J.Animal and Poultry Prod., Mansoura Univ., Vol.2(12): 493 - 513,2011

EFFECT OF SOME MEDICAL HERBS ON PRODUCTION OF LACTATING ZARAIBI GOATS

Abdelhamid A. M.[1] ; E. I. Shehata[2] and G. A. Maged[2]
[1]Fac. Agric., Mansoura University, Mansoura, Egypt.
[2]Animal Production Res. Inst., Agric. Res. Center, Egypt.

ABSTRACT

The main objectives of this work were to investigate the effects of dietary supplementation with *Artemisia absinthium, Rosemarinus officinalis* and *Pimpinella anisum* at levels of 3 and 6 g/100kg BW/daily on productive performance and economical efficiency. Milk yield and its composition were also studied. Additionally, the effect of these dietary treatments on the blood profile was examined. The obtained results indicated better effects of the tested herbs (particularly *Artemisia absinthium* at 6 g/100 kg BW/day) on daily feed intake, some hematological and biochemical parameters, overall mean of daily milk yield, milk fat %, feed conversion, live body weight of does, live body weight at birth and weaning, mortality rate of kids, kilograms produced per doe, and economic efficiency. Generally, the positive effects of the tested medical herbs are due to their active substances.

Keywords: *Goats – medical herbs – performance – milk yield and composition – blood – kids.*

INTRODUCTION

Research works had been carried out to study the possible effects of using natural additives such as medicinal herbs in animal feeding for various purposes such as improvement of immunity (Tawfik *et al., 2005),* detoxification of the aflatoxins (Abdelhamid *et al., 2002),* increasing the palatability and digestion as well as reducing the cholesterol and the enzyme activity (ALP, AST and ALT) in the blood and improving the other blood parameters as well (Hassan and Hassan*, 2009*) reducing the incidence of digestive disturbances such as diarrhea and bloat and reducing the feed cost per kg body weight gain or kg milk yield, e.g. improving the economical efficiency (Shehata *et al., 2007a),* improvement of the milk yield and their composition besides reduction of the somatic cell count (SCC) in the milk during all the lactation period (early, mid and late lactation) and consequently improving milk quality (Chiofalo *et al. , 2010),* minimizing the mortality rate of the offspring (El-Hosseiny *et al*., 2000 and Shehata *et al., 2007a),* improving the ruminal fluid environment and the daily body gain in growing animals (Abdelhamid *et al., 2004),* improving feed utilization efficiency and carcass quality (Morteza*, 2010),* and improving food quality and thus health and consequently used in treatment of both human and veterinary medicine (Kostadinovic *et al., 2010).*

Therefore, the present study was carried out to study the effect of some medicinal herbs such as *Artemisia absinthium, Rosemarinus officinalis* and *Pimpinella anisum* at two levels (3 and 6 g / 100 kg BW, daily) during the late pregnancy and suckling period (pre and post kidding) of Zaraibi goats on

productive and reproductive performances, blood profile, milk yield and composition, and economic efficiency.

MATERIALS AND METHODS

The experimental animals and their management: Twenty one Zaraibi does (within three seasons of lactation) aging 3 – 6 years and weighing on average 41.01kg were divided randomly into seven equal groups, 3 goats each. The animals were in the late pregnancy period (start of the 4^{th} month of pregnancy) and continued for three months of lactation (suckling period) at winning. 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 in groups. Each group was housed in a semi – roofed barn (3x 4 x4 meters). The rations were offered twice daily at 9 a.m. and at 5 p.m. water was available for the desire of each animal. The nutrient requirements were adjusted according to production (body weight and milk production) which was determined every two weeks according to NRC (1981) recommendations.

The experimental rations and nutritional requirements: The 7 groups of Zaraibi goats were used to evaluate the following experimental rations:

1- Concentrate feed mixture (CFM) + Rice straw (RS) + Berseem clover (BC) {Control, G_1}.
2- CFM + RS + BC + *Artemisia absinthium* at level 3 g / 100 kg BW, daily (G_2).
3- CFM + RS + BC + *Artemisia absinthium* at level 6 g / 100 kg BW, daily (G_3).
4- CFM + RS + BC + *Rosemarinus officinalls* at level 3 g / 100 kg BW, daily (G_4).
5- CFM + RS + BC + *Rosemarinus officinalls* at level 6 g / 100 kg BW, daily (G_5).
6- CFM + RS + BC + *Pimpinella anisum* at level 3 g / 100 kg BW, daily (G_6).
7- CFM + RS + BC + *Pimpinella anisum* at level 6 g / 100 kg BW, daily (G_7).

Amount of concentrate feed mixture (CFM) + rice straw (RS) + berseem clover (BC) were based on nutrient requirements recommendation of NRC (1981) of goats during the last 2 month of pregnancy and lactation periods. The CFM consists of 20 % un-decorticated cottonseed meal, 41% yellow corn, 5% soybean meal, 21% wheat bran, 5% rice bran, 4% molasses, 2.5 % limestone, 1.0% common salt and 0.5 % minerals mixture. The chemical analysis of the CFM, RS and BC in shown in Table (1).

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

Feeds	DM	Chemical composition					
		OM	CF	CP	EE	NFE	Ash
Concentrate feed mixture, CFM	91.90	93.5	16.0	15.02	3.41	59.07	6.5
Berseem clover, BC	14.30	86.5	24.5	14.03	2.3	45.67	13.5
Rice straw, RS	90.50	82.0	38.7	3.31	1.5	38.49	18.0

DM: Dry matter, OM: Organic matter; CF: Crude fiber; CP: Crude protein; EE: Ether extract and NFE: Nitrogen free extract.

Blood parameters: Blood samples were collected from 3 Zaraibi does at the end of feeding trials**.** The whole blood was immediately directed to hematological studies. Another blood samples were centrifuged at 4000 rpm for 20 minutes. Part of the separated sera was directed to enzymes determination and another part was stored frozen at -20^{0}C till the biochemical analysis. Commercial kits were used for colorimetric determinations besides calculations of hemoglobin**,** hematocrit**,** red blood cells (RBCs), mean cell volume (MCV), mean cell hemoglobin (MCH), mean cell hemoglobin concentration (MCHC), white blood cells (WBCs), differential leukocyte count**,** glucose**,** total protein**,** albumin**,** globulin**,** urea –N**,** creatinine**,** cholesterol**,** aspartic aminotransferase (AST) and alanine aminotransferase (ALT).

Chemical analysis of tested dietary ingredients: Samples were taken from the tested dietary ingredients for running the proximate analysis for dry matter (DM), crude protein (CP); ether extracts (EE), crud fiber (CF) and ash contents according to A.O.A.C. (1995) procedures.

Milk samples: Individual milk yield was recorded for each goat for all tested groups once biweekly. Representative milk samples (about 1% of the total milk produces) were taken once biweekly from each goat, from the morning and evening milking of the same day, then composites and analyzed for chemical composition according to Ling (1963) procedures.

Body weight changes: Changes of live body weight were recorded individually for the does and their born kids every 15 days. Litter size (borns / doe), kidding rate (litter size x100) were calculated.

Economic efficiency: Economic efficiency was calculated, as total output / total input according to the local prices (where on ton BC coasted 200 LE, RS 100LE, CFM 2000 and one kg live body weight of kids 30 LE).

