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EFFECT OF SUPPLEMENTING SOM MEDICINAL HERBS AND PLANTS ON THE PERFORMANCE OF LACTATING GOATS:
1- PRODUCTIVE AND REPRODUCTIVE PERFORMANCE.

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ABSTRACT

This study aimed to evaluate supplementation effects of four types of medicinal herbs on productive and reproductive performance of Zaraibi goat does. Thirty fife pregnant does (38.2±0.58 kg LBW, 3 years old) during the last two months of pregnancy were allocated to fife treatment groups (7 in each). All groups were fed similar basal diet consisted of concentrate feed mixture (CFM), berseem hay and rice straw. Does in the 1st group was fed on basal diet without supplementation (control), while CFM in diets of the 2nd , 3rd , 4th , and 5th group was supplemented with 100 mg/kg LBW, of ginger powder (GIN), curcumin or turmeric powder (TUR), oregano leaves crushed (ORE) or crushed *Nigella sativa seeds* (NSS). Live body weight of dams were recorded during pre- and post-partum, milk yield and composition were recorded during suckling period. Postpartum 1st oestrus was detected; litter size and viability of kids were calculated at birth and weaning. Blood components of does were estimated at weaning. Results showed insignificant differences in LBW of dams during pre-partum period. LBW of does increased (P<0.05) in all treated groups as compared to control, being higher (P<0.05) in ORE, TUR and NSS than in GIN group, respectively. Similar trend was found after kidding, but the difference in LBW of does between GIN and control group was not significant. Total litter weight at birth/doe was higher (P<0.05) only for TUR and NSS as compared to control. The differences in LBW of does during different months of the suckling period were not significant. During the suckling period, total and daily milk yield were the highest (P<0.05) in NSS. There were insignificant differences in milk contents among all groups during suckling period. Litter size at birth was the highest (P<0.05) in TUR, modest in GIN and ORE and lowest in control. Litter size at weaning was the highest (P<0.05) in GIN as compared to other groups. Does in NSS showed the highest twins (71.4%, P<0.05), while GIN showed the highest triples (57.14%, P<0.05). Only does in ORE and TUR produced quartets and six partite types (14.29% for each). There were insignificant differences in average LBW of kids at birth among groups. Does in GIN and ORE showed the shortest (P<0.05) interval from kidding to 1st oestrus and interval from weaning to 1st oestrus. Does in TUR showed the shortest (P<0.05) oestrus duration *vs* the longest duration for does in ORE group. During the breeding season, does in GIN showed acceptable periods of birth and weaning as well as appropriate date of 1st oestrus incidence. Does in NSS had the shortest period of birth and weaning. Both GIN and TUR groups showed the highest (P<0.05) haematological parameters and concentration of total proteins, albumin and globulin. Concentration of urea-N increased (P<0.05) in GIN and decreased (P<0.05) in ORE groups. Glucose concentration increased (P<0.05) in NSS group, but creatinine concentration was not affected by treatment. Contents of studied minerals in blood plasma of does were

affected by medicinal herbs treatment. Activity of ALP and AST increased ($P<0.05$) in GIN, while activity of ALP, AST and ALT decreased ($P<0.05$) in ORE group.

In conclusion, dietary supplementation with NSS had beneficial effects on growth and milk production, while supplementation with ginger yielded the best reproductive performance of Zaraibi goat does.

Keywords: Goat, medicinal herbs, milk production, reproduction, litter size.

INTRODUCTION

Recently, goats became an important aspect of animal production in Egypt. Therefore increasing productivity and reproduction of goats will contribute to improve the standard of living of the rural people. Research works had been carried out to study the possible effect of using natural additives such as medicinal herbs in animals feeding for various purposes such as improvement immunity (Tawfik *et al.*, 2005), increasing the palatability and digestion as well as reducing the cholesterol in the blood and improving the other blood parameters as well (Hassan and Hassan, 2009), improving the milk yield (Chiofalo *et al.*, 2010), minimizing the mortality rate of the offspring (El-Hosseiny *et al.*, 2000 and Shehata *et al.*, 2007*a*), and thus health and consequently used in treatment of both human and veterinary medicine (Kostadinovic *et al.*, 2010). Medical herbs and/or plants have play an important role in the life of human as a source of food maintaining and improving the health status and elimination of diseases. They contain phytoestrogens which are plant chemical similar to sex hormones (Sayed *et al.*, 2005).

Medicinal plants have high antioxidant activity which plays an important role in inhibiting and scavenging radicals that protect humans against infectious and degenerative diseases (Busquet *et al.*, 2005). Ravindran *et al.*, (2009) classified the herbs and spices under different categories of its potent effects. All the four tested additives have antioxidant, antimicrobial, pharmaceutical and nutritional properties.

