Egyptian Journal of Sheep & Goat Sciences, Vol. 18, No.1, P: 5-20, April 2023

Studying the effect of antioxidants (Origanum Vulgare and N-Acetylcysteine) administration on productive and reproductive performance of Damascus goats and their offspring.

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ABSTRACT

Thirty Damascus does aged 1.5-2 years and weighed 46.9±1.64 kg were used to define the influence of Origanum Vulgare oil or N-acetyl cysteine supplementation on reproductive performance, milk yield and composition, growth performance in addition to changes in some blood metabolites during late pregnancy and suckling periods of Damascus does. Does were randomly divided into three equal groups (10 each) and‹fed basal ration according to **NRC (1981)**. The first group, acted as control (G1), received a basal diet made up of 60% concentrate feed mixture (CFM), 20% berseem hay, and 20% rice straw. While the second (G2) and third (G3) groups consumed the same basic ration and supplemented daily with Origanum vulgare oil (OV oil) at a level of 1m. / kg concentrate (G2) and 0.3 gm / kg live body weight of N-acetyl-cysteine (NAC) after being dissolved in 200 ml of water and administered once daily for seven consecutive days during pregnancy and the same period after birth (Start before the first day of breastfeeding) (G3).

Results indicated that both treated groups, during late pregnancy and suckling periods, showed improve in fecundity, prolificacy, kids born per does joined, kids born or weaned per does kidded and kg born and weaned per doe kidded, taking in consideration that the flock have history of high mortality rates and still birth which indicated in the values presented for the control group. The high mortality rate of control group (30%) efficiently reduced by NAC (6.67%) while lightly reduced by OV oil (22.22%).

Daily milk yield of both treated groups were significantly higher than control group (G1). Fat, protein and lactose percentages for both treated groups also were significantly (P≤0.05) higher compared to the control group.

Either Origanum Vulgare oil or N-acetyl cysteine supplement led to a significant increase in weaning weights, daily gain and total gain of kids, while birth weight value does not show any differences between treatments. The best weights occurred with N-acetyl cysteine.

Origanum Vulgare oil or N-acetyl cysteine significantly (P<0.05) increased glucose, ALT and Vit C, while, the concentration of urea and AST significantly (P<0.05) decreased as result of Origanum Vulgare oil or N-acetyl cysteine treatment during late pregnancy and lactation periods as compared to the control does.

***Keywords**: Goats, Origanum Vulgare oil , N-acetyl cysteine, , reproductive performance, milk yield , growth performance and blood metabolites.*

INTRODUCTION

Origanum Vulgare oil are a mixture of several compounds of herbal origin that can be used for animal feeding to improve performance and health (**Roofchaee *et al*. 2011**). Origanum Vulgare oil when used in the diet may exert antioxidant property since it has two important phenol compounds, corresponding to 78-85% of the oil composition, i.e., carvacrol (2-methyl-5-isopropyiphenol) and thymol (2-isopropyl-5-methylphenol) (**Basmacioglu Malayoğlu *et al*. 2010**). According to **Botsoglou *et al*. (2002),** these compounds enter the circulatory system, thus distributed to muscles and other tissues. Moreover, this oil possesses antimicrobial activity, acting in the reduction of undesirable intestinal microflora, which favors the absorption of nutrients (**Bampidis *et al*. 2005**).

Origanum Vulgare oil can act as stimulant agent of the immune system during acute or chronic Inflammatory processes that characterize by an increase of the levels of serum globulins (**Rosa Neto and Carvalho 2009**), which can express the metabolic and nutritional status of the animal (**Zhu *et al*. 2014**). Moreover, essential oils may improve nutrient digestion and absorption by enzymatic stimulation. It is important to emphasize that the response of essential oils as supplements added in the feed depends on the level, composition, and the 44 combination of their compounds (**Zhang et al. 2005**).

N-acetyl cysteine is the acetylated variant of the amino acid L-cysteine. It is an excellent source of sulfhydryl groups. N-acetyl cysteine (NAC), a safe and cheap drug available in the market many years ago as mucolytic agent, have a role on infertility management (**Yildiz *et al*. 2012**). It is primarily a powerful antioxidant; it has activity on insulin secretion in pancreatic cells and on insulin receptors on animal's erythrocytes. NAC has antiapoptotic effects; it can preserve vascular integrity and has immunological functions (**Badawy *et al*. 2006**). NAC has multiple biological effects, two of them are potentially and directly related to the improved pregnancy rate. In recent years, a limited number of studies has shown the possible benefits of NAC administration on improving insulin sensitivity and better induction of ovulation outcomes in patients with polycystic ovary syndrome (**Fulghesu *et al*. 2002 and Rizk *et al.* 2005**)

Recently, a study had shown that NAC administration could improve antioxidant status and reproduction performance under heat stress condition (**Omid *et al*. 2018**). Therefore, NAC is a potentially effective treatment for various pregnancy complications, such as recurrent pregnancy loss (**Amin *et al*. 2008**). Maternal dietary NAC supplementation may improve the pregnancy outcomes of goats by enhancing oxidation resistance and anti- inflammation activity (**Jinhong *et al.* 2021).**

MATERIALS AND METHODS

The present study conducted at El-Gemmaiza Experimental Station, Animal Production Research Institute, Agriculture Research Center, Egypt. The work aimed to define the effects of Origanum Vulgare and N-Acetylcysteine administration on reproductive performance, milk yield and composition and growth performance during late pregnancy and lactation periods for Damascus does.

Thirty healthy Damascus does weighing 46.9 ±1.64 kg and aged 1.5–2.00 years were employed and devided to three groups (10 each). The first group, acted as control (G1), received a basal diet made up of 60% concentrate feed mixture (CFM), 20% berseem hay, and 20% rice straw. While the second (G2) and third (G3) groups consumed the same basic ration and supplemented daily with Origanum vulgare oil (OV oil) at a level of 1m. / kg concentrate or 0.3 gm. / kg/ live body weight of N-acetyl-cysteine (NAC) after being dissolved in 200 ml water and administered once daily for seven consecutive days during pregnancy and the same period after birth (Start before the first day of breastfeeding) (G3). Composite feedstuffs samples were taken and stored for proximate analysis according to A.O.A.C (2000). The chemical composition of ingredients and experimental diets are presented in Table 1.

Animals housed in semi open sheds under natural daylight condition and fed allowances according to **NRC (1981)** recommended for dairy goats. The does allowed drinking clean fresh water *ad lib*. Vitamins and minerals blocks were available all the time to does.

Table 1: Chemical composition of feed ingredients of the experimental rations

Item	Concentrate feed mixture (CFM)*	Berseem hay	Rice straw
DM	89.61	90.22	88.11
OM	19.85	84.67	82.11
CP	15.41	14.25	2.35
CF	12.85	26.61	37.82
EE	3.22	1.11	0.91
NFE	60.37	42.70	41.03
ASh	8.15	15.33	17.89

*CFM; concentrate feed mix contained in percentage ; 37% yellow corn , 30% undecorticated cottonseed , 20% wheat bran, 6.5% rice bran, 3% molasses , 2.5 limestone, 1% common salt.

The reproductive traits recorded for does including; does kidded birth alive /tested pregnant does (%); fecundity (percentage of kids born/does joined); prolificacy (percentage of kids born/does kidded); percentage of kids weaned/does kidded; kilograms of kids born/does kidded; Kilograms of kids weaned/does kidded; mortality rate and finally percentage of dead kids from birth to weaning.

