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EFFECT OF SUPPLEMENTING EWES RATIONS WITH *EUCLYPTUS GLOBULUS* LEAVES DURING LATE PREGNANCY AND LACTATION

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SUMMARY

Thirty-two pregnant Barki ewes (last 4-6 weeks of gestation period) 2nd to 3rd seasons were divided into four similar groups (8 ewes each). The first group (control group) (T_1) was fed a basal diet contain 700g concentrate feed mixture (CFM), 2kg berseem and 250 g wheat straw. The other three groups T_2, T_3 and T_4 were fed the same ration of T_1 plus 75, 100 or 125 mg/kg live body weight (LBW) *Euclyptus globulus* leaves (EGL), respectively.

Performance of newborn lambs and ewes were taken in addition to some blood parameters. Results obtained could be summarized as follows. Lamb performance indicated that gain and average daily gain (ADG) of suckling lambs significantly improved ($p \leq 0.05$) by adding of EGL with low supplementation level, but the difference between groups of the other supplementation levels and control group were not significant ($P \geq 0.05$).

Milk production from ewes indicated that 4% fat corrected milk was significantly increased ($p \leq 0.05$) with low supplementation level and significantly decreased ($p \leq 0.05$) with medium and high supplementation levels when compared with control group. Also, Feed efficiency as g DMI / g milk yield was improved by 25% with low supplementation level. Results of milk composition cleared that supplementation of EGL significantly increased ($p \leq 0.05$) Fat%, CP%, TS% and ash%.

Blood analysis indicated that adding EGL significantly increased total protein of blood serum, but the difference between T_1 and T_2 was not significant, also, GPT was significantly increased with T_3 and T_4 but the difference between T_1 and T_2 was not significant. Also, results of A/G ratio for T_1, T_2 and T_3 were not significant, but the result of T_4 was significantly decreased. The same result was obtained for serum blood urea. Other blood parameters like albumin, globulin, GOT and triiodothyronin activity were not significantly difference. Also, results indicated that serum total protein and albumin were higher in lactation period than in late gestation period, but the parameter of A/G ratio was significantly higher in late gestation and first two weeks of lactation period than other period during lactation period. Moreover, Triiodothyromine was significantly higher ($P > 0.05$) in late gestation than lactation period.

Keywords: *Euclyptus globulus leaves, milk production, lactating ewes, pregnancy ewes, lambs, weaning weight, blood analysis.*

INTRODUCTION

Increasing of milk yield for lactating ewes and weight of lambs at weaning are important factors for mutton production and increase sheep population in Egypt. Many researchers used medicinal plants as feed additives to improve the efficiency of feed utilization and animal productive performance. Different studies showed that ground leaves of *Euclyptus globulus* (EG) had beneficial effects on the efficiency of feed utilization and body weight gain with sheep (Aboul-Fotouh, *et al.* 1999). Also, Saleh and El Ashry (2007) reported that adding ground comphar leaves to lambs diets improved the nutrients digestibility coefficients and consequently nutritive value of the ration. Moreover, Aboul-Fotouh, *et al.* (2000) cleared that yield of buffalo's milk and its composition, FCM 4% fat and milk energy content were higher with EG leaves supplemented diets than the control. All these results were encouraging in this study to test the effect of adding ground *Euclyptus globulus* leaves to ewes' diets during late pregnancy and lactation periods on lambs birth weight and weaning weight, also, effect of these additives on milk yield, milk composition and ewe's weight changes after lambing.

MATERIALS AND METHODS

This study was carried out at the Experimental Agricultural Project (Sheep Farm) and Animal Nutrition Research Unit, Radiobiology Applications Department, Nuclear Research Center, Atomic Energy Authority, Abu Zabeel to investigate the effect of supplementing different levels of *Eucalyptus Globules* leaves (EGL) on productive performance of lactating ewes.

1-Animals and their rations:

Thirty two late pregnant Barki ewes (last 4-6 weeks of gestation period) at 2nd and 3rd seasons were used in this experiment. The ewes were assigned to four groups (8 ewes each). The ewes of first group (T_1 control) were fed on 700g concentrate feed mixture (CFM), 2kg berseem and 250g wheat straw/head/day. The ewes of 2nd, 3rd and 4th groups (T_2, T_3 and T_4) were received the same ration of T_1 +75,100 or 125 mg/kg live body weight (LBW) *Euclyptus globulus* leaves (EGL), respectively. All diets were analyzed according to the methods of the A.O.A.C. (1996).The EGL were cut from the trees and then air dried in shady aria. The dried EGL were ground in a hammer mill through 1mm diameter screen. The EGL were offered to the ewes with the half quantity of CFM at 9.0 am and the second half of CFM was offered at 3.0 pm. The wheat straw and berseem were offered at about 10.0 am. The formulation of (CFM) and its chemical composition is given in Table (1).