Ahmed *et al.* (2000*b*) reported that GIN significantly lowered lipid peroxidation by maintaining the activities of the antioxidant enzymes--superoxide dismutase, catalase and glutathione peroxidase in rats. GIN is comparatively as effective as ascorbic acid as an antioxidant. Turmeric or curcumin is also reported to have antibacterial, antiamoebic. anti-inflammatory and antifungal activities (Banerjee and Nigam 1978) as well as antioxidant, anticarcinogenic, antimutagenic, anticoagulant, antifertility, antidiabetic, antiprotozoal, antiviral, antifibrotic, antivenom, antiulcer, hypotensive and hypocholesteremic activities (Chattopadhyay *et al.*, 2004). Oregano (ORE) was found to inhibit aflatoxin and prevented growth of aspergillus (Basilico and Basilico, 1999), has a unique ability to improve many organs functions involved with digestion, blood flow and the rate of heart beat due to its antioxidant activity and its high content of phenolic acids and flavonoids (Bozin *et al.*, 2006).

Nigella sativa seeds (NSS) are good source of essential fatty acids, proteins, carbohydrates, vitamins A, B_1, B_2, C and niacin as well as minerals such as calcium, potassium, iron, magnesium, selenium, zinc and carotene.

The essential fatty Acids contain alpha-Linolenic acid (omega-3) and Linoleic acid (omega-6) (Khalifa, 1995 and Salem and El-Mahdy, 1999). NSS oils could be used as antioxidant agent as it inhibits the non-enzymatic peroxidation (Saad, 2001) which may increase the immunity and help the animals to tolerate the heat stress (Azab Awad-Allah, 2002). The available data on the effect of medicinal herbs supplementation in diet of Zaraibi goats are scare. Therefore, the current study aimed to evaluate the effect of dietary addition of GIN, TUR, ORE and NSS on milk production, reproductive performance and some blood parameters of lactating Zaraibi goats.

MATERIALS AND METHODS

The study was conducted at the Animal Production Research Station, El-Serow, Domiata Governorate, belonging to Animal Production Research Institute, Agricultural Research Center.

A total number of 35 Zaraibi goat does having live body weight of 38.2±0.58 kg, averaged three years old within the last two months of pregnancy were used in this study. Animals were allocated to five similar treatment groups (7 each) according to LBW, parity and milk production. Does were housed under a semi-roofed yard and kept under the same managerial conditions.

Animals were fed according to NRC (1981) allowances of milking goats which were adjusted according to the physiological and productive stage. Does of all groups were fed a control ration consisted of concentrate feed mixture (CFM), berseem hay (*Trifolium alexandrinum*) plus rice straw. The CFM consisted of 37.5% wheat bran, 27% yellow corn, 12.5% soybean meal (44% CP), 10% un-decorticated cottonseed cake, 5% rice bran, 4% sugarcane molasses, 3% limestone and 1% sodium chloride.

Does in the 1st group were fed the basal ration without additives as control ration (CR), while those in the 2nd, 3rd, 4th and 5th groups were fed the same basal ration supplemented with 100 mg/kg LBW, of GIN powder, *Zingiber officinale* (GIN), curcumin or turmeric powder, *Curcuma longa* (TUR), oregano leaves crushed, *Origanum Vulgare* (ORE) or crushed *Nigella sativa* seeds (NSS) according to Chevallier (1996). Feed additives were mixed manually with some fine CFM twice daily. Rations were offered in group feeding to does of each group twice daily at 8 a.m. and 4 p.m. Fresh drinking water, minerals and vitamins blocks were available for free choice. Dams were weighed during pre-partum period, at kidding and different weeks of post-partum period. Samples of feeds were analyzed according to A.O.A.C. (1995).

During suckling period (90 d), milk yield measurement was commenced after the kids were allowed to suckle the dams for the first seven days postpartum to consume colostrum and to establish strong dam–kid relationship to forestall rejection of kids by their dams after overnight separation to measure milk yield. Hand milking of the animals was done at 7 a.m. for two consecutive days in a week. The kids were separated from their dams for 12 h over night (6 p.m.–6 a.m.) and only reintroduced to their dams after milking. The milk was collected and weighed thereafter. Values obtained

were multiplied by a factor of 2 to get the milk yield for 24 h. This approach was continued for 90 days postpartum.

Approximately 100 ml of milk of each animal was sampled every fortnight for the determination of milk composition, and there were a total of four samplings on each animal during suckling period.

Milk yield was calculated as total or daily milk yield during the suckling period from each goat at the evening milking and the next morning milking. Composite milk samples were collected after seven day from post-partum and biweekly from five does randomly selected from each group and froze immediately (-20 °C) till analysis and calculated as average of fat, protein, lactose total solids, solids not fat and ash during the suckling period in g/100 ml milk using Milko Scan (mark ® ,133 B, N. FOSS, Electric, Den mark).

