experimental groups exhibited more feed intake compared to the control group. It is clear that increasing CFM levels in the experimental diets increased that feed intake. The supplementation of with 0.25, 0.50 or 0.75 g/kg of CFM increased feed intake by1.13, 2.29 and 3.18 % more than that of the control group, respectively. Fritz et al., (1992) suggested that Chamomile improve feed conversion of poultry.

Natural feed additives had beneficial effect for stimulation and activity of digestive system by improving the diet palatability and enhancing appetite of poultry, thus increasing the amount of feed consumed (Namur et al., 1988).

The results of feed conversion ration showed significant improvement in feed efficiency utilization by the CFM level in diet as compared to the control group during the experimental period. Quail fed 0.50 g/kg CFM during the experimental period recorded the best feed conversion.

The data indicated that the feed conversion ratio of the group fed diets supplemented with CFM was improved compared to those of the control group.

The improvement in feed conversion ratio of 0.50 g/kg CFM may be due to its highest egg mass as compared to that of CFM levels. Such improvement may be attributed to the properties of these materials that could act not only as antibacterial, anti-protozoa and antifungal but also as antioxidants (Bradley, 1992 and Leung and. Foster, 1996).

Mortality

No incidence of mortality occurred during the experimental period as well as no effects of CFM levels supplemented on the experimental diets. Eisenberg *et al.* (1993) indicated that medicinal plant contains natural substances that can promote health and alleviate illness.

Hatchability

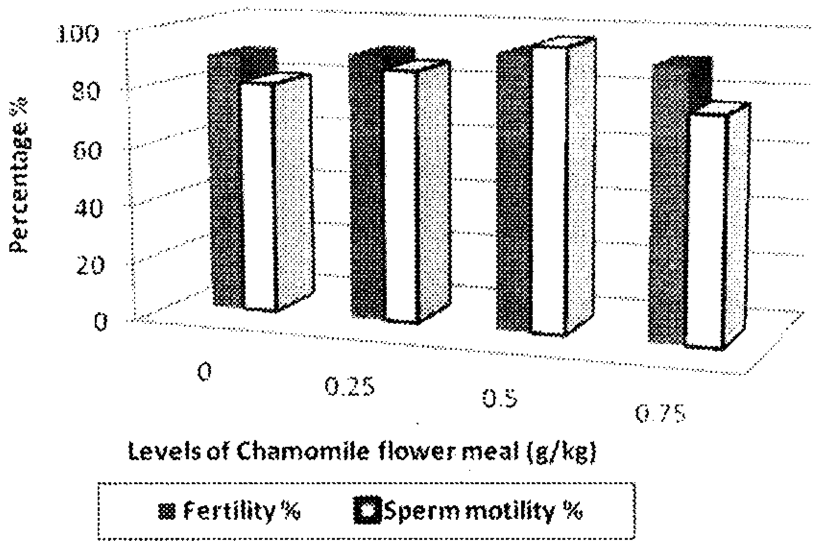
Results on hatchability percentage in the present study recorded a significant difference among groups (Table 2). However, feeding quail on 0.25, 0.50 or 0.75% CFM resulted in 1.54, 3.10 and 2.08 % higher in hatchability than that of the control group, respectively. Level of 0.50 g/kg recorded the highest hatchability compared to other_groups of CFM level which may be due to the increase in fertility and improvement of ($P<0.05$) Sperm concentration compared to other experimental groups.

Fertility %

Results on fertility percentage in the present study recorded a significant difference among groups (Table 2). It is worthy noting that feeding quail on 0.50 g/kg CFM level recorded higher values that may be attributed to improvement of Sperm concentration, sperm motility, total motile sperm, live spermatozoa and semen quality with level of 0.5 g/kg,(Fig.1).

Egg quality traits

The comparison between diets containing different levels of CFM and egg quality in comparison with the control diet is shown in Table (3). Data on yolk, eggshell and egg shape percentage were significantly increased by increasing CFM, while albumen and yolk index percentage decreased ($P<0.05$) by increasing CFM. On the other hand, shell thickness (mm) showed a non significant difference increase among groups.



Fig(1)Effect of Chamomile flower meal as feed additives on Fertility % and Sperm motility% .

