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THE EFFECT OF ADDING MINT OIL TO THE DIET ON SOME PRODUCTIVE AND PHYSIOLOGICAL TRAITS OF MALE LAMBS

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ABSTRACT

The current study has been conducted in the animal field of the College of Agriculture / Department of Animal Production, for the period from 26/5/2019 to 26/8/2019, in addition to the preliminary period of 14 days, and the trial period lasted 90 days, 16 male lambs from Awassi sheep have been used in this study bought from the market after weaning then divided on the basis of live body weight into four groups (treatments) of equal number (4 lambs / group). The first treatment was considered a control treatment and peppermint oil was added to it at rates of 400, 800, 1200 µl / lamb / day to the concentrated diet respectively to the second, third and fourth treatments. Peppermint oil has added daily to the concentrated fodder and the results exhibited that adding mint oil to the final weight of Awassi lambs led to a significant increase in treatment T3, reaching 30.00 kg compared with treatment T1 (The control), which reached 26.50 kg and treatment T4 was in the middle between them (28.75) kg. The addition of peppermint oil to the diets of Awassi lambs had a clear effect on increasing the efficiency of the food conversion, the conversion efficiency of the concentrated fodder, and the conversion efficiency of the protein intake for the experimental diets shown in the table, as the best treatment in the efficiency of the food conversion on the basis of total fodder consumption (g / day) / increase Daily weight (g / day) In lambs fed on fodder T3 (7.83) and that the best nutrient conversion efficiency when calculated on the basis of metabolized energy intake (mJ) / daily weight gain (g / day) is the treatment T3 compared with the rest of the treatments.

***Keywords*:** Mint Oil, Productive, Physiological Traits, Lambs

Introduction

Livestock constitute an important part of agricultural production in Iraq, and sheep are one of these wealth sources, whereas sheep farming is one of the oldest methods of agricultural exploitation in Iraq, as raised in almost all Iraqi districts and its importance comes through the dependence of a large number of people in their livelihood on raising them and what accompanies it in terms of industry and trade. Awassi sheep are distinguished by global fame in the Arab Levant region (Epstein, 1985). Researchers have been concerned for many years to study problems affecting animal's performance as well as production, among these problems is animal feeding as researchers seek to develop a formula that fits the animal's needs for the growth rapidity, increased production and the digestive system nature especially ruminants, in which established foundations and rules called the new protein system to encounter the animal's needs for growth and production (Abbas, 2010).

Microbiologists and nutritionists have focused on exploring alternative methods of plant extracts as food additives to diet in order to improve fodder efficiency and utilization by improving metabolism and modifying microbial activity in the rumen (Zeng *et al*., 2015). Lipids are one of the main energy sources of importance in the diets, in addition to carbohydrates, and Lipids contain carbon, hydrogen and oxygen, and the percentage of oxygen in them is low compared to carbohydrates, and the percentage of hydrogen is high, so it gives energy twice the amount of energy that carbohydrates give when they are burned (Al-Yassin and Mohammed, 2010) and considered as one of the important nutrients that go into nutrition, carrying with it fat-soluble vitamins (K, E, D, A). Minerals are also considered a source of essential fatty acids that are not in the capacity of the human body and animals to manufacture them, so they must be included in the diets and we can find these acids in some animal oils. (Al-Fadhli, 2011), the essential fatty acids are an important requirement for humans to maintain the normal formation, functions of cellular membranes,

Essential oils include several types used to treat humans and animals, and some of them are used in various cosmetics Also, essential oils are used to treat certain diseases or work to reduce disease if they are given to the patient in its pure form after it is extracted from the plant material or if these oils were used in their first form, which are in the form of fresh, dried or partially extracted vegetable herbs They are also used as flavor enhancers for most pharmaceuticals and foods (Hussain, 1981).

Materials and Methods

Current experiment has been conducted in the animal field of the Department of Animal Production , College of Agriculture - Diyala University for a period of 90 days, from 5/26/2019 until 26/8/2019, except for the preliminary period of 14 days, to study the effect of adding different concentrations of mint oil in a quantity of 400, 800, 1200 µl / lamb / day to the concentrated diet, where peppermint oil was added to the second, third and fourth treatments, and the first

treatment was considered a control treatment. In current study, 16 male lambs from Awassi sheep were used and the treatments were as follows:

- First treatment (T1): 2.5%: concentrated fodder of body weight + hay.
- Second treatment (T2): 2.5% concentrated fodder of body weight plus 400 µl / kg of mint oil fodder + hay.
- Third treatment (T3) 2.5%: concentrated fodder of body weight, plus 800 µl / kg of mint oil fodder + hay.
- Fourth treatment (T4): 2.5% concentrated fodder of body weight plus 1200 µl / kg of mint oil fodder + hay.