At weaning, blood samples were taken from the jugular vein of five does in each group with anticoagulant. Each sample was divided into two parts, the first to determine haematological parameters including haematocrite (Ht)%, haemoglobin (Hb), red blood corpuscles (RBCs) and white blood corpuscles (WBCs) immediately after blood collection. The 2nd blood sample was centrifuged at 3000 rpm for 20 minutes to obtain blood plasma which was stored at -20 °C till the biochemical analysis. Concentration of total protein, albumin and globulin (calculated by difference), creatinine, urea-N, glucose and some minerals (Na, K, Ca, Mg, P, CL and Zn) were determined in blood plasma using commercial chemical reagent kits. Also, activity of aspartate (AST), alanine amino-transferase (ALT) and alkaline phosphatase (ALP) enzymes was determined. Blood analysis was conducted in the Bioclimatology Unite Department of Radioisitops Applications, Radioisitops Applications Division, Nuclear Research Center Atomic Energy Authority, Inshas Cairo Egypt.

After 60 days post-partum period, does were monitored for sing of oestrus by introducing well trained teaser buck two time daily (at 8.0 a.m. and 4.0 p.m.) to detect the first oestrus and heat duration. At kidding, frequency of does producing single, twins, triples, quartet, and sex partite kids, litter size and weight at birth, viability rate, were calculated. Days from birth or weaning to 1st oestrus, average period and date at birth, weaning and first oestrus were calculated.

Data obtained in this study were statistically analyzed by ANOVA using the General Linear Model (GLM) procedures of the statistical Analysis Systems (SAS, 1999, version 8.0). The differences between least squares means were declared significant at $P < 0.05$ using Duncan (1955).

RESULTS AND DISCUSSION

Changes in live body weight (LBW):

Results in Table (1) show that, the differences in LBW of does among experimental groups during pre-partum period were not significant. However, marked differences in LBW were recorded before kidding, where LBW of does significantly ($P<0.05$) increased in all treated groups as compared to the control one, being significantly ($P<0.05$) higher in ORE, TUR and NSS groups than in GIN group, respectively. Similar trend was found after kidding, but the

difference in LBW of does between GIN and control group was not significant. It is of interest to note that the differences in LBW of does during different months of the suckling period were not significant.

In accordance with the present results, El-Saadany *et al.* (2008) found that LBW was higher in the lactating Zaraibi goats fed diet supplemented with ORE or NSS than that of the control does. Also, Allam *et al.* (2007) found that diet supplemented with 0.25 g NSS powder/kg LBW/day significantly (P<0.05) improved litters weight of Zaraibi does during suckling period and at weaning (90 days of age) due to increasing feed efficiency as gain/DM or TDN (P<0.05) in treated diets.

Table (1): Live body weight of does in experimental groups during different physiological stages. (Mean±SE)

Physiological stage	Control group	Treatment group			
		GIN	TUR	ORE	NSS
LBW (kg) during late pregnancy and at kidding:					
Initial weight	37.0±3.36	37.3±2.93	38.0±3.38	39.8±2.90	39.0±3.31
2 mo pre-partum	41.6±2.50	41.8±2.53	43.9±2.52	44.7±2.52	44.7±2.52
1 mo pre-partum	52.8±4.55	52.4±3.94	58.1±4.55	60.1±3.94	58.5±4.55
Before kidding (1-2 d)	52.4±2.14^{c}	54.6±2.71^{b}	55.3±2.99^{a}	55.6±2.83^{a}	55.0±3.51^{a}
After Kidding (1-2 d)	41.6±2.12^{b}	41.8±2.67^{b}	43.9±2.16^{a}	44.7±2.78^{a}	44.7±2.76^{a}
LBW (kg) during suckling period:					
1st month	35.2±3.74	35.1±3.24	40.9±3.74	43.0±3.24	42.5±3.74
2nd month	36.4±3.78	38.0±3.27	42.8±3.78	44.7±3.27	43.7±3.78
3rd month	36.3±3.74	38.1±3.24	42.2±3.74	43.2±3.24	42.5±3.74

^{a}, ^{b}, and ^{c}: Means denoted within the same row with different superscripts are significantly different at P<0.05.

In this respect, Mirzaei *et al.* (2012) found that dietary supplementation of medicinal herbs included NSS significantly increased digestibility coefficients of DM, CP, CF and NFE in dairy goats. In ewes, Mohamed *et al.* (2003) reported that supplementing feeds by 100 mg NSS/kg LBW significantly improved the feed intake and the digestibility coefficient of DM, OM, CP, CF and NFE and nutritive values as TDN, SE and DCP.

Milk production:

Results presented in Table (2) revealed that only does in NSS group showed significantly (P<0.05) higher milk yield in terms of total and daily yield than the control group during the suckling period, but did not differ significantly from those of other treated groups. However, treatment groups (GIN, TUR and ORE) showed insignificant increase in milk production as compared to the control group.

There were insignificant differences in milk contents among the experimental groups during the suckling period. Such results may indicate beneficial effect of medicinal herbs treatments on milk yield of does, in particular those treated with NSS without adversely effects on milk composition (Table 2).

Table (2): Milk yield and composition of does (Mean±SE) in experimental groups during the suckling period.

