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THE USE OF CHAMOMILE FLOWERS (*MATRICARIA RECUTITA*) IN LAYER HENS DIET

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SUMMARY

This experiment was conducted at Poultry Farm, College of Agriculture, Baghdad University, where 72 layer hens of 54 week old, were exposed to three levels of chamomile flowers (CF) (*Matricaria recutita*), 0.0 , 0.3 , 0.6 % in their diet for 8 weeks to find out the effects of CF in avian diets on their productivity.

Treatment 3 (0.6 % CF) revealed an increase in egg production whereas treatment 2 (0.3 % CF) showed an increase in egg mass. No significant differences appeared between treatments in weight of eggs. No significant differences were noticed in weight increment of layer hens except treatment 2 (0.3 % CF) during second and third weeks of trial .

A highly significant decrease in total count of microorganisms of small intestine of T_3 group and in large intestine of both T_2 and T_3 groups were observed.

***Keywords:** chamomile flowers, avian diets, layer hens, productivity, microorganisms*

INTRODUCTION

Many researchers have been carried out on the effects of supplementing medicinal plants to avian diets to improve the avian's ability and physiological characteristics as well as their productivity . Medicinal plants are common use in Iraq as a medical herb in human health and recently in poultry diet as fenugreek seed (Al-Neaimy, 1999, Al-Qaiym, 1999, Al-Taii, 2003), black seed (Al-Nidawi, 2003) and garlic powder (Ahmed, 2002 and Al-Hamdani, 2005).

One of the most common medicinal plant uses, in many countries is chamomile flowers because of its favorable effect in relaxation and reducing fever and cold as well as a stomach pain relive (Jakolev and Isaac,1979). It is an

annual plant scientifically known *Matricaria recutita* and some time *Chamomilla recutita* or *Matricaria chamomilla* (Foster, 1991). Britton and Brown (1913) classified this plants and it belongs to Aster family .

Blumenthal. (2000) and Schulz, *et al.* (1998) pointed out that chamomile flowers contain many chemical compounds such as coumarins, flavonoids (more than 8 %), aromatic oils (more than 50 %) which include Alpha bisabolol, azulene and chamazulene. It contains amino acids and fatty acids. Essential oil extracts of chamomile flowers consists of 20 to 33 % bisabolol A, 8 – 12 % type B, 7–14 % bisabolol oxide A , 4 to 13 % B – farncesene and 17–22 % en–yn dicycloether (Orav *et al.*, 2001). The most important components of chamomile flowers are alpha–bisabolol (8–14%) and chamazulene (5–7 %).

Recent studies showed the favourable effects of alpha – bisabolol as an antibacterial , antifungal as well as fever reducing agents ,with a favourable effect on skin burns in laboratory animals (Escop, 1990; Korting, *et al.* 1993). Chamazulene has an antialergitic ,inflamenatory and stomach pain (Mann and Staba, 1986; Der-Marderosiam and Liberti, 1988). Since the chamomile flowers contains heteropolysaccharides , so it has an effect on stimulating the macrocytes cell, and it activates the immunoregulation and increasing the sentivity of the effectors cells (Uteshev, 1999).

The objective of this study is to conduct the effects of this plant on productive and physiological characteristics and some other characters of eggs such as cholesterol concentration in yolk and its effect on bacteria count in small and large intestine to investigate the favourable effect of this plant through these characteristics under study.

MATERIALS AND METHODS

The experiment was conducted in the Poultry Farm, Agriculture College in Abu–Graib, Iraq. 72 layers of 54 weeks of age were brought from the Iraqi Meat Production Company. Birds were distributed randomly into a duplicate three treatments T_1 , T_2 and T_3 (12 birds/group) according to the addition of chamomile plant into their diets at percentages of 0.0, 0.3, 0.6 %, respectively. Each group were placed into 42 x 41 x 41 cm individual cages. Environmental conditions were controlled throughout the experiment which lasted for 56 days. When the bird reached 54 week old, they were fed on an experimental diet as shown in (Table 1).

The characteristics studied were:

1. Egg Production : recorded every two weeks of experimental periods.
2. Body Weight : measured weekly for 8 weeks .
3. Feed Consumption: Calculated weekly throughout the experiment for 8 weeks .

Table (1). Composition and calculated analysis of the experimental diets.