The animals were weighed weekly with a 100 kg tablet scale at eight in the morning after removing the fodder from the animals for 12 hours. The quantity of concentrated fodder provided to the animals was adjusted weekly based on the new weight of each treatment, as the feed was served in one meal daily at 8 am on the basis of 2.5 % of the live body weight, then coarse fodder (hay) is provided to the animals freely and before the introduction of the new feed, the concentrated and remaining coarse feed is collected and weighed to estimate the amount of feed consumed for each of them daily. This experiment dealt with the study of productive characteristics and includes:

1. Initial and Final Weight (KG)
2. Total weight gain (kg) = the final weight of a live animal _ the initial weight
3. Daily weight gain (g / day / animal) = total weight gain / number of days of experiment
4. Concentrated and coarse fodder intake (g / day)
5. (On dry matter basis) = fodder provided _ remaining fodder

To calculate the dry matter intake = concentrated or coarse feed intake x the dry matter ratio of the concentrated or coarse fodder

6. Fodder conversion efficiency = feed consumed (g / day) / daily weight gain (g / day).

Results and Discussion

The effect of adding peppermint oil on the initial and final weight

Table 1 shows that there was no significant effect among all treatments in the average primary weight, because all animals were close to the initial weight at the beginning of the experiment, as this weight was 20.40, 20.40, 21.00 kg, respectively, and the general average was 20.60 ± 0.48 kg.

The results of Table 2 displayed that adding mint oil to the final weight of the Awassi lambs led to a significant increase ($p \leq 0.01$) in treatment T3, reaching 30.00 kg, compared with treatment T1 (control), reaching 26.50 kg and treatment T4 was in the middle between them (28.75) kg, and The reason may be due to the fact that adding nutritional supplements from oils that are added to the diets of ruminants may lead to an increase in the activity of microorganisms by increasing the fermentation processes inside the rumen, as the microorganisms in the rumen have a role in increasing the digestibility, which works to maintain the microbial balance within the gut as well as increasing the efficiency of the metabolism process and thus increasing the growth response (Broudiscou *et al*., 1990), these results were in agreement with what obtained by Oliveira *et al*. (2013), which showed that adding oils and diets to ruminant fodder improved the concentration of butyric acid in the rumen by increasing the activity of microorganisms in the rumen with increased decomposition of ester bonds, which helped to increase the speed of fermentation and the reduction of the time that the nutrients spend in the animal's rumen, and thus this had a positive effect on the increase in the weight of the animal, as well as these results were in agreement with what was obtained by Benchaar *et al*. (2006) and Cruz *et al*. (2014) and Akande *et al*. (2015) While these results did not agree with the findings of Martin *et al*. (2010), in which attributed the reason for that adding oils to diets of ruminants had not improved the rumen environment and perhaps because of the lack of adaptation of the microorganisms to the oils added to the diets and their activity in the preparation of microbial protein and this was supported by this. Marino *et al*. (2013).

The effect of adding peppermint oil on daily and total weight gain

From results of Table 1 it is observed that there was no significant effect among all transactions in the daily weight increase rate, which amounted to 66.67, 72.22, 111.11, 94.44 kg. While it was noted that the treatments with peppermint oil added were significantly higher than ($p \leq 0.01$) over the first treatment (control) in the total weight increase rate, which amounted to (6.50, 10.00, 8.50), as these results are consistent with what 'Wachira *et al*. (2000) mentioned that when adding oils at different levels where indicated that there is a positive relationship with an increase in the level of addition through its effects on the fermentation processes that take place inside the rumen, which led to significant differences in weight gain, and with what found Copianchi *et al*. (2012).

When adding different levels of oils to a Holstein ration fodder, it obtained an increase in weight compared to the control treatment and also agreed with (Diniz *et al*., 2010; Vieira *et al*., 2011; Maia *et al*. 2012; Valero *et al*., 2014) in obtaining overweight and these results are not in agreement with the findings of (Nagalakshim and Dhanalakshmi, 2015; Menezes *et al*., 2015; Palmieri *et al*., 2016; Hamid *et al*., 2007; Chuntrakort *et al*., 2014) when adding different sources of vegetable oils to the diets, as they found no significant differences between the treatments in the rate of weight gain, and the reason may be attributed to the lack of adaptation of the micro-organisms to the oils added to the fodder diet.