Item	Control group	Treatment group			
		GIN	TUR	ORE	NSS
Milk yield during suckling period (kg/doe):					
Daily yield	1.70±0.17^{b}	2.17±0.17^{ab}	1.86±0.17^{ab}	1.94±0.17^{ab}	2.23±0.17^{a}
Total yield	154.7±15.1^{b}	197.3±15.1^{ab}	168.9±15.1^{ab}	176.4±15.1^{ab}	203.3±15.1^{a}
Milk composition (%) during the suckling period:					
Fat	3.78±0.021	3.71±0.021	3.85±0.02	3.84±0.021	3.86±0.021
Protein	2.84±0.01	2.81±0.01	2.79±0.01	2.80±0.01	2.83±0.01
Lactose	4.59±0.01	4.63±0.01	4.62±0.01	4.59±0.01	4.58±0.01
Ash	0.72±0.01	0.73±0.01	0.73±0.01	0.73±0.01	0.73±0.01
Total solids	11.93±0.016	11.87±0.016	11.98±0.016	11.97±0.016	12.03±0.016
Solids not-fat	8.14±0.026	8.17±0.026	8.13±0.026	8.12±0.026	8.17±0.026

$^{a \text{ and } b}$: **Means denoted within the same row with different superscripts are significantly different at P <0.05.**

In accordance with the observed increase in milk yield of does fed diet supplemented with medicinal herbs, El-Saadany *et al.* (2008) found that supplemented diets of lactating Zaraibi goats with ORE or NSS during summer season improved (P<0.05) milk yield by 32.1 and 42.0% than the control diet, respectively, with better results for NSS than ORE. They also did not find any significant effect of these herbs on chemical composition of milk. Recently, similar results were obtained by Mirzaei *et al.* (2012) on lactating goats.

Improvement of milk yield might refer to the positive effects of feed additives that contain proteolytic enzymes which help to digest proteins (Mowrey and Clayson, 1982). In this respect, Sada Andoa *et al.* (2003) reported that milk's antioxidative function was increased by feeding herbs to dairy cows.

Feeding herbs to dairy cattle may affect rumen microbes, fermentation and feed digestibility due to the herbs physiological or pharmacological functions in Holstein steers. The authors reported that herbs feeding had no adverse effects upon ruminal fermentation and nutrient digestibility. With regard to improved milk production of does in NSS group, Allam *et al.* (1999) observed that adding NSS to dairy goat diets had a positive effect on milk production. Also, Agarwhal *et al.* (1979) found that NSS oil increased the milk output of breast feeding mothers and revealed that NSS capacity to increase the milk flow of nursing mothers could be attributed to a combination of lipid portion and hormonal structures found in the black seeds.

Reproductive performance:

Results shown in Table (3) show that does in TUR, GIN and ORE groups produced higher total number of kids at birth, while does in NSS showed slightly lower total number of kids at birth than the control group. Such trend reflected in significantly (P<0.05) the highest litter size at birth of does in TUR, the modest in GIN and ORE groups and the lowest in the control one. Meanwhile, litter size at weaning was significantly (P<0.05) the highest in GIN group as compared to other groups.

Interestingly to note that, none of does produced single births, while there was marked effect of medicinal herbs treatment on frequency distribution of type of births. The highest frequency distribution of does produced twins (71.4%) was in NSS group, and the lowest distribution of triples (28.57%) births. Meanwhile, does in GIN yielded the highest frequency distribution of triples (57.14%) and moderate distribution of twins (42.86%) births. On the other hand, only does in ORE and TUR groups produced quartets and six partite types, respectively (14.29% for each, Table 3).

Inspite the observed increase in litter size of does in treatment groups as compared to the control group, average LBW of kids at birth was insignificantly the highest in NSS and ORE groups, modest in TUR group and the lowest in GIN and control ones. Does in the control group showed the lowest litter size with the lightest LBW, but this finding was not clear in treatment groups (Table 3).

It is worthy noting that, does in TUR group showed the highest litter size with the lowest viability rate at birth and at weaning as compared to other groups. However, does in GIN group produced significantly ($P<0.05$) higher litter size with viability rate higher at birth and lower at weaning than those of the control group. On the other hand, viability rate of kids produced from ORE and NSS groups was lower at birth than the control group and similar to the control group at weaning (Table 3). Similar values were obtained by Shehata *et al.* (2007*b*) and Abdelhamid *et al.* (2011) on Zaraibi does fed diets supplemented with medicinal herbs.

