Effect of Different Source of Protein added to Awassi Lamb Diets on Some Blood Biochemical properties

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Abstract

This experiment was conducted in the Department of Animal Production (Animal Field) at the Faculty of Agriculture - Tikrit University for the period from 24/9/2023 to 1/7/2024 to study the effect of protein source in the concentrate diet on some blood biochemical properties. Eighteen local lambs at 3-4 months of age and 22.50 ± 2.60 kg of weight were used. The lambs were randomly distributed into 3 treatments and individually fed concentrate diet containing 14% crude protein. The lambs in treatment 1 were fed concentrate diet supplemented with 8% soybean meal and considered as control treatment. At treatments 2 and 3, lambs were fed concentrate diets supplemented with 13% sesame and 8% sunflower meals respectively. The results of the study indicated that there were no significant differences among treatments in the levels of total protein, albumin, urea and creatinine in the blood serum of animals before the start of the study (0 time) and 45 and 90 days thereafter. The results also showed that no significant differences were observed in the level of growth hormone in the blood serum samples collected from lambs at the three collection time.

Keywords: Protein sources, Blood biochemical traits, Awassi lambs.

Introduction

Sheep are one of the main sources of livestock in Iraq, constituting a large part of the national agricultural income [4]. sheep are widespread in most regions of the world due to their ability to adapt to diverse environmental conditions, and contribute to the global production of red meat by 11% of total ruminant meat, while in the Arab world this percentage reaches 33.33% [8, 11. 14]. Awassi sheep, including the Nuaimi and Shawali breeds, represent 58.2% of Iraq's total sheep [3], and the Awassi sheep breed was used in this study as it is considered the most important in the semi-arid regions of the Middle East [15], They have distinctive characteristics that help them adapt to diverse environmental conditions, and they are resistant to diseases and their ability to withstand high temperatures [22]. The role of nutrition comes after determining the type of breed, as the quality and quantity of feed are the main factors affecting the productivity of ruminants, so concentrate diet was introduced in the ration to increase its energy content, improve feed utilization efficiency and enhance performance [23]. Due to the importance of nutrition in its impact on production, the use of locally available roughages in suitable ratios can contribute to reduce costs while maintaining performance, in addition to reduce the need for cereals, which are an essential component of human feeding [7]. The use of alternative feeds Such as some by-products of agriculture or industry, that

are characterized by being rich in nutrients, these feeds can replace part of the traditional ingredients in animal nutrition, and these byproducts are often much less expensive than traditional feed, which reduces dependence on this enhances the benefits them. and profitability of livestock breeding, and also contributes to reduce waste and associated pollution problems [17] . Soybean meal (SBM) is a by-product of soybean seed processing, widely used in ruminant feed, soybeans and other by-products such as oils and gain are added to raise the nutritional value of feed [10]. The sesame meal (SSM), is a by-product obtained from the process of extracting oil from sesame seeds, and is commonly used in sheep feeding in many countries, it is characterized by its distinctive smell and taste, in addition to being a good source of some minerals, especially calcium, and it also contains a high content of crude protein up to 47% in some species, making it easy to digest and absorb [18]. On the other hand, sunflower meal (SFM) is a by-product of sunflower seed extraction, containing 50% protein and a high fiber content, equivalent to soybean meal, and is mainly used in livestock feed in African countries such as South Africa and Tanzania [16]. Al-Dulaimi, et. al [5] reported in a study on Awassi lambs fed different levels of protein in the diet of soybean meal, significant differences (P<0.05) in some biochemical properties of the blood with an increase in Its level in the diet, they found significant superiority (P<0.05) in the concentration of blood urea nitrogen (BUN)and the presence of large differences in blood albumin, and it was observed that there were no notable variations in creatinine and total blood protein across all nutritional levels in the diet. Ahmed [2]indicated that SBM did not have a significant effect on the concentration of total protein or uric acid, while SM increased blood total protein concentration. Shihab, et. al., [20] showed in an experiment conducted using Awassi lambs and fed on diets of soybean meal and sesame meal, no significant effect of treatments on serum proteins. Shihab, et. al., [19] found in their study on Awassi lambs and some of their experimental groups were fed on a diet of sunflower and sunflower meal with low degradation, an increase in the concentration of urea and total protein In blood, while it did not reach the level of significance in the concentration of albumin and globulin. In her study of the effect of using sunflower as a protein source in feeding 18 Awassi ewes, Daoud [9] indicated a significant superiority some biochemical (P<0.05) in blood properties such as total protein concentration, albumin and globulin, there are a large and varied number of hormones that have a potential role and especially the hormones involved are primarily those involved in protein and energy metabolism [12]. These include growth hormone (GH), whose pattern performs a vital function, as well as protein, fat and carbohydrate metabolism [1]. It controls the physiological processes that consist of metabolism and growth [24]. The main functions of this hormone include increasing protein synthesis in skeletal muscles, increasing lipolysis and reducing glucose absorption from the liver, increasing calcium and phosphorus absorption, increasing blood flow, increasing the oxidation of free fatty acids, and reducing the oxidation of calcium and amino acids [6, 13, 21]. In the light of the challenges faced the animal production sector in general, especially Awassi ewes, from the decline in production and a deterioration in public health, and due to the high prices of feed materials, it has become necessary to use feed additives that locally available at reasonable prices, these additives aim to promote animal health and increase productivity, as they contain a range of compounds and elements that enhance immunity and improve metabolic processes in the body. Accordingly, this research seeks to investigate the impact of soybean, sesame, and sunflower seed meal as dietary supplements on various biochemical characteristics of blood serum.

