

## **EFFECT OF CHAMOMILE FLOWER ADDITION TO DIETS OF LACTATING ZARAIBI GOATS ON ITS PRODUCTIVE PERFORMANCE**

**M.I. Ahmed<sup>1</sup>; T.M.M. Mahdy<sup>1</sup>; A.M. Mansour<sup>2</sup>, Hoda Alzahar<sup>3</sup> and W.M.A. Sadek<sup>1</sup>**

<sup>1</sup>*Animal Production Research Institute, Dokki, Giza, Egypt.*

<sup>2</sup>*Animal Production Department, Faculty of Agriculture, Ain Shams University, Cairo, Egypt.*

<sup>3</sup>*Department of Dairy Science, Dorsal National Research Center, Cairo, Egypt.*

*(Received 9/10/2019, accepted 19/11/2019)*

### **SUMMARY**

This work was done to investigate the effects of the use of chamomile flower in the diet of goats on milk production and its composition as well as milk quality. In addition, the effect of these dietary treatments on blood profile and metabolism was examined. The 40 Zaraibi goats during the first lactation period were divided into four equal groups (10 each). Animals in the G1, G2, G3, and G4 groups received 0, 1, 2 and 3 g chamomile / head / day, respectively, in their regimens. The study was conducted in three stages of the breast-feeding season (the early, middle and late breast-feeding periods), suggesting that daily milk production increased with increasing chamomile levels. In goat's milk and the difference is important during milking, fat, protein, digestibility and total fat (SNF) are increased by conversion. Use of chamomile in goat's diet, especially at high levels (3 g / head / day), the highest standing milk fat percentage (%) was recorded. The slowest and lowest lactation was found during early lactation, and chamomile significantly reduced the number of somatic cells (SCC) during all stages of breastfeeding and; The somatic cell count is higher than in the period of lactation and then decreased the minimum level during the middle of the breast and then rose again to reach a maximum at the end of breastfeeding. Regarding blood profiles, the data obtained showed that most of the haematochemical parameters were not significantly affected ( $P>0.05$ ) by the tested regime. However, cholesterol and ALT enzymes were reduced while serum total protein, glucose, and phosphorus were increased, resulting in the addition of chamomile to the regime. In the same way, both MCHC% and lymphocytes increase with increasing chamomile levels in goat volumes, especially at high therapeutic levels. Digestion based on DMS and CMS are better with 4 G (1,139 and 0.133, respectively), followed by G3 (1,152 and 0.133, respectively) and the last G1 (1, 226 and 0147). Therefore, the use of chamomile in goat feeding during different breast-feeding periods (early and mid-lactation stages) had a positive effect on milk production and nutritional supplementation in addition to reduced SCC. And thus improve milk quality.

*Keywords, Milk composition, blood quality and goat performance*

### **INTRODUCTION**

The use of herbal and herbal remedies for men has been known since the time of ancient Egyptian civilization. Various attempts have been made to use natural materials such as herbal medicines, which are commonly accepted as feed additives, to improve feed efficiency and productivity of livestock such as sheep, goats, cattle and cows (Shehata *et al.* 2007), meanwhile, Maged (2012) and El-Kholany *et al.*, (2017). Use of herbal medicines in the diet as a preventive measure to avoid the risk of adverse effects. The help of chemicals, the medicinal properties of these drugs and their extracts and drugs have proven to be and always remain safe (Allam *et al.* 1999, Tawfik *et al.* 2005 and Abdelhamid *et al.* 2011). Plants are natural additives in animal nutrition for various uses, such as improving milk yield and its components. And, as a result, improving the milk properties (Zid and Amid, 2004), improving the fluid content of enriched and digestive factors as well as reducing cholesterol and improving the activity of enzymes. Some in the blood (Abdelhamid *et al.* 2011). Reduce the incidence of digestive disorders such as diarrhea and edema, thus reducing the mortality of offspring (Shehata *et al.* 2007). By improving immunity and detoxification of aflatoxins Tawfik *et al.* (2005) used both in humans and in veterinary medicine. Usually these positive effects can be attributed to active ingredients. Like flavonoids, coumarins, aromatic oils (alpha bicarbonate, ginseng and chamazulene) in chamomile flowers, which have a better tonic function than antifungal agents Tab-inflammatory and anti-spam (Ody Penelope, 1993).

Therefore, this study was conducted to evaluate the effect of consumption of cauliflower at different levels (0.1.2 and 3 g / head / day) during feeding of zebra goat milk on milk production. And odor cell counts (SCC) and milk quality as well as feed efficiency. A number of physiological parameters and blood profiles were examined.

## MATERIALS AND METHODS

This study was conducted at Animal Production Research Institute (APRI), Agriculture Research Center and Department of Dairy Sciences, National Research Centre, Dokki, Cairo, Egypt.

### *The experimental animals and their management:*

Forty Zaraibi goats (at the third and fourth season of lactation), one week after parturition was divided into equal groups. The animals were randomly assigned into 4 experimental groups each of ten animals. The animal's weight averaged 46.03, 45.39, 45.07 and 44.83 kg for the 4 groups (G<sub>1</sub>, G<sub>2</sub>, G<sub>3</sub> and G<sub>4</sub>, respectively). Animals were weighed at the beginning and thereafter at two-week intervals.

The animals fed two weeks as a transitional period on the same rations before the start of the experimental work. Does receive diets individually. The rations were offered twice daily in equal parts of 9.0 am and 3.0 pm. Water was available for the desire of each animal. The nutrients were changed according to production (body weight and milk production) which was determined every two weeks according to NRC (1981) recommendations. The 4 groups of dairy Zaraibi goats were used to evaluate the following experimental rations. The ratio of concentrate to roughage was 50:50 on DM basis, for control group (G<sub>1</sub>) which fed 50% concentrate feed mixture (CFM), 25% berseem hay (BH) and 25% rice straw (RS) without supplement, while animal G<sub>2</sub>, G<sub>3</sub> and G<sub>4</sub> received a daily feed supplement 1, 2 and 3 g chamomile/ head, respectively.