Table (3): Kidding performance of does in experimental groups. (Mean±SE)

Item	Control group	Treatment group			
		GIN	TUR	ORE	NSS
No. of goat does	7	7	7	7	7
No. of total borns	17	18	22	18	16
Litter size at birth	2.43±0.20^{c}	2.57±0.20^{b}	3.14±0.51^{a}	2.57±0.30^{b}	2.29±0.18^{c}
Litter size at weaning	2.00±0.18^{b}	2.29±0.20^{a}	1.71±0.32^{c}	2.00±0.17^{b}	1.86±0.16^{bc}
Type of births:					
Single (n-%)	0.00	0.00	0.00	0.00	0.00
Twins (n-%)	4 (57.14)	3 (42.86)	2 (28.57)	4 (57.14)	5 (71.43)
Triples (n-%)	3 (42.86)	4 (57.14)	4 (57.14)	2(28.57)	2 (28.57)
Quartets (n-%)	0.00	0.00	0.00	1 (14.29)	0.00
Six partite (n-%)	0.00	0.00	1 (14.29)	0.00	0.00
LBW(kg/kid)at birth	2.3±0.12	2.3±0.11	2.5±0.073	2.8±0.18	2.8±0.15
Viable kids (n-%):					
At birth (n-%)	14 (82.35)	18 (100)	14 (63.64)	14 (77.78)	13 (81.25)
At weaning (n- %)	14 (100)	16 (88.89)	12 (85.71)	14 (100)	13 (100)

^{a} ,^{b} and ^{c}: Means denoted within the same raw with different superscripts are significantly different at P<0.05.

Regarding the reproductive traits of does during postpartum period, it is of interest to note that does in GIN and ORE groups showed significantly ($P<0.05$) the shortest interval from kidding to 1st oestrus and the shortest interval from weaning to 1st oestrus as compared to other groups. However,

does in TUR group showed significantly (P<0.05) the shortest oestrus duration (21.0±5.39 d.) *vs* the longest duration (58.8±12.0 d.) for does in ORE group (Table 4).

These findings indicate improving postpartum ovarian activity of does in GIN and ORE groups as compared to those in other treatment and control groups. Along with the observed improvement in reproductive traits of does in GIN group, they showed acceptable periods of birth incidence and weaning attainment during the breeding season. However, does in NSS group showed the shortest period of birth and weaning during the breeding season (Table 4). Such finding may allow the best reproductive performance with longer rest period and labor does for does in GIN group during the breeding season. The present results are in agreement with those reported recently by Abdelhamid *et al.* (2011) on Zaraibi does fed diets supplemented with medicinal herbs.

Medical herbs play a vital role in improving the health status and elimination of diseases, because they contain phytoestrogens which are plant chemical similar to sex hormones (Sayed *et al.*, 2005). Also, they have activity for inhibiting and scavenging radicals (antioxidant activity) for protection against infectious and degenerative diseases (Busquet *et al.*, 2005).

Based on the obtained results, medicinal herbs, in particular GIN treatment played an important role in improving reproductive efficiency of Zaraibi does in terms of increasing litter size, viability rate of kids at weaning, shortening days open and the interval from weaning to 1st oestrus and periods of birth and weaning, and increasing ovarian activity during breeding season as compared to the control does.

Table (4): Reproductive traits of does in experimental groups. (Mean±SE)

Group	Average interval (d) from kidding to:		Oestrus duration (h)	Average period (d) of:		
	1st ostrus	Weaning		1st ostrus	Birth	Weaning
Control	150.7±14.6^{b}	60.3±14.6^{b}	33.0±5.11^{b}	42.8±11.6^{c}	10.6±4.72^{b}	11.6±5.30^{b}
GIN	122.1±9.7^{c}	33.5±9.98^{c}	36.8±7.21^{b}	20.9±9.48^{d}	10.8±4.17^{b}	10.1±3.66^{b}
TUR	147.0±15.1^{b}	56.5±14.9^{b}	21.0±5.39^{c}	48.3±17.8^{b}	22.8±5.05^{a}	22.0±4.94^{a}
ORE	122.0±19.9^{c}	34.1±16.3^{c}	52.8±5.16^{a}	40.0±19.70^{c}	18.0±4.42^{a}	18.4±5.25^{a}
NSS	166±11.7^{a}	75.8±11.0^{a}	32.0±4.68^{b}	58.8±12.00^{a}	4.4±1.96^{c}	3.6±1.69^{c}

a, b, c,and, d: Means denoted within the same row with different superscripts are significantly different at P <0.05.

Blood parameters:

Blood haematology:

Results recorded at weaning (Table 5) showed significant (P<0.05) increase in all haematological parameters studied, including count of RBCs and WBCs, Hb concentration and PCV value, only in blood of does in GIN and TUR groups as compared to the control group. However, does in both ORE and NSS groups did not differ significantly from those in the control does.

Table (5): Some haematological parameters of does in experimental groups at weaning. (Mean±SE)

Item	Control group	Treatment group			
		GIN	TUR	ORE	NSS
RBCs,x10^5/mm^3	4.59±0.07^b	5.09±0.07^a	5.02±0.24^a	4.47±0.19^b	4.70±0.34^b
WBCs,x10^3/mm^3	9.44±0.14^b	10.48±0.15^a	10.32±0.50^a	9.20±0.40^b	9.68±0.70^b
Hb, mg/dl	8.95±0.13^b	9.93±0.14^a	9.78±0.46^a	8.73±0.38^b	9.18±0.65^b
PCV, %	29.5±0.43^b	32.8±0.48^a	32.3±1.55^a	28.8±1.25^{bc}	30.3±2.17^b

$^{a, b, and, c}$: Means denoted within the same row with different superscripts are significantly different at P <0.05

