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Effect of pure glycerol treatment on growth and some blood standards in Awasian sheep in central Iraq

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Abstract

The study was conducted at the Faculty of Agriculture of the University of Tikrit from 12/9/2021 to 12/12/2021 of 91 days to study the effect of adding glycerol as an alternative source of energy and feed in some productive qualities represented in growth (weight gain), some blood and biochemical parameters and the concentration of some hormones using 12 The lambs were divided into three nutritional groups with four lambs each group, the first group without glycerol, the second 30 ml glycerol and the third 60 ml glycerol. The results showed a moral increase (P≤0.05) between the factors in the rate of daily weight gain of the two lambs, as it outperformed the third treatment (60 ml glycerol/carries/day) compared to the first treatment (control) that was free of additions and the second treatment contains (30 ml glycerol/pregnancy/day). This results were reflected in the total weight gain of the two loads, as the third treatment (60 ml glyserol/day/pregnancy) exceeded morally (P≤0.05) by an average of (16.35) kg compared to the first treatment (control) (9.85) kg and the second (30 ml glycerol/day/carries) (10.92) kg. The results also showed that the third treatment (60 ml/day/carries) was morally superior (P≤0.05) in dietary conversion efficiency at a rate of (5.53 fodder/kg meat) compared to the second and third factors (7.68 and 9.64 fodder/kg meat), respectively. Differences between factors in the rate of daily feed consumption were also seen. With regard to the results of biochemical blood characteristics (glucose, cholesterol, total protein, urea) at the end of the experiment, there was a moral increase in glucose, as the third treatment recorded a moral increase (P≤0.05) in its concentration compared to the second and first treatment, while thyroxin T4 recorded a moral increase (P≤0.05).

Introduction:

Sheep represent the most important livestock in Iraq raised for meat, milk and wool, and the annual revenues of these products are about 60%, 25% and 15% respectively (Diz and Hama, 2008). There are three breeds of Iraqi sheep; Al-Awassi, Al-Nuaimi, Al-Kuradi, Hamdani and Al-Arabi sheep, (Oramari et al., 2014). The Awassi breed is widespread across the Eastern Mediterranean. It is the main breed in Iraq and Syria. Al-Awassi is the predominant and most famous species in Iraq, accounting for about 60% of Iraqi sheep, and is bred mainly for the production of meat, milk and wool (Al-Dabbagh, 2009). Feed is usually the biggest cost associated with animal production. Corn is an important source of energy in most ruminant animal diets. A corn used as animal feed has been shown to have noticeable concentrations of glycerol (Wu, 1994). Which is a major by-product of biodiesel production, and because of its availability and nutritional properties, it has become an attractive choice to be used as a dietary supplement for ruminants (DiLorenzo & Galyean, 2010). Moreover, it has an attractive price when compared to corn, and is in line with continued growth and global production that turns it into a promising alternative (Abo El-Nor et al., 2010). Researchers and ruminant nutrition specialists have been widely

interested in listing glycerol as an energy source to replace corn, which may be a viable alternative in food formula for ruminants and can reduce feed costs. Glycerol is a byproduct of the biodiesel industry. Glycerol weighs about 10% vegetable oil or fat by weight (Dasari et al., 2005). From the above, this experiment was to find out the effect of adding glycerol as an energy source in some production qualities (better weight gain, final weight rate for a shorter period of time, and an alternative to energy in the feed needed by ruminants), some biochemist blood standards and the concentration of some important hormones.

Materials and research methods:

This study was conducted in the animal field, affiliated with the Department of Animal Production at the Faculty of Agriculture - University of Tikrit for the period from 12/9/2021 to 12/12/2021 of 91 days, preceded by a preliminary period of 11 days for the adaptation of lambs to concentrated bush Table No. (1). In this experiment, I used 12 lamps purchased from local markets in Salah al-Din Governorate, ranging in age from 4-5 months and with an initial weight rate of 22.1 + 0.9 kg. The lambs were weighed after the end of the preliminary period and for two consecutive days after cutting off the feed for 12 hours, for the purpose of fixing the The lambs were distributed into three feeding groups by weight by four lambs per group, as the average weight of those groups was approximately 22.550±0.18, 22.725±0.26 and 22.650±0.14 kg respectively. Experimental transactions were randomly distributed to the groups. The lambs were numbered in plastic numbers in addition to placing lamb numbers In front of lambs throughout the duration of the experiment.