Amounts of concentrate feed mixture (CFM), berseem hay (BH) and rice straw (RS) were based on nutrient requirements recommendation of NRC (1981) of goats during the lactation periods. The concentrate feed mixture (CFM) consisted 40% ground yellow corn, 25% undertreated cotton seed meal, 25% wheat bran, 4% rice bran, 3% molasses, 2% limestone and 1% sodium chloride. The chemical analysis of the CFM, BH and RS is shown in Table (1).

**Table (1): Chemical composition (% on DM basis) of feed ingredients.**

Item	% on DM basis						
	DM	OM	CP	CF	EE	NFE	Ash
Concentrate feed mixture (CFM)	92.3	93.27	15.73	16.3	3.51	57.73	6.73
Berseem hay (BH)	90.5	85.90	12.81	30.0	2.33	40.76	14.10
Rice straw (RS)	89.7	82.70	3.45	39.3	1.37	38.58	17.3

### *Chemical analysis of tested feed ingredients:*

Sample were taken from the tested dietary ingredients for running the proximate analysis for dry matter (DM), crude protein (CP), crude fiber (CF), ether extracts (EE) and ash contents according to A.O.A.C. (1995) procedure, nitrogen free extract (NFE) was calculated by deference .

### *Sampling and analysis of milk:*

Animals were milked twice daily of 6.0 am. and 5.0 pm. Milk was recorded daily for each animal during the experimental periods. Samples of milk were collected once every two week's immediately after each milking. Milk samples were taken for acidity determination then analysis for fat, total solids (TS), total protein (TP) and ash (Ling, 1963), lactose content was assessed according to Barnett and Abdel-Tawab (1957), solids not fat (SNF) was calculated by difference. Concerning physical properties of curd, the rate of whey syneresis of fresh curd measured as the volume of drained whey after 10, 30 ,60 and 90 min. It was calculated as percentage of the milk volume according to Lawerence (1959).

### *Sampling and analysis of blood:*

Blood samples were collected from the jugular vein before feeding, from 3 does of each group once at end of the experiment. Whole blood was immediately used for hematological estimation. Another blood sample was centrifuged at 4000 rpm for 20 minutes separated serum was used for enzymes determination while the other part was frozen at -20°C until the other biochemical analysis.

**Statistical analysis:**

Statistical analysis was carried out by using the least squares procedure for analyzing the data with equal subclass numbers described by SAS (2003).

$$Y_{ijk} = \mu + A_i + e_{ik}.$$

Where:  $\mu$  = general mean common element to all observations,  $A_i$  = an effect due to the  $i^{\text{th}}$  treatment,  $e_{ijk}$  = random error particular to the  $ik^{\text{th}}$  observations, assumed to be independently randomly distributed ( $O, \delta^2e$ ). It includes all the other effects not specified in the model. Tests of significant for the differences between means were carried out according to Duncan's new multiple range test (Duncan, 1955).

## RESULT S AND DESCUSION

**Milk yield:**

Milk yield during the different experiment periods are presented in Table (2) and Figure (1). It could be noted that daily milk yield of Zaraibi goats reached the peak of the 2<sup>nd</sup> month of lactation. Therefore, it gradually declined till the end of lactation periods.

The obtained results indicated that daily milk yield during early lactation period was tended to increase (1.85, 1.92, 1.95 and 1.97 kg/head) with increasing level of chamomile in goats rations (G1, G2, G3 and G4, respectively), The daily milk yield during mid-lactation period was improved non significant by 5.96, 8.61 and 9.93% vs. 7.77, 8.74 and 11.65% in late lactation for G2, G3 and G4, respectively compared with the control and the differences were significant only during late lactation period as shown in Table (2). Daily milk yield of Zaraibi goats reached the peak of the 2<sup>nd</sup> month of lactation. Therefore, it gradually declined till the end of lactation periods. Abdelhamid *et al.* (2011) found that Milk yield of dairy goats reached the peak of the 4<sup>th</sup> week of lactation in control group and at the 6<sup>th</sup> and 8<sup>th</sup> week of lactation as a result of using *Pimpinella anisum* at level 3 and 6 g/100kg BW/ daily, respectively. In the same time, Mousa (1996) and Shehata *et al.* (2007) cited that the peak of daily milk yield of Zaraibi goats recorded at 2<sup>nd</sup> to 6<sup>th</sup> week of lactation then it gradually declined till the end of lactation period. The positive effect of medicinal herbs on milk yield may be due to the increases of serum Glucose with chamomile groups (Table 7). The positive effect of medicinal herbs on milk yield was observed also by Shehata *et al.* (2004) and Abdelhamid *et al.* (2011) when added some medicinal herbs in goats rations and this improvement in milk yield may be due to the positive and significant effect of herbs on digestion coefficients of most nutrients and feeding values (as TDN, SE and DCP) as reported by Mohamed *et al.* (2003). Zied and Ahmed (2004) observed also a positive effect of chamomile and thyme on overall mean daily milk yield (1.586 and 1.540 kg/h, respectively vs. 1.407 kg/h without addition) during the experimental period (270 days). Allam *et al.* (1999) studied the effect of using some medicinal plants and herbs as feed additives and found that daily milk yield was improved with chamomile by more than 10% compared with either the other herbs or the un supplemented diet.

**Milk composition:**

The effect of experimental treatments on milk composition during suckling period (early lactation), mid and late lactation periods are presented in Table (2). Milk of fat, protein, total solids and solids non-fat (SNF) were increased with using chamomile in goats rations especially the high level (3g/head/ day), while lactose and ash were slightly differ among the tested groups. However, in the same time, the highest values of milk fat (%) were recorded during late lactation periods and the lowest values were recorded in early-lactation periods as shown in Table (2). The positive effect of chamomile on milk contents may be due to the increases of serum total protein, albumin and glucose with chamomile groups (Table 7). Similar results were observed by Zied and Ahmed (2004) with using some medicinal herbs (chamomile and thyme) during the different experimental periods. Similarly, no clear effect numerous medicinal herbs were observed for most milk composition (Kholif, 2000, Shehata *et al.*, 2004). Generally, the obtained values of milk constituents are within the normal range given by Ahmed *et al.* (2008a) and Ayyad *et al.* (2014) for Zaraibi goats during the different periods (suckling, mid and late lactations).