Improving haematological parameters of does in GIN group was associated with the finding that GIN promotes cardiovascular health by making platelets (thrombocyte) less and keeping blood flowing on arteries. Also, GIN therapeutic properties effectively stimulate circulation of the blood, removing toxins from the body, cleaning the bowels and kidneys and nourishing the skin (Bensky and Gamble, 1993). Also, Sambaiah *et al.* (1982) reported similar results in blood picture with GIN supplements. In accordance with the effect of ORE and NSS, El-Saadany *et al.* (2008) found that PCV values and WBCs count were not affected significantly by dietary addition of ORE or NSS. In the same line, Mohamed *et al.* (2003) and Habeeb *et al.* (2009) reported that NSS prevents the increase in Ht%. Increasing count of WBC in GIN and TUR groups is in agreement with the recent results of Mirzaei *et al.* (2012) in dairy goats fed diets supplemented with medicinal plant mixture. They reported that these results may be due to the improvements occurred in metabolic process as response to the experimental herbs.

Blood biochemicals:

Results presented in Table (6) cleared significant (P<0.05) increase in concentration of biochemicals such as total proteins (TP), albumin (AL) and globulin (GL) in blood plasma of does in GIN and TUR groups. Concentration of urea-N significantly (P<0.05) increased in GIN and glucose concentration significantly (P<0.05) increase in NSS groups. However, creatinine concentration was not affected significantly by medicinal herbs treatment.

Table (6): Some biochemical concentrations in blood plasma of does in experimental groups at weaning. (Mean±SE)

Item	Control group	Treatment group			
		GIN	TUR	ORE	NSS
Total protein, g/dl	7.18±0.11^b	7.98±0.12^a	7.85±0.38^a	7.00±0.30^b	7.37±0.53^b
Albumin , g/dl	3.60±0.04^b	3.88±0.04^a	3.84±0.13^a	3.53±0.11^b	3.66±0.19^b
Globulin, g/dl	3.58±0.07^b	4.10±0.07^a	4.01±0.24^a	3.47±0.20^b	3.71±0.34^b
Urea-N, mg/dl	83.7±1.43^b	92.8±4.66^a	82.4±2.20^b	71.7±0.81^c	84.2±0.69^b
Creatinine, mg/dl	0.85±0.02^{ab}	0.94±0.05^a	0.84±0.02^{ab}	0.73±0.01^b	0.86±0.01^{ab}
Glucose mg/dl	82.6±7.29^b	90.6±6.86^{ab}	87.5±5.92^{ab}	75.8±7.00^b	99.2±3.53^a

$^{a, b, and, c}$: Means denoted within the same row with different superscripts are significantly different at P <0.05

Similar results were reported by El-Saadany *et al.* (2008), who found that albumin, creatinine concentration was not negatively or significantly (P<

0.05) affected by supplementing ORE or NSS to the diet of lactating Zaraibi goats during summer season. Salem and El-Mahdy (1999) reported insignificant effect of NSS on concentration of total protein, albumin and creatinine in blood plasma of the Ossimi lambs. Azab Awad-Allah (2002) reported that concentration of urea and albumin was not affected significantly due to NSS supplement at the rate of 100 mg/kg body weight in Friesian calves. Awad-Allah and Gehad (2003) found that supplementing rations of growing sheep with 2% NSS did not effect on albumin concentration.

In similarity with the present results of NSS group, Daghash *et al.* (1999) found an increase in plasma glucose concentration of rabbit bucks fed NSS diet. Also, Mirzaei *et al.* (2012) found that glucose concentration in blood plasma increased in dairy goats fed diets supplemented with medicinal plant mixture as compared to control. It is of interest to note that increasing glucose level of does in NSS group was associated with increasing milk yield.

Mineral contents:

Results in Table (7) indicated that feeding GIN diet resulted in significant ($P<0.05$) increase in contents of K, Ca and P in blood plasma of does, while feeding TUR diet significantly ($P<0.05$) increased contents of Ca and P in blood plasma of does. Interestingly to note that, feeding NSS diet significantly ($P<0.05$) increased concentration of K, Mg, Cl and Zn, while Na concentration was not affected significantly by medicinal herbs treatment with the exception of NSS and ORE being higher in NSS (155.7±5.5) than in ORE group (119.2±10.8) .

In harmony with the present results, El-Saadany *et al.* (2008) observed that contents of Na, Ca, Mg, P and Zn in blood plasma were not affected significantly by diets supplemented to lactating Zaraibi goats with ORE, while K and Zn contents significantly increased by NSS. Salem and El-Mahdy (1999) found insignificant differences due to rations supplemented with NSS in Ca and P concentrations in the blood plasma of the Ossimi lambs. Inspite ORE is rich in mineral elements such as potassium, calcium, magnesium, phosphorus, zinc, manganese, iron, copper, sulphur, chlorine, iodine and selenium, whereas its sodium content is low, it did not alter mineral profiles, inversely reduced ($P<0.05$) K concentration of does in ORE group.