Statistical analysis: Data were statistically analyzed by the least squares methods described by Likelihood program of SAS (2003). Differences among means were determined by Duncan's New Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Daily feed intake:

The effect of medicinal herbs such as *Artemisia absinthium, Rosemarinus officinalls* and *Pimpinella anisum* at level 3 and 6 g / 100kg BW, daily on average daily feed intake during late pregnancy and suckling periods is presented in Table (2). During late pregnancy period, daily feed intake as % BW and g/ kg $w^{0.75}$ tended to increase with using medicinal herbs especially G_5 (3.33 and 86.6, respectively) and G_7 (3.32 and 86.0, respectively) compared with the control, G_1 (3.23 and 83.7, respectively). The same trend was observed also with daily DM intake during suckling period among the tested treatments as shown in Table (2). The highest daily DM intake (% BW and g/ kg $w^{0.75}$) during suckling period was recorded with G_5 (3.78 and 95.9, respectively) followed by G_7 (3.77 and 95.6, respectively), while the lowest value was detected with G_1 (3.69 and 93.1, respectively). Similar results were observed by Shehata *et al*. (2006) with Zaraibi goats. Shehata *et al*. (2004)

found that the adding medicinal herbs such as chamomile had positive effect on daily DM intake during late pregnancy and lactation (suckling, mid and late lactation) periods especial during mid –lactation period. The same authors reported that the daily feed intake may increase by herbs supplementation to support the greater milk yield (as reported also by Ahmed, 1999). The daily DM intake expressed as % BW and g / kg w $^{0.75}$ during lactation period was higher than that consumed during the late pregnancy period in all treatments as shown in Table (2). This may be attributed to the increase rumen size of the animals for the parturition and being free of the gravid uterus stress on the rumen. It may be also attributed to the higher requirements for milk production (Abdelhamid *et al*., 1999a and Shehata *et al*., 2007b). The results showed that the R/C ratio was 50/50 in all groups except G_5 during two experimental periods (51/ 49) and G_7 (51/49) during suckling period only. These ratios were similar during both physiological stages (pregnancy and suckling period) as reported by Ahmed *et al.* (2008) with Zaraibi does. They found that the values of R/C ratio during the late pregnancy were 50/50 or 51/49 vs. 49/51 or 50/50 during suckling period.

Water consumption *:*

Data of water consumption of Zaraibi does during late pregnancy and lactation periods are presented in Table (3). The results indicated that the highest value of water consumption (ml/ g DM intake) during late pregnancy period were recorded with both Artemisia (2.49 and 2.53 in G_2 and G_3, respectively) whereas, the lowest values were detected with two levels of Rosemary (2.15 and 2.16 in G_4 and G_5, respectively). In the same time, the values of water consumption as ml /g DM intake were nearly similar between G_1 (control, 2.36) and both of two pimpinella groups (2.34 and 2.36 of G_6 and G_7, respectively). The same trend was observed also between treatments during the lactation period as shown in Table (3).

Table (2): Daily feed intake by Zaraibi does during late pregnancy and suckling periods.

Items	Treatments						
	G_1	G_2	G_3	G_4	G_5	G_6	G_7
Daily DM intake (g/h) during gestation :							
From CFM	734	737	736	735	740	739	745
From BC	421	430	431	429	437	429	433
From RS	301	311	319	317	338	323	327
Total DM intake	1456	1478	1486	1481	1515	1491	1505
DM intake, % of BW	3.23	3.28	3.27	3.26	3.33	3.31	3.32
DM intake, g/ kg w $^{0.75}$	83.7	84.9	84.9	84.6	86.6	85.7	86.0
(R/ C) ratio	50: 50	50:50	50:50	50:50	51:49	50:50	50:50
Daily DM intake (g/h) during suckling period :							
From CFM	750	756	760	757	762	761	759
From BC	429	438	440	439	447	440	447
From RS	310	333	335	333	362	336	355
Total DM intake	1489	1527	1535	1529	1571	1537	1561
DM intake, % of BW	3.69	3.75	3.73	3.71	3.78	3.77	3.77
DM intake, g/ kg w $^{0.75}$	93.1	94.8	94.6	94.0	95.9	95.2	95.6
(R/ C) ratio	50:50	50:50	50:50	50:50	51:49	50:50	51:49

These results are in accordance with those of Zeid (1998), who indicated that water intake was decreased with the addition of some herbs such as chamomile and fenugreek seeds (112.9 and 115.8 ml/kgw$^{0.82}$, respectively) compared with the control (131.6 ml/ kgw$^{0.82}$), whereas it was higher with *Nigella sativa* (155.2 ml / kgw$^{0.82}$) and mixture of herbs (garlic, *Nigella sativa*, fenugreek seeds and chamomile) (144.9 ml/ kgw$^{0.82}$) and showed that Nigella *sativa* and herbs mixture may enhance water metabolism or water consumption. The same study indicated also that water intake by Zaraibi does was similar between garlic treatment and control group (132 and 131.6 ml / kgw$^{0.82}$, respectively). In this respect, Zeid *and Ahmed* (2004) found that water intake expressed as ml/ kgw$^{0.82}$ and ml /kg DM intake tended to decrease with using of chamomile in Zaraibi bucks rations, but it was approximately similar between the control group and thyme treatment (90.70 and 88.05ml /kgw$^{0.82}$, respectively). In other study, using medicinal additives in lactating animals rations (chamomile and *Negella sativa*) minimized drinking water /kg milk by 36.51 and 46.54%, respectively than the control (El-Saadany *et al*., 2003). Generally, these results indicate that using some medicinal herbs such as chamomile (as reported by El-Saadany *et al*., 2003 and Zeid *and Ahmed*, 2004) and rosemary (as reported by the present study) in ruminant rations seems more suitable for desert conditions where water resources are somewhat restricted.

Table (3): Daily water consumption by Zaraibi does as affected by experimental treatments.

Items	Treatments						
	G_1	G_2	G_3	G_4	G_5	G_6	G_7
Water intake during the gestation period:							
L/ head / day	3.43	3.68	3.76	3.19	3.27	3.49	3.55
ml / kgw$^{0.82}$	151	162	165	140	143	154	155
ml / g DM intake	2.36	2.49	2.53	2.15	2.16	2.34	2.36
Water intake during the suckling period:							
L/ head / day	4.15	4.39	4.43	3.87	3.93	4.24	4.28
ml / kgw$^{0.82}$	200	210	210	183	185	203	202
ml / g DM intake	2.78	2.87	2.89	2.53	2.50	2.76	2.74

Comparing pregnancy and lactation periods in the context of water consumption, the results indicated that water consumption decreased in late pregnancy than in lactation period (Table 3). The values of water consumption during the late pregnancy period were (151, 162, 165, 140, 143, 154 and 155 ml /kgw$^{0.82}$ vs. 200, 210, 210, 183, 185, 203 and 202 ml/kgw$^{0.82}$ throughout the lactation period for the seven treatments, respectively. These results are in accordance with these of Abdelhamid *et al*. (1999a), who indicated that water consumption reduced in the late month of pregnancy than in suckling period. The same authors found also that water consumption by Zaraibi does tend to be decreased with advancement of pregnancy. It could be noticed that the consumed quantities of water took the same trend of the feed intake, since it depends on rumen size before and after parturition.

Hematological blood parameters:

Data of hematological parameters of lactating Zaraibi does fed different experimental rations are presented in Table (4). The obtained results indicated that the values of hemoglobin (Hb), red blood cells (RBCs), mean cell hemoglobin concentration (MCHC), lymphocytes and neutrophils cells were significantly affected by tested experimental treatments as shown in Table (4). The highest values of Hb and RBCs were recorded with G_3 (12.23 and 14.03, respectively), followed by G_5 (12.20 and 13.97, respectively) then G_7 (12.07 and 13.90, respectively) and the lowest values of detected with G_1 (11.40 and 13.20, respectively). The same trend was observed also with values of MCHC. As for lymphocytes, G_3 recorded the highest value (7.10) whereas, the lowest value was recorded with G_1 (6.30) and the differences were significant. Moreover, neutrophils cells were reduced as a result to addition of three herbs (*Artemisia absinthium, Rosemarinus officinalis and Pimpinella anisum*) at two levels, but the differences were significant only between G_1 and G_3.

Similar results were observed by Abdelhamid *et al*. (2004) and Shehata *et al*. (2004) with small ruminants (sheep and goat, respectively). In this respect, Abdelhamid *et al*. (2002) observes that adding some medicinal herbs (thyme, safflower, ginger, black cumin and garlic) increased lymphocytes percent in blood liquid and consequently improved immunity of the animals. Moreover, Tawfik *et al*. (2005) reported that some hematological parameters such as Hb, MCHC, and lymphocytes were significantly higher as a result to adding of chamomile flowers as a medicinal herbs to aflatoxins contaminated diet (AF) and thus, AF induces immunosuppression and increased WBCs but adding medicinal herb (chamomile) overcome this effect and increased lymphocytes percentage. In general, the obtained data indicate that all estimated values for measured parameters were within the normal range as reported by Abdelhamid *et al*. (1999b) and Ahmed *et al.* (2008 and 2011).