2-Weight of lambs and ewes:

After lambing ewes and lambs were weighted directly after lambing within 15 hr and weighted at 15, 30, 45 and 60 days of age and the lambs were weaned at 60 days of age.

3-Recording of milk production and composition of milk:

Table (1). Chemical composition (DM basis %) of concentrate feed mixture (CFM), berseem clover and wheat straw used in ewes diets.

Item	CFM	Berseem	Wheat straw
Dry matter %	90.14	19.1	90.30
Organic matter %	92.21	86.19	88.45
Ash %	7.79	13.81	11.55
Crude protein %	14.00	14.36	3.85
Either extract %	1.82	2.41	1.28
Crude fiber %	12.09	35.79	36.51
Nitrogen free extract (NFE) %	64.30	33.63	46.81

CFM consisted of 25% crushed yellow corn, 35% sugar beet pulp, 20% undecorticated cotton seed meal, 2% soybean meal, 15% wheat bran, 1% common salt (NaCl), 1.5% dicalcium phosphate and 0.5% mineral mixture (Each kg of mineral mixture contains: zinc 7200mg, cupper 1800mg, iron 1800mg, manganese 3600mg, cobalt 18mg, iodine 110mg, selenium 18mg, sodium 74.3g, the carrier material (calcium carbonate) up to 1000g.

Table (2). Performance of lambs suckling their dams fed ration supplemented with different levels of Eucalyptus Globules Leaves (EGL) (mean ± SE).

Item	T_1 (Control)	T_2 75mg/kgLBW	T_3 100mg/kgLBW	T_4 125mg/kgLBW
No. of lambs	8	8	8	8
Birth weight (kg)	3.78 ± 0.23	4.11± 0.38	3.70± 0.21	3.51±0.34
WW	11.39± 0.87	14.03± 1.08	12.33± 0.66	13.03± 0.86
Gain (kg)	7.61^{b}± 0.87	9.91^{a}± 0.81	8.63^{ab}± 0.51	9.51^{ab}± 0.63
ADG	126.9^{b}± 14.5	165.2^{a}± 13.5	143.8^{ab} ± 8.5	158.5^{ab} ± 10.5

WW = Weaning weight (kg), ADG = Average daily gain (g)

The lambs were isolated out of their dams after the second meal at 3.0 pm till the next day. The ewes were completely hand milked till stripping on the next day morning and milk yield was recorded. The ewes were milked at 15, 30, 45 and 60 day from lambing. Milk samples were taken and analyzed for fat, total solid (TS), solid not fat (SNF), total proteins (TP) and ash according to methods of Ling, (1963), lactose was calculated by difference.

4- Sampling and analysis of blood serum:

At the same day of milking, blood samples were directly collected from Jugular vein of ewes into vacuum tube before morning feeding. The vacuum tube was centrifuged at 3000 rpm (500 g) for 15 min, and then blood serum was separated into polypropylene tube and stored at -18°c until analysis. Serum total proteins were determined as described by Armstrong and Carr (1964). Also, albumin (Doumas *et al*, 1971), urea (Patton and Crouch, 1977), transaminases, GOT and GPT activities (Reitman and Frankel, 1957) were determined. Globulin and albumin globulin ratio (A/G ratio) were calculated.

Triiodothyronin (T3) was determined by Radioimionoassy (RIA) using solid phase coated tubes and the tracer was labeled with ^{125}I (Diagnostic Products Corporation, Los Angeles, USA).

5-Statistical analysis:

Data of milk yield, milk composition and blood parameters obtained from this study were statistically analyzed according to SAS, (1996), procedure. The following model was subjected:

$$Y_{ijkl} = U + T_i + a\,(T)_{ij} + W_k + E_{ijkl}$$

Where: Yijkl = Parameter under analysis, U = Overall mean, Ti = The fixed effect of treatment (T) when (i) = 1,2,3,4, a (T)ij = the random effect of animal j within treatment (i), WK = the fixed effect of time, Eijkl = random error.