Table (3): Egg quality ($\overline{X}$ ±SE) as affected by Chamomile flower meal in laying quail diets.

Items	Levels of Chamomile flower meal (g/kg)				Sig.
	Control (0)	0.25	0.50	0.75	
Egg weight (g)	11.50 ± 0.11	11.57 ± 0.09	11.63 ± 0.08	11.61 ± 0.10	n.s
Yolk %	$31.11^{a}\pm0.08$	$31.35^{ab}\pm0.09$	$31.60^{a}\pm0.06$	$31.70^{a}\pm0.07$	*
Albumen %	$55.12^{a}\pm0.09$	$55.10^{ab}\pm0.07$	$54.42^{ab}\pm0.04$	$54.11^{b}\pm0.07$	*
Egg shell %	$13.20^{b}\pm0.03$	$13.04^{ab}\pm0.04$	$13.71^{a}\pm0.04$	$14.01^{a}\pm0.05$	*
yolk index %	$48.70^{a}\pm0.10$	$48.93^{a}\pm0.09$	$47.57^{ab}\pm0.05$	$46.96^{b}\pm0.09$	*
Egg shape %	$78.14^{b}\pm0.05$	$78.50^{ab}\pm0.02$	$79.02^{ab}\pm0.04$	$81.22^{a}\pm0.03$	*
Shell thickness (mm)	0.240 ± 0.03	0.240 ± 0.04	0.241 ± 0.02	0.243 ± 0.05	n.s

a,b: Means within a row with different superscripts are significantly different.
*Sig. =Significance, * = (P< 0.05), n.s = not significant.*

Digestibility and nutritive values

Apparent digestion coefficients values of dietary treatments are illustrated in table (4), regarding those of organic matter (OM), crude protein (CP), crude fiber (CF), ether extract (EE) and nitrogen free extract (NFE). Such values were significantly (P<0.05) differed among the experimental groups and the data indicated that, all nutrients digestibility values increased for quail fed CFM diet compared to the control diets.

In general, there was a significant increase in the digestion coefficients of OM, CF, EE and NFE of the experimental diets when compared with the control diet.

Similar trend was observed for the nutritive values of the tested diets in terms of digestible crude protein (DCP %), total digestible nutrients (TDN %) and ME (kcal/kg), which increased significantly (P<0.05) increased with increasing CFM up to 0.75 g/kg level.

It is importance to note that the results of the digestion trials were coincided generally with the differences in productive performance and feed conversion ratio in quail diets in comparison will the control diet.

Table (4): Digestibility coefficients and nutritive values ($\bar{X}$±SE) of the experimental diets as affected by Chamomile flower meal.

Items	Levels of Chamomile flower meal (g/kg)				Sig
	Control (0)	0.25	0.50	0.75	
Digestion coefficients%					
OM	79.05^{b}±1.62	79.84^{ab}±1.32	80.02^{ab}±1.40	81.75^{a}±1.39	*
CP	80.51^{b}±1.25	81.62^{ab}±1.18	82.19^{a}±1.20	82.99^{a}±1.24	*
CF	24.08^{b}±1.51	24.78^{b}±1.20	26.29^{ab}±1.24	27.49^{a}±1.11	*
EE	86.98^{b}±1.22	87.95^{ab}±0.90	88.29^{ab}±0.82	89.05^{a}±0.71	*
NFE	86.95^{b}±1.25	88.95^{a}±1.13	88.97^{a}±1.20	89.57^{a}±1.26	*
Nutritive values					
DCP%	16.33^{b}±0.30	16.56^{ab}±0.21	16.68^{ab}±0.28	16.83^{a}±0.33	*
TDN%	64.16^{b}±1.31	65.42^{ab}±1.30	65.62^{ab}±1.35	66.15^{a}±1.41	*
ME(kcal/kg)	2701^{b}±26.16	2754^{b}±22.03	2761^{ab}±25.08	2785^{a}±37.70	*

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

These results are in agreement with Abd El-Galil (2007) and Abd EL-latif *et al*, (2003) who indicated that, addition of medicinal herbal plants had a significant effect on improving digestibility coefficient and nutritive values.

