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The Effect of Different Types of Essential Oils on Some Blood Characteristics of Awassi Lambs

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Abstract

This study was conducted in the fields of the College of Veterinary Medicine - Tikrit University. The study included 20 Awassi lambs, 5 lambs for each treatment (T1 control, T2 using laurel oil, T3 using clove oil, T4 using sage oil) at the age of 6 months, dosed daily with a concentration of 500 mg/animal of the mentioned oils for a period of 90 days. This study is aimed to evaluate the effect of essential oils on blood characteristics (total protein, albumin, glucose, urea, cholesterol, triglycerides, uric acid, creatinine, calcium, magnesium, GOT, GPT, HDL, VDL, LDL, ALP). The results showed that using sage and clove oil was superior to the control treatment in terms of glucose (82.40, 80.40, 67.20, 56.80mg/dl)and triglycerides (91.40, 63.40, 60.20, 59.60 mg/dl), and adding clove oil was superior to the control treatment in calcium (9.81, 9.20, 9.32, 8.32 mg/dl) and magnesium (5.62, 5.40, 4.66, 4.56 mg/dl) and GPT (28.60, 24.80, 22.0, 21.80 U/L) and HDL (29.60, 26.60, 25. 40, 24.20 mg/dl). The laurel oilusing treatment was superior to the control in VDL (17.60, 16.20, 16.0, 14.80 mg/dl).

Key words : Awassi lambs, essential oils, cloves.

Volatile oils are organic compounds also known as etheric or aromatic oils. They are a complex and liquid mixture of hydrocarbon and oxygen substances and aromatic compounds. They are formed as a result of biosynthesis through plant metabolism, and are collected in special vascular structures such as glandular capillaries or glands. Essential oils are oily outgrowths that are surrounded by walls that prevent their volatilization in the plant (Al-Mayah and Alwan, 2001). Essential oils are volatile aromatic compounds found in many plants that are usually extracted through steam or water distillation. They are a mixture of secondary receptors usually composed of terpenoids and phenylpropanoids (Calsamiglia *et al*, 2007). These compounds have been shown to positively manipulate ruminal fermentation and improve nutrient utilization in ruminants (Hristov *et al.,* 1999). Furthermore, essential oils have been evaluated for their antimicrobial activity and have recently been investigated as rumen modifiers in ruminants (Wallace, 2005). Recent comprehensive reviews published on essential oils and their active ingredients (Calsamiglia *et al.,* 2007; and Benchaar *et al.,* 2008) indicated that some essential oils can enhance rumen microbial fermentation and alter rumen metabolism correspondingly. However, most research defines essential oils as volatile substances that evaporate easily when heated, and they contain a complex group of many different chemical substances that give their characteristics and independent effects, such as terpenes, and a high percentage of alcohol that gives them a disinfecting property, in addition to esters, phenols, and flavonoids. The use of antioxidants and antimicrobials, meat products, are necessary for prolonging the storage period and preventing them from contamination (Romo and ahmed, 2005). The oxidation process occurs as a result of the transfer of oxygen within cells,

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which causes great damage to the cells, and this damage may lead to disruption of normal cell functions (Youssef and Yacoub, 2014).

There was lack of local studies and research on oils extracted from medicinal plants and their uses in many fields, Hence the presence study was conducted to explore the presence of phenolic compounds and their antioxidant properties.

Materials and Methods

The study was carried out at the College of Veterinary Medicine / Tikrit University for a period of 90 days on 20 Awassi lambs of 6 months old. The animals were divided into four groups of 5 animals each.

T1 control treatment

T2 treated with 500 mg laurel oil/lamb/day

T3 treated with 500 mg clove oil/lamb/day

T4 treated with 500 mg sage oil/lamb/day

Breeding was done in individual cages for each lamb. The animals were fed a concentrated feed at a rate of 3% of their body weight, in addition to coarse feed until satiation. The oil was provided in the form of a capsule daily to each lamb through the esophagus before feeding. The blood biochemical parameters were analysed by auto analyser (APPLE, Japan) using ready-made kits. The enzyme activity of (ALP) was measured according to the method of Reitman and Frankel (1957), and the concentrations of glucose, uric acid, total protein and cholesterol were measured according to Wotton (1964); Arliss and Entvistle (1981); Henry *et al* (1974); Richmond (1973) respectively, by using SPINRECT (Spanish).

The data was analyzed statistically using the statistical program SAS (Statistical Analysis System) (2010) to study the comparison between Cypriot and local goats in milk production and growth characteristics of newborns. The test for significant differences between means was conducted using Duncan's multinomial test (Duncan, 1955).

$Yijm = \mu + Ti + eij$

Yij = The value of the view belonging to transaction i.

μ = The general average of the studied trait.

Ti = The effect of treatment (control, laurel treatment, clove treatment, sage treatment) on the studied traits

eijm = Random error, which is assumed to be randomly and normally distributed with a mean equal to zero and a variance of $\sigma 2e$.