Also, data of lamb's weight were analyzed according to SAS, (1996), procedure. and the statistical model was as follows:

$$Xij = \mu + Ai + Eij$$

Where: Xij = represents observation, μ = overall mean, Ai = effect of treatment (rations), Eij = experimental error.

RESULTS AND DISCUSSION

1- Performance of lambs:

Results of Table (2) indicate that supplementation of (EGL) increased the gain of lambs, and the difference between control group and low supplementation level group ($T_1$and T_2) was significant ($p \leq 0.05$). Also, results indicated that average daily gain (ADG) of lambs in (T_2) were improved significantly ($p \leq 0.05$) by 30.2% when compared with lambs of (T_1), on the other hand (ADG) of lambs in (T_3) and (T_4) were improved by 13.3 and 24.9% when compared with lambs of (T_1) but the differences were not significant ($p \geq 0.05$). This improvement in weaning weight of lambs may be due to that EGL contains oils (1, 8 cineole or eucalyptol), which reported by Chalchat

(1995), release in the milk and this oils improve lamb performance through their antibacterial activities, so that, Hmamouchi *et al.* (1992) indicated that oil of EGL has antibacterial activities against 9 microorganisms (including salmonella type, *Klebsiella spp, Streptococcus A, Proteus spp, Staphylococcus aureus*). Also, Medina *et al.* (1992 and 2001) found some antibacterial activities of Eucalyptus species against *Escherichia coil.* Moreover, Juergens *et al.* (2003) reported that 1, 8 cineol (eucalyptol) acts as an anti- inflammatory in bronchial asthma. Also, we can suggest another suggestion for improvement in weaning weight of lambs, that EGL improve rumen digestion for ewes and increase nutrient digestibility (Saleh and El Ashry 2007) and increase milk yield which reflect on performance of lambs.

Saleh, (2004) found that mean weight of lambs at weaning (at 60 days) was 14.4 kg when fed their dams (Barki ewes) on 900 g CFM, 2kg berseem and 250g rice straw without any feed additives and increased by 3.3 and 7.6% by adding 20 and 40 g/h/day fenugreek seeds, respectively.

2- Milk yield and milk composition:

Data of Table (3) presents, DMI, mean milk yield, 4% FCM, feed conversion and feed efficiency. The results indicated that milk yield was non-significantly increased by 8.8% with the first supplementation level (75mg/kg LBW) and significantly decreased with others supplementation levels. Values of 4% FCM yield look the same trend as that of milk yield. It is cleared that 4% FCM production of T_2 was significantly increased ($P \leq 0.05$), by 33.3% when compared with control group, but significantly decreased ($P \geq 0.05$) with T_3 and T_4 compared to control treatment. Abou-Fotouh *et al* (2000) found that mean milk yield for Egyptian lactation buffaloes was non-significantly improved by 21.1% when fed diet supplementing with EGL compared to control group. Also, they found that 4% FCM yield was significantly increased by 18.9% compared to the control group. This improvement of milk yield may be due to increasing of nutrient digestibility and nutritive value for diet supplementing with EGL, Saleh and El Ashry (2007), El Bordeny *et al* (2006), Aboul-Fotouh *et al* (1999).

Also, data of feed conversion in table 3 when discussed as g DMI/g 4%FCM indicated that feed conversion was improved by 25.1% compared with control group with the first supplementation level from EGL (75mg/kg LBW) and decreased by 21.8 and 19.4% with the level of 100 & 125 mg /kg LBW, respectively. In addition, it could be noticed that feed efficiency improved by 33.1% with first supplementation level and tumbled with other supplementing levels. The same results were obtained by Aboul-Fotouh *et al* (2000).They found that feed conversion was improved by 19.3% for kg DMI/kg 4% FCM when feed ration supplemented with EGL to Egyptian lactating buffalos.

Results of Table (4) indicated that addition of EGL significantly increased the percentage of milk fat, crud protein, ash and total solids. It could be noticed that fat % increased significantly by 19.1, 23.1and 20.1% for T_2, T_3 and T_4 when compared to control group, respectively. This may be due to that

Table (3). Performance of Barki ewes fed rations supplemented with different levels of Eucalyptus Globules Leaves (EGL).