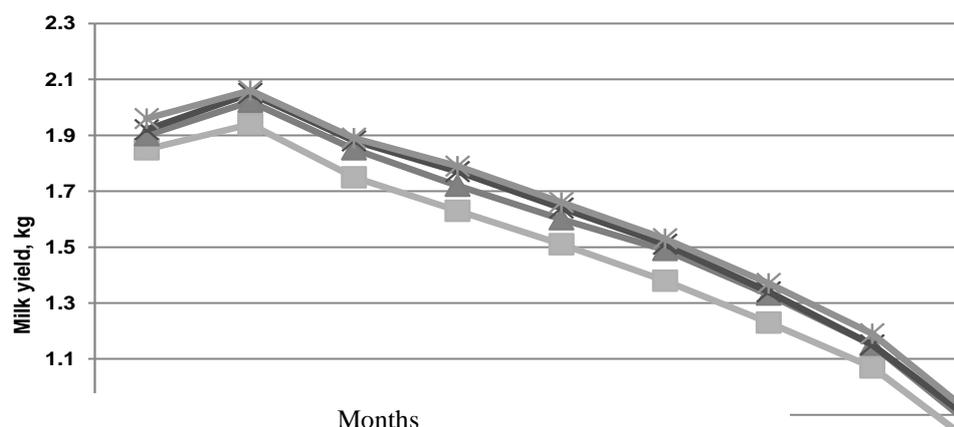


Figure (1): Average daily milk yield, measured monthly.

Table (2): Effect of the experimental treatments on average milk yield , milk composition and somatic cell count's during lactation periods.

Item	Group				SE
	G1	G2	G3	G4	
Early lactation (Suckling period):					
Daily milk yield, kg/h	1.85	1.92	1.95	1.97	0.081
Milk composition, %					
Fat	3.41	3.40	3.43	3.45	0.053
Protein	3.03	3.11	3.09	3.13	0.047
Lactose	4.63	4.61	4.67	4.69	0.039
Total solids	11.78	11.82	11.92	12.01	0.123
Solids non fat (SNF)	8.37	8.42	8.49	8.56	0.057
Ash	0.71	0.70	0.73	0.74	0.009
Somatic cell count's (SCC) x10 <sup>3</sup>	465 <sup>a</sup>	291 <sup>b</sup>	243 <sup>bc</sup>	185 <sup>c</sup>	13.01
Mid-lactation period:					
Daily milk yield, kg/h	1.51	1.60	1.64	1.66	0.075
Milk composition, %					
Fat	3.75	3.81	3.86	3.87	0.055
Protein	3.05	3.12	3.11	3.13	0.043
Lactose	4.61	4.65	4.63	4.70	0.041
Total solids	12.14	12.33	12.39	12.47	0.095
Solids non fat (SNF)	8.39	8.52	8.47	8.60	0.048
Ash	0.73	0.75	0.73	0.77	0.008
Somatic cell count's (SCC) x10 <sup>3</sup>	391 <sup>a</sup>	239 <sup>b</sup>	191 <sup>b</sup>	143 <sup>c</sup>	11.53
Late-lactation period:					
Daily milk yield, kg/h	1.03 <sup>c</sup>	1.11 <sup>bc</sup>	1.12 <sup>ab</sup>	1.15 <sup>a</sup>	0.067
Milk composition, %					
Fat	4.11	4.09	4.13	4.15	0.063
Protein	3.07	3.11	3.12	3.14	0.051
Lactose	4.63	4.65	4.66	4.67	.060
Total solids	12.56	12.59	12.68	12.74	0.097
Solids non fat (SNF)	12.56	12.59	12.68	12.74	0.097
Ash	8.45	8.50	8.55	8.59	0.053
Somatic cell count's (SCC) x10 <sup>3</sup>	523 <sup>a</sup>	395 <sup>b</sup>	303 <sup>c</sup>	231 <sup>d</sup>	14.50

Means in the same row with different superscripts are significant at  $P < 0.05$ . SE: Standard error.

G1: Control, which fed 50% concentrate feed mixture, 25% berseem hay and 25% rice straw without supplement, while animal G2, G3 and G4 received a daily feed supplement 1, 2 and 3 g chamomile/ head, respectively.

**Milk fat composition:**

The goat milk fat is composed of several hundred fatty acids, the share of which in the total FA pool is considerably differentiated. The share of five of those acids (C10:0, C14:0, C16:0, C18:0, C:18-1 cis) comprises over 75% of total FA in milk (Park *et al.* 2007). Data presented in Table (3) indicated that goat's diets supplemented with treatment G2, G3 and G4 significant tended to increase both of C4, C8, C10, C12, C14 and C16. At the same time addition of previous treatments diets tended to decrease C16, C18:1 cis, C18:2 cis and C18:3 n3. From these data of milk fat composition, the good effect of these additives appeared by increasing the level of healthy fatty acids.

**Somatic cell counts:**

Data of somatic cell counts (SCC) are presented in Table (2). Somatic cell counts were increased during the suckling periods and then decreased to the minimum values during mid-lactation and tended to increase again thereafter at the end of lactation (late lactation) with all groups

Concerning the effect of tested experimental rations, the results indicated that SCC was generally decreased with using chamomile (G2, G3 and G4) compared with G1 (control) and the differences were significant during all three experimental periods as shown in Table (2). Somatic cell count (SCC) during suckling period was reduced by 37.42, 47.74 and 60.61 vs. 38.87, 51.15 and 63.43% in mid lactation for G2, G3 and G4, respectively compared with the control. The same trend was observed during late lactation period and the values were 523000, 395000, 30300 and 231000 of G1,G2,G3 and G4, respectively.