Material and Methods

This study was carried out in the animal sector of the Department of Animal Production at the Faculty of Agriculture, University of Tikrit, from September 24, 2023, to January 7, 2024. The lambs were Distributed into three groups, each consisting of six individuals, the first treatment group, designated as T1 (control), received a diet comprising Concentrate diet and soybean mealmaking up 8% of the total diet, the second treatment group, T2, was provided with a diet that included concentrate diet and sesame meal, constituting 13% of the overall diet, the third treatment, T3, involved feeding a concentrate diet supplemented with sunflower meal at a concentration of 8%. Following weaning, the lambs were housed for a trial period of 15 days, during which they were prevented from free grazing with the rest of the herd, they were placed in a semiexposed barn that was divided into individual cages, equipped with fixed feed and water, which was made available freely, the lambs were identified using plastic tags affixed to their ears, allowing for easy differentiation, additionally, the numbers corresponding to each treatment were displayed on the cages used for rearing. During the feeding process, a system commonly employed in livestock management was utilized, providing the lambs with a diet consisting of both concentrate and roughage feed, offered in two meals each day-one in the morning and one in the evening. Roughage includes Alfalfa hay at a rate of 1 kg per head per day, along with Concentrate at 3% of the lambs' live weight. The lambs were weighed weekly. Concentrate consisted crushed barley (54%), wheat bran (21%), crushed yellow corn (10%), limestone (1%), and table salt (1%), additionally, soybean meal, sesame, and sunflower are included in the specified proportions.

Blood samples were collected monthly at the morning from all lambs before treatment, in the middle and at the end of the experiment from jugular vein after cutting feed for 12 hours and 10 ml of blood with a disposable syringe, the blood was placed in glass tubes free of anticoagulant (Gel Tube) type (gel and clot activator) size 6 ml, placed in a centrifuge - German Originator Company (Modal_2_6E) - at a speed of 3000 rpm and for 15 minutes to obtain serum and put in tubes size 10 ml (plain GLM) which has been frozen at -20 ° C until laboratory analysis is performed. Serum separation was performed in the laboratory of the Department of Animal Production / Faculty of Agriculture / University of Tikrit and biochemical serum analysis were conducted in an external laboratory, including concentrations of total protein, creatinine, urea, albumin and growth hormone.

Serum biochemical tests were performed and estimated as follows:

Total protein and albumin

The concentration of total protein and albumin in serum was measured using a ready-made test kit manufactured by the French company Biolabo-Model: 1979 and following the work steps attached to (Kit) using a device known as spectrophotometer.

Urea and creatinine

The concentration of urea and creatinine level in blood serum were measured using a readymade test kit manufactured in the American company AFLO - Model: 1994 and following the work steps attached with (Kit) using a device known as Geno TEK.

Growth hormone

The concentration of growth hormone in lambs' blood serum was measured using a ready-made test kit manufactured by the American company (U.S.A, Monobind) for Elisa technique and following the work steps attached with (Kit) using a Cobas e 601.

Results and Discussion

Effect of protein source treatment on some blood biochemical characteristics:

Effect of protein source on the Blood total protein concentration at days 0, 45 and 90 of the study: The results shown in table (1) indicate that there are no significant differences in the blood total protein concentration among treatments at all collection times (Figure 1). The reason for this may be that the effect of the protein source of beneficial all treatments was on the metabolites in the blood those obtained by [2, 9,20.

Table 1. Effect of protein source on the blood total protein concentration)g/dl) at days 0, 45 and 90 of the study

	Mean \pm SE			
	Treatments			
Period (Days)	T1	T2	T3	P
	(Control)			
0	6.12±0.55	6.40 ± 0.06	6.51±0.16	N.S
	а	а	a	
45	6.66 ± 0.27	6.93 ± 0.33	6.78±0.19	N.S
	а	a	a	
90	6.96 ± 0.20	6.63 ± 0.15	6.79±0.24	N.S
	а	a	a	

Notes: N.S. Insignificant, Concentrate diet contained SBM at 8% in T1 (control treatment), SSM at 13% in T2 and SFM at 8% in T3.