Biochemical blood parameters:

The effect of experimental treatment on serum biochemical parameters is presented in Table (5). The results indicated that most of the tested blood constituents were not significantly affected by adding medicinal herbs to Zaraibi does rations. In the same time, the values of total protein and globulin tended to increase in animals given the different herbs and the differences were significant for serum globulin. Whereas, serum albumin showed some fluctuation among groups. Similar results were observed by Zeid (2004) and Tawfik *et al*. (2005). Mohamed *et al*. (2003) observed that the supplementation of Rosemary showed a significant elevation in alpha1 and beta 2 globulin. The same authors observed that serum concentrations of total protein, alpha 1, alpha 2, beta 1, beta 2 and gamma 2 globulins were significantly higher as a result to the presence of chamomile flowers (500 mg/ kg LBW/ day) in ewes rations.

Table (4): Data of blood parameters of Zaraibi does fed the experimental diets

Items	Treatments						
	G1	G2	G3	G4	G5	G6	G7
Hb (g/dl)	11.40^{c}	11.87^{abc}	12.23^{a}	11.73^{abc}	12.20^{ab}	11.63^{bc}	12.07^{ab}
Hct (%)	35.00	34.33	33.67	34.67	33.00	34.00	33.33
MCHC (%)	32.60^{c}	34.40^{b}	36.37^{a}	33.83^{b}	37.00^{a}	34.20^{b}	36.23^{a}
RBCs (10^{6}/ mm^{3})	13.20^{b}	13.57^{ab}	14.03^{a}	13.60^{ab}	13.97^{a}	13.50^{ab}	13.90^{ab}
MCV (Fl)	20.33	19.67	20.33	21.50	20.67	20.00	20.50
MCHb (g)	5.67	5.83	6.17	6.00	6.33	5.90	6.17
WBCs (10^{3}/mm^{3})	10.40	10.07	10.07	10.03	10.00	10.17	9.97
Lymphocytes (%)	6.30^{c}	6.33^{c}	7.10^{a}	6.50^{bc}	6.90^{ab}	6.43^{bc}	6.70^{abc}
Neutrophils (%)	3.10^{a}	2.77^{ab}	2.20^{b}	2.43^{ab}	2.30^{ab}	2.60^{ab}	2.43^{ab}
Monocytes (%)	1.20	1.10	1.03	1.07	1.03	1.13	1.07

a, b, c Means in the same row with different superscripts are significantly different at P≤0.05.

The present study indicated also that serum urea-N and creatinine were not significantly affected as a result of medicinal herbs inclusion to the diets. The same trend was observed with serum glucose as shown in Table (5). Similar results were observed by Abdelhamid *et al*. (2004) and Zeid *and Ahmed* (2004). In a recent study, Hassan and Hassan (2009) studied the effect of *Rosemarinus officinalls* (RO), *Nigella sativa* (NS), or probiotic (PR) on blood glucose (BG), blood urea nitrogen (BUN), plasma uric acid (PUA) and growth hormone (GH), They found that the feed additives significantly (P<0.05) increased BG, BUN and GH and decreased PUA when compared with the control diet. The same authors observed that GH of lambs which received RO was significantly (P<0.05) higher than those which received NS and PR.

The obtained results indicated that the concentrations of serum cholesterol and enzyme activity (AST and ALT) were reduced with using the three tested herbs than the control group and the differences were significant in cholesterol and AST only. Similar results were observed with Shehata *et al* (2004) and Priolo *et al*. (2007) with lactating does and ewes, respectively. Mohamed *et al*. (2003) found that serum alkaline phosphatase activity decreased significantly in rosemary supplemented ewes as compared with the control. Moreover, Tawfik *et al*. (2005) observed that serum total lipids and cholesterol as well as the enzyme activity (ALP, AST and ALT) were reduced with using some medicinal herbs (chamomile) in small ruminant rations. Finally, Abdelhamid *et al*. (2002) reported that blood protein and iron concentrations improved while, the concentration of total lipids and the activity of ALP and ALT were reduced as a result of adding some medicinal herbs to the contaminated diet. Generally, the obtained data showed that most serum parameters were slightly differed among the tested groups, though some differences were significant but, all values were within the normal range as reported by Kaneko (1989), Abdelhamid *et al*. (2004) and Sadek (2011) with both goats and sheep.

Table (5): Data of biochemical parameters of Zaraibi does blood fed the experimental diets.

Item	Treatments						
	G1	G2	G3	G4	G5	G6	G7
Total protein, g/dl	6.50	6.63	6.77	6.57	6.67	6.50	6.60
Albumin, g/ dl	3.20	3.20	3.10	3.20	3.20	3.17	3.10
Globulin, g/ dl	3.30^{b}	3.43^{ab}	3.67^{a}	3.37^{ab}	3.47^{ab}	3.33^{ab}	3.50^{ab}
A / G	0.97	0.93	0.85	0.96	0.93	0.95	0.89
Urea-N, mg/ dl	15.83	15.57	15.10	15.47	15.40	15.67	15.50
Creatinine, mg/ dl	0.93	0.92	0.85	0.93	0.87	0.83	0.88
Glucose, mg/ dl	56.33	57.33	59.00	75.00	58.33	58.67	58.00
Cholesterol, mg/dl	94.67^{a}	90.67^{ab}	88.00^{b}	91.67^{ab}	89.67^{ab}	92.67^{ab}	92.00^{ab}
AST, IU/ L	62.33^{a}	59.67^{abc}	56.00^{c}	61.33^{ab}	57.33^{bc}	62.33^{a}	58.00^{bc}
ALT, IU/ L	18.83	17.83	17.33	18.33	17.83	18.67	17.67
AST /ALT	3.33	3.37	3.26	3.33	3.22	3.35	3.29

a, b, c Means in the same row with different superscripts are significantly different at P≤0.05

Milk yield :

The average of biweekly milk yield of lactating Zaraibi goats during suckling (early lactation) is presented in Table (6). The obtained results indicated that daily milk yield of Zaraibi goats reached the peak at the 4th week of lactation in G_1, G_2, G_3, G_4 and G_5 and at the 6th week of lactation in G_6 and G_7. In this respect, Shehata *et al*. (2007b) cited that daily milk yield of Zaraibi goats (fed 100% NRC) reached the peak at the 6th week of lactation in some treatments (high or low concentrate) and at the 4th week of lactation in other treatments (high concentrate).

Moreover, Mousa (1996) found that milk yield in high lactating Zaraibi does reached the peak at 4th and 6th week of lactation with high feeding level, while does given low feeding level reached the peak at 2nd and 4th week of lactation then it gradually declined till the end of lactation period. The differences in milk yield were significant among tested treatments during most of lactation weeks as shown in Table (6). The overall mean of daily milk yield was the highest (1.44 kg) with G_3, followed by G_7 (1.42 kg) then G_2 (1.41 kg) and G_5 (1.40 kg) and lastly the control (G_1), which recorded the lowest value (1.27 kg) and the differences were significant. Whereas, the differences between G_1 (control) and other treatments (G_4 and G_6) were not significant. Thus, the average milk yield was significantly improved as a result to using of the three studied medicinal herbs at the high level (6g /100 kg BW /day) and *Artemisia absinthium* at the low level (3g /100 kg BW /day) as well. Whereas, it improved with *Rosemarinus officinalis* and *Pimpinella anisum* at level 3g /100 kg BW, daily by 8.66 and 9.45 %, respectively, compared to the control group, but without significant differences.

This positive effect of medicinal herbs on milk yield were observed also by Shehata *et al*. (2004 and 2006) with using some medicinal herbs and plants in lactating Zaraibi goat rations. The improvement in milk yield may be due to the positive and significant effect of medicinal herbs on digestion coefficients of most nutrients and feeding values (as TDN, SE and DCP) as

reported by Mohamed *et al*. (2003) with using medicinal herbs such as *Rosemarinus* in small ruminant rations.

Milk composition:

The effect of experimental treatments on milk composition during suckling period (early lactation) is presented in Table (7). The percentage of milk fat % was significantly influenced by the tested treatments. The effects of the high level of three herbs (G3, G5 and G7) on fat % were significant. The highest value of fat % was recorded with G_3 (4.10), followed by both G_5 and G_7 (4.07), then G_2 (3.97) and lastly, G_1 (3.73). Moreover, using the three herbs had positive effect on total solids as shown in Table (10), but the differences in total solids between G_1 (11.94) and G_3 (12.48) were significant only. Similar results were observed by Shehata *et al*. (2006) with using some medicinal herbs in lactating Zaraibi goat rations. In this respect, Shehata *et al*. (2004) reported that most measured components especially fat and total solids tended to increase with addition of chamomile in Zaraibi goats diets. Generally, no noticeable effect of tested rations were observed for other milk content (protein, lactose, solid non fat and ash) and the obtained values of milk constituents are within the normal range given by Abdelhamid *et al*. (1999c) and Shehata *et al*. (2004 and 2006) for Zaraibi goats.