**Table (3): Effect of tested experimental rations on milk fat composition.**

Item	Group				SE
	G1	G2	G3	G4	
Butyric acid C4:0	0.18	0.37	0.33	0.52	0.27
Caproic acid C6:0	1.20	1.15	1.23	1.43	0.19
Caprylic acid C8:0	1.99	1.99	2.25	2.58	0.19
Capric acid C10:0	7.43 <sup>b</sup>	7.14 <sup>b</sup>	8.88 <sup>ab</sup>	9.75 <sup>a</sup>	0.48
Lauric acid C12:0	3.23	2.90	3.40	3.58	0.15
Myristic acid C14:0	8.07	7.38	8.51	8.70	0.40
Myristoleic acid C14:1	0.35	0.39	0.41	0.39	0.01
Pentadecytic acid C15:0	0.78	0.90	0.91	0.90	0.04
Palmitic acid C16:0	26.41	24.93	27.13	27.86	1.11
Palmitoleic acid C16:1	0.85	1.11	0.53	0.55	0.16
Margaric acid C17:0	0.55	0.60	0.57	0.52	0.01
10-Heptadecenoic acid	0.83	0.95	0.87	0.78	0.05
Stearic acid C18:0	11.72	11.95	11.26	10.35	0.51
Oleic acid C18:1cis	29.70	30.55	27.16	25.98	1.28
Oleic acid C18:1trans	1.01	2.26	1.35	1.09	0.32
Linoleic acid C18:2cis	3.79	3.17	3.12	2.95	0.29
Linoleic acid C18:2trans	0.04	0.11	0.24	0.23	0.06
Arachidic acid C20:0	0.24	0.35	0.25	0.24	0.04
Linoleinic acid C18:3n6	0.63	0.77	0.73	0.80	0.22
Linoleinic acid C18:3n3	0.45	0.25	0.27	0.26	0.11
Elcosapentaenoic acid C20:5	0.26 <sup>c</sup>	0.32 <sup>bc</sup>	0.46 <sup>a</sup>	0.42 <sup>ab</sup>	0.03
Docosahexanaeroic acid C22:6	0.23	0.40	0.11	0.45	0.27
SFA	61.83	59.69	64.73	66.43	1.39
UFA	38.17	40.31	35.27	33.57	1.39
Total	100.00	100.00	100.00	100.00	-

G1: Control, which fed 50% concentrate feed mixture, 25% berseem hay and 25% rice straw without supplement, while animal G2, G3 and G4 received a daily feed supplement 1, 2 and 3 g chamomile/ head, respectively.

SE: Standard error.

These results of somatic cell count agree with those of Shehata *et al.* (2004) who found that SCC was generally higher during the first month of lactation and suckling, and then gradually decreased to a minimum in the 4<sup>th</sup> and 5<sup>th</sup> months in mid-lactation. Thereafter, SCC increased again gradually to a maximum at the end of lactation (9<sup>th</sup> month). In agreement with the present results, Boumgartner *et al.* (1992) found that SCC was closely related to the period of lactation, being the highest during the 6<sup>th</sup> week following parturition then decreased to the 24<sup>th</sup> week of lactation and then being high at the end of lactation.

It is interesting to note a negative relationship between SCC and milk yield (Shehata *et al.* 2004 and Ahmed *et al.* 2017). In this respect, Baro *et al.* (1994) and Bedo *et al.* (1995) found that SCC correlated negatively with milk yield. This noticeable effect on reducing SCC and consequently improving milk quality might be attributed to active ingredients like flavonoids, coumarins, cyanogenicglycosids and salicylates in chamomile that function as anti-inflammatory, antiseptic, antispasmodic agent (Korting *et al.* 1993, Ody Penelope, 1993 and McIntyre, 1995).

#### **Milk quality:**

Concerning milk quality, the color and flavor as well as the acidity and pH (Tables 4 and 5) were similar with all tested experimental treatments. In the same time, incubation of goat's milk with 1% *Lactococcuslactis* subsp. *lactis* resulted in increased acid development for all groups.

This development in acidity proved that goat's milk of different treatments is proper for manufacturing some fermented dairy products such as cheese, yoghurt and cultured milk. Moreover, natural milk pH and pH of milk incubation with 1% *Lactococcuslactis* subsp. *lactis* were decreased with the prolonged incubation period. These results agree with those of Youssef (1989) and Ibrahim *et al.* (2008). As for physical properties of curd, the fresh whole raw goats' milk was heated to 30°C and rennet was added. The results in Table (6) indicated that there is no significant variation among different groups of row goat's milk as regard RCT, CT, whey syneresis and fat loss of whey. These results were consistent with those of Nasr *et al.* (1990), Mehana (1998) and Ahmed *et al.* (2008b).

**Table (4): Acidity and pH development of goat's milk (Row milk).**

Group	Incubation period (hours)											
	Acidity						pH					
	0	1	2	3	4	5	0	1	2	3	4	5
G1	0.163	0.181	0.193	0.20	0.28	0.380	6.63	6.51	6.42	6.35	6.30	5.81
G2	0.161	0.178	0.197	0.23	0.29	0.400	6.62	6.52	6.40	6.33	6.28	5.73
G3	0.165	0.185	0.210	0.24	0.31	0.420	6.63	6.47	6.38	6.32	6.33	5.61
G4	0.167	0.190	0.220	0.26	0.30	0.410	6.61	6.43	6.35	6.30	6.31	5.55

G1: Control, which fed 50% concentrate feed mixture, 25% berseem hay and 25% rice straw without supplement, while animal G2, G3 and G4 received a daily feed supplement 1, 2 and 3 g chamomile/ head, respectively.

**Table (5): Acidity and pH development of goat's milk incubation with 1% *Lactococcuslactis* subsp. *lactis*.**

Group	Incubation period (hours)											
	Acidity						pH					
	0	1	2	3	4	5	0	1	2	3	4	5
G1	0.162	0.175	0.183	0.210	0.261	0.540	6.62	6.55	6.40	6.20	6.03	5.25
G2	0.161	0.183	0.191	0.224	0.275	0.525	6.60	6.43	6.35	6.25	6.05	4.95
G3	0.163	0.185	0.195	0.230	0.289	0.611	6.55	6.45	6.23	6.23	5.90	4.91
G4	0.165	0.187	0.193	0.235	0.296	0.620	6.57	6.41	6.21	6.21	5.85	4.80

G1: Control, which fed 50% concentrate feed mixture, 25% berseem hay and 25% rice straw without supplement, while animal G2, G3 and G4 received a daily feed supplement 1, 2 and 3 g chamomile/ head, respectively.