Figure 1. Effect of protein source on the Blood total protein concentration at days 0, 45 and 90 of the study

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Effect of protein source on blood albumin concentration at days 0, 45 and 90 of the study: Table (2) showed that there was no significant difference among treatments in the blood albumin concentration at all collection times. This may be due to the fact that the effect of the protein source in the diet may have maintained the level of albumin in the blood In other word, the effect of the sources of protein was beneficial to maintain the natural balance of metabolites in the bodyThis result is consistent with those obtained by [9, 19.[

Table 2. Effect of protein source on blood albumin concentration)g/dl(at days 0, 45 and90 of the study

	Mean \pm SE			
	Treatments			
Period (Days)	T1	T2	T3	Р
	(Control)			
0	3.48±0.13	3.56 ± 0.04	3.32±0.13	N.S
	а	а	а	
45	3.13±0.16	3.43 ± 0.08	3.44±0.16	N.S
	а	а	а	
90	3.16±0.18	3.45 ± 0.07	3.55±0.12	N.S
	a	а	а	

Notes: N.S. Insignificant, Concentrate diet contained SBM at 8% in T1 (control treatment), SSM at 13% in T2 and SFM at 8% in T3



Figure 2. Effect of protein source on blood albumin concentration at days 0, 45 and 90 of the study

Effect of protein source on blood urea nitrogen concentration at days 0, 45 and 90 of the study: The results shown in Table (3) revealed that no significant differences among treatments in the blood urea nitrogen concentration at all collection times. This may be attributed to the increase in the amount of protein in the diet and the increase of the digested ratio, leading to an increase in the absorption of ruminal ammonia nitrogen through rumen wall into the blood and the conversion by the liver into urea, then part of urea is excreted through urine and the other part moves through the blood to the salivary glands and rumen wall again [2]. This findings are consistent with those reported by [2, 19.]

Table 3. Effect of protein source on blood urea nitrogen concentration)mg/dl(at days 0, 45and90 of the study

	Mean \pm SE			
	Treatments			_
Period (Days)	T1	T2	T3	Р
	(Control)			
0	46.66±2.4	36.00 ± 2.1	10 16+1 81	N.S
	3	9	49.10±4.04	
	а	а	a	
45	35.50 ± 1.8	36.00 ± 2.1	26 50+2 80	N.S
	7	9	30.30±2.80	
	а	а	a	
90	38.33 ± 2.2	38.83 ± 2.1	10 92 12 20	N.S
	3	2	40.85±2.50	
	а	a	ä	

Notes: N.S. Insignificant, Concentrate diet contained SBM at 8% in T1 (control treatment), SSM at 13% in T2 and SFM at 8% in T3.



Figure 3. Effect of protein source on blood urea nitrogen concentration at days 0, 45 and 90 of the study

Effect of protein source on blood creatinine concentration at days 0, 45 and 90 of the study: The results shown in table (4) indicated that there was no significant difference among treatments in the blood creatinine concentration at all collection times. This may be due to an increase in the amount of protein in the diet and in the proportion of digested proteinThis result is consistent with That obtained by [5.]

Finally, there were no significant differences in the concentrations of total protein, albumin,

urea nitrogen and creatinine in blood due to the effect of protein sources in the diet, and it was noted that all values were within the normal ranges.

Table 4. Effect of protein source on blood creatinine concentration)mg/dl(at days 0, 45 and 90of the study

	Mean ± SE Treatments			
Period (Days)	T1 (Control)	T2	Т3	Р
0	0.63±0.03	0.68±0.01	0.71±0.01	N.S
	a	а	a	
45	0.80 ± 0.04	0.81 ± 0.04	0.80 ± 0.03	N.S
00	a 0.21+0.02	a 0.21+0.02	a 0.20+0.02	NC
90	0.31 ± 0.03	0.31 ± 0.03	0.30 ± 0.03	N.S
	а	a	а	

Notes: N.S. Insignificant, Concentrate diet contained SBM at 8% in T1 (control treatment), SSM at 13% in T2 and SFM at 8% in T3.



Figure 4. Effect of protein source on blood creatinine concentration at days 0, 45 and 90 of the study

Effect of protein source on blood growth hormone concentration at days 0, 45 and 90 of the study: The statistical analysis (table 5) showed no significant difference in the concentration of growth hormone among treatments and all periods, which were represented by the days 0, 45 and 90 of the study. Studies have indicated that physiological levels of this hormone during the reproductive phase are usually lower than levels required in experimental protocols and that values of this hormone are high in growing or malnourished animals [12.]

	Mean ± standard			
Period (Week)	Tansaction T1	T2	Т3	P
	(Control)			
0	2.57±0.33	2.76±0.34	3.01±0.51	N.S
	а	а	а	
45	3.16 ± 0.32	3.29 ± 0.49	3.00±0.16	N.S
	а	а	а	
90	2.10 ± 0.27	2.62 ± 0.47	2.42±0.39	N.S
	а	а	a	

Table 5. Effect of protein source on blood growth hormone concentration (ng) at days 0, 45 and90 of the study

Notes: N.S. Insignificant, Concentrate diet contained SBM at 8% in T1 (control treatment), SSM at 13% in T2 and SFM at 8% in T3.





Conclusion

The findings of the current study indicate that the incorporation of a protein source derived from soybean, sesame, and sunflower meals did not yield significant variations in the blood parameters, which encompassed the biochemical characteristics of blood serum Acknowledgment: We are grateful to the animal Production Department, College of Agriculture, University of Tikrit for providing the requirements of work

[1]

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