The effect of adding peppermint oil on the efficiency of food conversion

The results of Table 2 revealed that adding peppermint oil to the diets of Awassi lambs had a clear effect on increasing the efficiency of the feed conversion, the conversion efficiency of the concentrated feed, and the conversion efficiency of the protein intake for the experimental fodder diets shown in the table, as the best treatment in the efficiency of the feed conversion on the basis of total fodder intake (g / Day) / daily weight gain (g / day) in lambs fed on T3 (7.83) ribs compared to lambs fed on T4 (9.26), T2 (9.43) and 1T (15.26) rations, and that the best feed conversion efficiency when calculated on the basis of Metabolized energy intake (mJ) / daily weight gain (g / day) is the treatment T3 compared to the rest of the treatments, as when calculating the efficiency of the fodd conversion based on the crude protein intake (g / day) / daily weight gain (g / day), we notice a significant improvement ($P \leq 0.05$) in treatment T3 (0.74) compared with treatment T4 (1.19) and T2 (2.15), and T1 (2.63), and significant differences at the level of ($p \leq 0.05$) have been noted in the efficiency of food conversion based on its calculation from the amount of

concentrated feed intake / daily weight gain and the metabolized energy intake / crude protein intake between the different experimental treatments, while there are no significant differences. In the efficiency of food conversion on the basis of daily weight gain, all stated results indicate an improvement in the efficiency of the food conversion and an increase in the benefit of these lambs from the daily food intake by increasing the oil level in the experimental treatments.

The efficiency of the feed conversion depends on the amount of fodder consumed during a certain period, the weight gain or production obtained during that period, as well as the nutrient content of the feed (Baker *et al*., 2002). These results agreed with results by Koukolova *et al*. (2010) and Igarashi *et al*. (2007) when obtained the improvement in the efficiency of the nutritional conversion in adding vegetable oils to concentrated diets while current study has no agreement with what Narimani-Rad *et al*. (2012) obtained, whose results depended on the addition of vegetable oils to coarse diets only also, Lee *et al*. (2002) and Griffith *et al*. (2016) supported this in favor of vegetable oils. The differences in the researchers results are due to several factors, including the proportion of plant cell wall content, the type of diet, and experimental errors (Babayemi *et al*., 2004).

Table 1 : Averages ± standard error of the effect of adding mint oil to the concentrated feed in the final weight (kg), the rate of daily weight gain and the rate of total weight gain (kg).

Average overall weight gain (kg)	Average daily weight gain (g/day)	Final weight (Kg)	Initial weight (Kg)	*Studied traits* / Treatment
1.22 B ±6.00	13.61 ±66.67	26.50 ± 0.65 B	20.50± 0.65	T1
6.50 ± 1.04 AB	72.22 ± 11.56	0.65 B ± 26.50	0.41 ± 20.00	T2
0.91 A ± 10.00	111.11 ± 10.14	0.71 A ± 30.00	0.71 00± 20.	T3
8.50 ± 1.32 AB	94.44 ± 14.69	28.75 ± 1.03 AB	20.25 ±0.48	T4
**	N.S	**	N.S	Level of significance

The different letters within the column indicate the presence of significant differences at the probability level (P≤0.01).

Table 2 : Averages ± standard error of the effect of adding peppermint oil to the concentrated feed on feed conversion efficiency, energy conversion efficiency and protein intake for experimental feeds on a dry matter basis.

Nutritional conversion efficiency of crude protein intake (g / day) / daily weight gain (g / day)(	Energy conversion efficiency Megajoules/day) / daily weight gain (gm / day)	Efficiency of feed conversion of concentrated feed intake (g/day/daily weight gain (g/day)	Food conversion efficiency (G/day)/daily weight gain (g/day)	treatment
2.63±0.79 C	1.95±0.97	11.43±1.72 C	15.26±2.98 C	T1
2.15±0.34 AB	0.04±0.02	8.65 ± 1.51 AB	9.43±0.76 B	T2
0.74±0.24 A	0.04±0.02	5.58 ±0.69 A	7.83±0.5 A	T3
1.19±0.43 AB	0.06±0.02	9.07±1.25 AB	9.26 ±1.66 B	T4
*	N.S	*	*	Level of significance

The different letters within one column indicate the presence of significant differences at the probability level (p≤0.05)

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