Table (6): Effect of experimental treatments on daily milk yield by lactation Zaraibi goats.

Lactation Day	Treatments						
	G1	G2	G3	G4	G5	G6	G7
15 day	1.41	1.52	1.502	1.47	1.48	1.55	1.57
30 day	1.48	1.58	1.61	1.55	1.57	1.57	1.58
45 day	1.39^{b}	1.51^{ab}	1.54^{ab}	1.50^{ab}	1.52^{ab}	1.58^{ab}	1.59^{b}
60 day	1.23^{b}	1.39^{ab}	1.45^{a}	1.36^{ab}	1.38^{ab}	1.34^{ab}	1.41^{a}
75 day	1.17^{b}	1.32^{a}	1.37^{a}	1.29^{a}	1.33^{a}	1.27^{ab}	1.31^{a}
90day	0.95c	1.12^{ab}	1.15^{a}	1.09^{ab}	1.11^{ab}	1.05^{b}	1.07^{ab}
Average	1.27^{b}	1.41^{a}	1.44^{a}	1.38^{ab}	1.40^{a}	1.39^{ab}	1.42^{a}

a, b, c Means in the same row with different superscripts are significantly different at P≤0.05.

Somatic cell count (SCC) in Table (7) shows that differences among the seven groups were not significant where the counts ranged from 670 to $745x10^3$. Shehata *et al*. (2004) gave SCC for dairy Zaraibi goats of $459x10^3$ cell /ml, which is comparable to the physiological medium level of $415x10^3$ cells /ml established for goats (Perntaner *et al*., 1991). The increase in SCC in the present study may be attributed to the effect of suckling period as reported by Shehata *et al*. (2004) who observed that SCC was closely related to the period of lactation, being the highest during the 6- 12 week following parturition (suckling period) then decreased to the 24^{th} week of lactation and then being high at the end of lactation. In a recent study, Ahmed *et al*. (2008) stated that SCC was noticeable reduced during lactation period (ranged from 407 to 425 x 10^3) than in suckling period (ranged from 516 to 546 x 10^3).

Feed utilization:

The values of feed conversion (feed / yield) of Zaraibi does fed on the experimental rations during the early lactation (suckling period) are presented

in Table (8). The obtained results indicated that the feed conversion was better with using medicinal herbs in goat rations compared to the control group (unsuplementation). The feed conversion values as kg DM/kg milk were lowest in *Artemisia* rations (1.08 and 1.06 in G_2 and G_3, respectively) and the highest value was obtained with control ration, G_1 (1.17). Similarly, the feed conversion value as kg CP/kg milk was better with two Artemisia groups (0.132 and 0.130 in G_2 and G_3, respectively) compared with the other groups especially G_1 (0.144).

Table (7): Effect of experimental treatments on milk composition by lactation Zaraibi goats.

Item	G1	G2	G3	G4	G5	G6	G7
Average milk yield, kg	1.27^{b}	1.41^{a}	1.44^{a}	1.38^{ab}	1.40^{a}	1.39^{ab}	1.42^{a}
Fat, %	3.73^{b}	3.97^{ab}	4.10^{a}	3.93^{ab}	4.07^{a}	3.90^{ab}	4.07^{a}
Protein, %	3.03	2.95	3.01	2.96	2.98	2.97	2.99
Lactose, %	4.43	4.51	4.60	4.50	4.54	4.48	4.55
Total solids, %	11.94^{b}	12.19^{ab}	12.48^{a}	12.14^{ab}	12.36^{ab}	12.11^{ab}	12.37^{ab}
Solid non fat, %	8.21	8.22	8.38	8.21	8.29	8.21	8.31
Ash, %	0.75	0.76	0.78	0.75	0.77	0.76	0.77
SCC, $\times 10^3$ cell/ml	745	670	694	695	673	705	683

a, b: Means in the same row with different superscripts are significantly different at $P \leq 0.05$.

Thus, the improvement in feed conversion calculated as dry matter intake and crud protein intake / milk yield in some tested treatments (G_3) reached to about 9.5 and 10%, respectively compared to control (unsuplementation). The positive effect of feed conversion efficiency was observed also by Abdelhamid *et al*. (2004) and Morteza *et al*. (2010) with using some medicinal herbs in small ruminant rations. Zeid *and Ahmed* (2004) observed that the feed conversion efficiency (based on DM) was improved by 10.91and 8.38% with both chamomile and thyme, respectively, compared with the control group (unsuplementation). In buffaloes, El-Nor *et al*. (2007) observed that the calculated efficiencies of milk yield /DM intake and 4% FCM/DM intake were improved ($P<0.05$) as a result to using some medicinal herbs such as caraway treatment at level 50 g/head/day.

Use of antibiotics as growth promoters in animal feeds has been banned in the European Union due to increasing concerns about the appearance of residues in meat and milk and antibiotic resistant strains of bacteria. Some essential oils (EO) modify rumen microbial activity and appear to be a 'natural' alternative to modify rumen microbial fermentation. Effects of 10 EO (i.e., clove leave, hyssop, lavandin, lavender, thyme, oregano, rosemary, sage, savory, tea tree) were evaluated in *in vitro* 24 h batch culture of diluted rumen fluid at pH 6.50. A 10:90 forage: concentrate diet typically fed to beef cattle in a barley grain based beef system was used as substrate. Most of these EO modified rumen microbial fermentation and may allow manipulation of rumen fermentation to improve animal performance (Castillejos *et al.,* 2008). Since medical herbs contain EO, therefore its use improved rumen fermentation, and hence feed utilization.

Diets commonly used to feed animals often incorporate some additives with the aim to improve the technological, sensory, nutritional and

zootechnical attributes of feedstuffs and to protect animal health and environment. Phytogenic products (herbal preparations or phytochemicals), traditionally used in the prevention and treatment of illness, seem to be natural, safe, suitable and non-expensive alternative additives for use in animal feeding. Plants contain a large amount of secondary compounds, with a diverse chemical structure that may result in different effects on the animals, mainly at the digestive and metabolic levels. Of these potential activities, it is of special interest their antimicrobial properties against bacteria, fungi, protozoa and viruses. In ruminants, herbal compounds may be feasible agents to manipulate microbial fermentation in the rumen in order to attain interesting productive, health, environmental and product quality benefits (Lopez *et al.,* 2007).

Body weight change of does:

Table (9) presents changes in live body weight (LBW) of Zaraibi does during late pregnancy and suckling periods. There were no significant (P≥0.05) differences among treatments for does at any interval. The main initial LBW (at the 4th month of gestation) was approximately equal in all groups and ranged from 38.7 to 39.3 kg. The LBW of does increased to the maximum before parturition and recorded the highest values (ranged from 50.7 kg in G_1 to 52.3 kg in G_5) then sharply decreased (post-parturition) to the minimum at day 90th (weaning) in all groups. The same trend was observed by Ahmed *et al.* (2008) with Zaraibi does during the late pregnancy and lactation periods. Devendra (1979) recorded a decline in body weight of high milk yielding goat during the first month post-partum. Moreover, Ahmed (1999) found that dairy Zaraibi goats fed 100% NRC had decreased LBW from 13 to 22% at day 60th post-parturition.

Table (8): Feed utilization efficiency by Zaraibi does as affected by the experimental treatments.

Items	Groups						
	G_1	G_2	G_3	G_4	G_5	G_6	G_7
No of does	3	3	3	3	3	3	3
Av. body weight, kg	40.3	40.7	41.1	41.2	41.6	40.8	41.4
Metabolic body size, $W^{0.75}$	15.99	16.11	16.23	16.26	16.38	16.14	16.32
Av. Daily feed intake during early lactation (suckling period):							
From CFM	750	756	760	757	762	761	759
From BC	429	438	440	439	447	440	447
From RS	310	333	335	333	362	336	355
Total DM intake	1489	1527	1535	1529	1571	1537	1561
DM intake, % BW	3.69	3.75	3.73	3.71	3.78	3.77	3.66
DM intake, g/ kg $W^{0.75}$	93.1	94.8	94.6	94.03	95.9	95.2	95.6
(R/ C) ratio *	50:50	50:50	50:50	50:50	51:49	50:50	51:49
CP intake, g/h	183	186	187	187	189	187	189
Av. Daily milk yield, kg/h	1.27^{b}	1.41^{a}	1.44^{a}	1.38^{ab}	1.40^{a}	1.39^{ab}	1.42^{a}
Feed utilization efficiency:							
Kg DM /kg milk	1.17	1.08	1.06	1.11	1.12	1.11	1.10
Kg CP / kg milk	0.144	0.132	0.130	0.135	0.135	0.134	0.133

a, b: Means in the same row with different superscripts are significantly different at P≤0.05.