Table (7): Mineral concentrations (Mean±SE) in blood plasma of does in experimental groups at weaning.

Item	Control group	Treatment group			
		GIN	TUR	ORE	NSS
Na, mmol/l	129.8±11.3^{ab}	142.3±10.6^{ab}	137.5±9.20^{ab}	119.2±10.8^{b}	155.7±5.51^{a}
K, mmol/l	3.25±0.28^{b}	3.56±0.27^{a}	3.44±0.23^{ab}	2.98±0.27^{c}	3.90±0.14^{a}
Ca, mg/dl	9.87±0.14^{b}	10.98±0.18^{a}	10.79±0.50^{a}	9.62±0.41^{b}	10.17±0.75^{ab}
Mg, mg/dl	1.31±0.12^{b}	1.43±0.11$^{a\,b}$	1.39±0.09^{b}	1.20±0.11^{bc}	1.57±0.06^{a}
P, mg/dl	3.19±0.09^{b}	3.89±0.12^{a}	3.77±0.31^{a}	3.03±0.26^{b}	3.39±0.47^{ab}
Cl, mmol/l	107.6±9.50^{b}	118.0±8.93^{ab}	113.9±7.71^{ab}	98.7±9.12^{bc}	129.2±4.60^{a}
Zn, mg/dl	106.9±9.44^{bc}	117.3±8.88^{b}	113.3±7.67^{b}	98.1±9.07^{c}	128.5±4.57^{a}

$^{a, b, and, c}$: **Means denoted within the same row with different superscripts are significantly different at P <0.05**

Enzyme activity:

Results in Table (8) revealed that feeding GIN diet significantly (P<0.05) increased activity of alkaline phosphatase (ALP) and AST, while feeding ORE significantly (P<0.05) decreased activity of ALP, AST and ALT. The present results concerning activity of all enzyme studied as affected by NSS are similar to those obtained by El-Saadany *et al.* (2008) on Zaraibi goats, but they also reported unchanged activities of AST, ALT and ALP as affected by ORE, which are in contrast to the present results. Recently, Basavaraj *et al.* (2011) found that that activity of ALP, AST and ALT in blood serum was not affected by TUR supplementation in diets of rabbits.

Daly (1998) mentioned that NSS combinations with cisplatin partially prevented many undesired changes in the activities of serum enzymes. In agreement with the present results, Awad-Allah and Gehad (2003) found that supplementing rations of growing sheep with 1 or 2% NSS didn't adversely affected the liver function as ALT and AST activities did not differ significantly.

Table (8): Activity of transaminases (AST and ALT) and alkaline phosphatase (ALP) in blood plasma of does in experimental groups at weaning. (Mean±SE).

Item	Control group	Treatment group			
		GIN	TUR	ORE	NSS
ALP	52.34±0.89^{b}	58.00±2.92^{a}	51.53±1.37^{b}	44.80±0.51^{c}	52.62±0.43^{b}
AST	96.02±1.64^{b}	106.41±5.35^{a}	94.54±2.52^{b}	82.18±0.93^{c}	96.53±0.79^{b}
ALT	51.56±0.88^{a}	57.14±2.87^{a}	50.76±1.35^{a}	44.13±0.50^{b}	51.84±0.42^{a}

$^{a, b, and, c}$: **Means denoted within the same row with different superscripts are significantly different at P <0.05**

In this respect, Mahmoud *et al.* (2002) reported that *Nigella* oils have played a significant role for altering the liver damage induced by *Schistosoma mansoni* infection in mice and helped in improving the immunological host system and to some extent with its antioxidant effect. In contrast to the present results, Sambaiah *et al.* (1982) reported that GIN reduced AST and ALT activities.

The observed improvement in performance of does in GIN group may be due to that the gingerols increase the motility of the gastrointestinal tract and have analgesic, sedative, antipyretic and antibacterial properties (Ahmed *et al.*, 2000*a*). Also, GIN contains proteolytic enzymes that help to digest proteins (Mowrey and Clayson, 1982) and it tonics the intestinal muscles, stimulates secretion of bile from the liver and gallbladder, which helps digest fats and promotes cardiovascular health by making platelets (thrombocyte) less and blood keep flowing on arteries (Bensky and Gamble, 1993). Moreover, Ahmed *et al.* (2000*b*) reported that GIN significantly lowered lipid peroxidation by maintaining the activities of the antioxidant enzymes--superoxide dismutase, catalase and glutathione peroxidase in rats. The blood glutathione content significantly increased in GIN fed rats. Results of Ahmed *et al.* (2000*a*) suggested that GIN exerts an antioxidative effect by decreasing lipid peroxi-dation, increasing GSH content and maintaining normal levels of antioxidant enzymes. The mechanism by which GIN provides an environment for the enhanced level of glutathione (GSH) is yet to be ascertained.

Generally, these results indicated that all values of blood parameters presented in this study are within the normal range for healthy animals and the tested additives to diets of lactating goats did not negatively affected liver function (Mirzaei *et al.,* 2012).