**Table (6): Effect of tested experimental rations on RCT, CT, whey syneresis and fat loss of whey in row goat's milk.**

Group	RCT	CT	Whey syneresis				Fat loss of whey %
	Min: sec	(gram)	10	30	60	90	
G1	2.41	36.5	26.50	38.60	47.3	55.70	0.50
G2	2.45	34.7	28.30	40.80	51.7	57.50	0.51
G3	2.33	35.3	26.70	43.50	53.1	61.30	0.51
G4	2.31	37.1	27.00	41.70	52.5	60.90	0.55

RCT: Rennet coagulation time, CT: Curd Tension

G1: Control, which fed 50% concentrate feed mixture, 25% berseem hay and 25% rice straw without supplement, while animal G2, G3 and G4 received a daily feed supplement 1, 2 and 3 g chamomile/ head, respectively.

**Feed intake and conversion:**

The effect of chamomile flowers at levels 0, 1, 2 and 3 g/head/ day on average daily DM intake and feed conversion are presented in Table (7). The obtained data indicated that daily feed intake as % BW and g / kg w<sup>0.75</sup>, though offered according to allowances, show slight increase with using chamomile being 3.97 and 101.4 for G2, 4.01 and 103.0 for G3, 4.05 and 104.0 for G4 while control, G1 consumed 3.89 and 104.8, respectively. Concerning feed conversion ratio, the obtained data indicated that feed conversion calculated as dry matter intake/ milk yield were better 1.166, 1.152 and 1.139) with the chamomile groups (G2,G3 and G4, respectively ) compared with the control (1.226). Similarly, the values of feed conversion based on crude protein improved by 5.44, 6.12 and 7.50 % with G2, G3 and G4, respectively comparable to G1.

**Table (7): Average daily feed intake and feed conversion ratio by lactating goats as affected by experimental rations.**

Item	Group			
	G1	G2	G3	G4
No. of dairy goats	10	10	10	10
Average body weight, kg	46.03	45.39	45.07	44.83
Average milk yield, g/h/d	1461	1545	1570	1593
Average feed intake, g/h/d				
CFM	900	903	907	909
BH	451	453	455	456
RS	440	445	447	450
Total DM intake g/h	1791	1801	1809	1815
DM intake, % BW	3.89	3.97	4.01	4.05
DM intake, g/ kg w <sup>0.75</sup>	101.4	103.0	104.0	104.8
CP intake, g/h/d	214.52	215.42	216.37	216.92
CP intake, g/ kg w <sup>0.75</sup>	12.14	12.32	12.44	12.52
Concentrate : roughage (C/R) ratio	50: 50	50:50	50:50	50:50
Feed conversion efficiency ratio:				
Kg DM / kg milk	1.226	1.166	1.152	1.139
Kg CP/ kg milk	0.147	0.139	0.138	0.136

G1: Control, which fed 50% concentrate feed mixture, 25% berseem hay and 25% rice straw without supplement, while animal G2, G3 and G4 received a daily feed supplement 1, 2 and 3 g chamomile/ head, respectively.

Similar results of feed intake and conversion were observed by Ibrahim *et al.* (2013). Shehata *et al.* (2004) observed that the addition of chamomile had positive effect on DM intake during late pregnancy and lactation periods (suckling, mid and late lactation) especially during mid-lactation. The same authors stated that the daily DM intake may increase by medicinal herbs to support the greater milk yield (as reported also by Ahmed, 1999). The positive effect on feed conversion was observed by Ibrahim *et al.* (2013) and Gabr *et al.* (2015). Zeid and Ahmed (2004) found that feed conversion ratio based on DM intake improved by 10.91 and 8.38% with both chamomile and thyme, respectively.

**Blood profile:**

Data of hemato-biochemical parameters are presented in Table (8). The results indicated that most tested blood parameters were not significantly affected by the tested experimental rations. Comparison of hematological parameters revealed small fluctuation among groups fed different rations in concentrations of Hb, RBC's, Hct and WBC's. In the same time, both MCHC% and lymphocytes were higher with increasing level of chamomile in goat's rations and the differences were significant. Similarly, serum protein, albumin and globulin tended to increase with chamomile groups (G2, G3 and G4) and the differences were significant in total protein only. Mohamed *et al.* (2003) found that serum concentrations of total protein, alpha1, alpha2 beta1, beta2 and gamma 2 globulin were highly significantly as a result of using chamomile to ewes rations.

Also, serum Glucose increase with chamomile groups (78.01, 80.17 and 79.95 mg/dl for G2, G3 and G4, respectively. Compare to G1 (75.17 mg/dl) (P>0.05).

Serum creatinine was significantly decreased (1.11, 1.05 and 1.03) with the three groups (G2, G3 and G4, respectively) compared with the control (1.25). Thus, creatinine level in blood clearly presents goat's kidney status, so it can be a good indicator on the animal health as reported by El-Basiony *et al.* (2015). Moreover, serum cholesterol, triglyceride and activities of AST and ALT were higher with the control ration (G1) compared with the other groups and the differences were significant in both cholesterol and ALT concentrations only. Finally, both calcium and phosphorus tended to increase with using chamomile

in rations of dairy Zaraibi goats and the differences were significant in serum phosphorous only as shown in Table (8).

Serum protein, albumin and globulin tended to increase with chamomile groups (G2,G3 and G4). Similarly, El-Basiony *et al.* (2015) observed a positive effect to some medicinal herbs on total protein and globulin and they stated that this increase may also due to an immune stimulate effect of used herbs. creatinine level in blood clearly presents goat's kidney status, so it can be a good indicator on the animal health as reported by El-Basiony *et al.* (2015).

Similar results were observed by Shehata *et al.* (2004) and Abdelhamid *et al.* (2011). Tawfik *et al.* (2005) found that serum total lipids and cholesterol as well as the enzyme activity (ALP, AST and ALT) were reduced as a result to using of chamomile in sheep rations. Kaneko (1989) cited that the normal physiological range of blood phosphorus (inorganic) in from 5.0 to 7.3 mg/dl.