Ingredients	Control diet	Diet 1	Diet 2
Corn	57	57	57
Wheat	15	15	15
Soybean meal (44% CP)	14.5	14.5	14.2
Protein concentration (1)	6	6	6
Limestone	7	6.9	6.9
Salt (NaCl)	0.5	0.3	0.3
Chamomile flowers	0.0	0.3	0.6
Calculated compostion *			
ME (Kcal / Kg)	2851	2851	2851
Crude Protein %	16	16	16
C : P Ratio	181.6	181.6	181.6
Calcium %	3.2	3.2	3.2
Available phosphorus %	0.31	0.31	0.31
Methionine %	0.34	0.34	0.34
Methionine + Cystine %	0.61	0.61	0.61
Lysine %	0.78	0.78	0.78

(1) Chemical composition of protein concentration : 2200 Kcal ME/Kg , 40% CP , 8% Fat ,3.5% Fiber , 25% Ash , 3.5 % Ca , 1.2 % Available phosphorus , 1.2 % lysine , 1.8 % methionine , 1.8% Cystine .

* Calculated composition According to NRC , 1994 .

4. Egg Mass: measured for the first 4 weeks and at the end of experiment (8 weeks), according to the formula :

Egg Mass = Mean egg weight X Number of egg produced / day (Rose, 1997)

5. Some specific egg characteristics :

Some specific characteristics of produced eggs such as egg weight, yolk and albumin weight , shell weight , albumin height and shell thickness were measured after 4 and 8 weeks feeding trial on chamomile (Stadelman and Cotterill, 1977)

6. Bacterial counts for microorganism in small and large intestine of birds according to (Harrigan and Mecance, 1976).

7. Cholesterol concentration in egg yolk.

Cholesterol concentration in egg yolk (mg / g yolk) was measured at the end of the feeding trial according to Franey and Elias (1968) .

Statistical Analysis

SAS (1996) was used in the statistical analysis, the data were analyzed according to the Complete Randomized Designed (CRD), and Duncan (1955) was used to compare the significant between the treatments means.

RESULTS AND DISCUSSION

1. Egg Mass and Production:

Egg production on the bases of hen house percentage for the experimental treatments are presented in Table (2).

It seems that egg production increased significantly ($P<0.05$) with birds fed on diet T_3 (0.6 % Chamomile) comparabably with other treatments in the first two weeks of feeding trial , whereas these differences disappeared through the period from week 3 to 6 and appeared again during week 7 and 8 following the same pattern of the first two weeks. It assumed that if the feeding trial continued for longer period it might be more evidenced.

The results showed no significant differences (Table, 3) in egg mass after 4 weeks of feeding on chamomile treatment comparabably with the control, however, at the 8^{th} week, T2 (0.3 % CF) differed significantly.

The explanation of these results might be due to active components found in the CF and their effect on productive characteristics and performance during the experiment causing a better and a healthy status of the bird, therefore, it increase productivity .

2. Specific characteristics of the egg:

Some specific characteristics of the egg (SCE) such as egg weight, yolk and albumen weight, shell weight, as well as albumen height and shell thickness are presented in Table (4). No significant differences of all specific characteristics of egg were found .

3. Body weight :

Table (2). Effect of using chamomile flowers on Hen House (H.H) egg production %

Treatment with chamomile flowers	Egg Production %			
	Weeks			
	1,2	3,4	5,6	7,8
Control	64.071 ± 0.40 b	77.975 ± 0.32	83.031 ±0.31	80.650 ± 0.29 b
0.3 %	60.714 ± 0.35 b	78.571 ± 0.41	82.142 ± 0.40	79.761 ± 0.25 b
0.6 %	72.023 ± 0.37 a	75.595 ±0.43	82.738 ± 0.47	85.119 ± 0.32 a
Significancy	*	NS	NS	*

NS = Non significant

* Different superscripts within a column (a,b,) differ significantly (P<0.05).

Table (3). Effect of using chamomile flowers on egg mass (gm/hen/day)

Treatment with chamomile flowers	Egg mass (gm)	
	4 Weeks	8 Weeks
Control	47.733 ± 0.35	46.550 ± 0.41 b
0.3 %	46.904 ± 0.40	53.954 ± 0.43 a
0.6 %	48.455 ± 0.42	49.727 ± 0.39 b
Significancy	NS	*

NS = Non significant

* Different superscripts within a column (a,b,) differ significantly (P<0.05).