The ingredients of the bush were well mixed, and placed in plastic bags with a capacity of 50 kg. The amount of feed provided to the lambs per day was 3% of the weight of the living body, in addition to the hay of wheat 150 g/day/carriage as a dry substance. The lambs were fed on the experimental relationships gradually for 11 days as an introductory period before starting the experiment. The lambs were weighed weekly and periodically before the feed was served in the morning using the electronic scale until the end of the experiment to calculate the weights of animals. The amount of feed provided to the lambs was adjusted according to the weight gain of each pregnancy, as the amount of feed was given in the form of two meals per day at seven in the morning and 4 pm for the duration of 91 days, and there was no residual feed, in order to calculate the amount of feed consumed by each pregnancy actually.

Table (1): Substances used in the formation of experimental provender (g/kg) + glycerol (ml/L)

Provenders	T3	T2	T1
Crushed barley	600	600	600
Wheat bran	190	190	190
Yellow corn	150	150	150
Soybeans	40	40	40

Salt	20	20	20
Cholesterol (mg/L)	60	30	0

Weight and weight gain:

The lambs weighed at the beginning of the experiment and the weight continued every week until the end of the study, to identify weight gain and monitor growth. The weight process was done using a special scale with a capacity of 150 kg and divisions of 0.1 kg, and the difference in weight gain was calculated according to the following equation:

Weight gain (kg) = subsequent weight - previous weight (Gazelle and Al-Sagher, 1980)

Food conversion efficiency: Feed conversion ratio:

The percentage of dietary conversion of the two trial campaigns was calculated by dividing the concentrated feed consumed by the amount of weight gain. (Consumer Feed Quantity)/(Weight Increase)=FCR

Blood samples were also collected in the center of the experiment (31/10/2021) and at the end of the experiment (12/12/2021) after fodder was lifted from animals before the blood sampling process for 12 hours. The blood samples were withdrawn from the jugular vein in the neck area by a 10 ml wine syringe and placed in plastic tubes free of the anticoagulant, then placed in the centrifuge (3000 r/minute) for 20 minutes to separate the serum (Serum) from the rest of the components, then the serum was kept in sealed tubes (frozen) under the temperature of (C°-20) until the chemical tests were carried out and tests and analyzes were carried out in an external laboratory.

Statistical Analysis System (SAS) (2012) was used in data analysis to study the impact of different parameters on traits studied according to a complete random design (CRD), and compared the moral differences between averages to the Duncan (1955) polynomial test.

Mathematical Model (Mathematical Model):

Yij = + Ti + eij

As if:

Yij: The viewing value of the transaction i.

μ: General average of the studied trait.

Ti: Transaction effect i.

Eij = empirical error that is naturally and independently distributed with an average of zero and an equal variation of ⁇ 2 σ.

Results:

Table (2) indicates that there are significant differences (P≤0.05) between the factors in the rate of daily weight gain of lambs, as the third treatment given (P≤0.05/day) significantly exceeded (60 ml/carries/day) Glycerol at a rate of 170 g/day compared to the first treatment free of additives. We see from Table (3) that there are no significant differences between the experimental transactions during the first three weeks, but a significant increase (P≤0.05) of the third transaction was observed compared to the first and second treatment during the fourth, fifth, sixth, seventh, eighth, ninth, tenth, eleventh, twelfth and thirteenth weeks.

Table (2): Effect of Different Levels of glycerol on the Productive Qualities of Awastic Lambs?

Characters	Groups			
	First	Second	Third	P- value
Primary weight (kg)	22.55±0.18	22.72±0.26	22.65±0.14	NS
Final weight (kg)	31.12 b±0.93	33.65 b±1.25	39.00 a±1.22	*
Total weight gain (kg)	8.57 b±1.10	10.92 b±1.03	16.35 a±1.28	*
Daily weight gain (gm)	90 b±1.02	120 b±0.98	170 a±1.26	*
Rate of consumed feed (kg/day)	0.86 b	0.89 b±0	1.1 a±0	*
Effective food conversion (feed kg/meat kg)	9.64 b±1.31	7.68 ab±0.83	5.53 a±0.41	*

Table (3) Effect of Different Levels of Glycerol on the Average Weekly Weights of Awasian Lambs.