**Table (8): Blood profile of dairy Zaraibi goats as affected by tested experimental rations.**

Item	Group				SE
	G <sub>1</sub>	G <sub>2</sub>	G <sub>3</sub>	G <sub>4</sub>	
Hemoglobin, g/dl	11.10	11.50	11.45	11.65	0.54
Hematocrit, Hct, %	35.97	35.53	34.30	33.50	1.25
RBC's x10 <sup>6</sup> /ml	12.87	13.10	13.17	13.31	0.63
MCHC, %	30.91 <sup>b</sup>	32.29 <sup>ab</sup>	33.41 <sup>a</sup>	34.79 <sup>a</sup>	0.47
White blood cells (WBCs)x 10 <sup>3</sup> /ul	11.35	11.17	10.73	10.61	0.96
Lymphocytes, %	49.15 <sup>b</sup>	50.05 <sup>ab</sup>	52.26 <sup>a</sup>	52.89 <sup>a</sup>	0.53
Granules, %	42.69	42.14	40.00	39.80	0.79
Monocytes,%	8.13	7.81	7.75	7.31	0.81
Glucose, mg/dl	75.17	78.01	80.17	79.95	1.85
Total protein, g/dl	7.11 <sup>b</sup>	7.35 <sup>ab</sup>	7.63 <sup>a</sup>	7.65 <sup>a</sup>	0.15
Albumin, g/dl	3.71	3.80	3.92	3.83	0.21
Globulin, g/dl	3.41	3.55	3.71	3.82	0.19
A/G Ratio	1.088	1.070	1.057	1.003	0.012
Creatinine, mg/dl	1.25 <sup>b</sup>	1.11 <sup>a</sup>	1.05 <sup>a</sup>	1.03 <sup>a</sup>	0.11
Triglyceride, mg/dl	51.17	49.90	50.01	48.79	2.51
Cholesterol, mg/dl	80.19 <sup>b</sup>	74.71 <sup>ab</sup>	75.11 <sup>ab</sup>	73.50 <sup>a</sup>	2.13
AST, IU/L	50.21	47.35	45.50	46.03	1.95
ALT, IU/L	22.11 <sup>b</sup>	19.35 <sup>ab</sup>	19.51 <sup>ab</sup>	18.35 <sup>a</sup>	1.02
Calcium, mg/ dl	9.75	10.11	10.05	10.21	0.17
Phosphorus (inorganic), mg/dl	6.25 <sup>b</sup>	6.59 <sup>ab</sup>	6.85 <sup>a</sup>	7.01 <sup>a</sup>	0.11

Means in the same row with different superscripts are significant at  $P < 0.05$ . SE: Standard error.

G1: Control, which fed 50% concentrate feed mixture, 25% berseem hay and 25% rice straw without supplement, while animal G2, G3 and G4 received a daily feed supplement 1, 2 and 3 g chamomile/ head, respectively.

Generally, the obtained values are within normal range reported by Jain (1986), Kaneko (1989), Ahmed (1999), El-Kholany *et al.* (2013) for healthy goats and sheep and in line with the finding of Maged (2004), Abdelhamid *et al.* (2011) and El-Kholany *et al.* (2015) who used some medicinal herbs in rations of sheep, goats and cows, respectively.

#### **Physiological parameters:**

The effect of the tested experimental treatments on physiological parameters of dairy Zaraibi goats is presented in Table (9). The obtained data indicated no significant differences in respiration rate, pulse and rectal and skin temperature. Generally, values detected among tested groups revealed that the animal, generally were in good health condition as reported by Maged *et al.* (2017) with lactating Zaraibi goats during mid-lactation period.

**Table (9): The effect of the experimental treatments on physiological parameters.**

Item	Group				Standard error
	G1	G2	G3	G4	
Respiration rate	18.90	20.35	19.50	20.05	1.50
Pulse	80.95	82.11	81.73	81.15	3.17
Rectum temperature	37.85	39.04	38.35	39.17	0.21
Skin temperature	37.61	38.51	38.13	38.71	0.19

G1: Control, which fed 50% concentrate feed mixture, 25% berseem hay and 25% rice straw without supplement, while animal G2, G3 and G4 received a daily feed supplement 1, 2 and 3 g chamomile/ head, respectively.

## CONCLUSION

It could be concluded that using chamomile flowers in lactating goat's rations had positive effect not only on improving the milk production and composition, but also on reducing the somatic cell counts (SCC) reflected on improving milk quality. Moreover, feed utilization and some hemato-biochemical parameters were better also with the treatment groups especially with the high level of chamomile. Further studies are needed to evaluate the utilization of chamomile by some other farm animals, during different physiological periods and for long time.