Item	T_1 (control)	T_2 75mg/kgLBW	T_3 100mg/kgLBW	T_4 125mg/kgLBW
No. of ewes	8	8	8	8
Weight of ewes (kg)	37.6	37.6	37.8	37.9
DMI g/h/day	1238.7	1238.7	1238.7	1238.7
DMI g/ kg $^{0.75}$	85.4	84.4	83.08	84.4
Milk yield (g/h/day)	$364.5^{a} \pm 33.05$	$396.6^{a} \pm 39.84$	$269.4^{b} \pm 31.86$	$288.6^{b} \pm 34.01$
FCM (g/h/day)	$370.0^{b} \pm 41.45$	$493.3^{a} \pm 45.26$	$304.5^{c} \pm 37.27$	$309.5^{c} \pm 31.1$
Feed conv-1	3.40	3.12	4.18	4.29
Feed conv-2	3.35	2.51	4.08	4.00
Feed efficiency-3	0.299	0.398	0.245	0.250

FCM =Fat corrected milk (4%), Feed conv-1 = Feed conversion as g DMI / g milk yield, Feed conv-2 = Feed conversion as g DMI / g FCM, Feed efficiency -3 = Feed efficiency as on 4% FCM

Means in the same row having different superscripts per each item differ significantly ($p<0.05$)

Table (4). Chemical composition of milk produced by ewes fed ration supplemented with different levels of Eucalyptus Globules Leaves (EGL).

Item	T_1 (control)	T_2 75mg/kgLBW	T_3 100mg/kgLBW	T_4 125mg/kgLBW
Fat %	$3.99^{b} \pm 0.26$	$4.75^{a} \pm 0.21$	$4.91^{a} \pm 0.23$	$4.79^{a} \pm 0.32$
CP%	$4.07^{c} \pm 0.05$	$4.55^{b} \pm 0.07$	$4.72^{a} \pm 0.08$	$4.46^{b} \pm 0.09$
Ash%	$0.83^{b} \pm 0.01$	$0.88^{a} \pm 0.02$	$0.89^{a} \pm 0.02$	$0.87^{a} \pm 0.03$
T.S %	$15.23^{b} \pm 0.38$	$17.05^{a} \pm 0.28$	$17.10^{a} \pm 0.32$	$17.0^{a} \pm 0.26$
Lactose%	6.35 ± 0.32	6.88 ± 0.21	$6.59 \pm .21$	6.90 ± 0.32

Means in the same row having different superscripts per each item differ significantly ($p<0.05$)

increasing EGL in the rumen increased acetic acid production which responsible for increasing fat % in milk.

Also, Table (4) showed that percentage of crude protein was significantly increased by 11.8, 16.0 and 9.6%, for T2, T3 and T4 when compared with the control group. This may be due to that adding of EGL increased crude protein digestibility and increased total protein and albumin in blood serum (Saleh and El Ashry 2007). Moreover, Bush (1991) found a positive correlation between plasma total proteins and albumin and protein absorbed and synthesized. Also, Aboul-Fotouh *et al* (2000) found that fat yield as g/d was significantly increased by 17.9% and protein yield increased by 27.2% for Egyptian lactating buffaloes when feed ration supplemented with EGL. Also, Table (4) showed also, that milk ash was significantly increased by 6.0, 7.2 and 11.6% whereas total solids significantly increased by 12.0, 12.3 and 11.6% for T2, T3 and T4, respectively, when compared with the control group ($P \leq 0.05$). These results are comparable with the results of average daily again (ADG) of lambs.

The body weight of ewes during lactation are illustrated in Table (5). The results indicated no significant difference between weight of ewes among the different experimental group during lactation , but weight of ewes at 60 days post-partum which fed on ration supplemented with EGL were greater than weight of ewes fed on control ration.

3- Blood serum parameters:

Data of Table (6) showed that serum total protein were significantly higher ($p \leq 0.05$) for all supplemented treatment. Also, results indicated that serum total protein, albumin and globulin were the highest at 100mg/kg LBW. These results are comparable with the results of milk composition which cleared that ewes fed on EGL produce milk contain high protein percentage. Moreover these results are in agreement with those reported by Saleh and El Ashry (2007) and Hekal, *et al* (2005). Who reported that addition of EGL to ruminant ration increased serum total protein and albumin. Results cleared also that A/G ratio was gradually decreased by increasing level of EGL and the differences between control treatment and experimental treatments were significant($p \leq 0.05$) but, the differences between experimental treatments were not significant ($p \geq 0.05$).

Values of GOT enzymes (Table, 6) was not significantly different by adding EGL, whereas, the enzymes of GPT were significantly increased with levels of 100 and 125 mg/kg LBW but the different between T_1 and T_2 were not significant ($p \geq 0.05$). Also , results of blood urea were not significantly different between T_2 and T_3 compared with control group, whereas, the levels of blood urea was significantly decreased with treatment of T_4 (high level of EGL) and all these levels of blood urea are in agreement with the results reported by Saleh (2004) on lactating ewes.