Weight/ group	Primary	Weeks												
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th
First	22.550 ±0.18	22.625 ±0.18	23.35± 0.18	24.225 ±0.04	24.925 ±0.08 b	25.475 ±0.21 b	26.100 ±0.35 b	26.80± 0.38 b	27.22± 0.79 b	28.175 ±0.74 b	28.625 ±0.79 b	29.17 ±0.97 b	30.250 ±0.98 b	31.125 ±0.93 b
Second	22.725 ±0.26	22.795 ±0.26	23.925 ±0.50	24.650 ±0.53	25.450 ±0.51 b	26.300 ±0.42 b	27.200 ±0.42 b	28.350 ±0.50 b	29.125 ±0.48 b	29.22± 0.66 b	30.02± 0.72 b	31.35 ±1.00 b	32.45± 1.13 b	33.65± 1.25 b
Third	22.650 ±0.14	23.350 ±0.26	24.100 ±0.33	25.450 ±0.43	27.050 ±0.40 a	28.100 ±0.40 a	29.425 ±0.79 a	31.025 ±1.07 a	32.150 ±0.98 a	33.10± 0.90 a	34.35± 0.82 a	35.95 ±0.97 a	37.37± 1.22 a	39.00± 1.22 a
P-value	NS	NS	NS	NS	*	*	*	*	*	*	*	*	*	*

Values represent averages ± standard error.
(*) means the existence of moral differences (P 0.05).
(N.S) means a moral difference (P ≥ 0.05).
Table (2) shows that there are significant differences (P≤0.05) between the factors in the total weight gain rate of lambs. The third treatment given (60 ml/carries/day) outperformed Glycerol significantly (P≤0.05) at a rate of 16.35 kg over the first treatment (control) (9.85) kg and the second (30 ml/day/pregnancy) at a rate of (10.92) kg, while there were no significant differences between the first and second factors.

Table (2) shows the final weights of Tuesday's transactions amounting to (31.10, 33.65 and 39.02) kg, respectively. It was noted that the third treatment (P≤0.05) is significantly superior to the first treatment (control) and the second treatment added (30ml/day/carriage), although there are no significant differences in the amount of feed consumed (dry matter).
Through table (2) we note the morality of the third treatment (P≤0.05) in the amount of feed consumed at a rate of 1.1 Kg/day, compared to the first and second group, the daily feed consumption rate was 0.86 and 0.89 Kg/day, Respectively. There is an increase in the efficiency of dietary conversion for both the second and third transactions (7.68 and 5.53 Feed/kg Meat) respectively (P≤0.05) compared to the first treatment (9.64 Feed/kg Meat), and the third treatment significantly outperformed (P≤0.05) in dietary conversion efficiency over the second treatment.

Table (4) shows the effect of glycerol in the three experimental coefficients with regard to the biometic blood qualities and the concentration of certain hormones (cortisol, thyroxine and triiodothreonine), as a blood test was performed in the center of the experiment and showed no moral differences between the three coefficients in the blood of the three groups.

Table (4) Effect of Different Levels of Glycerol on Chimocytic Blood Qualities of Awastic Lambs

Characteristics	Groups			
	First	Second	Third	P-value
Glucose (mg/dl)	64.922±4.27	69.567±4.21	67.950±3.16	NS
Cholesterol (mg/d)	64.36±2.79	67.072±2.72	69.457±4.49	NS
Urea (mg/dl)	32.157±2.36	31.255±1.97	31.022±1.86	NS
Total protein (gm/dl)	4.840±0.49	4.905±0.35	4.785±0.33	NS
Cortisol (mg/dl)	12.450±2.20	13.050±2.94	11.650±1.58	NS

T3 (nmol/L)	3.250±0.33	2.975±0.409	3.100±0.69	NS
T4 (nmol/L)	0.19+7.470	6.537±0.35	5.912±0.85	NS

Table (5) at the end of the experiment shows that there are moral differences (P≤0.05) in the percentage of blood glucose for the three factors in favor of the third and second factors. The third treatment exceeded the rate of glucose concentration (89.753 mg/dL) over the second treatment 76.105 mg/dl compared to the first treatment recorded (74.012 mg/dl).

Table (5) Effect of different levels of glycerol on biochemist blood traits at the end of the experiment

Characteristics	Mean ± SD			
	1st	2nd	3rd	P-value
Glucose (mg/dl)	74.012±2.48	76.105±2.19	89.753±1.79	*
Cholesterol (mg/dl)	66.514±5.33	58.510±2.32	64.750±2.95	NS
Urea (mg/dl)	30.124±2.56	31.765±1.66	32.010±2.124	NS
Total protein (gm/dl)	4.975±0.125	4.890±0.15	4.875±0.17	NS
Cortisol (mg/dl)	11.275±0.84	11.450±1.08	11.370±0.84	NS
T3 (nmol/L)	3.572±0.92	4.132±0.97	4.562±0.71	NS
T4 (nmol/L)	4.165 c±0.68	6.360 b±0.88	8.202 a±0.43	*

Discussion:

It is a finding consistent with what he pointed out (Donkin, 2008; Novais et al., 2018) that glycerol that is added as a dietary supplement in feed, replaced with a certain percentage of corn, added to water, or given directly through the mouth leads to an increase in productive qualities (Saleem et al, 2018; Kalyesubula et al, 2019; Guo et al, 2020). There was no significant differences between the experimental transactions during the first three weeks, but a significant increase (P≤0.05) of the third transaction was observed compared to the first and second treatment during the fourth, fifth, sixth, seventh, eighth, ninth, tenth, eleventh, twelfth and thirteenth weeks. In the same ten weeks of the this moral superiority of the third treatment in terms of weekly weight gain may be due to the positive effect of glycerol on increased feed intake and improved nutrient digestion (Gaillard et al., 2018).

there was significant differences (P≤0.05) between the factors in the total weight gain rate of lambs. The third treatment given (60 ml/carries/day) outperformed Glycerol significantly (P≤0.05) at a rate of 16.35 kg over the first treatment (control) (9.85) kg and the second (30 ml/day/pregnancy) at a rate of (10.92) kg, while there were no moral differences between the first and second factors. This superiority in the final weight of lambs is the result of the superiority of this treatment in the rate of total and daily weight gain and the final weight rate. This result is a natural reflection as a result of the rate of

daily and weekly weight gain previously addressed. This is consistent with what he found (Trabue et al., 2007; Gorka et al., 2009; Sitnikov et al., 2015; Hyeokjoong, 2019; Wang et al., 2021).

It was noted that the third treatment (P≤0.05) is significantly superior to the first treatment (control) and the second treatment added (30ml/day/carriage), although there are no significant differences in the amount of feed consumed (dry matter). The reason for this improvement in weight gain may be attributed to the fact that glucose led to an improvement in the digestion factor of nutrients in the relation to these transactions and the provision of glucose. This was directly reflected in performance, growth and daily weight gain, and then the final weight of the lambs, as well as the added glucose to provide the energy necessary to get the most benefit From the bush provided, the third treatment significantly outperformed (P≤0.05) the second treatment and the first treatment, and this may be due to the fact that the percentage of glycerol used in the bush for the third treatment is more efficient than the second and first treatment in meeting the lambs' energy requirements. This is in line with what the researchers found that the use of glycerol in sheep's peerage promotes growth and the rate of weight gain and increases the final body weight of sheep (Andrade et al., 2018), while the results of studies differed in showing the effect of adding glycerol to the ruminant diet on body weight and body condition .

There is an increase in the efficiency of dietary conversion for both the second and third transactions (7.68 and 5.53 Feed/kg Meat) respectively (P≤0.05) compared to the first treatment (9.64 Feed/kg Meat), and the third treatment significantly outperformed (P≤0.05) in dietary conversion efficiency over the second treatment. These results are consistent with what was found by (Ezequiel et al., 2015; Andrade et al., 2018; Saleem et al., 2018). To the properties possessed by pure glycerol, as it is directly absorbed by the rumen rumen wall with 43%, as well as passage from the rumen to the gut pence 13%, which led to the enhancement of the animal's energy by increasing the synthesis of glucose. On the other hand, studies have not indicated the effective dose or amount of glycerol that increases or decreases the amount of feed consumed and conversion efficiency because many factors, including the purity of the glycerol used, the feeding system, the production stage of livestock and other factors, all affect the effective dose of glycerol (Favaro et al., 2015 and Karlsson et al., 2019).

The third treatment exceeded the rate of glucose concentration (89.753 mg/dL) over the second treatment 76.105 mg/dl compared to the first treatment recorded (74.012 mg/dl). It seems that the high concentration of glucose in the blood of lambs is due to the effect of glycerol added to the bush. Most of the glycerol consumed is absorbed directly by the animal and transmitted to the liver, where the enzyme glycerol Kinase converts it to glycerol-3-phosphate used to stimulate the formation of glucose in the liver through the process of sugar formation (Rojek and others, 2008). A result consistent with (Torres et al., 2021) and (Valencia et al., 2021) when no significant differences were recorded for both (total protein, blood urea and cholesterol) and this is consistent with his progress (Krehbiel, 2008). Through Table (5), we also note a moral superiority (P≤0.05) of the concentration of thyroxin T4 in the third treatment at a rate of 8.202 nmol/L over the second and first

treatment, which recorded a concentration of 6.360 and 4.165 nmol/L respectively. The positive effect of glycerol in the feed consumed and the efficiency of dietary conversion appears to have been reflected positively on thyroxin by increasing its concentration, which positively affected the increase in animal appetite and this led to these results. As for cortisol, there were no significant differences between the three factors, which may be due to the similar environmental conditions surrounding animals to some extent, which applies to the concentration of triiodine.

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