Table (4). Effect of using chamomile flowers on specific characteristics of the egg

Treatment with chamomile flowers	Weeks	
	4	8
	Egg weight (gm)	
control	65.525 ± 1.325	62.075 ± 2.125
0.3 %	65.800 ± 0.450	63.650 ± 3.150
0.6 %	65.600 ±2.650	60.900 ± 2.950
Significancy	NS	NS
	Yolk weight (gm)	
Control	19.350 ± 0.150	16.200 ± 0.900
0.3 %	18.750 ± 0.750	17/050 ± 0.250
0.6 %	20.100 ± 1.900	16.200 ± 0.700
Significancy	NS	NS
	Albumen weight (gm)	
Control	37.825 ± 0.975	37.550 ± 2.550
0.3 %	38.700 ± 0.600	38.050 ± 2.350
0.6 %	37.450 ± 2.250	36.050 ±0.050
Significancy	NS	NS
	Shell weight (gm)	
Control	8.350 ± 0.050	8.325 ± 0.025
0.3 %	8.350 ± 0.150	8.550 ± 0.150
0.6 %	8.050 ± 0.650	8.650 ± 0.350
Significancy	NS	NS
	Albumen height (mm)	
Control	5.750 ± 0.250	5.000 ± 0.000
0.3 %	5.500 ± 0.500	5.000 ± 0.000
0.6 %	5.000 ± 0.000	6.000 ± 1.000
Significancy	NS	NS
	Shell thickness (mm)	
Control	0.460 ± 0.020	0.440 ± 0.020
0.3 %	0.455 ± 0.015	0.440 ± 0.030
0.6 %	0.445 ± 0.045	0.355 ± 0.005
Significancy	NS	NS

NS = Non significant .

No significant differences in body weight between treated groups except at the 2nd and 3rd weeks which indicated an increase in body weight of layers fed on 0.3 % CF (Table, 5). This increase might be due to the improving effect of chamomile flowers, which increase the palatability of the diet .

4. Feed Consumption :

A significant feed consumption difference on the 1st week of feeding trial, particularly T3 (0.6 % CF) was observed (Table, 6). The differences disappeared from 2nd week and further till 6th week inspite of increasing in feed consumption with control treatment on week 7th of the experiment.

5. Bacteria count in small and large intestine :

A significant decrease in the small intestine pathogenic bacteria with 0.6 % chamomile flowers treatment comparing with 0.3 % CF and the control (Table, 7). When bacteria count in large intestine was considered, it seems that there was a significant decrease in treated groups comparing with the control. It can be concluded that this might be due to the heteropolysaccharides which have a role in blocking the receptors found at the outer surface of the gram negative bacteria like *E.Coli* and *Salmonellas* .

It is indigestible food in the digestive tract that consider a good media for nonpathogenic bacteria or organisms turning these polysaccharide through fermentation and using them in favour of their reproduction. It increases the number of nonpathogenic organisms and decrease the number of the pathogenic bacteria (Dupholac, 2005 and Kaplan and Robert, 2003). This effect may be due to the polysaccharides found in chamomile flowers which increase the immunity in the bird through the activation of the immunity cells in the birds' body (Uteshev, *et al.* 1999), which eventually improve the health condition of the bird as well as the productive characteristics.

The improvement effect of chamomile flowers on immunity may be also due to either increasing globulin content of blood or perhaps due to the high level of iron (1500 ppm) in chamomile flowers and its role in hemoglobin synthesis (Schleicher et al., 1998). Moreover, Kolacz et al. (1997) reported that chamomile flowers contain azulenes stimulating phagocytosis that may have been directly involved in immune reactivity.

6. Cholesterol :

No significant differences were found in cholesterol level between the treatment groups (Table, 8).

In believe that this study may be was the first which used the chamomile flowers in layer diet - in Iraq - and make a benefit from medical properties, judging from the present study and the result obtained a clearer picture might be established if we used the chamomile flowers at earlier stage of age and for a longer time. This study may be the beginning of other studies for more understanding and investigating the

Table (5). Effect of using chamomile flowers on body weight (gm)

Weeks	Body weight (gm)			Significancy
	Treatment with chamomile flowers			
	Control	0.3 %	0.6 %	
1	1778.75 ± 21.25	1895.00 ± 95.00	1775.00 ±25.00	NS
2	1783.75 ± 12.48 b	1912.50 ± 72.50 a	1785.00 ± 15.00 b	*
3	1780.00 ± 23.45 b	1887.50 ± 17.50 a	1835.00 ± 35.00 ab	*
4	1773.75 ± 28.24	1875.00 ± 25.00	1850.00 ± 50.00	NS
5	1760.00 ± 29.44	1877.50 ± 22.50	1855.00 ±45.00	NS
6	1780.00 ± 33.91	1880.00 ± 80.00	1885.00 ± 55.00	NS
7	1762.50 ± 48.41	1890.00 ± 65.00	1850.00 ± 50.00	NS
8	1775.00 ± 32.27	1890.00 ± 50.00	1812.50 ± 37.50	NS

NS = Non significant

*Different superscripts within the same row (a,b) differ significantly (P<0.05).