In addition Table (6) showed that Triiodo thyronine was not significantly increased by adding EGL for lactating ewes for T2 and T3. Also, Saleh and El Ashry (2007) and Abu-Taleb, *et al.* (2003) found that the addition of

Table (5). Live body weight of ewes during lactation period (kg).

Period of lactation	T_1 (Control)	T_2 75mg/kgLBW	T_3 100mg/kgLBW	T_4 125mg/kgLBW
weight at lambing*	37.6	37.6	37.8	37.9
15 days	36.2	37.1	36.6	38.1
30 days	35.4	35.4	37.5	36.4
45 days	34.8	35.3	36.6	36.6
60 days	35.0	36.0	35.9	36.6
Weight at 60days as % of weight at lambing	94.1	96.7	94.9	96.8

*weight at lambing means weight of ewe directly after lambing

Table (6). Effect of feeding ration supplemented with different levels of *Eucalyptus globules* leaves (EGL) on some blood parameters of ewes during late pregnancy and lactation.

Item	T_1 (Control)	T_2 75mg/kg LBW	T_3 100mg/kg LBW	T_4 125mg/kg LBW	±SE
Total protein (g/dl)	9.30^{b}	9.52^{ab}	10.13^{a}	9.98^{a}	0.22
Albumin (g/dl)	4.66	4.65	4.83	4.74.	0.06
Globulin (g/dl)	4.65	4.87	5.30	5.24	0.22
A/G ratio	1.18^{a}	1.05^{ab}	1.04^{ab}	0.98^{b}	0.06
GOT (U/l)	48.03	49.64	49.46	55.56	5.44
GPT (U/l)	10.91^{b}	10.35^{b}	12.08^{a}	12.70^{a}	0.27
Urea (mg/dl)	29.28^{a}	28.50^{a}	30.10^{a}	22.63^{b}	1.36
T3 (ng/dl)	85.44	91.22	91.11	84.44	5.26

Means in the same row having different superscripts per each item differ significantly ($p<0.05$)

Table (7). Some blood parameters for ewes during late pregnancy and lactation (means ±SE).

Item	gestation	lactation			
	Last 2 week	2 week	4 week	6week	8week
Total protein (g/dl)	9.24 ±0.34	9.54 ± 0.27	9.74 ±0.28	9.90 ± 0.24	10.20 ± 0.24
Albumin (g/dl)	4.69 ± 0.10	4.90 ±0.10	4.78 ±0.08	4.55 ± 0.08	4.69 ± 0.09
Globulin (g/dl)	4.40 ± 0.32	4.48 ± 0.27	4.81 ± 0.26	5.19 ± 0.28	5.36 ± 0.29
A/G ratio	1.19^{a} ±0.10	1.19^{a} ± 0.10	1.02^{ab} ± 0.05	0.95^{b} ± 0.07	0.93^{b} ± 0.07
GOT (U/l)	71.07 ± 18.77	64.05 ± 14.88	66.99 ± 18.17	69.45 ± 16.15	66.28 ± 16.65
GPT (U/l)	11.30 ± 0.27	11.86 ± 0.39	11.87 ± 0.46	11.17 ±0.51	11.34 ± 0.44
Urea (mg/dl)	24.57 ± 2.27	26.65 ± 2.0	28.93 ± 2.34	28.65 ±1.50	26.51 ± 1.73
T3 (ng/dl)	138.8^{a} ± 11.5	85.8^{b} ± 11.3	83.9^{b} ± 6.5	70.7^{b} ± 7.1	61.5^{b} ± 6.2

Means in the same row having different superscripts per each item differ significantly ($p<0.05$)

camphor leaves to the diet of male lambs and Japanese quails, respectively increased Triiodo thyromine activity in blood serum.

Also Table (7) showed some blood parameters of ewes during late pregnancy and lactation. The results indicated that serum total protein and albumin were higher in lactation period than in late gestation period. But the parameter of A/G ratio was significantly higher in late gestation and first two weeks of lactation period than late lactation periods. These results are comparable with those reported by Saleh (2005). Moreover, Triiodo thyronine was significantly higher ($P>0.05$) in late gestation than lactation period. Also, this result is in agreement with that reported by Saleh (2005). He reported that Triiodothyroniine was 2.68 ng/ml during late pregnancy and 1.65ng/ml during lactation .On the other hand the GOT, GPT and blood urea were not significantly different before and after lambing.