Daily milk yield for each doe measured individually by suckling kids. The measure applied biweekly for one day, twice (every 12 h), starting from the seventh day of parturition throughout the following 12 weeks until weaning. The kids separated from their dams at 16:00 pm before the day of measurement. Kids weighed immediately before and after suckling and hand milked to measure residual milk in the udder. The differences between kid's weights before and after suckling and residual milk denote the produced milk. Milk samples collected during milking and stored at -20 °C for analysis. Fat and protein contents were determined according to **A.O.A.C. (2000).** Lactose content **(Barnett and Abd El-Tawab, 1957).**

Blood samples were collected from 5 does of each group monthly during last month of pregnancy and from kidding to weaning (suckling period). Blood samples were collected from jugular vein puncture using heparinized vacutainer tubes just at morning before feeding and drinking then immediately centrifuged at 4000 rpm for 15 minutes. Blood plasma were obtained and stored at -20 °C until analysis for aspartate amino transferase (AST), alanine amino transferase (ALT) enzyme activities according to **Reitman and Frankel (1957)**, glucose, cholesterol, urea (**Henry, 1965),** total lipids in serum was determined by the absorption spectrophotometer **(Kaneko, 1989).** Vitamin C analyzed by using method of 2,4-dinitrophenylhydrazine **(Tietz, 1994).** The absorbance of all tubes were red at 520 nm via spectrophotometer. Vitamin C concentration expressed as mg/dL plasma.

.Data were statistically analyzed using analysis of variance procedure described by **SPSS (2012)** computer program using the following fixed model:-

$$Y_{ij} = \mu + T_i + e_{ij}$$

Where: Yij = the observation. μ = Overall mean. Ti = Effect of the treatments. eij = Random error component assumed to be normally distributed.

Significant differences among treatments were tested by Duncan,s Multiple Range Test **(Duncan, 1955).**

RESULTS AND DISCUSSION

Reproductive performance:

Data in Table (2) clearly indicate that dietary supplementation of Origanum Vulgare oil

(OV) and N-Acetylcysteine (NAC) during late pregnancy and suckling periods improved fecundity, prolificacy, kids born per does joined, kids born or weaned per does kidded and kg born and weaned per doe kidded. The high mortality rate of control group (30%) efficiently reduced by NAC (6.67%) while lightly reduced by OV oil (22.22%).

These results conform with **Jinhong *et al*. (2021)**; **Kaibin Fu *et a*l (2022) and Luo *et al* (2021)** who found that NAC administration during pregnancy increased significantly the number of kids born than that in control. This observation suggested that dietary NAC supplementation exerted a beneficial effect on the survival of goat embryos at the early pregnancy stage. (**Jinhong *et al*., 2021)**.

The kilograms of kids born or weaned per does joined or does kidded were the highest ($P \leq 0.05$) in group supplemented with NAC followed by OV oil supplemented group then the control group. These results are in agreement with the obtained results by **Ashour *et al.* (2018).** The results showed that supplement of NAC or OV oil increased milk yield than control (Table, 6). The increased milk yield of does is an important factor for the production of robust kids at weaning (**Helal and Abdel-Rahman, 2010)**. These results might be due to that NAC and OV oil administration influence the glucose metabolism. Glucose is the most important energy source for the fetus.

Table (2): Reproductive performance of Damascus goats as affected by antioxidant administrations during late pregnancy and lactation periods.

	Treatments		
Items	**Control (G1)**	**OV (G2)**	**NAC (G3)**
Number of pregnant does used	10	10	10
Does kidded birth alive/ Pregnant does (%)	80 [a]	70 [a]	100 [a]
Fecundity, Kids born / doe joined (%)	100 [ab]	90 [b]	150 [a]
Prolificacy, Kids born / doe kidded	10 (1.25) [a]	9 (1.29) [a]	15 (1.50) [a]
Number of alive kids at weaning	7	7	14
Kids weaned /does kidded, (%)	87.50 [b]	77.78 [b]	140.00 [a]
Kg. of kids born per each doe kidded	4.06 [a] ± 0.55	4.00 [a] ± 0.57	4.60 [a] ± 0.48
Kg. of kids weaned per each doe kidded	13.12 [c] ± 1.94	22.00 [b] ± 0.62	27.30 [a] ± 1.21
Mortality rate of kids from birth to weaning %	30	22.22	6.67

[a,b] : values in the same row bearing different superscripts significantly differed ($P<0.05$)

The raise in blood glucose levels might due to increase secretion of IGF-1, which provide a hypothetical explanation for the improved intrauterine fetal development that led to higher kids weights at birth (**Musser *et al*., 1999).** NAC plays an important role on intrauterine membrane growth because NAC administration improve insulin sensitivity (**Fulghesu *et al*. 2002 and Rizk *et al.* 2005)**. It likely has a growth hormone-like action that affects intrauterine embryonic nutrition, stimulation and oxidation of glucose (**Pirestani and Aghakhani, 2017**).

***Milk yield and composition*:**

Many factors can affect milk yield including breed of goats, twining rate, feeding level and parity of does (**Latif *et al*, 1988).**

Daily milk yield during suckling period (12 weeks) are shown in Table (3). Daily milk yield (gram/head/day) increased gradually to reach the peak at the third and fourth weeks after parturition. Treated groups had significant (P<0.05) more daily milk yield than control group (Table 3). OV oil administration produced more milk (1088.96 ± 64.29 g/d) than NAC (1034.33±57.38 g/d), but difference was not

Table (3): Average of daily milk yield (g/h/d) of Damascus does during first 12 weeks of lactation as affected by antioxidant administrations.

Period	**Treatments**			
Milk yield, g/h/d	**Control (G1)**	**OV oil (G2)**	**NAC (G3)**	**Overall mean**
First week	642.00 ± 186.87	1309.50 ± 227.24	1090.00 ± 242.88	$1013.83^{ab} \pm 218.99$
2weeks	1281.00 ± 276.50	1510.00 ± 232.74	1374.00 ± 265.01	$1388.00^{a} \pm 258.08$
3weeks	1442.00 ± 242.55	1617.00 ± 243.66	1380.00 ± 261.38	$1479.00^{a} \pm 249.20$
4 weeks	1054.00 ± 276.86	1470.00 ± 198.82	1283.00 ± 181.33	$1269.00^{a} \pm 219.00$
5 weeks	1034.00 ± 265.78	1456.00 ± 171.79	1258.00 ± 218.39	$1249.00^{a} \pm 218.65$
6 weeks	978.00 ± 244.83	1454.00 ± 215.86	1245.00 ± 166.84	$1225.67^{a} \pm 209.18$
7 weeks	952.00 ± 259.20	1043.00 ± 230.33	1165.00 ± 196.03	$1053.33^{a} \pm 228.52$
8 weeks	920.00 ± 326.13	936.00 ± 167.83	1106.00 ± 204.76	$987.33^{b} \pm 232.91$
9 weeks	758.00 ± 212.14	874.00 ± 199.80	732.00 ± 49.37	$788.00^{bc} \pm 153.77$
10 weeks	710.00 ± 71.75	484.00 ± 87.27	534.00 ± 72.23	$576.00^{c} \pm 77.08$
11 weeks	530.00 ± 35.93	448.00 ± 52.34	586.00 ± 36.03	$521.33^{c} \pm 41.43$
12weeks	620.00 ± 34.31	466.00 ± 62.74	659.00 ± 36.34	$581.67^{c} \pm 44.46$
Overall mean	$910.08^{B} \pm 65.92$	$1088.96^{A} \pm 64.29$	$1034.33^{AB} \pm 57.38$	

$^{a;b\ and\ c}$: values in the same column bearing different superscripts significantly differed (P<0.05)

$^{A,\ B}$: values in the same row bearing different superscripts significantly differed (P<0.05).

significant. These results are in correspondence with the results obtained by **Abu El Ella *et al.* (2017).**