*** (R/ C): Roughage to concentrate ratio**

In another study on Zaraibi does during late pregnancy and lactation periods, Shehata *et al*. (2007b) reported that the LBW of does increased to the maximum before parturition (end of pregnancy) and recorded the highest values (ranged from 55.7 to 58.8 kg) then sharply decreased (post-parturition) to the minimum in suckling period, thereafter it tended to increase again (but very slowly) within all groups during the lactation period. Similar results were observed also by Sadek (2011) with Rahmany ewes during the late pregnancy and suckling periods.

Concerning the effect of the treatments, the obtained results indicated that LBW tended to increase by medicinal herbs, especially with G_5 (52.3 kg) during the last month of pregnancy compared with G_1 (50.7 kg). The same trend was reported by Allam *et al.* (1999). The average of LBW before parturition were 50.7, 51.3, 51.6, 51.8, 52.3, 51.2 and 51.7 kg and the corresponding values at the weaning (90^{th} days) were 39.5, 40.1, 40.6, 40.7, 41.3, 40.2 and 41.0 for G_1, G_2, G_3, G_4, G_5, G_6 and G_7, respectively. Generally, LBW tended to increase as a result to adding some medicinal herbs (chamomile and thyme) in Zaraibi doe rations (Zeid and Ahmed, 2004). They found that the average of LBW before parturition were 57.2, 58.7 and 58.3 kg and the corresponding values at the weaning were 36.8, 38.2 and 37.5 kg, whereas at the day 270^{th} (9 month) were 37.9, 39.7 and 38.9 kg for control, chamomile and thyme, respectively. However, considerable improvements in daily weight gain, feed conversion ratio and feed intake were obtained when phytogenics were included in the feed of different species of farm animals (Steiner, 2010).

Table (9): Live body weight (Kg) of Zaraibi does during late pregnancy and suckling periods.

Items	Treatments						
	G1	G2	G3	G4	G5	G6	G7
Initial weight (at 90 days of pregnancy)	39.3	37.9	39.2	39.0	38.7	38.8	39.1
At 120 days of pregnancy	44.5	44.4	45.3	44.7	45.5	44.8	45.4
At 150 days of pregnancy	50.7	51.3	51.6	51.8	52.3	51.2	51.7
Weight at kidding	42.8	43.0	43.5	43.5	43.9	43.0	43.6
At 30 days post kidding	41.0	41.3	41.6	41.7	42.0	41.4	41.8
At 60 days post kidding	40.2	40.6	41.0	41.2	41.5	40.5	41.3
Weight at 90 days post kidding (weaning)	39.5	40.1	40.6	40.7	41.3	40.2	41.0
Weight at 90 days as % of weight at kidding	92.3	93.3	94.0	93.6	94.1	93.5	94.0

Productive performance:

Data of the productive performance of Zaraibi does fed on the tested experimental rations are summarized in Table (10). The results indicated that using the three medicinal herbs in goat rations had no adverse effect on doe performance during the late pregnancy period. No abortion cases were happened during the late eight weeks of pregnancy. Yet, three abortion cases were happened during the late pregnancy period with Zaraibi does fed 100 % (of NRC) high concentrate (Shehata *et al*., 2007b). The obtained data

showed that four still birth cases were happened in 4 different groups (G_1, G_3, G_4 and G_6) as shown in Table (10). Thus, the percentages of still birth cases were about 19 % on overall average, whereas it was 20 % with Shehata *et al*. (2007b). Another study on Zaraibi does during the late pregnancy and suckling periods (Shehata *et al*., 2007a) found that the percentage of still birth cases ranged between 20 to 30 % in the different groups.

From data in Table (10), it seems that the twins parturition was higher by Zaraibi does, hence the kidding rate or litter size was higher too. Litter size ranged from 2.33 to 3.00 in the experimental groups. Litter size was 2.67 in most experimental groups (G_2, G_3, G_6 and G_7) versus 2.33 in control group (G_1). Moreover, kidding rate was 267 in G_2, G_3, G_6 and G_7 vs. 233 in G_1. But, G_4 recorded the highest (300) value. Similar values for litter size and kidding rate were obtained by Shehata *et al*. (2007b). While Abdelhamid *et al.* (1999c) found that litter size ranged from 2.25 to 2.42 when fed clays supplemented rations. In another study on Baladi goats, Gihad *et al*. (1985) found that kidding rate ranger from 114 to 175 % for Baladi does fed concentrate feed mixture, whereas it was 247 in Zaraibi does (Shehata *et al*., 2007a).

The present study indicated that does given medicinal herbs in the experimental treatments during the last two months of pregnancy gave born kids with heavier weights at the birth and weaning than those fed control group (non-supplemented, G_1) and the highest values were recorded with G_3 (2.29 and 9.41, respectively) and the lowest values were detected with G_1 (1.98 and 8.26, respectively) and the differences were significant as shown in Table (10).

Accordingly, output measured as kilograms produced per doe was better with G_3, followed by G_5 and G_7 then G_2 and lastly the control group. These positive effects may be attributed to the effect of the used medicinal herbs on average body gain at birth and weaning as reported by Shehata *et al* (2007a). They stated that output measured as kilograms produced per doe per year improved significantly due to chamomile supplement.

As for mortality cases of Zaraibi kids, one-mortality case was happened in each of G_1, G_2, G_4, G_6 and G_7 as shown in Table (10). Thus, the percentage of mortality recorded the highest values in control group (16.67 %) then G_6 (14.29 %) followed by G_2, G_4 or G_7 (12.5 %), whereas mortality rate was zero in both G_3, and G_5. Similar results were observed by El-Hosseiny *et al*. (2000), who observed that using medicinal herbs such as chamomile flowers in doe diets reduced mortality rate of born kids to zero during the suckling period compared with rates of 6.67 to 13.33 % for other medicinal herbs.

In this respect, Shehata *et al*. (2007a) found that the digestive disturbances and mortality rate of kids was markedly reduced as a result of using medicinal herbs in goat rations and this noticeable effect on reducing digestive disturbances (diarrhea and bloat) and consequently reducing mortality rate of born kids might be attributed to active ingredients like flavonoids, coumarins and aromatic oils in chamomile flowers that function as

better tonic, antiseptic, stomach pain release, anti-inflammatory and antispasmodic agent (Mclntyre, 1995).

Performance of kids :

Data of performances of the offspring (kids) in relation to their dam's treatments are presented in Table (11). Table (12) presents average of biweekly values of the change in live body weight of kids. Results of live body weight at birth and at weaning indicated that the effect of the three tested medicinal herbs (at level 3 or 6 g/ 100 kg BW, daily) during the last two months of pregnancy had positive effect on both birth and weaning weights and hence total body gain (TBG) and daily body gain (DBG) of kids. Average body weight at birth was lower with control ration (G_1) than with other rations and the difference between G_1 (1.98 kg) and G_3 (2.29 kg) was significant. The same trend was observed also with weaning weight. The highest value of weaning weight was recorded with G_3 (9.41 kg), then G_5 (9.21 kg) followed by G_7 (9.07 kg) and lastly, the lowest value was detected with G_1 (8.26 kg) and the differences were significant. Similar results in birth and weaning weights were reported by Shehata *et al*. (2007a) with Zaraibi does.

Table (10): The effect of experimental treatments on productive performance of Zaraibi does.