Adding herbal medicinal plants to the diet asserted the biological role for herbal medicinal plants in activities of metabolic functions and biosynthesis of hormones (Abd El-Latif *et al.*, 2002).

Economical efficiency

The present results indicated that the diet containing 0.50 g/kg CFM as a feed additive results in the highest net revenue and economic efficiency compared to the other experimental groups (as shown in table 5) this may be related to the improvement of feed conversion ratio.

It was noticed that the control diet gave the lowest net revenue and economic efficiency. The best relative economic efficiency was detected with 0.50 g/kg CFM being 106.53% followed by those fed 0.25 and 0.75 g/kg CFM, respectively when compared with the control group.

Table (5): Economical evaluation of quail as affected by Chamomile flower meal.

Items	Control	Levels of Chamomile flower meal (g/kg)		
		0.25	0.50	0.75
Feed conversion ratio	3.70	3.59	3.57	3.64
Cost of kg feed (L.E)	1.593	1.593	1.594	1.594
Feed cost of kg egg (L.E)	5.894	5.719	5.691	5.802
Selling price of one kg egg (L.E)	13.00	13.00	13.00	13.00
Net revenue (L.E)	7.106	7.281	7.309	7.198
Economic efficiency	120.56	127.31	128.43	124.06
Relative economic efficiency%	100	105.60	106.53	102.90

Semen characteristics

Mean values of the Japanese quail semen characteristics as affected by different levels of Chamomile flower meal (CFM) are presented in table (6).Data revealed no significant differences in the ejaculate volume, total sperm output and sperm abnormalities between the treatment groups.

Sperm concentration was significantly increased (P<0.05) in the quail fed diet containing 0.50 g CFM /kg by 23 1% followed by 0.25 g/kg as compared to the control group.

Additionally, feeding Japanese quail with level of 0.5 g/kg improved (P<0.05) sperm motility, total motile sperm, live spermatozoa and semen quality factor by 20.8, 69.4, 12.7 and 58.0 %, respectively when compared to the control group. On the other hand, hydrogen ion concentration (pH) significantly decreased at level of 0.5 g/kg by 8.5 % as compared to the control group. White (1976) found that seminal plasma is usually an isotonic neutral medium and is detrimental to sperm cell survival. So, pH is a good indicator for semen quality (Morsy, 2007).

This improvements in semen characteristics of Japanese quail as a result of feeding by CFM especially by level of 0.5 g/kg diet may attribute to its protective effect of CFM on the testis and epididymis. This improvement in semen characteristics may be attributed to the biological function of Chamomile flower meal as antioxidant and a scavenger of oxygen free radicals in seminal plasma which are toxic by-products of many metabolic processes (McKay and Blumberg, 2009)

Also, the improvement may be due acceleration of the mechanism of the reproductive hormones in the body. This effect is also apparent (P<0.05) as improved fertility level by CFM supplementation in this experiment (Table 2).

Table (6): Effect of Chamomile flower meal as feed additives on the semen characteristics of Japanese quail.

Items	Control	Levels of Chamomile flower meal (g/kg)			
	(0)	0.25	0.50	0.75	Sig.
Ejaculate volume(ml)	0.018±0.001	0.018±0.001	0.020±0.002	0.023±0.003	n.s
Sperm concentration ($\times10^6$ml)	663.33^b±31.7	816.66^a±52.3	836.66^a±46.66	703.33^{ab}±8.8	*
Total sperm output ($\times10^6$)	11.93±1.29	14.69±2.20	16.73±2.34	16.17±2.30	n.s
Sperm motility %	80.00^b±5.77	86.66^{ab}±3.33	96.66^a±3.33	76.66^b±3.33	*
Total motile sperm ($\times10^6$)	9.54^b±1.76	12.73^{ab}±2.34	16.17^a±2.56	12.39^{ab}±1.15	*
Live spermatozoa %	81.00^b±3.78	85.33^{ab}±2.33	91.33^a±1.76	81.66^a±5.84	*
Dead spermatozoa %	19.00^b±3.78	14.67^{ab}±2.33	8.67^a±1.76	18.34^a±5.84	*
Sperm abnormalities %	10.33±1.85	8.00±3.51	7.66±0.88	9.33±2.84	n.s
Semen quality factor (SQF)	9.66^b±1.53	12.53^{ab}±2.11	15.27^a±1.83	13.20^{ab}±0.80	*
Hydrogen ion (pH)	7.83^a±0.16	7.33^{ab}±0.16	7.16^b±0.16	7.66^{ab}±0.16	*

a, b Means bearing different superscripts within the same row are significantly different (P<0.05).