Actual and 4% FCM yield for Damascus does (Table 4) was significantly (P≤0.05) higher in OV followed by NAC while lower in control group. The increase of milk yield and FCM were 19.65, 13.65% and 28.13, 5.06 %, respectively for OV oil and NAC. **Abd EL Tawab *et al.* (2022)** found that the increasing milk yield and FCM with OV oil administration to goat diets enhanced milk efficiency. Also, the improve in the nutrients digestibility and ruminal fermentation with OV oil supplementation is the major reasons for higher milk yield, and FCM. **Rigout et al.** (2003) reported that increasing milk yield may be due to increased milk lactose content which improves milk production, the active compounds found in the OV oil could enhance ruminal fermentation processes, and increase performance of goat production. Similar result obtained by **Bodas, *et al*. (2012) and Salem *et al*. (2014).**

These results are in agreement with **Kung *et al*. (2008)** and **Chiofalo *et al*. (2010)** who observed that essential oils increased milk yield. Also, **Mousa et al. (2022)** found that groups fed diets supplemented with essential oils (oregano, garlic or clove oils) recorded significantly (P<0.05) higher actual daily milk yield and 4% fat corrected milk compared with the control. While, **Hristov *et al*. (2012)** noted that milk production not affected by feeding different levels of Origanum vulgare to lactating dairy cows with decreased DMI and increased feed efficiency. **Simitzis *et al*. (2007)** reported that milk production not affected significantly by oregano essential oil supplementation in lactating dairy cows. Moreover, **Tassoul and Shaver (2009)** found that milk efficiency increased by using essential oils in dairy cattle diets. On other hand, the increased milk yield in treated groups could attribute to increase of the litter size and litter weight that shown previously (Table 2), in comparison to those in control group. The litter size and litter weight are the main factors affect milk yield in goats (**Abu El Ella *et al*. 2017) and in rabbit (Ashour *et al*., 2018).** Moreover, the significant increase in milk yield due to OV oil or NAC supplementation may resulted from increasing body weight of does and/or increase of prolactin level.

Table (4): Daily milk yield, 4% fat corrected milk (FCM) and milk composition of Damascus does as affected by some antioxidant administration.

Items	Treatments		
	Control (G1)	**OV oil (G2)**	**NAC (G3)**
Average body weight (kg)	46.8	47.1	46.8
Yield (g/ h/d)			
Milk	$910.08^{b} \pm 65.92$	$1088.96^{a} \pm 64.29$	$1034.33^{ab} \pm 57.38$
FCM 4%	$1178.19^{b} \pm 100.88$	$1509.66^{a} \pm 100.99$	$1237.84^{ab} \pm 82.65$
Fat	$35.04^{c} \pm 4.13$	$49.98^{a} \pm 4.27$	$43.13^{b} \pm 4.71$
Protein	$34.31^{b} \pm 4.26$	$43.56^{a} \pm 3.93$	$38.47^{b} \pm 4.65$
Lactose	$42.14^{b} \pm 3.60$	$51.62^{a} \pm 3.20$	$48.20^{ab} \pm 3.63$
Composition (%)			
Fat	$3.85^{c} \pm 0.07$	$4.59^{a} \pm 0.06$	$4.17^{b} \pm 0.07$
Protein	$3.72^{b} \pm 0.07$	$4.00^{a} \pm 0.07$	$3.77^{b} \pm 0.08$
Lactose, %	$4.63^{a} \pm 0.05$	$4.74^{a} \pm 0.04$	$4.66^{a} \pm 0.05$

a, b and c,: values in the same row bearing different superscripts significantly differed (P<0.05)

Milk composition of Damascus does presented in Table (4). Results indicate that fat and protein percentages increased significantly (P≤0.05) in treated groups than control. Meanwhile, G2 (VO oil) had significantly higher (P≤0.05) contents of fat and protein (4.59 and 4.00%) than G3 (NAC) (4.17 and 3.77%), respectively. While, lactose percentage was nearly similar among groups as the effect of OV oil or NAC supplementation was not significant. The improved milk composition of Damascus does might due to improve the udder heath. Similar result obtained by **Abo El-Nor *et al*. (2007)**. The improved milk composition resulted from supplementing OV oil mightattributed to maintain of the gross energy losing by gas formation, that lead to provide higher net energy for milk production and increases the fat % specially UFA **(El-Sherbiny *et al*., 2016).** In addition, **El-Essawy *et al.* (2021)** found that fat yield (g/d) and fat content (g/kg) were higher (P < 0.05) with supplement of essential oil to lactating Shami goat's diet. **Lei *et al*., *(*2019**) reported multiple effects of dietary supplement with essential oil on rumen microbiota, where essential oil could make better feed efficiency and nutrient utilization by ruminants. Essential oil can also decrease protein degradation in the rumen. (**Ratika and James Singh, 2018)**. Essential oil may also influence the rumen degradation and metabolism of proteins by reducing the deamination reactions of amino acids, thus lower rumen ammonia production. In this meaning, essential oil could prevent the increase of ammonia-producing bacteria, responsible about these reactions.

These results are in agreements with **EL-Saadany et al. (2008) who** reported that the milk fat percentage of Zaraibi goats increased progressively (P< 0.05) during lactation stage. **Simitzis *et al*. (2007)** found that oregano essential oil supplementation improved (P< 0.05) milk protein percentage in lactating ewes after one month of constant nutrition with examined diet. On the hand, **Simitzis *et al*. (2007)** found that milk fat percentage was not affected significantly by oregano essential oil supplementation. **EL-Saadany et al. (2008)** observed that the percentages of protein and lactose percentages in milk not affected significantly (P< 0.05) by using Oregano oil administration.

Yields of different milk components had the same trends of their levels. Similar resulted obtained by **El-Ghandour *et al.* (2017)**. Milk fat content depends mainly upon animal's genetic, dietary feed and animal environmental factors. Furthermore, the ruminal acetate/propionate ratio plays an important role on milk fat synthesis **(Benchaaret al. 2007)** and (**Agarwal et al. 2009)**. Feeding OV oil produced milk with higher lactose content. Also, the ruminal propionate plays a fundamental role on lactose synthesis as a gluconeogenesis precursor, which affects milk lactose content (**Kholif *et al*. 2017**). The observed increase in milk protein yield in treated groups might attributed to elevation in the supply of OV oil and NAC administration to the mammary gland, to form milk protein. Similar result obtained by **Mepham, (1982) and Gabr, (2012)**. Although, some scientists showed that dietary of essential oil had no significancy effect on milk production and composition (**Benchaar *et al.* 2006**).

Growth performance:

Data in Table (5) show higher values (P<0.05) of weaning weight, daily gain and total gain of kids born from does supplemented with OV oil or NAC compared with control group, while birth weight value had no differences among groups. These results agree with results reported by **Abeer *et al.* (2019)** who observed that the lamb birth weight not affected by EO administration (P>0.05). Supplementation with EO in the current research has positive effect (P<0.001) on overall BW changes of lambs until weaning. The greatest increase in treated groups attributed mainly to the higher milk yield than the control group (Table, 3 and 4). This result may be due to the higher milk yield and contents of total solid, total protein and milk fat, which is in consistency with results of **Shakweer *et al*. (2005)** and **Zeedan *et al*. (2014).** On the other hand, this effect might be due to higher milk yield and an increase in transfer of energy and nutrients from doe to the kids through milk (**Ramanua *et al*., 2004**).

Table (5): Growth performance of Damascus kids under the effect of some antioxidant administration.