Item	G1	G2	G3	G4	G5	G6	G7
No. of does	3	3	3	3	3	3	3
Single kids, No.	1	_	_	_	_	1	_
Twins kids, No.	_	2	1		2		1
Triple kids, No.	2	_	2	3	1	1	2
Quadruplets kids, No.	_	1	_	_	_	1	_
Born kids, No./group	7	8	8	9	7	8	8
Still birth kids, No./group	1	0	1	1	0	1	0
Alive kids (No./group) at day							
0	6	8	7	8	7	7	8
15	6	7	7	8	7	6	8
30	5	7	7	8	7	6	7
45	5	7	7	7	7	6	7
60	5	7	7	7	7	6	7
75	5	7	7	7	7	6	7
90	5	7	7	7	7	6	7
Litter size (LS), kids/doe	2.33	2.67	2.67	3.00	2.33	2.67	2.67
Kidding rate, LS %	233	267	267	300	233	267	267
Av. birth weight, kg/kid	1.98^{b}	2.10^{ab}	2.29^{a}	2.06^{ab}	2.19^{ab}	2.16^{ab}	2.25^{ab}
Av. Weaning weight, kg/kid	8.26^{c}	8.89^{abc}	9.41^{a}	8.71^{bc}	9.21^{ab}	8.95^{ab}	9.07^{ab}
Total body gain, kg/kid	6.22^{c}	6.73^{ab}	7.13^{a}	6.60^{bc}	8.20^{ab}	8.06^{ab}	6.84^{ab}
Av. daily gain of kids, g	69.11^{c}	74.76^{ab}	79.21^{a}	73.33^{bc}	91.11^{ab}	89.56^{ab}	76.03^{ab}
Kg kids born/doe	3.97	5.60	5.33	5.50	5.10	5.03	5.80
kg kids weaned/doe	13.77	20.73	21.97	20.33	21.50	17.90	21.17
Mortality of kids, No./group	1	1	0	1	0	1	1
Mortality of kids, %/group	16.67	12.50	0	12.50	0	14.29	12.50

a, b, c: Means in the same row with different superscripts are significantly different at $P \leq 0.05$.

In this respect, Zeid (1998) studied the effect of some medicinal herbs such as garlic (GR), *Nigella sativa* (NS), fenugreek (FN) and chamomile (CH)

in pregnant Zaraibi doe rations on birth and weaning weights and he found that birth weights of kids were 2.150, 2.381, 2.828, 2.514 and 2.571 kg for dams given CN (control ration, without addition), GR, NS, FN and CH, respectively, and the corresponding values of weaning weigh were 8.110, 9.982, 9.426, 9.718 and 10.115 kg, respectively.

From the aforementioned result, it was obvious that the effect during the late pregnancy was highly positive on birth weight and hence the weaning weight. Approximately, 70 % of fetal growths in sheep take place during the last 6 weeks of gestation (Robinson *et al*., 1977), also in goats more than 80 % of fetus growth occur during the last 8 weeks (Morand-Fehr, 1981).

Table (11): Effect of experimental treatments on growth performance of kids.

Item		G1	G2	G3	G4	G5	G6	G7	Average
Birth weight, Kg	Male No.	3	4	4	5	4	4	5	
	Average	2.13^{c}	2.28	2.43	2.18	2.40	2.35	2.30	2.30^{A}
	Female No.	3	4	3	3	3	3	3	
	Average	1.83	1.93	2.10	1.87	1.90	1.90	1.97	1.93^{B}
	Total No.	6	8	7	8	7	7	8	
	Average	1.98^{b}	2.10^{ab}	2.29^{a}	2.06^{ab}	2.19^{ab}	2.16^{ab}	2.18^{ab}	
Weaning weight, Kg	Male No.	3	4	4	5	4	4	5	
	Average	8.50^{c}	9.23^{ab}	9.75^{a}	8.96^{bc}	9.60^{a}	9.23^{ab}	9.26^{ab}	9.23^{A}
	Female No.	2	3	3	2	3	2	2	
	Average	7.90^{b}	8.43^{ab}	8.97^{a}	8.10^{ab}	8.70^{ab}	8.40^{ab}	8.60^{ab}	8.49^{B}
	Total No.	5	7	7	7	7	6	7	
	Average	8.26^{c}	8.89^{abc}	9.41^{a}	8.71^{bc}	9.21^{ab}	8.95^{ab}	9.07^{ab}	
Total body gain, Kg	Male No.	3	4	4	5	4	4	5	
	Average	7.07^{ab}	6.95^{ab}	7.33^{ab}	6.78^{b}	7.20^{ab}	8.00^{a}	7.84^{ab}	7.32^{A}
	Female No.	2	3	3	2	3	2	2	
	Average	7.00	6.43	6.87	6.15	6.80	7.35	6.55	6.73^{B}
	Total No.	5	7	7	7	7	6	7	
	Average	6.22^{c}	6.73^{ab}	7.13^{a}	6.60^{bc}	7.03^{ab}	6.72^{ab}	6.84^{ab}	
Daily body gain, g	Male No.	3	4	4	5	4	4	5	
	Average	70.74^{d}	77.22^{bc}	81.39^{a}	75.33^{bc}	80.00^{ab}	76.39^{bc}	77.33^{abc}	77.09^{A}
	Female No.	2	3	3	2	3	2	2	
	Average	66.67	71.48	76.30	68.33	75.56	71.11	72.78	72.22^{B}
	Total No.	5	7	7	7	7	6	7	
	Average	69.11^{c}	74.76^{ab}	79.21^{a}	73.33^{bc}	78.10^{ab}	74.63^{ab}	76.03^{ab}	

a, b, c, d: Means in the same row with different superscripts are significantly different at $P \leq 0.05$.

A, B: Means in the same column with different superscripts are significantly different at $P \leq 0.05$.

Results indicated also that the total body gain (TBG) and daily body gain (DBG) were significantly higher as a result of using medicinal herbs in all tested treatments, except G_4 as shown in Table (11). The highest value of DBG was recorded with G_3 (79.21 g), then G_5 (78.10 g), followed by G_7 (76.03 g), while G_1 recorded the lowest (69.11 g) value. Similar results were observed by El-Hosseiny *et al*. (2000). In another study on Zaraibi does and their born kids, Shehata *et al*. (2007a) found that the addition of chamomile as medicinal herbs in goats' rations during the late pregnancy period had

positive effect on growth rate during suckling period. The averages DBG of male kids were 115 and 119 g in both chamomiles (5 and 10 g / 100kg BW/ day, respectively) vs. 109 g in control group (non-supplemented). Generally, the TBG and DBG followed the same trend as that obtained with birth and weaning weights.

Table: (12): Average of biweekly values of the changes in live weight of kids.

Item	G1	G2	G3	G4	G5	G6	G7
Average birth weight at 0 day	1.98^{b}	2.10^{ab}	2.29^{a}	2.06^{ab}	2.19^{ab}	2.16^{ab}	2.18^{ab}
Average birth weight at 15 day	3.42^{b}	3.66^{ab}	4.10^{a}	3.56^{b}	3.87^{ab}	3.72^{ab}	3.79^{ab}
Average birth weight at 30 day	4.72^{c}	4.80^{bc}	5.36^{a}	4.75^{bc}	5.10^{abc}	4.83^{abc}	5.29^{ab}
Average birth weight at 45 day	5.88^{c}	5.99^{bc}	6.69^{a}	5.83^{c}	6.34^{abc}	6.05^{bc}	6.46^{ab}
Average birth weight at 60 day	6.74^{b}	7.03^{ab}	7.67^{a}	6.96^{ab}	7.47^{a}	7.12^{ab}	7.51^{a}
Average birth weight at 75 day	7.72^{c}	8.03^{abc}	8.57^{a}	7.87^{bc}	8.44^{ab}	8.03^{abc}	8.43^{ab}
Average weaning weight at 90 day	8.26^{c}	8.89^{abc}	9.41^{a}	8.71^{bc}	9.21^{ab}	8.95^{ab}	9.07^{ab}

a, b, c: Means in the same row with different superscripts are significantly different at $P \leq 0.05$.

As for the effect of sex, the present results indicated that the birth weight for males were heavier than those of females kids. The average birth weights were 2.30 vs. 1.93 Kg in males and females. The corresponding weights at weaning were 9.23 vs. 8.49 kg. The differences in live body weight at birth and weaning between males and females were significant. Thereby, the TBG and DBG were significantly higher with male than female kids. The average TBG in males were 7.32 vs. 6.73 kg in females. The corresponding values of DBG were 77.09 vs. 72.22 g. Similar results were observed by Ahmed (1999) and Sadek (2011) with Zaraibi does and Rahmany ewes, respectively. Generally, the birth and weaning weights for males (1.76 and 12.10 kg, respectively) were heavier than those of females (1.56 and 10.85, respectively) kids (Shehata *et al*., 2007a).

