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EFFECTS OF DIETARY HERB SUPPLEMENTS FOR EWES ON MILK CONTENTS AND SOME BIOCHEMICAL PARAMETER

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ABSTRACT
This experiment was conducted on 9 Awassi ewes of similar weight (BW around 50 Kg) and age (45-48 months) for 60 days, were equally divided into three dietary treatments. Group 1 served as a control group received drinking water, groups 2 and 3 have given water with garlic (*Allium sativum*) and ginger (*Zingiber officinale*) extract by 2 ml/2 liter per day in the water drinking respectively. All groups were fed the basal diet; while Ekomilk was used to analysis milk samples. No significant effect was found in Lactose, fat, pH, FP and DEN, while protein and NSF improved ($P<0.05$) by adding garlic and zinger in water drinking at 1st and 3rd weeks, However, No significant difference were observed in creatinine, ALT and AST, While the cholesterol and glucose were decreased ($P<0.05$) at 3th, 4th and 1st, 3th, and 4th respectively.

KEYWORDS: Herb supplements, milk and ewes.

INTRODUCTION

The production of milk from sheep is a great importance for lamb production because of its effect directly on young growth, especially during the first weeks of their life. There are many attempts have been made to achieve increase in the production of milk and thereby profits. Feed supplements, hormones, minerals and feed additives were used. Many essential oils have strong antimicrobial activities against a wide range of bacteria, yeasts and molds (Baratta *et al.,* 1998; Giordani *et al.,* 2004).These compounds have been shown to modulate ruminal fermentation to improve nutrient utilization in ruminants (Wang *et al.,* 1996; Hristov *et al.,* 1999). Bovine Somatotropins administration to healthy dairy animals is reported to increase milk production (Lurdi, 1993), but such a treatment is very expensive and the milk from treated cattle may not be safe for human consumption (Kronfeld, 1991). Allam *et al.,* 1999, observed that using medicinal plants such as chamomile in dairy animal diet had a positive effect on milk production and efficiency of feed conversion as well. Plant extracts with high concentration of secondary metabolites are good candidates for achieving one or more of these objectives (Teferedegne 2000; Wanapat *et al.,* 2008).Therefore, the aim of this work was to evaluate the effect of adding some herb supplements like garlic oil (*Allium sativum*) and ginger oil (*Zingiber officinale*) to the rations on milk composition and some biochemical parameters such as cholesterol, total proteins, creatinine, glucose, ALT and AST.

MATERIAL & METHODS

Nine ewes in the 3th or 4th lactation seasons were used in this experiment starting by the first week of lactation and extended to 60 days. Ewes were divided into three groups (three animals each) the first group was control gave the water from the sink water as a water drinking, the second group was given the garlic (*Allium sativum*) extract by 2 ml/2 liter per day in the water drinking, and the third group was given the ginger (*Zingiber officinale*) extract by 2 ml/2 liter per day in the drinking water. All groups were fed the basal diet, table 1 shows the composition of concentrate fed.

TABLE 1: Formulation of concentrate feed mixture, and proximate analysis of the basal diet (BD)

Ingredients (g/kg)	Control ration
Barley grain	69.0
Wheat bran	14.0
Soybean meal	14.6
Calcium Carbonate	1.3
Sodium Chloride	0.5
Calcium Phosphate	0.5
Trace elements & Vitamins	0.1
Dry matter % (DM)	88.55
Organic matter % (DM)	
Ash %	5.45
Crude protein %	13.60
Either extract %	4.66
Crude fiber %	8.40
Nitrogen free extract (NFE)%	67.89

Sampling and analysis of milk

Individual milk samples were collected from all animals every week during the experimental period (60 days). The ewes were hand milked once daily at morning and take 15 ml from each one. Milk samples were analyzed for total solids, fat, protein, non-protein nitrogen, PH, freezing point, acidity, water percentage and lactose using Ekomilk.

Sampling and analysis of blood serum:

Blood samples were collected from the jugular vein area from all ewes within each group on weekend in the morning. The blood samples were directly collected into clean dried glass culture tubes and centrifuged at 4000 rpm. for 20 minutes; blood serum was then separated into a clean dried glass vial and stored at -18°C till chemical analysis. Blood serum samples were analyzed for concentrations of total protein as described by Armstrong and Carr (1964), albumin (Doumas *et al*., 1971), glucose (Siest *et al*., 1981), cholesterol (Raltiff and Hall, 1973) and serum ALT (Alanine transaminase) and AST (aspartate aminotransferase (Reitman and Frankel 1957). Globulin and albumin/ globulin ratio were calculated.

Statistical analysis

A completely randomized statistical design was used. Collected data were statistically analyzed by analysis of variance (ANOVA) by the statistical package SPSS for Windows (2001), standard version.