Items	Treatments		
	Control (G1)	**Origanum Vulgare (G2)**	**NAC (G3)**
Birth weight (kg)	**3.25** ^{a} ± 0.13	**3.11** ^{a} ± 0.18	**3.07** ^{a} ± 0.08
Weaning weight (kg)	**15.00** ^{c} ± 0.62	**22.00** ^{b} ± 0.62	**25.93** ^{a} ± 0.95
Total gain (kg)	**11.14** ^{c} ± 0.63	**18.71** ^{b} ± 0.75	**22.86** ^{a} ± 0.99
Daily gain (g)	**123.81** ^{c} ± 7.04	**207.93** ^{b} ± 8.30	**253.97** ^{a} ± 11.05

a, b and c,: values in the same row bearing different superscripts significantly differed (P<0.05)

Blood plasma metabolites:

The renal function, principally represented by urea-N concentration during late pregnancy and lactation periods significantly effected by OV oil and ANC treatments compared to the control group (Table 6). It can be observed that the concentration of urea-N significantly (P<0.05) decreased as results of NAC (G3) followed OV oil (G2) treatments compared to control group (G1). This may because improvement of renal function may eliminate the excretion of urea-N from blood to urine in NAC group (**Ashour *et al.*, 2018)**. Concentration of urea- N in goats influenced by many factors such as; dietary protein level, feed quality and feed restriction. The NAC treatment particularly with high producer dose may has the ability to reduce the elevated level of blood urea-N. This finding agree with that of **Cam *et al*. (2008**) who reported that NAC provided protection against negative effects on performance, renal and liver damage and biochemical alterations induced by diseases. The present results agree with **Ashour *et al.* (2018)** who reported that plasma urea concentration decreased with NAC administration to rabbits compared to control. Also, **El-Essawy *et al.*, (2021)** and **Mousa *et al*., (2022)** reported that the blood urea -N was significantly decreased ($P \geq 0.05$) with lactating Shami goats fed diet supplemented with essential oil blend compared to control group. **EL-Saadany *et al*., (2008)** observed that the kidney functions presented as urea-N concentration were not negatively and significantly ($P< 0.05$) affected by supplementing OV to the diet of lactating Zaraibi goats during summer season. While disagree with **Abd EL Tawab *et al.* (2022)** who found that inclusion of marjoram essential oil in diets of Damascus goats did not affect serum urea-N levels.

The significant drop found in urea content in plasma at the end of lactation is in accordance with the study of **Abu El-Ella *et al*. (2017)** on Damascus goats and **Karaphelivan *et al*. (2007)** on Tuj ewes. These findings support the hypothesis that changes in blood urea level during lactation could depend on rate of milk synthesis (**El-Sherif and Assad 2001).** It is probably associated with the use of urea for protein synthesis with the ruminal hepatic pathway to compensate the low protein uptake during the dry period (**Yokus *et al*. 2006**). The higher levels of urea during late pregnancy could ascribed to the high thyroid activity in pregnant females, which induces an increased protein catabolism. The high requirement for energy by sheep during the second half of pregnancy led to an increase in urea level, which is evident during late pregnancy (**Antunovic *et al*., 2002).**

Plasma urea concentration is a significant indicator for dietary protein supply in both sheep and goats **(Nazifi *et al.*, 2003**). The increase in urea serum levels during lactation period, despite the late gestation, is strictly dependent on dietary intake of proteins, which is more relevant during lactation period because of the increased requirements. The requirement to protein increased more during lactation than during late pregnancy, which recognized by the higher urea serum level during lactation (**Roubies *et al*., 2006**).

The current study showed that concentration of glucose was higher ($P<0.05$) with OV oil or NAC administrations during late pregnancy and lactation periods compared to control. These results are similar to those of **Abd EL Tawab *et al.* (2022)** on Damascus does; who reported that glucose concentration was higher ($P<0.05$) with OV oil supplement than control. **Kholif *et al.* (2012).** reported that serum glucose improved ($P<0.05$) with cinnamon and garlic oils supplementation which is the precursor of glucose synthesis. While, other studies showed that dietary OV oil reduced the concentration of insulin and glucose in blood plasma, suggesting enhance of glucose tolerance (**EL-Saadany *et al*., 2008 and Shaker *et al*., 2020**). Increases in blood serum glucose concentration, with using OV oil as feed supplement, reflect the enhancement of organic matter digestibility and short chain fatty acids production. There is a positive relationship between serum glucose and milk production (**Abd EL Tawab *et al.*, 2015 *and* 2022)**. The blood glucose was significantly higher during middle and late lactation than late pregnancy (Table 6). These results may due to that large amount of blood glucose withdrawn by the mammary gland for the synthesis of milk lactose (**Nale, 2003**). These results are similar with those reported by **Abu El –Ella *et al.* (2017)** on Damascus goats**; Eman *et al*. (2014)** and **Slaninal *et al.* (1992)** on dairy cow.

Table (6): Liver and Kidney functions of Damascus does during late pregnancy and suckling periods as affected by some antioxidant administrations.

Blood components	Periods	Treatments			Overall mean
		Control (G1)	OV oil (G2)	NAC (G3)	
Urea (mg/dI)	Late month of pregnancy	$3.60^{a} \pm 0.71$	$4.38^{a} \pm 0.75$	$2.84^{a} \pm 0.03$	$3.61^{A} \pm 0.50$
	1st month of suckling	$5.72^{a} \pm 0..47$	$4.04^{b} \pm 0.28$	$3.27^{b} \pm 0.45$	$4.34^{A} \pm 0.40$
	2nd month of suckling	$5.39^{a} \pm 0.83$	$4.62^{ab} \pm 0.39$	$3.23^{b} \pm 0.08$	$4.41^{A} \pm 0.43$
	3rd month of suckling	$5.67^{a} \pm 0.17$	$3.80^{b} \pm 0.36$	$2.70^{c} \pm 0.22$	$4.06^{A.} \pm 0.25$
Effect of treatment		$5.09^{a} \pm 0.54$	$4.21^{b} \pm 0.414$	$3.01^{c} \pm 0.19$	
Glucose	Late month of pregnancy	$68.17^{a} \pm 2.60$	$68.30^{a} \pm 1.50$	$68.24^{a} \pm 3.38$	$68.24^{AB} \pm 1.31$
	1st month of suckling	$64.88^{b} \pm 0.70$	$79.76^{a} \pm 0.28$	$72.69^{ab} \pm 4.09$	$72.44^{A} \pm 2.46$
	2nd month of suckling	$56.96^{b} \pm 0.21$	$71.83^{a} \pm 2.32$	$71.59^{a} \pm 2.61$	$66.79^{B} \pm 2.66$
	3rd month of suckling	$65.61^{a} \pm 2.82$	$72.77^{a} \pm 5.61$	$66.71^{a} \pm 2.75$	$67.83^{AB} \pm 2.15$
Effect of treatment		$63.90^{b} \pm 1.58$	$73.16^{a} \pm 2.43$	$69.81^{a} \pm 3.21$	
ALT	Late month of pregnancy	$52.80^{a} \pm 1.93$	$53.25^{a} \pm 0.43$	$52.35^{a} \pm 3.26$	$52.80^{B} \pm 1.04$
	1st month of suckling	$48.65^{b} \pm 0.38$	$49.15^{b} \pm 0.20$	$58.00^{a} \pm 0.98$	$51.93^{B} \pm 1.55$
	2nd month of suckling	$58.05^{a} \pm 2.74$	$55.05^{a} \pm 2.45$	$56.25^{a} \pm 0.90$	$56.45^{A} \pm 1.18$
	3rd month of suckling	$48.85^{a} \pm 0.49$	$53.75^{a} \pm 2.57$	$53.75^{a} \pm 0.55$	$52.12^{B} \pm 1.12$
Effect of treatment		$52.09^{b} \pm 1.33$	$52.80^{ab} \pm 1.01$	$55.09^{a} \pm 1.01$	
AST	Late month of pregnancy	$59.00^{a} \pm 2.90$	$62.40^{a} \pm 0.81$	$55.60^{a} \pm 2.54$	$59.00^{B} \pm 1.50$
	1st month of suckling	$67.10^{a} \pm 3.41$	$61.80^{a} \pm 1.62$	$67.30^{a} \pm 3.29$	$65.40^{AB} \pm 1.70$
	2nd month of suckling	$82.60^{a} \pm 6.93$	$61.20^{b} \pm 1.62$	$61.70^{b} \pm 6.87$	$68.50^{A} \pm 4.54$
	3rd month of suckling	$75.00^{a} \pm 3.12$	$67.70^{a} \pm 0.06$	$65.40^{a} \pm 6.00$	$69.37^{A} \pm 2.43$
Effect of treatment		$70.92^{a} \pm 3.25$	$63.27^{b} \pm 0.94$	$62.50^{b} \pm 2.53$	

A and B: values in the same column bearing different superscripts significantly differed (P<0.05)
a, b and c : values in the same row bearing different superscripts significantly differed (P<0.05).