Based on the foregoing results, dietary supplementation (100 mg/l kg LBW) with NSS had beneficial effects on growth and milk production performance, while dietary supplementation of ginger yielded the best reproductive performance of Zaraibi goat does.

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تأثير اضافة بعض الاعشاب والنباتات الطبية على اداء الماعز الحلابة :

١- الاداء الانتاجى و التناسلى

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قسمت ٣٥ عنزة زرايبى فى موسم الحليب الثالث بمتوسط عمر ثلاث سنوات ووزن ٣٨.٢± ٠.٥٨ كجم الى خمسة مجموعات متماثلة. استمرت التجربة من الثلث الاخير من الحمل وحتى الفطام لاختبار تأثير اضافة بعض الأعشاب الطبيه على الاداء الانتاجى والتناسلى للماعز الحلاب. غذيت جميع المجموعات على علية اساسية موحدة مكونة من علف مركز و دريس برسيم وقش أرز . غذيت العنزات على العليقة الاساسية بدون اضافات فى المجموعة الاولى (المقارنه) أو مع ١٠٠ ملجم/كجم وزن حى من كل من مسحوق الزنجبيل-الكركم-البردقوش أو حبة البركة فى علية المجموعة الثانية والثالثة والرابعة والخامسة على التوالى. تم تقدير الوزن ، كمية وتركيب اللبن خلال فترة الرضاعة (٩٠ يوم) ، وبعض الخصائص التناسليه خلال فترة ما بعد الولادة ،وبعض خصائص الدم عند الفطام. أظهرت النتائج عدم وجود فروق معنوية فى وزن الجسم بين المجاميع خلال الثلث الاخير من الحمل وحتى الولادة . قبل وعند الولادة أظهرت مجموعة البردقوش أعلى وزن تلاها مجموعة الكركم وحبة البركة ثم الزنجبيل على التوالي. لم يتأثر وزن الجسم خلال فترة الرضاعة. أظهرت مجموعة حبة البركة اعلى انتاج لبن معنويا مقارنة بالمقارنة وكانت الفروق غير معنوية بينها وبين باقى مجموعات الأعشاب التى لم تختلف معنويا عن الكنترول. لم توجد فروق معنوية فى التحليل الكيماوى للبن بين المعاملات. كان حجم البطن عند الولادة الاعلى معنويا فى مجموعة الكركم ومتوسط فى مجموعة الزنجبيل والبردقوش والاقل فى مجموعة المقارنة. كان حجم البطن عند الفطام اعلى معنويا فى مجموعة الزنجبيل مقارنة بباقى المعاملات. أعطت مجموعة حبة البركة أعلى نسبة مواليد توأميه (٧١.٤%) ومجموعة الزنجبيل اعطت اعلى نسبة مواليد ثلاثية (٥٧.١٤%)، بينما ظهرت حالة واحدة ذات ولادة رباعية فى مجموعة البردقوش وأخرى سداسية فى مجموعة الكركم. كان وزن البطن عند الولادة الاعلى فى مجموعة حبة البركة و البردقوش ومتوسط فى الكركم و الاقل فى مجموعة الزنجبيل والمقارنة. كانت الفترة من الولادة وحتى ظهور أول شياع وكذلك الفترة من الفطام وحتى ظهور أول شياع اقل معنويا فى مجموعة الزنجبيل والبردقوش. كانت مجموعة الكركم الاقل معنويا فى فترة ظهور الشياع بينما كانت مجموعة البردقوش الاطول معنويا. أعطت مجموعة الزنجبيل افضل متوسط فترة حدوث ولادات وفطام وكذلك شياع (١١ ، ١٠ ، ٢١ يوما تقريبا على التوالى) مقارنة بباقى المعاملات. أدت اضافة كل من الزنجبيل والكركم الى زيادة معنوية فى قياسات صورة الدم وكذلك فى كل من البروتين الكلى و الألبيومين و الجلوبيولين. ارتفع تركيز اليوريا معنويا فى مجموعة الزنجبيل وانخفض فى مجموعة البردقوش. وارتفع الجلوكوز معنويا فى مجموعة حبة البركة ولم يتأثر تركيز الكرياتينين بالمعاملات. كان هناك تأثير للمعاملات على تركيزا لمعادن بيلازما الدم . أدت اضافة الزنجبيل الى زيادة معنوية فى انزيم الالكالين فوسفاتيز والانزيمات الناقلة للامين بينما ادت اضافة البردقوش الى انخفاضها معنويا.

أظهرت هذه الدراسة أن إضافة حبة البركة كان لها تأثير ايجابى على كل من النمو وانتاج اللبن بينما اضافة الزنجبيل اعطت افضل اداء تناسلى للماعز الزرايبى .وبالتالى يمكن اضافة هذه الاعشاب لعلائق الماعز الحلابة وذلك لزيادة انتاج اللبن وتحسين الحالة الصحية والفسيولوجية والأداء التناسلى لها وكذلك لاداء خلفتها.

قام بتحكيم البحث

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