RESULTS & DISCUSSION

TABLE 2: The effect dietary of garlic and ginger supplement on some biochemical parameters of ewe milk

	Before treatment			Week 1			Week 2			Week 3			Week 4		
	C	G	Z	C	G	Z	C	G	Z	C	G	Z	C	G	Z
Protein%	5.0 ± 0.03	4.9 ± 0.07	4.8 ± 0.20	1.9 ± 0.93b	4.5 ± 0.90ab	4.7 ± 1.01a	5.6 ± 0.25	5.5 ± 0.05	5.6 ± 0.15	3.1 ± 0.15b	4.4 ± 0.20ab	5.6 ± 0.95a	7.1 ± 0.10	6.8 ± 0.10	7.2 ± 0.35
Fat%	10.7 ± 1.10	9.2 ± 0.41	9.2 ± 0.33	4.5 ± 0.90	7.9 ± 0.85	9.6 ± 1.60	9.1 ± 1.20	8.9 ± 0.25	8.8 ± 0.95	4.7 ± 0.90	6.9 ± 0.80	8.5 ± 2.05	3.8 ± 0.50	4.8 ± 0.35	6.9 ± 1.10
Lactose%	2.1 ± 2.16	4.3 ± 0.00	4.3 ± 0.01	4.1 ± 0.10	4.2 ± 0.05	4.1 ± 0.05	4.3 ± 0.05	4.4 ± 0.00	4.2 ± 0.20	4.5 ± 0.15	4.4 ± 0.15	4.4 ± 0.00	4.6 ± 0.05	4.6 ± 0.00	4.6 ± 0.00

Differences in the same column with different superscripts are statistically significant at P<0.05

TABLE 3: The effect dietary of garlic and ginger on some physical and hygiene parameters of ewe milk

	Before treatment			Week 1			Week 2			Week 3			Week 4		
	C	G	Z	C	G	Z	C	G	Z	C	G	Z	C	G	Z
NSF%	10.1 ± 0.02	10.0 ± 0.05	9.8 ± 0.21	6.5 ± 1.10b	9.6 ± 1.10a	8.7 ± 0.20ab	11.0 ± 0.35	10.8 ± 0.05	10.6 ± 0.60	8.4 ± 0.30b	9.4 ± 0.85ab	10.1 ± 1.95a	12.8 ± 0.10	12.5 ± 0.10	12.6 ± 0.05
PH	5.4 ± 0.00	5.4 ± 0.00	5.4 ± 0.00	5.4 ± 0.00	5.4 ± 0.00	5.3 ± 0.00	5.3 ± 0.00	5.3 ± 0.00	5.3 ± 0.00	5.3 ± 0.00	5.3 ± 0.00	5.3 ± 0.00	5.2 ± 0.00	5.2 ± 0.00	5.2 ± 0.00
FP	56.2 ± 0.39	56.6 ± 0.30	55.9 ± 0.70	35.8 ± 7.80	54.2 ± 4.15	52.7 ± 0.30	59.5 ± 1.75	59.0 ± 0.05	59.3 ± 1.30	55.1 ± 1.30	55.6 ± 0.20	56.8 ± 3.90	71.9 ± 0.65	69.9 ± 0.15	71.4 ± 0.20
DEN	26.6 ± 0.90	27.5 ± 0.05	26.8 ± 0.65	17.8 ± 3.85	26.7 ± 3.55	21.8 ± 2.20	31.5 ± 2.35	31.1 ± 0.10	31.5 ± 1.55	27.0 ± 0.30	27.8 ± 0.10	32.4 ± 2.25	44.5 ± 1.05	43.0 ± 0.70	44.3 ± 0.15

Differences in the same column with different superscripts are statistically significant at P<0.05

NSF: non solid fat, FP: freezing point, DN: Density

Milk composition

Table 2 and 3 show significant effect (P<0.05) of garlic and ginger at first and third weeks in protein and solid non fat compared to control group. However, no significant effects were noticed in Lactose, fat, pH, FP and DEN as a result of garlic and ginger supplementation. These results agree with (EL-Ghousein. S. 2010) that found adding some medicinal plants such as chamomile flowers (CF) or Nigella sativa seeds (NSS) increased (P<0.05) protein, solid non fat and ash of milk, while no significant effects in fat and lactose. While, milk protein was increased with essential oils additives as a result of improvement of ruminal microbial protein synthesis. Similar results were obtained by (Spanghero *et al.*, 2008) who reported that essential supplementation to rations had increased the milk protein content. Supplementation of cinnamon, garlic and ginger oils could be used to improve rumen fermentation as propionate production and reduce methane gas emission and enhancing milk production and milk protein of lactating goats. Cinnamon oil supplementation improved conjugated linoleic acid and omega3 fatty acids in milk fat. In addition, cinnamon oil supplementation to dairy animals can contribute to improve the health properties of milk and suggesting that its consumption benefits human health (Kholif *et al.*, 2012).