Hematological parameters

The overall means of hematological parameters are presented in table (7). Treating Japanese quail with CFM level of 0.5 g/kg increased (P<0.05) hemoglobin, total protein and globulin concentrations by 68.0, 45.7 and 58.7%, respectively as compared to the control group. These findings are in agreement with those reported by Abaza (2001) in broiler, Abd El-Latif *et al.* (2003) in Japanese quail and Abu-Taleb *et al.* (2008) in Japanese quail. They reported that using medicinal herbs such as chamomile improved digestion, limiting the development of undesirable microorganisms and promotion of bile flow facilitating digestion and absorption of nutrients. Hence, the improvement in hemoglobin may be due to increased iron absorption caused by CFM.

On the other hand, the increase in total protein in treating Japanese quail with CFM level of 0.5 g/kg by 45.7 % as compared to control may be attributed to improvement digestibility coefficient and nutritive values (Table 4). These findings are in agreement with those reported by Abd El-Galil (2007) and Abd El-Latif *et al.* (2003).

Cholesterol concentration decreased ($P<0.05$) by 17.2 and 20.6 % in the Japanese quail fed with level of 0.5 and 0.75 g/kg, respectively, as compared to the control group. This result is in agreement with those obtained by Sharma (1986) and Riyad (1987). Abaza (2001) reported that feeding broiler chickens on diets containing 0.25 % chamomile flower significantly decreased total cholesterol by about 30.5% than the control group.

Table (7): Effect of Chamomile flower meal as feed additives on the hematological parameters of Japanese quail.

Items	Control (0)	Levels of Chamomile flower meal (g/kg)			Sig
		0.25	0.50	0.75	
Hemoglobin (g/dl)	$10.75^{b}\pm0.79$	$15.57^{ab}\pm2.81$	$18.06^{a}\pm0.28$	$11.33^{b}\pm1.81$	*
Glucose (mg/dl)	372.71±1.42	362.63±41.05	343.40±16.30	347.25±3.96	n.s
Total protein (g/dl)	$6.45^{b}\pm0.49$	$8.15^{ab}\pm0.71$	$9.40^{a}\pm0.48$	$8.49^{a}\pm0.34$	*
Albumin (g/dl)	3.35±0.71	3.50±0.61	4.48±0.49	4.40±0.09	n.s
Globulin (g/dl)	$3.10^{b}\pm0.54$	$4.65^{a}\pm0.29$	$4.92^{a}\pm0.28$	$4.09^{ab}\pm0.40$	*
Cholesterol (mg/dl)	$135.40^{a}\pm5.4$	$121.66^{ab}\pm2.0$	$112.06^{b}\pm10.33$	107.39 ±5.8	*
Creatinine (mg/dl)	0.41±0.02	0.25±0.06	0.39±0.02	0.37±0.14	n.s
Alanine transaminase (I.U./L)	30.66±8.25	30.00±5.79	21.00±5.50	2a.66±5.23	n.s
Aspartate transaminase (I.U./L)	44.92±11.69	46.85±11.07	41.40±7.03	46.05±2.95	n.s

a, b Means bearing different superscripts within the same row are significantly different (P<0.05).

Concentrations of glucose, albumin, creatinine, ALT and AST did not significantly affected by using different levels of CFM. The insignificant decrease in creatinine, ALT and AST concentrations may be due to the medicinal effect of CFM plant on the reductions in the severity of histopathological degeneration in liver. Also, this may indicates no harmful effect of CFM on liver and kidney tissues (Schelicher *et al.*, 1998). In this respect, Adding herbal medicinal plants to the diet asserted the biological role for herbal medicinal plants in activities metabolic functions and biosynthesis of hormones (Abd El-Latif *et al.*, 2002). These effects may be due to the reflection of the antimicrobial, ant-fungal, antiseptic activities and anti-inflammatory (Abaza, 2001).