CONCLUSION

From the previous results it could be concluded that supplementing lactating ewes ration with 75mg/kg LBW EGL increased 4% fat corrected milk by 33.3%, milk fat %, total solid % and crude protein %. Also, addition of EGL improved weight of lambs at weaning by 23.2% which led to early weaning and reflecting on lambing interval. Moreover, supplementation of EGL improves fed conversion by 25.1% for milk production.

Further studies are required to investigate the effect of EGL supplements on:

- Rumen microbial protein synthesis.
- Estrus cycle during lactation period.
- Sterility of rams and semen evaluation.

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اثر اضافة اوراق الكافور لعلائق النعاج خلال مرحلتى الحمل وادرار الحليب

هشام منير صالح

قسم التطبيقات البيولوجية، مركز البحوث النووية، هيئة الطاقة الذرية، مصر

استخدم فى هذه الدراسة اثنين وثلاثون نعجة برقى فى المرحلة الاخيرة من الحمل (آخر ٤-٦ اسابيع من الحمل)مابين موسم ثانى وثالث ووزعت عشوانيا الى اربع مجموعات المجموعة الأولى (الشاهد) غذيت على عليقة تتكون من ٧٠٠جم علف مركز و٢كجم برسيم و ٢٥٠ جم تبن قمح/راس/يوم فى حين غذيت المجاميع الثانية والثالثة والرابعة على نفس العليقة الخاصة بالمجموعة الأولى مضافا اليها ٧٥ او ١٠٠ او ١٢٥ مجم اوراق كافور / كجم وزن حى على الترتيب.

اظهرت النتائج الخاصة بالاداء الانتاجى للحملان ان الزيادة فى الوزن ومعدل الزيادة اليومى تحسن معنويا باضافة اوراق الكافور لعليقة النعاج وذلك مع مستوى الاضافة المنخفض فى حين ان الفروق بين مستوى الاضافة المتوسط والعالى والمجموعة الشاهد لم تكن معنوية

ايضا اظهرت نتائج تحاليل اللبن ان انتاج اللبن المعدل ٤% دهن قد زاد معنويا مع مستوى الاضافة المنخفض من اوراق الكافور فى حين انخفض معنويا مع مستوى الاضافى المتوسط والعالى مقارنة بالمجموعة الشاهد ايضا الكفاءة الغذائية تحسنت بنسبة ٢٥% مع مستوى الاضافة المنخفض (٧٥مجم/كجم وزن حى) مقارنة بالمجموعة الشاهد. كذلك اتضح من نتائج تحاليل اللبن ان اضافة اوراق الكافور قد رفعت معنويا نسبة كل من الدهن والبروتين والرماد و المواد الصلبة الكلية.

كذلك اظهرت نتائج تحاليل سيرم الدم ان اضافة اوراق الكافور قد زادت معنويا بروتينات سيرم الدم فى حين ان الفروق بين المجموعة الشاهد ومجموعة مستوى الاضافة المنخفض لم تكن معنويا كذلك زاد البيومين وجلوبيولين سيرم الدم زيادة غير معنوية باضافة اوراق الكافور ايضا نشاط انزيمات الكبد GPT زاد معنويا مع مستوى الاضافة المتوسط والعالى مقارنة بمجموعة مستوى الاضافة المنخفض والمجموعة الشاهد التى لم تكن بينهما فروق معنوية كذلك بالنسبة لتركيز يوريا الدم والنسبة بين الألبيومين والجلوبيولين قد انخفضا معنويا مع مستوى الاضافة العالى فى حين ان الفروق بين المجاميع الثلاثة الاخرى لم تكن معنوية. هذا فى حين ان اضافة اوراق الكافور الى عليقة النعاج لم يؤثر معنويا على نشاط هرمون الغدة الدرقية ثلاثى اليود والذى تم تقديرة باستخدام طرق المناعة الاشعاعية. كذلك وجد ان بروتينات سيرم الدم وكذلك الالبيومين والجلوبيولين قد زاد فى مرحلة انتاج اللبن عن المرحلة الاخيرة من الحمل وعلى العكس فقد وجد ان نشاط هرمون الغدة الدرقية ثلاثى اليود قد زاد معنويا خلال المرحلة الأخيرة من الحمل عن مرحلة انتاج اللبن.