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It can be observed that the concentration of glucose significantly (P<0.05) increased as a result of NAC administration . In addition, the NAC administration may regulates glucose level throughout diminution of oxidative stress.

Results of blood analysis (Table 6) revealed that group G3 (NAC) recorded (P<0.05) the highest concentration of ALT followed in a decreasing order by G2 (OV oil group) and G1 (Control group) respectively during late pregnancy and lactation periods. The control group (G1) had (P<0.05) higher AST while, the lower value was recorded with NAC and OV oil treatments. The present values of these enzymes are within the normal physiological range (**Mousa *et al*., 2022 and Samira *et al*., 2016**). These findings indicate that, NAC treatment had no negative effect on liver function and assured the good health status of goats as reported by **Ashour *et al*. (2018)** in rabbits. These results agree with results reported by **EL-Saadany *et al*. (2008)** in Zaraibi goats and **Mousa *et al*. (2022)** in Shami goats**,** that the liver function represented by AST and ALT activities were significantly decreased by dietary supplement of OV oil compared to control group. On the other hand, **Abd EL Tawab *et al.* (2022)** reported observed (P > 0.05) no effects with the inclusion of OV essential oils on liver function as AST and ALT concentrations.

Supplementation with OV oil or NAC did not affect blood plasma total lipids, cholesterol, high density lipoprotein (HDL), low density lipoprotein (LDL) concentrations (P > 0.05) (Table 7). However, a significant increase (P > 0.05) in Vitamin C resulted with NAC but not with OV oil administration compared with control does. These results agree with results reported by **Jozwik *et al*. (2010).** The obtained results showed that introducing N-acetylcycteine (NAC) into the diet of lactating goats, significantly (P > 0.05) increased the level of vitamin C in goat blood serum, irrespective of the concentration of somatic cells in their milk. It means that NAC increases antioxidant capacity and may reduce production of lipid peroxidation in blood of goats. This may lead to the improvement of the quality of milk and health status of milking goats.

Table (7): Total lipids fractions and Vit C of Damascus does during late pregnancy and suckling periods as affected by some antioxidant administrations.

Blood components	Periods	Treatments			Overall mean
		Control (G1)	OV oil (G2)	NAC (G3)	
Total lipids	Late month of pregnancy	503.03^{a}±180.86	709.10^{a}±44.63	571.71^{a}±153.39	594.61 ^{A} ±75.96
	1st month of suckling	681.85^{a} ± 89.23	634.12 ^{a} ±6.57	647.73 ^{a} ± 44.32	654.56 ^{A} ± 29.68
	2nd month of suckling	704.55^{a} ± 68.21	620.45^{a} ± 6.56	601.52^{a} ±23.52	642.17 ^{A} ±26.23
	3rd month of suckling	725.00^{a} ± 95.78	627.26^{a}±26.24	607.70 ^{a} ±35.86	654.04 ^{A} ±34.74
Effect of treatment		653.61^{a} ±56.44.	647.73^{a}±15.56	630.68^{a}±118.89	
Cholesterol	Late month of pregnancy	140.44^{ab}±28.88	171.43 ^{a} ±0.41	162.50 ^{b} ±0.21	158.12 ^{A} ± 9.52
	1st month of suckling	176.43 ^{a} ±11.96	179.29 ^{a} ±4.95	164.29 ^{a} ±5.77	173.33 ^{A} ± 4.69
	2nd month of suckling	175.36 ^{a} ±8.04	170.72 ^{a} ±5.36	160.72 ^{a} ±1.60	168.93 ^{A} ± 3.56
	3rd month of suckling	174.65 ^{a} ±3.92	168.22 ^{a} ±2.27	154.65 ^{b} ±1.03	165.84 ^{A} ± 3.24
Effect of treatment		166.72 ^{a} ± 8.31	172.41 ^{a} ±2.05	160.54 ^{a} ± 1.70	
LDL lipoprotein	Late month of pregnancy	97.93 ^{a} ±2.67	101.10 ^{a} ±0.87	94.75 ^{a} ± 2.22	97.93 ^{A} ± 1.38
	1st month of suckling	114.60 ^{a} ±19.98	115.45 ^{a} ±5.23	101.70 ^{a} ± 4.45	110.58 ^{A} ± 6.49
	2nd month of suckling	108.15 ^{a} ±20.99	106.15 ^{a} ±3.72	101.00 ^{a} ±3.12	105.10 ^{A} ± 6.31
	3rd month of suckling	114.40 ^{a} ±14.61	87.50 ^{a} ±0.69	90.95 ^{a} ± 4.47	97.62 ^{A} ± 6.11
Effect of treatment		108.77 ^{a} ± 7.24	102.55 ^{a} ±3.35	97.10 ^{a} ± 2.07	
HDL lipoprotein	Late month of pregnancy	50.02 ^{a} ±2.12	50.85 ^{a} ±2.28	49.19 ^{a} ±3.83	50.02 ^{A} ± 1.44
	1st month of suckling	53.44 ^{a} ±3.18	50.54^{a} ±1.86	50.54 ^{a} ±3.18	51.51 ^{A} ± 1.48
	3rd month of suckling	46.39 ^{a} ± 0.06	49.92 ^{a}±0.30	49.44 ^{a} ±2.66	48.58 ^{A} ± 0.95
	2nd month of suckling	54.90 ^{a} ±0.42	50.02 ^{ab} ±0.96	45.56 ^{b} ±2.22	50.16 ^{A} ± 1.52
Effect of treatment		51.19 ^{a} ± 1.29	50.33 ^{a} ± 0.67	48.68 ^{a} ± 1.41	
Vit C	Late month of pregnancy	32.70 ^{a} ±4.95	23.37 ^{a} ±0.24	42.03 ^{a} ±7.93	32.70 ^{B} ± 3.81
	1st month of suckling	45.92 ^{b} ±4.26	32.60 ^{c} ±2.72	59.45 ^{a} ±1.42	45.99 ^{A} ± 4.16
	2nd month of suckling	31.78^{b} ±6.75	34.44 ^{b} ±0.95	51.66 ^{a} ±4.97	39.29 $^{A B}$ ± 3.95
	3rd month of suckling	42.84 ^{a} ±6.27	39.16 ^{a} ±4.14	48.18 ^{a} ±6.75	43.39 ^{A} ± 3.20
Effect of treatment		38.31 ^{b} ± 3.04	32.39 ^{b} ± 2.04	50.33 ^{a} ± 3.12	

$^{A\ and\ B}$ values in the same column bearing different superscripts significantly differed (P<0.05)

$^{a\ and\ b}$: values in the same row bearing different superscripts significantly differed (P<0.05).