## REFERANCES

- AOAC (1995). Official Methods of Analysis. (16th) Edt. Association Analytical Chemists, Washington, D.C., USA.
- Abdelhamid A. M.; E. I. Shehata and G. A. Maged. (2011). Effect of medical herbs on production of dairy Zaraibi goats . J. Agric. Sci. Mansoura Univ., 2(11): 493-513.
- Ahmed, M. E, A. M. Abdelhamid, Fathia A. Ibrahim and Sara I.M. Grawish (2017). Response of lactating Zaraibi goats to diets containing sesbania and Kochia silage as a new and high source of protein. International J. of Current research in Biosciences and plant Biology. 4(10): 52-62.
- Ahmed, M.E., E.I. Shehata, F.F. AbouAmmou, A.M. Abdel-Gawad, and K.M. Aiad. .of Rahmani sheep (2008a). Milk production, feed conversion rate and reproduction of Zaraibi goat in response to bacterial feed additive during late pregnancy and lactation of Rahmani sheep. Egypt. J. Anim. Prod., 45: 189.
- Ahmed, M. E. ; E. I. Shehata, F. A. Ibrahim, K. M. Aiad, O. A. El-Zalaky. (2008b). Milk production and quality of dairy Zaraibi goats fed trifolium alexandrinum (1st cut) silage with some crop residues. Egypt. J of Sheep and Goat Sci. , vol. 3(2): 27-40.
- Ahmed, M.E. (1999). Improving feed conversion efficiency during reproductive-stress. Ph. D. Thesis, Fac. Agric. Mansoura Univ.
- Allam, S.M., M.H. El-Hossieny, A.M. Abdel-Gawad, S.A. El-Saadany and A.M.M. Zeid (1999). Medicinal herbs and plants as feed additives for ruminants. 1-Effect of using some medicinal herbs and plants as feeds additives on Zaraibi goat performance. Egyptian J. Nutrition and Feeds, 2(Special Issue): 349.
- Ayyad, K. M., W.M.A. Sadek, G.A. Maged, E.I. Shehata and M.E. Ahmed (2014). Impact of feeding microbial additives on production and hygienic quality in milk of Zaraibi does. 12<sup>th</sup> Conf. Agric. Dev. Res., Fac. Agric. Ain Shams Univ. Cairo, Egypt.
- Barnett, A.J.G. and G. Abd El-Tawab (1957). Determination of lactose in milk and cheese. J. Sci. Food Agric., 8: 437 – 441.
- Baro, J.A., J.A. Carriedo and F. San Primitivo (1994). Genetic parameters of test day measures for somatic cell count, milk yield and protein percentage of milking ewes. J. Dairy Sci., 77: 2658-2662.
- El-Basiony, A.Z.; H.M. Khattab; A.M. Kholif; Fatma I.I. Hadhoud and H.A. El-Alalmy (2015). Effect of using Echinacea purpurea, Nigella Sativa and chioctriumintybus in dairy goats diet on milk production and quality :2-Effect on digestibility, some blood parameters and milk production and quality. Egypt. J. Nutre. and feeds (2015), 18(2) Special Issue: 137-145.
- Bedo, S., E. Nikodemusz and K. Gundel (1995). Variations in the yield, composition and somatic cell count of ewes' milk during lactation, Act. Vet Hung., 43: 463.
- Boumgartner, W., A. Pernthaner and G. Eibl (1992). The effect of lactation period on the cell count of sheep milk. Dtsch Tierarztl Wochenschr, 99: 213-219.
- Duncan, D.B. (1955). Multiple range and Multiple F-test Biometrics, 11: 1-42.

- El-Kholany, M. E., E. S. Soliman, F. A. El-Sayed, and M. E. Ahmed (2013) Growth performance, some rumen parameters and blood profile of male Zaraibi goats fed diets containing Sesbania seeds as a new source of protein. . *Animal and Poultry Prod.*, Mansoura Univ., 4(12):747-759.
- El-Kholany, M.E., A.A. Mehana, G.A. Maged and A.A. El-Mowafy (2015). Performance and some rumen parameters of ballade cows fed rations supplemented with productive chamomile flowers during late pregnancy and lactating periods *J. Animal and Poultry Prod.*, Mansoura Univ., Vol.6(12): 705-717.
- El-Kholany, M.E., F. A. Elsayes, A.A. Mehany and G. A. Maged (2017). Effect of dietary supplementation of chamomile flowers on digestability and productive performance of Baladi growing calves. *J. Animal and Poultry Prod. Mansoura Univ.*, vol. 8(12): 459-465.
- Gabr, A.A.; M.E. Ahmed; Fathia A. Ibrahim and M.S. Seleem (2015). Growth performance, some rumen parameters and blood profile of male Zaraibi goats fed diets added with Chufa tubers (*Cyperus Esculentus L.*) during the growing period. *J. Agric. Sci. Mansoura Univ.* vol. 6:(9) 609.
- Ibrahim, F.A ; K.M.K. Ayad, M.E. Ahmed and M.E. El-Kholany (2013). Effect of using chufa tubes (*Cyperus esculantus L.*) in Zaraibi goats diets on the resultant milk and labinal. *Egyptian J. of Sheep and Goat Science*, 8(1) : 201-211.
- Ibrahim, F.A , M. E. Ahmed and A. S. Soliman (2008). Cultivation and evaluation of some green forage mixture and its utilization in feeding of lactating Zaraibi goats. *Egyptian J. Nutrition and Feeds*, 11(2): 329.
- Jain, N.C. (1986). *Veterinary Hematology*. 4<sup>th</sup> Ed., Lea & Febiger. Philadelphia
- Kaneko. I.H. (1989). *Chemical Biochemistry of Animals*. 4<sup>th</sup> ED. Academic Press, Inc USA.
- Kholif, A. M. (2000). Medicinal plants seeds supplementation to lactating goats diets. *Conf. Anim. Agric. & 11th Conf. Egyptian Soc. Animal Prod.*, Alexandria, 6-9 November, P:197
- Korting, H. C., M. Schafer-Korting and H. Hart (1993). Anti-inflammatory activity of hamamleis distillate applied topically to the skin. Influence of vehicle and does. *Eur. J. Clin. pharmacol.* (44: 315).
- Lawrence, A.J., 1959. Syneresis of rennet Curd. *J. Dairy Technol.*, 14: 166.
- Ling, E.R. (1963). *A Text Book of Dairy Chemistry*. 3rd Ed. Chapman and Hall Ltd., London.
- Maged, G. A. (2004). *Nutritional Studies on Small Ruminants*. Master of Agriculture Science. Fac. of Agric., Mansoura Univ., Egypt
- Maged, G.A. ( 2012). Effect of medical herbs on production of dairy Zaraibi goats. Ph. D. Thesis, Fac. of Agric., Mansoura Univ., Egypt.
- Maged, G.A.; M. E. El-Kholany; G.E. El-Imam; F.A. El-Sayed; T. H El-Swah; M.A. Aboul-Omran and A.A. Al-Mowafy (2017). Response of milk production of dairy Zaraibi goats to feeding rations containing different levels of Sesame seeds unsuitable for manufacturing as an inexpensive and untraditional source of protein.
- McIntyre, A. (1995). *The complete woman's herbal*, Henry Holt Co., New York, pg. 41.
- Mehana M.Y., El-Shazly, A.A., Nasr M.M. and Ayad K.M. (1998). Studies on Domiati cheese, 1- yield, gross chemical composition and physical properties of curd of goat's milk as affected by feeding rations. *J. Agric. Sci. Mansoura Univ.*, 23(11): 49.
- Mohamed, A. H. B. E. El-Saidy and I. A. El-Seidi (2003). Influence of some medicinal plants supplementation.: 1- On digestability, nutritive value, rumen fermentation and some blood biochemical parameters in sheep. *Egyptian J. Nutrition and Feeds*, 6: 139.
- Mousa, M.M. (1996). *Physiological and nutritional studies on goats*. Ph.D. Thesis, Fac. Agric., Mansoura Univ.
- Nasr, M. M., A.A. Kandeel and M.M.K. Metwally (1990). The effect of hennilase rennet in the manufacture of domiati cheese made from cows milk. *Annals Agric. Sc.*, Moshtohor, 28.
- NRC (1981). *Nutrient Requirements of Domestic Animals. Nutrient Requirements of Goats*. National Research Council, Washington, D.C. USA, of Official Analytical Chemists, Washington, D.C., USA.
- Ody Penelope (1993). *The complete medicinal herbal*, Dorling Kindersley, New York, p. 47.