Results and Discussion

From Table I, it was shown that clove and sage oil had a significant effect on blood glucose level compared to the control (82.40, 80.40, 67.20, 56.80 mg/dl), and also sage oil treatment showed superiority for triglycerides when compared to control and laurel oil and clove oil treatment groups (91.40, 63.40, 60.20, 59.60 mg/dl). This result did not agree with (Devant *et al*., 2007; Chaves *et al*., 2008; Shaver and Tassoul, 2009) and agreed with Yang *et al*. 2010 when a significant effect of essential oils was found on cholesterol and triglycerides.

Table I: The effect of essential oils on the blood biochemical characteristics in Awassi lambs

Treatment	Control	Laurel oil	Clove oil	Sage oil
Total protein(g/dl)	3.58 ± 0.21a	3.52 ± 0.24 a	3.32 ± 0.16 a	3.74 ± 0.19 a
Albumin/ (gldl)	1.25 ± 0.16 a	1.71 ± 0.18 a	1.50 ± 0.14 a	1.76 ± 0.08 a
Clucose(mg/dl)	67.20 ± 1.93 ab	56.80 ± 1.46 b	82.40 ± 7.90 a	80.40 ± 9.82 a
Urea(mg/dl)	41.40 ± 1.02 a	41.40 ± 1.80 a	43.0 ± 0.31 a	42.80 ± 0.58 a
Cholesterol (mg/dl)	90.0 ± 3.40 a	89.80 ± 6.93 a	86.80 ± 6.9 a	97.20± 4.66 a
Triglycerides(mg/dl)	59.60 ± 3.96 b	60.20 ± 4.46 b	63.40 ± 2.78 b	91.40 ± 12.02 a
Uric acid(mg/dl)	3.20 ± 0.58 a	3.0 ± 0.30 a	3.50 ± 0.22 a	3.24 ± 0.37 a
Creatine(mg/dl)	0.66 ± 0.05 a	0.74 ± 0.05 a	0.68 ± 0.07 a	0.62 ± 0.02 a

Different letters within one row indicate significant differences

Table II: Effect of essential oils on mineral elements and blood enzymes of Awassi lambs

Treatment	Control	Laurel oil	Clove oil	Sage oil
Calcium (mg/dl)	9.32 ± 0.18 b	8.32 ± 0.22 c	9.81 ± 0.05 a	9.20 ± 0.13 b
Magnesium(mg/dl)	4.66 ± 0.21 ab	4.56 ± 0.22 b	5.62 ± 0.42 a	5.40 ± 0.36 ab
GOT (U/L)	25.40 ± 1.77 a	27 60 ± 2.73 a	25.0 ± 1.81 a	21.80 ± 1.68
GPT (U/L)	21.80 ± 0.80 b	22.0 ± 2.42 b	28.60 ± 0.24 a	24.80 ± 1.11 ab
HDL (mg/dl)	24.20 ± 1.06 b	25.40 ± 1.28 b	29.60 ± 0.72 a	26.60 ± 1.93 ab
VLDL (mg/dl)	14.80 ± 0.80 b	17.60 ± 0.50 a	16.0 ± 0.83 ab	16.20 ± 0.96 ab
LDL (mg/dl)	74.60 ± 1.50 a	71.0 ± 1.78 a	75.20 ± 2.47 a	75.40 ± 2.20
ALP(U/L)	82.40 ± 1.69 a	82.20 ± 2.69 a	77.40 ± 4.61 a	86.20 ± 1.39

Different letters within one row indicate significant differences

From Table II, the results showed that the treatment of clove oil was superior compared to the control, sage and laurel oil for blood calcium (9.81, 9.20, 9.32, 8.32 mg/dl), and for blood magnesium (5.62, 5.40, 4.66, 4.56 mg/dl), also it was superior for GPT when compared to control and of sage and laurel oil (28.60, 24.80, 22.0, 21.80 U/L)treatment for HDL (29.60, 26.60, 25.40, 24.20 mg/dl), while the treatment of laurel oil had a significant effect on VLDL in the blood than control, sage and clove oil treatments (17.60, 16.20, 16.0, 14.80 mg/dl). This result is consistent with Ozdogan (2011), but did not agree with the study of Vakili *et al.* (2013) when studying liver enzymes.

The results of this study showed that essential oils have the ability to improve rumen fermentation by reducing the percentage of acetate and increasing propionate production, and thereby improve the growth characteristics of the animal. Essential oils can be considered as feed additives to treat rumen microbial fermentation as it, enhance fat metabolism, have antimicrobial and anti-inflammatory properties, and help the resistance to disease-causing bacteria (Murphy *et.al*, 2010). They are important for the digestion and absorption of rumen protein, glycerides, phospholipids, and the metabolism of the amino acid tryptophan (Li *et. al.* , 2019) that essential oils can change the activity of some enzymes by changing the abundance of microorganisms in the rumen, which in turn helps the digestion and absorption of nutrients in ruminants (Schmieder *et. al.*, 2011).

Conclusion

Integration of essential oils in the dietry feed increases the activity of rumen enzymes and improves blood characteristics, which in turn helps in the digestion and absorption of nutrients.

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