CONCLUSION

From the present study, it could recommend that Origanum Vulgare oil or N-acetyl cysteine could added to does ration at levels 1m. / kg / concentrate and 0.3 gm. / kg / LBW, respectively, during late pregnancy and lactation periods. They succeed to improve reproductive and productive performance, milk yield and composition during the first 12 weeks of lactation, growth performance and some blood components without any adverse effects on either liver or renal function. In addition, the use of Origanum Vulgare oil or N-acetyl cysteine as an antioxidant provide effective way of controlling oxidative stress. The best results obtained by using N-acetyl cysteine (G3). More studies are required in this field to confirm such result.

REFERENCES

Abd EL Tawab A.M.; Kholif A.M.; EL-Bordeny N. E.; Elsayed M.H. and Nadia A. H. Selim (2022). Feed utilization and lactational performance of Damascus goats fed a diet supplemented with marjoram or basil essential oils. Egypt. J. Chem. Vol. 65 (5), 407-418.

Abd El Tawab A.M.; Matloup O.H.; Kholif A.M.; Abo El-Nor S.A.H.; Murad H.A.; El-Sayed H.M. and Khorshed M.M (2015). Influence of additionof tannase enzyme to reducing tannins effects in lactating goats diets. International Journal of Dairy Science, 10(1): 24-35(2015).

Abeer M. El-Essawy; Ahlam, R. Abdou1 and Marwa H. EL- Gendy (2019). Impact of Anise, Clove, and Thyme essential oils as feed supplements on the productive performance and digestion of Barki ewes. Australian J. of Basic and Applied Sci. 13 (1): 1-13.

Abo El-Nor SHA.; Khattab HM.; Al-Alamy HA.; Salem FA. And Abdou MM. (2007). Effect of some medicinal plants seed in the rations on the productive performance of lactating buffaloes. Int. J. Dairy Sci. 2: 348-355.

Abu El Ella A.A.; Hafez Y. H.; Abdel-Hafez M.A. and El-Ghandour A. A. (2017). Effect of L-carnitine and Co-enzyme Q10 treatments on immune response, productive and reproductive performance of Damascus goats and their offspring. 2- Productive, reproductive performance and some blood metabolites during late pregnancy and lactation periods. Egypt. J. of Sheep & Goat Sci., Vol. 12 (3), 87-107.

Agarwal N.; Shekhar C.; Kumar R.; Chaudhary L.C. and Kamra D.N. (2009). Effect of peppermint (Mentha piperita) oil on in vitro methanogenesis and fermentation of feed with buffalo rumen liquor. Anim. Feed Sci. Technol., 148, pp.321-327.

Amer. J. Clin. Path., 28: 57. Rizk AY.; Bedaiwy MA. and Al-Inany HG. (2005). N-acetyl-cysteine is a novel adjuvant to clomiphene citrate in clomiphene citrate-resistant patients with polycystic ovary syndrome.Fertil Steril 83:367–370.

Amin A.F.; Shaaban O.M. and Bediawy M.A. (2008). N-acetyl cysteine for treatment of recurrent unexplained pregnancy loss. Reproductive Biomedicine Online, *17*(5), 722–726.

Antunovic, Z.; Novoseleci, J.; Sauerwnin, H.; Speranda, M.; Vegar, M. and Pavic, V. (2002). Blood metabolic profile and some of hormones concentration in ewes during different physiological status. Bulgarian Journal of Agricultural Science, 17 (5) : 687-695.

AOAC, (2000). American official methods of chemical analysis, 17th ed., AOAC Int., Gaithersburg, MD, USA

Ashour, G.; Samah M. Abdel-Rahman; Morsy W.A.; Noha M. Abdel-Azeem and Safaa A. Barakat (2018). Physiological, reproductive and productive performance of rabbit does as influenced by N- acetylcysteine administration**.** Egyp J. of Rabbit Sci. 28 (1): 63-92.

Badawy A.; El Nashar AB. and El Totongy M. (2006). Clomiphene citrate plus N-acetyl cysteine versus clomiphene citrate for augmenting ovulation in the management of unexplained infertility: A randomized double-blind controlled trial. Fertil Steril.; 86:647–50.

Bampidis, VA.; Chirstodoulou, V.; Florou-Panteri, P.; Christaki, E.; Chatzopoulou, PS., Tsiligianni, T. and Spais, AB. (2005). Effect of dietary dried oregano leaves on growth performance, carcass characteristics and serum cholesterol of female early maturing turkeys. BrPoult Sci 46(5): 595-601.

Barnett, A. S. and Abdel-Tawab, G. (1957).A rapid method for determination of lactose in milk and cheese, J. Sci. Food Agric., 8:437–441.

Basmacioglu Malayoglu, H; Baysal, S.; Misirlioglu, Z.; Polat, M.; Yilmaz, H. and Turan, N. (2010). Effects of oregano essential oil with or without feed enzymes on growth performance, digestive enzyme, nutrient digestibility, lipid metabolism and immune response of broilers fed on wheat–soybean meal diets. Br Poult Sci 51(1): 67-80.

Benchaar C.; Petit H.V.; Berthiaume R.; Whyte T.D and Chouinard P.V. (2006). Effect of addition of essential oil and Monensin premix on digestion**,** ruminal fermentation milk production and milk composition in dairy cows. J. Dairy Sci., 89: 4352-4364

Benchaar C.; Petit H.V.; Berthiaume R.; Ouellet D.R.; Chiquette J. and Chouinard P.V. (2007). Effects of essential oils on digestion, ruminal fermentation, rumen microbial populations, milk production and milk composition in dairy cows fed alfalfa silageor corn silage. J. Dairy Sci., 90: 886-897.

Bodas, R.; Prieto, N.; García-González R.; Andrés S.; Giráldez F.J., and López, S. (2012) Manipulation of rumen fermentation and methane production with plant secondary metabolites. Anim. Feed Sci. Technol. 176, 78–93.

Botsoglou, NA.; Florou-Paneri, P.; Christaki, E.; Fletouris, DJ. and Spais, AB. **(2002)**. Effect of dietary oregano essential oil on performance of chickens and on iron-induced lipid oxidation of breast, thigh and abdominal fat tissues. Br Poult Sci 43(2): 223-230.

Çam, Y.; Eraslan, G.; Atasever, A.; Eren, M.; Liman, B.C. and Şeybek, N. (2008). Efficacy of N-Acetylcysteine on aflatoxicosis in rabbits. *Polish J. Environ. Stud*., 17: 189-197.

Chiofalo B.; Riolo E.B.; Fasciana G.; Liotta L. and Chiofalo V. (2010). Organic management of dietaryrosemary extract in dairy sheep: effects on milk quality and clotting properties. Vet. Res. Commun. 34, 197–201

Duncan, D. B. (1955). Multiple range and multiple F-test. Biometrics, 11: 1-42.

El-Sherbiny M. A.; Cieslak, E.; Pers-Kamczyc J.; Szczechowiak D. Kowalczyk and Szumacher-Strabel M. (2016). Short communication: A nanoemulsified form of oil blends positively affect the fatty acid proportion in ruminal batch cultures. J. of Dairy Sci, 99: 399–407.

El-Essawy A.M.; Anele U.Y.; Abdel-Wahed A.M.; Abdou A.R. and Khattab I.M. (2021). Effects of anise, clove and thyme essential oils supplementation on rumen fermentation, blood metabolites, milk yield and milk composition in lactating goats. Anim. Feed Sci. Technol., 271: 114760.

El-Ghandour A. A. Abu El Ella A.A.; Hafez Y. H. and Abdel-Hafez M. (2017). Effect of L-carnitine and Co-enzyme Q10 treatments on immune response, productive and reproductive performance of Damascus goats and their offspring. 1- Effect on quality and chemical composition of milk and Labneh. Egypt. J. of Sheep & Goat Sci., Vol. 12 (2), 1-10.