CONCLUSION

From the nutritional, economical efficiency and some physiological performance stand points of view, it could be concluded that, using dietary medicinal plant such as Chamomile flower meal at 0.50 g/kg of the diet could improved performance and economical efficiency of laying Japanese quail and some physiological functions.

REFERENCES

Abaza, I. M. (2001). The use of some medical plants as feed additives in broiler diets Ph.D. thesis, Fac. Agric. Alex. Univ. Egypt.

Abd El-Galil, K., (2007). Effect of some feed additives on performance of laying Japanese quail. 1- Effect of Margoram leaves meal as a feed additive in laying Japanese quail diets. J. Agric. Sci. Mansoura Univ.,32(7):5167-5179.

Abd El-Latif, S .A.; A.T. El-Yamany and Eman A. F. El-Daly (2003). Evaluation of using different levels and sources of medical herbs in growing Japanese quail diets. Egypt.J.Nutr.and Feeds 6 (Specical Issue):219-220.

Abd El-Latif, S.A.; Abou-Ammo, Faten A., A. Ibrahim and A. M. El-Kaiaty (2002). Effect of feeding dietary thyme black cumin,dianthus and fennel on peroductive and some metabolic responses of growing japanese quail. Egypt. Poult. Sci., 22(1): 109-125.

Abdel-Aal, E.S.M. and R.S. Attia (1993).Characterization of black cumin (Nigella sativa) seed. 1-Chemical composition and lipids. Alexandria of Science Exchange, 14:467-482.

Abou-Raya, A.K. and A.G.H. Galal (1971). Evaluation of poultry feeds in digestion trials with reference to some factors involved. Egypt. J. of Anim., 11(1): 207-221.

A.E.P. (1994) Agricultural Economic Publication. Ministry of Agricultural and land reclamation. A.R.E.

A.O.A.C. (1990). In"Official Methods of Analysis", Associations of Official Agricultural Chemists,15th.ed.,Washington, D.C.USA.

Blom, E. (1950). A 1-min live-dead sperm stain by means of eosin-nigrosin. J. Fertil. Steril., 1: 176-177.

Boulos, I. (1983). Medicinal plants of north Africa reference publication. Inc. Proc.. 2nd Con. Fac. Vet. Med. Cairo, Univ., Cairo, Egypt, (1992).

Bradley, P.R. (1992). British Herbal Compendium, Vol.1, Bournemouth: British Herbal Medicine Association.

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

El-Hindawy, M.M; M.L. Tawfeek and S.H. Osman (1996). Effect of some biological feed additives for different periods on performance of broiler chick. Zagazig J. Agri. Res., 23 (5): 773-783.

Eisenberg, D. M.; R.C. Kessler; C. Foster ; F.E. Norlock,; D. R., Calkins and T. L. Delbanco (1993). Unconventional medicine in the United States. Preference, costs and patterns of use. N. Engl J. Med. 328:246-252.

Evans, F.J. and B. pharm (1975). Herbs, A Concise Guide in Colour Herbs by Fertilizer Frantisek severa, Engligh consultant F.J. Evans, B. Pharm. Phosphorus. D. Hamlyn London, New York. Syndeny, Toronto.

Fritz, Z; A. Schleicher; S. Kinal; L. Tarosz and F. Majdanski (1992). Substitution of antibiotics by herbs in feed mixtures for broiler chicks. Rozavway, Naukowe, Zootechniki. Moogrofie. Rozarway Poland. NO. 31: 315-325.

Gill, C. (1999). More Science behind 'Botanical: herbs and plant extracts as growth enhances. Feed international (4): 20-23.

Jakobsen, P.E.; S.G. Kirsten and H. Nielsen (1960). Fredjelighed frogmed fierbrae. Digestibility trails with poultry "Bereting fra for sogslabortoriat, Kabenhaven, 56: 1-34.

Khodary, R.M.; M.H. El-Ezzawy and I.R. Hamdy (1996). Effect of Niegalla sattivae on egg production,hatchability percentage and some biochemical values in laying hens with reference to fertility in cockerles. Proc. 7th Sci. Vet. Med. Assuit Univ., Egypt.,17-19.