TABLE 4: The effect dietary of garlic and ginger supplementation on some biochemical parameter in ewe

	Before treatment			Week 1			Week 2			Week 3			Week 4		
	C	G	Z	C	G	Z	C	G	Z	C	G	Z	C	G	Z
Cholesterol (Mg/dl)	125.7 ± 26.1	129.9 ± 21.6	171.2 ± 22.0	141.0 ± 6.37	191.0 ± 53.3	166.2 ± 27.7	156.6 ± 13.7	160.4 ± 27.2	138.0 ± 38.8	136.9 ± 13.7ab	77.2 ± 9.8b	147.3 ± 27.0a	130.0 ± 23.9a	117.0 ± 9.3ab	93.8 ± 5.0b
Total Protein (g/dl)	0.5 ± 0.10	0.4 ± 0.03	0.3 ± 0.16	0.5 ± 0.00	0.4 ± 0.03	0.4 ± 0.03	0.5 ± 0.05	0.5 ± 0.03	0.5 ± 0.00	0.5 ± 0.00	0.4 ± 0.00	0.5 ± 0.03	0.5 ± 0.14	0.3 ± 0.05	0.5 ± 0.05
Glucose (mg/dl)	120.9 ± 0.40	163.9 ± 44.80	184.4 ± 30.07	101.5 ± 40.01b	152.6 ± 60.59a	119.8 ± 38.56ab	42.4 ± 9.02c	89.5 ± 39.94a	63.8 ± 18.7abc	30.2 ± 5.07	30.5 ± 4.85	29.5 ± 1.65	16.7 ± 0.48b	26.8 ± 0.81ab	68.5 ± 9.41a

Differences in the same column with different superscripts are statistically significant at P<0.05

TABLE 5: The effect dietary of garlic and ginger supplementation on the liver and kidney function test in ewe

	Before treatment			Week 1			Week 2			Week 3			Week 4		
	C	G	Z	C	G	Z	C	G	Z	C	G	Z	C	G	Z
Creatinine	1.0 ± 0.06	0.7 ± 0.00	0.7 ± 0.12	0.7 ± 0.17	0.8 ± 0.05	0.9 ± 0.08	0.8 ± 0.06	1.1 ± 0.05	0.9 ± 0.12	0.9 ± 0.18	0.8 ± 0.12	0.9 ± 0.15	0.9 ± 0.12	1.1 ± 0.32	1.3 ± 0.03
AST	1029.4 ± 5.55	1013.5 ± 19.80	1012.3 ± 17.11	1014.7 ± 16.06	985.5 ± 18.67	949.3 ± 21.50	1001.1 ± 9.51	968.1 ± 39.31	947.2 ± 15.98	993.5 ± 6.07	990.4 ± 9.32	926.7 ± 27.09	898.3 ± 50.05	970.2 ± 24.39	992.4 ± 12.98
ALT	937.2 ± 25.21	847.6 ± 38.00	919.9 ± 17.58	864.0 ± 35.37	896.4 ± 25.23	876.8 ± 25.89	639.7 ± 173.6	839.1 ± 54.04	895.1 ± 20.95	865.0 ± 38.29	874.9 ± 24.62	704.4 ± 172.8	878.7 ± 62.36	788.0 ± 13.24	794.4 ± 58.81

Differences in the same column with different superscripts are statistically significant at P<0.05

Blood serum metabolites

Table 4 shows the concentrations of relevant blood serum metabolites of these ewes. Addition of zinger and garlic decreased (P<0.05) serum cholesterol and glucose on 3rd and 4th weeks. However, no significant differences were noticed in total proteins, these results agree with (Kholif *et al*., 2012) that found adding garlic, zinger and cinnamon in goat's diets improving glucose and decreasing cholesterol levels. These results indicated the healthy effect of EOs supplementation to goat's diets to decrease cholesterol concentrations. Oils supplementation is known to increase blood cholesterol (Garcia-Bojalil *et al*., 1998), although the types of fatty acids in zinger, garlic would seem to differ resulting the decline of cholesterol concentration. Table 5 shows no significant effects were noticed in creatinine, ALT (Alanine transaminase) and AST (aspartate aminotransferase).This results agree with (Kholif *et al*., 2012).The results of ALT and AST enzymes regarded indicate the healthy effect of garlic and zinger to ewe as a disease of cholesterol.

CONCLUSION

Supplementation of garlic and ginger oil should be used to improve rumen fermentation as propionate production and reduce methane gas emission and enhancing milk composition, In addition, essential oil supplementation to dairy animals can contribute to improve the health properties of milk and suggesting that its consumption benefits human health. Further work is necessary to determine if the essential oils additive would be effective for high producing cows and the products from this milk and their effect on the human health.

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