El-Saadany S.A.; Habeeb A.A.M.; EL- Gohary E.S.; Deeb M.M. and Aiad K.M. (2008). Effect of supplementation of oregano or nigella sativa seeds to diets of lactating Zaraibi goats on milk yield and some physiological functions during summer season. Egypt. J. Anim. Prod. 45: 469-487.

EL-Sherif M.M.A. and Assad, F. (2001). Changes in some blood constituents of Barki ewes during pregnancy and lactation under semi-arid conditions. Small Ruminant Research 40, 269-277.

Eman M. Abd-el Naser; Ghada A.E. Mohamed and Hanan K. Elsayed (2014). Effect of lactation stages on some blood serum biochemical parameters and milk composition in dairy cows. Assiut Vet. Med. J. 60 (142): 83-88.

Fulghesu AM.; Ciampelli M.; Muzj G.; Belosi C.; Selvaggi L.; Ayala GF. and Lanzone A. (2002). N-acetyl-cysteine treatment improves insulin sensitivity in women with polycystic ovary syndrome. Fertil Steril. 77 (6):1128-35.

Gabr, Sh. A. **(2012)**. Reproductive performance and milk yield of Friesian dairy cows affected by L-tyrosine treatment during early postpartum period. Life Sci. J. 9: 4486- 4489.

Helal, F.I.S. and K.A. Abdel- Rahman (2010). Productive performance of lactating ewes fed diets supplementing with dry yeast and/or bentonite as feed additives. World J. Agric. Sci. 6(5):489-**498.**

Henry, R.J. (1965). *Clinical chemistry. Principles and Technics*, P: 293.

Hristov A.N., Lee C., Cassidy T., Heyler K., Tekippe J.A., Varga G.A., Corl B., Bra R.C. (2012) Effect of Origanum vulgare L.leaves on rumen fermentation, production, and milk fatty acid composition in lactating dairy cows. Journal of Dairy Science, 96, 2, 1189 – 1202.

Jinhong Luo; Zheng Ao; Zhiqiang Duan; Ye Ao; Shinan Wei; Wei Chen and Xiang Chen (2021). Effects of N-acetyl-cysteine on the reproductive performance oxidative stress and RNA sequencing of Nubian goats. Vet Med Sci. 7:156–163.

Jóźwik1 A., Bagnicka E; Strzałkowska N.; Śliwa-Jóźwik A.; Horbańczuk K; Cooper R. G.; Pyzel B.; Krzyżewski J.; Świergiel A. H. and Horbańczuk J. O. (2010). The oxidative status of milking goats after per os administration of N-acetylcysteine. Animal Science Papers and Reports. 28 (2): 143-152.

Kaibin Fu; Xiang Chen; Wei Guo; Zhinan Zhou; Yan Zhang; Taotao Ji; Peifang Yang; Xingzhou Tian; Weiwei Wang and Yue Zou (2022). Effects of N-acetylcysteine on the expression of genes associated with reproductive performance in the goats uterus during early gestation. Animals, 12: 1-18.

Kaneko, J.J.(1989). Clinical Biochemistry of Domestic Animals. Academic Press Inc. London.

Karaphelivan, M.; Ayakisi, E.; Atakisi, O.; Yucart, R. and Pancarcis. M. (2007). Blood biochemical parameters during the lactation and dry period in Tuj ewes. Small Ruminant Research 73, 267-271.

Kholif A.E.; Matloup O.H.; Morsy T.A.; Abdo M.M.; Abu Elella A.A.; Anele U.Y. and Swanson K.C. (2017). Rosemary and lemongrass herbs as phytogenic feed additives to improve efficient feed utilization, manipulate rumen fermentation and elevate milk production of Damascus goats, Livestock Science, 204: 39-46.

Kholif S.M;. Morsy T.A ; Abdo M.M ; Matloup O.H and Abu El-Ella A.A (2012). Effect of supplementing lactating goats rations with garlic, cinnamon or ginger oils on milk yield, milk compositions and milk fatty acids profile. J life Sci 4(1): 27-34.

Kung, Jr. L.; Williams P.; Schmidt R.J. and Hu W. (2008). A blend of essential plant oils used as an additive to alter silage fermentation or used as a feed additive for lactating dairy cows. J. Dairy Sci., 91: 4793-4800

Latif, M.G.A; Hassan G.A.; El-Nouty F. and Zaki B.S. (1988). Milk yield and composition of Barki and Rahmani ewes in summer and winter lactations. Alex. J. Agric. Res. 33:95-106.

Lei Z.; Zhang K.; Li C.; Jiao T.; Wu J.; Wei Y.; Tian K.; Li C.; Tang D.; Davis D.I.; Casper D.P.; Jiang H.; Wang X. and Wang J. (2019). Ruminal metagenomic analyses of goat data reveals potential functional microbiota by supplementation with essential oil-cobalt complexes. BMC Microbiol., 19, 30.

Luo, J. ; Ao, Z.; Duan, Z.; Ao, Y.;Wei, S.; Chen,W.; Chen, X. (2021). Effects of N-Acetylcysteine on the reproductive performance, oxidative stress and RNA sequencing of Nubian goats. Vet. Med. Sci. **2021**, 7, 156–163.

Mepham, T. B. (1982). Amino acid utilization by lactating mammary gland. J. Dairy Sci. 65:287.

Mousa A. A.; Abdella M. M.; El- Sayaad G. A.; Salah Eldeen T. A. and Sherein H. Mohamed (2022). Influence of nano emulsified oregano, garlic and clove oils blend on *in vitro* rumen fermentation parameters and productive performance of lactating Shami goats. Egupt. J. Nutri. and Feed, 25 (1) : 11-27.

Musser, R. E., Goodband, R. D., Tokach, M. D., Owen, K. Q., Nelssen, J. L., Blum, S. A., Dritz, S. S. & Civis, C.A. (1999a). Effects of L-carnitine fed during gestation and lactation on sow and litter performance. J. Anim. Sci. 77: 3289‑3295.

Nale, R.A. (2003). Metabolic profiling in buffaloes before and after parturition. M.V.Sc. thesis submitted to MAFSU, Nagpur: 29-34.

Nazifi, S.; Saeb, M.; Rowghani, E. and Kaveh, K. (2003). The influences of thermal stress on serum biochemical parameters of Iranian fattaile sheep and their correlation with triiodothyronine, thyroxine and cortisol concentrations. Comp Clin Path, 12, 135-139.

N.R.C .(1981). Nutrient Requirements of goats. National Academy of Science. National Research Council, Washington, DC, U.S.A.

Omid K.; Amirali, S. and Ahmad K. (2018). N-Acetyl cysteine improves performance, reproduction, antioxidant status, immunity and maternal antibody transmission in breeder Japanese quail under heat stress condition. Livestock Sci. 217, 55–64.

Pirestani, A. and Aghakhani, M. (2017). The effects of rumen-protected choline and L carnitine supplementation in the transition period on reproduction, production, and some metabolic diseases of dairy cattle. J. of Applied Anim Res. ISSN: 0971-2119 (Print) 0974-1844 (Online).

Ratika K. and James Singh R.K. (2018). Plant Derived Essential Oil in Ruminant Nutrition A Review. Int. J. Curr. Microbiol. Appl. Sci., 7: 1747–1753.

Reitman, S. and Frankel, S. (1957). Colormetric GOT and GPT transaminases determination.

Rigout S.; Hurtaud, C.; Lemosquet, S.; Bach, A. and Rulquin, H (2003) Lactational effect of propionic acid and duodenal glucose in cows. J. Dairy Sci. 86, 243–253.

Rizk AY.; Bedaiwy MA and Al-Inany HG. (2005).N-acetyl-cysteine is a novel adjuvant to clomiphene citrate in clomiphene citrate-resistant patients with polycystic ovary syndrome.Fertil Steril. 83:367–370.