Leung, A.Y.; and S. Foster, (1996). Encyclopedia of Common Natural Ingredients used in Food, Drugs and Cosmetics, 2nd ed. New york: John Wiley& Sons, Inc.

Mann, C. and E.J. Staba (1986).The chemistry, pharmacology and formulations of Chamomile . In, Graker L.E., Simon J. E., eds. Herbs, spices and Medicinal plants: Recent Advances in Botany, Horticulture and Plarmacology, Vol. 1. Arizona, Oryxprss, 235-280.

McKay, D.L. and J.B. Blumberg (2009). A review of the bioactivity and potential health benefits of chamomile tea (*Matricaria recutita L.*). Human Nutrition Research Center on Aging at Tufts University, USA. 20(7):519- 530.

Melrose, D. R. and J.A. Laing (1970). The characteristics of normal semen. Chap. 4-Fertility and infertility in the Domestic animals. Ed. by J. A. Laing Bailliere Tindall and Gasssell, London.

Morsy A.S, (2007). Enhancing rabbit performance reared in newly reclaimed areas by alleviating the environmental stress. Ph.D. Thesis, Fac. Agric., Cairo Univ., Egypt.

Namur, A. P.; J Morel and H. Bichek, (1988). Compound animal feed and feed additives. In Deboer, F., H. BICHEL, eds. Livestock Feed Resources and Feed Evaluation in Europe. Elsevier. Sci. publ., Amsterdam.

N.R.C. (1994). National Research Council, Nutrient requirements of poultry 9th ed. National Academic of Science. Washington, Dc. USA.

Osman, S.M.H. (1996). Responses of broiler chicks for some dietary supplementation M.Sc. Thesis Fac., of Agric. Zagazig Univ., Egypt.

SAS (1996). Statistical analysis system User's Guide. SAS institute, Gary, North Carolina.

Sedki, A.A. (1999). Effect of different housing systems on rabbits performance. Ph.D. Thesis, Fac. of Agric., Cairo Univ., Egypt.

Smith, J. T. and D.T. Mayer (1955). Evaluation of sperm concentration by the haemocytometer method. Fertil. Steril., 6: 271-275.

Titus, H.W. and J.C. Fritz(1971). The scientific feeding of chickens. The interstate printers and Publishers, Inc., Danville, Illinois, U.S.A.

White, I. G. (1976). Reproduction in the male. In: Veterinary Physiology. Phillis, J.G. Bristol: Wright-Scientechnica.

Zeid, A. M. (1998). Effect of medicinal herbs in performance of goat. Ph. D. Faculty of Agric. Cairo University.

تاثيراضافة مسحوق أزهار البابونج إلى عليقة السمان الياباني البياض على الأداء الانتاجي والتناسلى وبعض الوظائف الفسيولوجية

خالد عبد الجليل[1]، هنده عبد الجليل محمود[1]، على صابر مرسى[2]، أمال محمد حسن[2]

[1]قسم تغذية الحيوان والدواجن – مركز بحوث الصحراء – المطرية- القاهرة.

[2]قسم فسيولوجيا الحيوان والدواجن – مركز بحوث الصحراء – المطرية- القاهرة.