Distillate rosemary leaves can be proposed as an ingredient in ruminant feed because they both alter neither the yield nor the quality of goats' milk and allow for an increased concentration of polyphenolic components (flavonoids hesperidin, naringin, and genkwanin; gallic acid; and phenolic diterpenes carnosol and carnosic acid) in the goats' milk and in the plasma of the suckling goat kid (Jordan *et al.,* 2010). There was no difference on milk yield between the polyherbal supplemented groups and control ($P>0.05$), although polyherbal supplementation had positive effect on litter birth weight and growth rate compared to control. Weaning weights were higher ($P<0.001$) in supplemented groups compare to non-supplemented does. In supplemented treatments compared to control, mortalities and morbidities were also lower in kids born. It was concluded that pre-partum to weaning supplementation increased kids growth rates and weaning weights, and reduced kid mortalities, but it did not have a significant effect on milk production (Mirzaei *et al*., 2011).

Economic efficiency:

The effects of tested experimental rations on cost of consumed feed and economical efficiency are presented in Table (13). The obtained results indicated that the economic efficiency was noticeably different between the experimental rations. The cost of consumed feed (L.E/h) tended to decrease in control ration (337.2) compared with the tested treatments (ranged 345.9 to 355.8) as shown in Table (21). The corresponding values of price of kilogram weaned (L.E/h) were greatly increased as a result to using medicinal herbs in the tested treatment (ranged 537 to 659.1) compared with the control (non-supplemented, 413.1).

Thus, the values of economical efficiency were markedly different as a result to the effect of tested treatments (*Artemisia absinthium, Rosemarinus officinalis and Pimpinella anisum*) at both levels (3 and 6g / 100 kg BW / day) as reported in the present study. The highest value of economical efficiency was recorded with G3 (1.87), then G5 (1.81), followed by both G2 and G7 (1.80) but, the lowest value was recorded with control (1.23). This result agrees with that of Allam *et al*. (2007), who observed a significant increase in economic efficiency as a result to addition of medicinal herbs (anise seed, chamomile, black seed and mint) and values were 1.50, 1.50, 1.58 and 1.63 vs. 1.28 of control (non-supplemented). Similar results were observed by Zeid *and Ahmed* (2004) with using of medicinal herbs in pregnant Zaraibi does' rations.

Generally, although some medicinal herbs (such as chamomile) showed the highest feed cost; yet, it also showed the highest economic return compared with control (Shehata *et al*., 2007a). The same authors found that the economic return was improved by about 17.0 and 29.0% with both chamomile (5 and 10 g / 100 kg BW / day, respectively) compared with non-supplemented control.

Table (13): Economic efficiency of Zaraibi does feed the experimental rations.

Items	Treatments						
	G1	G2	G3	G4	G5	G6	G7
Daily feed intake (as fed), g/ h:							
During pregnancy period:							
CFM	799	802	801	800	805	804	811
BC	2944	3007	3014	3000	3056	3000	3028
RS	333	344	352	350	373	357	361
During suckling period:							
CFM	816	823	827	824	829	828	826
BC	3000	3063	3077	3070	3126	3077	3126
RS	343	368	370	368	400	371	392
Cost of consumed feed(L.E)	337.2	345.9	352.2	346.6	355.8	347.3	353.6
Price of kg weaned (L.E)	413.1	621.9	659.1	609.9	645.0	537.0	635.1
Economic efficiency, %	1.23	1.80	1.87	1.76	1.81	1.55	1.80

Conclusively and from the obtained results, it could recommend the dietary supplementation of the tested herbs (particularly *Artemisia absinthium* at 6g/100kg BW/day) for its benefits on daily feed intake, hematological and

biochemical parameters, overall mean of daily milk yield, milk fat %, feed conversion, live body weight of does, live body weight at birth and weaning, mortality rate of kids, kilograms produced per doe, and economic efficiency.

REFERENCES

Abdelhamid, A. M.; A. E. Sallam; G.A. Abd Allah and S. H. El-Samra (2002). Effect of feeding male rats on aflatoxic diets without or with medicinal herbs (thyme, safflower, ginger, black cumin and/or garlic). Proc. 2nd Conf. Food born Contamination and Egyptian's Health, 23-24 April, El-Mansoura, Egypt, PP: 99-121.

Abdelhamid, A.M., E. I. Shehata and M. E. Ahmed (1999a). Physio-nutritional studies on pregnant and lactating goats fed on rations differing in roughage/concentrate ratio at different feeding levels and/or not supplemented with bentonite. 1- Effects on feed and water consumption and some rumen parameters. J. Agric. Sci., Mansoura Univ., 24 (8): 3863-3880.

Abdelhamid, A.M., E. I. Shehata and M. E. Ahmed (1999b). Physio-nutritional studies on pregnant and lactating goats fed on rations differing in roughage /concentrate ratio at different feeding levels and /or not supplemented with bentonite. 2- Effects on the blood profile. J. Agric. Sci., Mansoura Univ., 24 (9): 4587-4612.

Abdelhamid, A.M., E. I. Shehata and M. E. Ahmed (1999c). Physio-nutritional studies on pregnant and lactating goats fed on rations differing in roughage /concentrate ratio at different feeding levels and /or not supplemented with bentonite. 3- Effects on productivity, reproductivity and metabolic disturbances. J. Agric. Sci., Mansoura Univ., 24 (9): 4637.

Abdelhamid, M.A.; M.E.Ahmed; E.I.Shehata; Faten F. Abou Ammou and G.A.Maged (2004). Impact of using chamomile flower on the performance of Rahmane sheep. J. Agric. Sci. Mansoura Univ., 29: 6105-6117.

Ahmed, M.E. (1999). Improving feed conversion efficiency during reproduction-stress-phases. Ph.D. Thesis Fac. Agric., Mansoura Univ.

Ahmed, M. E.; E.I.Shehata, F.F. Abou Ammou, A.M. Abdel-Gowad and K. M. Aiad. (2008). Milk production feed conversion rate and reproduction of Zaraibi goat in response to bacterial feed additive during late pregnancy and lactation. Egypt. J. Anim. Prod., 45: 189.

Ahmed, M. E., O. A. El-Zelaky, K. M. Aiad and E. I. Shehata (2011). Response of small ruminants to diets containing reed forage either as fresh, silage or hay versus berseem hay. Egypt. J. of Sheep and Goat Sciences, 6 (1).

Allam, S.M., H.M. El-Banna and Randa R.E. El-Elamie. (2007). Performance of Zaraibi kids fed diets supplemented with medicinal herbs. Egypt. J. Nutrition and Feeds, 10 (2) special Issue: 349.

Allam, S.M., H.M. El-Hosseiny, 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. Egypt. J. Nutrition and Feeds, 2 (Special Issue): 349.

A.O.A.C. (1995). Official Methods of Analysis 16th Ed., Association of Official Analytical Chemists, Washington, D.C., USA

Castillejos, L.; S. Calsamiglia, J. Martin-Tereso and H. Wijlen (2008). *In vitro* evaluation of effects of ten essential oils at three doses on ruminal fermentation of high concentrate feedlot-type diets. Animal Feed Science and Technology, 145 (1/4): 259-270.

Chiofalo, B; E. B. Riolo, G. Fasciana, L. Liotta and V. Chiofalo (2010). Organic management of dietary rosemary extract in dairy sheep: effects on milk quality and clotting properties. Veterinary Research Communications. 34: Supplement 1, 197.

Devendra, C. (1979). Coat production in Asian region, current status available, genetic resources and potential prospects. Indian Dairy Man., xxx: 513.

Duncan, D. (1955). Multiple range and multiple F-test. Biometrics, 11:1.

El- Hosseiny, H. M.; S.M. Allam, S. A. El -Saadany, A. M. Abdel-Gawad and A.M. M. Zeid (2000). Medicinal herbs and plants as feed additives for ruminants. 2-Effect of using some medicinal herbs on growth performance of Zaraibi kids. Proc. Conf. Anim. Prod. Sakha, Kafr El-Sheikh, 18-20 April, P: 189.

El-Nor, S. A. H. A.; H. M. Khattab, H. A. Al-Alamy, F. A. Salem and M. M. Abdou (2007). Effect of some medicinal plants seeds in the rations on the productive performance of lactating buffaloes. Intern. J. of Dairy Sci., 2 (4): 348-355.