Roofchaee, A.; Irani, M.; Ali Ebrahimzadeh. M. and Reaz Akbar, M. (2011). Effect of dietary oregano (*Origanum vulgare* L.) essential oil on growth performance, cecal microflora and serum antioxidant activity of broiler chickens. Afr J Biotechnol 10(32): 6177-6183.

Rosa Neto, NS. and Carvalho, JFD. (2009). O uso de provas de atividade inflamatória em reumatologia. Rev Bras Reumatol 49(4): 413-430.

Roubies N., Panouis N., Fytianou A., Katsoulos P.D., Giadinis N., Karatzias H. (2006). Effects of age and reproductive stage on certain serum biochemical parameters of Chios sheep under greek rearing conditions. Journal Veterinary Medicine. 53: 277-281.

Salem A.Z.M.; Kholif A.E.; Olivares M.; Elghandour M.M.Y.; Mellado M.; and Arece J. (2014) Influence of S. babylonica extract on feed intake, growth performance and diet in vitro gas production profile in young lambs. Trop. Anim. Health Prod. 46, 213-219.

Samira A., M. Abdur, E. Anaam, S. Albert and M. Waleed (2016). Biochemical and hematological profile of different breeds of goat maintained under intensive production system. African J. of Biotech., 15: 1253-1257.

Shaker B. Al-Suwaiegh ; Sabrin A. Morshedy ; Abdallah T. Mansour; Mohamed H. Ahmed; Soliman M. Zahran ; Tareq M. Alnemr and Sobhy M.A. Sallam (2020). Effect of an essential oil blend on dairy cow performance during treatment and post treatment periods. Sustainability 12: 9123.

Shakweer, I.M.E.; EL-Mekass, A.A.M. and EL-Nahas, H.M. (2005). Effect of different levels of supplemented organic zinc source on performance of Friesian dairy cows. J. Agric. Sci. Mansoura Univ., 30 (6): 3001 - 3011.

Simitzis P.E.; Bizelis J.A.; Fegeros K. and Deligeorgis S.G. (2007). Effect of dietary oregano essential oil supplementation on sheep milk characteristics. Anim. Sci. Rev. 37: 69-78.

SlaninaL, Ľ.; Beseda, I.; Hlinka, D.; Illek, J.; Kovac, G.; Kroupova, V.; Lehocky, J.; Michna, A.; Rossow, N.; Sokol, J. and Vajda, V. (1992). Metabolic profile of cattle in relation to health and production. ŠVS SR, Bratislava, 115 p. ISBN 80-7148-001-0.

SPSS (2012). SPSS User's Guide Statistics Version 19. Copyright IBM, SPSS Inc., USA.

Tassoul, M.D. and Shaver R.D. (2009). Effect of a mixture of supplemental dietary plant essential oils on performance of per parturient and early lactation dairy cows. J. Dairy Sci., 92: 1734-1740

Tietz NW. (1994). Textbook of clinical chemistry. 2nd ed. Philadelphia: WB Sounders; 199

Yildiz BO.; Bozdag G.; Yapici Z.; Esinler I.; Yarali H. (2012). Prevalence, phenotype and cardiometabolic risk of polycystic ovary syndrome under different diagnostic criteria.Hum. Reprod. 27:3067–73.

Yokus, B.; Cakir, D. U.; Kanay, Z.; Gulten, T. and Uysal, E. (2006). Effects of seasonal and physiological variations on the serum chemistry, vitamins and thyroid hormone concentrations in sheep. Journal of Veterinary Medicine 53, 271-276.

Zeedan, Kh.I.I.; El-malky, O.M. and Abu El-Ella, A.A. (2014) . Nutritional physiological and microbiological studies on using Biogen-Zinc on productive and reproductive performance of ruminants. 2- Productive performance, digestion and some blood components of Damascus goats. Egyptian J. Sheep & goats Sci. Vol. 9 (3), 49-66.

Zhang, KY.; Yan, F.; Keen, CA. and Waldroup PW. (**2005**). Evaluation of microencapsulated essential oils and organic acids in diets for broiler chickens. Int J Poult Sci 4(9): 612-619

Zhu, X.; Liu, W.; Yuan, S. and Chen H. (**2014**).The effect of different dietary levels of thyme essential oil on serum biochemical indices in Mahua broiler chickens. Ital J Anim Sci 13(3): 576-581.

دراسة تأثيير مضادت الأكسده (زيت البردقوش & ن أسيتايل سستين) على الأداء الانتاجى والتناسلى للماعز الدمشقى ومواليدها

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الملخص العربى

أجريت هذه الدراسه على 30 عنزه دمشقى عمر 1.5 - 2 سنه بمتوسط وزن 46.9±1.64 كجم وذلك لمعرفة تأثير اضافة كلا من زيت البردقوش & ن أسيتايل سستين على الأداء التناسلى وانتاج اللبن ومكوناته ومعدلات النمو وتحليل مكونات الدم خلال الفتره الاخيره من الحمل وموسم انتاج الحليب.

قسمت العنزات الى ثلاث مجاميع (كل مجموعه 10 عنزات عشار) غذيت العنزات على حسب مقررات NRC 1981 .

المجموعه الأولى :العليقه المقارنه (الكنترول) تتغذى على 60 % مخلوط علف مركز + 20 % دريس برسيم + 20% قش أرز .

المجموعه الثانيه :العليقه المقارنه + واحد سم من زيت البردقوش / كجم عليقه مركزه حتى نهاية التجربه.

المجموعه الثالثه : العليقه المقارنه + 0.3 ملجرام / كجم وزن حى / للرأس من الاستيل سستين لمدة سبع ايام متتاليه فى فترة الحمل ونفس المده بعد الولاده (البدء قبل رضاعة اليوم الأول) مره واحده يوميا بصوره سائله (تجريع).

أظهرت النتائج مايلى . المعامله بكل من زيت البردقوش و استيل سستين أدت الى تحسين صفات الخصوبه والتوأميه وعدد الجداء المولوده لكل الأمهات المعده للتلقيح وعدد الجداء المفطومه لكل الأمهات الوالده وتحسين القدره التناسليه للأمهات وخفض نسبة النفوق فى الجداء من الميلاد الى الفطام .

حدث تحسين معنوى فى محصول اللبن اليومى ومكونات اللبن من نسبة الدهن و البروتين وسكر اللاكتوز فى كلا من مجموعتى زيت البردقوش واستيل سستين مقارنة بمجموعة المقارنه .

مجموعة زيت البردقوش و استيل سستين ادت الى تحسين معنوى فى كل من وزن الفطام ومعدل الزياده الوزنيه للجداء واجمالى معدلات النمو عن المجموعه المقارنه.

مجموعة زيت البردقوش و استيل سستين أدت الى زياده معنويه فى تركيزمكونات الدم من الجلوكوز وأنزيم ALT و فيتامين C وادت الى انخفاض معنوى فى تركيز مكونات الدم من اليوريا وأنزيم AST .

نستخلص من هذه النتائج ان اضافة زيت البردقوش بمعدل واحد سم / كجم علف مركز يوميا او استيل سستين بمعدل 0.3 مليجرام / كجم وزن حى خلال الفتره المتأخره من الحمل وفترة الرضاعه كان لهما الأثر الايجابى فى تحسين الأداء الانتاجى والتناسلى ومحصول وتركيب اللبن خلال أول 12 أسبوع من موسم الحليب كذلك تحسن أداء النمو للجداء وبعض مكونات الدم وعدم وجود تأثير سلبى على مكونات الدم لوظائف الكبد والكلى. وكانت أفضل معامله من النتائج السابق ذكرها هى المعامله بـ ن استيل سستين .