استخدم في هذا البحث عدد 180 سمان ياباني عمر 4 أسابيع وحتى عمر 22 أسبوع. كان الهدف من البحث دراسة تأثير اضافة مسحوق أزهار البابونج إلى عليقة السمان الياباني البياض على الأداء الغذائي وبعض الوظائف الفسيولوجية. قسمت الإناث (120 أنثى) إلى أربع مجموعات تجريبية متساوية. احتوت كل مجموعة على 30 أنثى سمان (15 مكررات بكل منها 2 سمان). بينما قسمت الذكور (60 ذكر) إلى أربع مجاميع متساوية (تم حفظ كل ذكر بطريقة منفصلة). غذيت الطيور حتى حد الشبع على نسب متدرجة من مسحوق ازهار البابونج 0.25 ، 0.50 و0.75 جم/ كيلو جرام عليقة. العلائق المستخدمة متشابهة في نسبة البروتين الخام 20% والطاقة الممثلة 2900 كيلو كالورى /كيلوجرام. عند عمر 15 أسبوع نقلت الذكور للإناث بنسبة تناسلية 2 أنثى : 1 ذكر لمدة 20 دقيقة لمدة خمسة ايام لتقدير نسبة الخصوبة الفقس. ويمكن إيجاز أهم النتائج في النقاط التالية: سجلت المعاملة المغذاة على 0.75 جم /كجم من إضافة مسحوق أزهار البابونج تحسنا معنويا (عند المستوى 5%) في كل من وزن الجسم والتغير فى وزن الجسم مقارنة بباقي المعاملات، بينما سجلت معاملة المقارنة اكثر القيم انخفاضا. لم يسجّل العمر عند النضج الجنسي ووزن البيضة الأولى فروقا معنوية، بينما سجل وزن وعدد وكتلة البيض اختلاف معنويا (عند مستوى 5%) بين المعاملات أثناء الفترة التجريبيّة. كما لوحظ زيادة معدل استهلاك الغذاء خلال فترة التجربة زيادة معنوية (عند مستوى 5%) وذلك بإضافة مسحوق ازهار البابونج في العليقه، وقد سجلت المعاملة المغذاة على 0.75 جم /كجم أعلى تلك القيم، بينما سجلت المعاملة المقارنة اقل القيم خلال الفترة التجريبية. و سجلت كلامن النسبة المئوية للفقس والخصوبة فروق معنوية (عند مستوى 5%) بين مجموعات المعاملة.كما حققت المعاملة التي غذيت على 0.50 جم /كجم من اضافة مسحوق ازهار البابونج افضل معدل تحويل غذائي خلال فترة التجربة مقارنة بباقي المعاملات. كما سجّلت النسبة المئويّة للبياض ودليل الصفار انخفاض معنويا (عند مستوى 5%) بينما سجلت النسبة المئوية للصفار وسمك قشرة البيضة زيادة غير معنوية بزيادة مستويات الإضافة لمسحوق أزهار البابونج. و حدث تغير معنوي (عند مستوى 5%) فى شكل البيضة وذلك بزيادة نسبة مسحوق ازهار البابونج فى العليقة.

أظهرت معاملات الهضم الظاهرية للمادة العضوية و البروتين الخام والألياف الخام و مستخلص الأثير والمستخلص الخالي من النتروجين اختلافا معنويا (عند مستوى5%) بإضافة مسحوق ازهار البابونج في العليقة. حيث حققت المعاملة التي غذيت على 0.50 جم/كجم افضل معاملات هضم وقيم غذائية مقارنة بباقي المعاملات. و تحقق أعلى عائد اقتصادي للمعاملة المغذاة على 0.50 جم /كجم من مسحوق ازهار البابونج خلال فترة التجربة مقارنة بباقي المعاملات، بينما سجلت معاملة المقارنة اقل القيم. و أيضا حققت المعاملة التي غذيت على 0.50 جم /كجم من اضافة مسحوق ازهار البابونج تحسنا معنويا(عند مستوى 5%) فى تركيز الحيوانات المنوية وصفات حركة الحيوانات المنوية والحركة الكلية للحيوانات المنوية ونسبة الحيوانات المنوية الحية ودليل جودة السائل المنوى، من ناحية أخرى اضافة مسحوق ازهار البابونج (0.5 جم/كجم) خفض معنويا (عند مستوى 5 %) رقم الأس الهيدروجينى بحوالى 8.5 % مقارنة بمجموعة المقارنة. كما حققت المعاملة التي غذيت على 0.50 جم /كجم من اضافة مسحوق ازهار البابونج زيادة معنوية (عند مستوى 5%) فى الهيموجلوبين والبروتين الكلى والجلوبيولين، بينما انخفض معنويا تركيز الكولستيرول فى المعاملة التي غذيت على 0.50 و 0.75جم /كجم.

يمكن التوصية من الوجهة الغذائية والفسيولوجية والاقتصادية إلى امكانية استخدام مسحوق ازهار البابونج في العليقة بمستوى0.50 جم/كجم في علائق السمان البياض لتحسين الاداء دون تأثير سلبي على معدلات الإنتاج والعائد الاقتصادي وبعض الوظائف الفسيولوجية.