- Park Y.W., Juarez, M., Ramos, M., Haenlein, G.F.W. (2007). Physico-chemical characteristics of goat and sheep milk. *Small Ruminant Research* 68: 88-113.
- SAS Institute (2003). *SAS/STAT User's Guide: statistics. Ver. 9.1*, SAS Institute Inc., Cary, NC, USA.
- Shehata, E.E.; F.H. Abd El-Rasoul; F.F. AbouAmmou, M.E. Ahmed and A. M. Abdel-Gawad (2007). Effect of feeding some medicinal herb, Chamomile flowers, on some productive performance of Egyptian Zairaibi does and their new born kids. *Egyptian J. Sheep and Goat Sci.*, 2(2):111-120.
- Shehata, E.E.; F.H. Abd El-Rasoul; M.E. Ahmed, F.F. Abou-Ammou and R. El-Ahwall (2004). Effect of feeding a medicinal herb, chamomile flower on production and hygiene of goat milk production. *Egypt. J. Nutr. and Feeds*, 7: 109.
- Tawfik, S.A, M.E. Ahmed, E.I. Shehata and O.B. El-Gazzar (2005). Effect of adding chamomile flowers to aflatoxins contaminated diet on growth performance, rumen parameters and some blood components of growing lamb's .4th Int. Sci. Conf., Mansoura. P: 251.
- Youssef, A.S. (1989). Studies on goat's milk: utilization in soft and hard cheese making. Ph. D. Thesis, Faculty of Agr., Al Azhar Univ. Egypt.
- Zeid, A.M. and M.E. Ahmed (2004). Productive performance of Zairaibi goats fed rations containing some medicinal herbs. *J. Agric. Sci. Mansoura Univ.*, 29 (2): 595-608.

### تأثير اضافته زهرة البابونج إلى علائق الماعز الزرايبي الحلابة على الاداء الانتاجي لها

محمد ابراهيم احمد<sup>1</sup> ، طارق مسلم محمود مهدي<sup>1</sup> ، أحمد ممدوح منصور<sup>2</sup> ، هدى الزهار<sup>3</sup> و وليد ماهر أمين صادق<sup>1</sup>

<sup>1</sup>معهد بحوث الإنتاج الحيواني - مركز البحوث الزراعية- الدقى- جيزة- مصر.

<sup>2</sup>قسم الإنتاج الحيواني- كلية الزراعة- جامعة عين شمس- مصر.

<sup>3</sup>قسم علوم الألبان-المركز القومي للبحوث-الدقى-القاهرة- مصر.

هذا العمل تم لدراسة تأثير إضافة زهور الكاموميل لعلائق الماعز الحلاب علي إنتاج اللبن وتركيبه وجودته بالإضافة الي تأثير هذه المعاملات علي صورة الدم وكفاءة تحويل الغذاء.

تم استخدام 40 ماعز زرايبي في بداية الحليب، حيث قسمت عشوائيا الي أربع مجموعات متساوية (10 حيوانات في كل مجموعة). و كانت مجموعات الحيوانات هي: 1م, 2م, 3م و 4 اعطيت 0 , 1 , 2 و 3 جرام كاموميل/ راس / يوم مضافة في علائقها علي التوالي. و قد استمرت دراسته فترات الأدرار الثلاثة ( المبكر والمتوسط والمتأخر).

أظهرت النتائج اتجاه إنتاج اللبن اليومي الي الزيادة مع زيادة مستوي الكاموميل في العليقة والزيادة كانت معنوية في مرحلة الأدرار الأخيره فقط. و قد أظهرت مجموعات الكاموميل زيادة في نسبة دهن اللبن والمواد الكلية والمواد الغير دهنية والبروتين الكلي خصوصا في 4م (3 جم كاموميل/رأس/يوم). سجلت مجموعات الكاموميل أنخفاض معنوي في عدد الخلايا الجسديه في اللبن (SCC) في كل مراحل الأدرار وكانت 4م أكثرهم أنخفاضا.

سجل عدد الخلايا الجسديه في اللبن (SCC) أعلى مستوياته في مرحلة الرضاعة ثم أنخفض الي أقل مستوياته في مرحلة الإدرار الوسطي ثم عاد للإرتفاع ثانيه في الإدرار المتأخر. بالنسبة لتأثير المعاملات علي سيرم الدم ومكوناته فأن معظم مكونات الدم لم تتأثر معنويا بالمعاملات. ازدادت نسبة البروتين والجلوكوز والفوسفور في الدم مع اضافته الكاموميل، وازدادت أيضا نسبه %MCHC و الليمفوسيت في الدم مع زيادة الكاموميل خصوصا في 4م.

سجلت 4م أفضل كفاءة تحويل للغذاء علي أساس المادة الجافه والبروتين الخام تلتها 3م ثم 2م وأقلهم في كفاءة تحويل كانت في مجموعه المقارنه.

يمكن أستنتاج أن إضافة الكاموميل بنسب من 1 : 3 جم للرأس لعلائق الماعز الحلاب أدت الي زيادة إنتاج اللبن وزيادة نسب مكوناته، وبالتالي زيادة كفاءة تحويل الغذاء وأيضا تحسين جودة اللبن و انخفاض ملحوظا في الخلايا الجسديه.