Table (6). Effect of using chamomile flowers in feed consumption (gm/hen/day)

Weeks	Feed consumption (gm) Treatment with chamomile flowers			Significancy
	Control	0.3 %	0.6 %	
1	111.250 ± 1.250 ab	106.000 ± 1.000 b	113.300 ± 1.300 a	*
2	111.545 ± 1.455	110.000 ± 1.000	114.000 ± 1.000	NS
3	111.500 ± 0.500	110.250 ± 1.250	114.000 ± 1.000	NS
4	109.000 ± 1.000	109.000 ± 1.000	113.000 ± 1.000	NS
5	110.545 ± 2.455	109.940 ± 1.040	112.440 ± 1.220	NS
6	108.025 ±2.025	109.700 ± 1.000	112.000 ± 1.000	NS
7	115.000 ± 1.000 a	109.760 ± 1.060 b	112.500 ± 1.000 ab	*
8	111.500 ± 0.500	110.000 ± 1.000	113.300 ± 0.900	NS

NS = Non significant

* Different superscripts within the same row (a,b) differ significantly (P<0.05).

Table (7). Bacteria count in small and large intestine (Log / gm as mean±standard error) by using chamomile flowers

Treatment with chamomile flowers	Bacteria count (log / gm)	
	Small intestine	Large intestine
Control	10.500 ± 0.500 a	73.500 ± 1.500 a
0.3 %	9.000 ± 0.000 a	4.000 ± 2.000 b
0.6 %	2.500 ±0.500 b	4.000 ± 0.000 b
Significancy	*	*

NS = Non significant

* Different superscripts within the same column differ significantly (P<0.05).

Table (8). Cholesterol kevel (mg/100 ml blood serum as mean±standard error) as affected by feeding chamomile flowers

Treatment with chamomile flowers	Cholesterol (mg / 100 ml blood serum)
Control	13.575 ± 0.085
0.3 %	13.550 ± 0.090
0.6 %	13.450 ±1.690
Significancy	NS

NS = Non significant

productive effect of chamomile flowers in poultry nutrition .

CONCLUSION

From the medical properties of chamomile flowers and the results obtained point of view, one can term that this study was the first to use chamomile flowers in layer diet. This study establishes a fundamental bases to used chamomile flowers in poultry nutrition particularly earlier stage of age .

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استخدام أزهار البابونج (*Matricaria Recutita*) في علائق الدجاج البياض

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أجريت هذه الدراسة في حقل الدواجن التابع لقسم الثروة الحيوانية في كلية الزراعة ببغداد، باستخدام 72 دجـــاجة بياضة بعـــمر 54 أسبوع غذيت في علائقها على ثلاث مستويات (0.0 و 0.3 و 0.6 %) من أزهار البابونج ولمدة 8 أسابيع لدراسة تأثير إضافة أزهار البابونج إلى عليقة الدواجن على الأداء الإنتاجي للدجاج البياض.

أظهرت النتائج تفوق معنوي في إنتاج البيض للمعاملة الثالثة 0.6 % من زهرة البابونج وتفوق معنوي في كتلة البيض للمعاملة الثانية 0.3 % من زهرة البابونج. لم تلاحظ فروق معنوية في كل من وزن البيض , الصفار , البياض والقشرة وسمكها وارتفاع البياض والكولسترول بعد 4 و 8 أسابيع من التغذية , ولم تلاحظ فروق معنوية في أوزان الدجاج باستثناء تفوق المعاملة الثانية 0.3 % من زهرة البابونك عند الأسبوعين الثاني والثالث من التجربة .

تبين حصول انخفاض عالي المعنوية في أعداد الأحياء المجهرية في الأمعاء الدقيقة للمعاملة الثالثة (0.6 %) وانخفاض معنوي في أعداد الإحياء المجهرية في الأمعاء الغليظة لكلا المعاملتين الثانية (0.3 %) والثالثة (0.6 %) بالمقارنة مع معاملة المقارنة .