El- Saadany, S.A.; A.M.M. Zeid, A.M. A. Mohi- Eldin and T. I. El- Monayer (2003). Impact of using different feed additives on the performance of lactating Friesian cows. Egyptian J. Nutrition and Feeds, 6 (Special Issue): 551- .

Hassan, S. A. and K. M. Hassan (2009). Effect of supplementation of medicinal plants and probiotic on growth rate and some blood parameters of Karadi lambs. Egypt. J. of Nut. and Feeds, 12 (1): 53.

Jordan, M. J.; M. I. Monino, C. Martinez, A. Lafuente and J, A. Sotomayor (2010). Introduction of distillate rosemary leaves into the diet of the Murciano-Granadina goat: transfer of polyphenolic compounds to goats' milk and the plasma of suckling goat kids. Journal of Agricultural and Food Chemistry, 58 (14): 8265-8270.

Kaneko, J. J. (1989). Clinical Biochemistry of Animals. 4th Ed. Academic Press, Inc. USA.

Kostadinović, L.J.; J. Lević, S. Pavkov, G. Dozet and T. Galonjacoghill (2010). Efect of Mentae piperitae on antioxidative status in broiler chickens. Savremena Poljoprivreda, 59 (3-4).

Ling, E.R. (1963). A Text Book of Dairy Chemistry. 3rd Ed. Chapman and Hall Ltd., London.

Lopez, S.; R. Garcia-Gonzalez, M. Fernandez, R. Bodas and J. S. Gonzalez (2007). Medicinal plants as feed additives in animal nutrition. In: Singh, V. K.; Govil, J. N.; Ahmad, K.; Sharma, R. K. (Recent Progress in Medicinal Plants, Vol. 15). Natural Products, I: 309-333.

Mclntyre, A. (1995). The complete Woman's herbal, Henery Holt Co., New York, P: 41.

Mirzaei, F.; S. Prasad and T. R. Preston (2011). Influence of a dietary phytoadditive on the performance of does and respective litters in cross bred dairy goats. Journal of Animal and Plant Sciences, 10 (1): 1259-1267.

Mohamed, A. H., B.E. El-Saidy and I. A. El-Seidi (2003). Influence of some medicinal plants supplementation. 1- On digestibility, nutritive value, rumen fermentation and some blood biochemical parameters in sheep. Egyptian J. Nutrition and Feeds, 6: 139.

Morand-Fehr, P. (1981). Chapter in Growth "Goats production" Edited by C. Gall, Academic press, London, P 253.

Morteza, K; A. Abd-Razak, Y. Goh, Q. S. Awis and M. Ivan (2010). Effects of dietary herbal antioxidants supplemented on feedlot growth performance and carcass composition of male goats. Amer. J. of Ani. and Vet. Sci., 5 (1): 33.

Mousa, M, M. (1996). Physiological and nutritional studies on goats Ph.D. Thesis, Fac. Agric., Mansoura Univ.

NRC (1981). Nutrient Requirements of Domestic Animals. Nutrient requirements of goats. National Research Council, Washington, D.C. USA

Perntaner, A., A. Deutz, G. Schlerka and W. Baumgartner. (1991). The somatic cell count in sheep and goat milk. Tierarztl. Prax., 19: 612.

Priolo, A.; L. Biondi, H. B. Salem and P. Morand-Fehr (2007). Pregnancy toxaemia prevention by feeding Sarda ewes a specific herbal extract compound. Options Mediterraneennes. Serie A, Seminaires Mediterraneens, 74: 407-410.

Robinson, J.J., I. McDonald, C. Fraser and R. M. Corofts (1977). Studies on reproductive in prolific ewes. 1- Growth of the products of conception. J. Agric. Sci. Camb., 88: 539.

Sadek, W.M.A. (2011). Nutritional requirements of Rahmani ewes. Ph. D. Thesis, Fac. Agric., Mansoura Univ.

SAS Institute (2003). SAS/STATR User's Guide: statistics. Ver. 9.1, SAS Institute Inc., Cary, NC, USA.

Shehata, E.I, F.H. Abd El-Rasoul, F.F. Abou Ammou, M.E. Ahmed and A. M. Abdel-Gawad, (2007a). Effect of feeding the medicinal herbs, chamomile flower, on some productive performance of Egyptian Zaraibi does and their new born kids. Egypt. J. of sheep and goats Sci., 2:111.

Shehata, E.I, M.E. Ahmed, F. H. Abd El-Rasoul, F.F. Abou Ammou and R. El- Ahwal (2004). Effect of feeding a medicinal herb, chamomile flower, on production and hygiene of goat milk production. . Egyptian J. Nutrition and Feeds, 7 (2): 109-117.

Shehata, E. I., M. E. Ahmed, Faten. F. Abou Ammou, A. A. M. Soliman, K.M. Aiad and A. M. Abd El- Gawad (2006). Comparison of feeding reed as hay or silage with feeding berseem hay or maize silage to dairy Zaraibi goats. Egyptian sheep, goats and Desert animals Sci., 1(1): 233.

Shehata, E.I., M.E. Ahmed, F.F. Abou Ammou, M.A. El-Ashry, A.A.M. Soliman and S.A Tawfik, (2007b). Performance and metabolic profile of Zaraibi goats under different feeding regimes. Egyptian J. Nutrition feeds, 10 (2) special Issue: 185.

Steiner, T. (2010). Optimizing gut health and performance through a phytogenic feed additive. Krmiva, 52 (4): 217-227.

Tawfik, S.A, M.E. Ahmed, E.I. Shehata and O.B.El-Gazzar (2005). Effect of adding chamomile flowers to aflatoxins containing diet on growth performance, rumen parameters and some blood components of growing lambs. 4th Inter. Sci. Conf. Mansoura.

Zeid, A.M. (1998). Effect of using medicinal plants on goats' performance. Ph. D. Thesis, Fac. of Agric., Cairo Univ., Egypt.

Zeid, A.M. (2004). Impact of using different feed additives on the performance of growing Frisian calves. J. Agric. Sci. Mansoura Univ.,

Zeid, A.M. and M.E. Ahmed (2004). Productive performance of Zaraibi goats fed rations containing some medicinal herbs. J. Agric. Sci. Mansoura Univ., 29 (2): 595-608.

تاثير بعض الأعشاب الطبية على إنتاج الماعز الزرايبى الحلاب

عبد الحميد محمد عبد الحميد[1]، عصام الدين إبراهيم شحاتة[2]، جمال عبد المعطى ماجد[2]
1قسم إنتاج الحيوان، كلية الزراعة، جامعة المنصورة، المنصورة
2 معهد بحوث الإنتاج الحيواني، وزارة الزراعة، ج م ع.

تم إجراء تجربة تغذية لاختبار سبعة علائق تجريبية (مقارنة وثلاث نباتات طبية هى الدمسيسة، حصا لبان، ينسون بتركيزين لكل منها هما 3 و 6 جم/100كجم وزن جسم/يوم) على عدد 21 عنزة زرايبى في فترة الحمل المتأخرة وذلك بمتوسط وزن 41.0 كجم وعمرها يتراوح مابين 3- 6 سنوات ، حيث تم توزيع العنزات عشوائيا في سبع مجموعات متساوية بعدد (3 بكل مجموعة)، استهلت الدراسة على مرحلة الحمل المتأخر (الشهر الرابع والخامس من الحمل) والولادة ثم الرضاعة، وانتهت بفطام الجداء (بعد ثلاثة أشهر من الولادة). ورغم تفوق المعاملات المختلفة على المقارنة، إلا أن المجموعة الثالثة (6 جم دمسيسة /100كجم وزن حى/ يوم) كانت هي الأفضل (والتى يُوصى بها) من حيث متوسط إنتاج اللبن اليومى، نسبة دهن اللبن، عدّ الخلايا الجسدية فى اللبن، التحويل الغذائى للبن، وزن النتاجات عند الميلاد والفطام، معدل النفوق فى النتاجات، عدد الكيلوجرامات المفطومة لكل أم، والكفاءة الاقتصادية.

قام بتحكيم البحث

أ.د / عبد الخالق السيد عبد الخالق — كلية الزراعة – جامعة المنصورة
أ.د / محمد ابراهيم احمد — مركز البحوث الزراعية