EFFECT OF DIFFERENT SOURCES OF ROUGHAGES ON SOME BLOOD COMPONENTS OF AWASSI LAMBS

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ABSTRACT

The aim of this experiment was to find out the effect of urea treated wheat straw on Awassi lambs performance and some blood parameters. Eighteen individual Awassi lambs 6 months old and live body weights ranged 26-29 kg were used. They were divided into three equal groups fed either untreated wheat straw 0% (T1), urea treated wheat straw 7% (T2) or green alfalfa (T3) plus concentrate. Results showed that urea- treatment of wheat straw improved crud protein content of the straw .Group (T3) shows higher final live body weight (42.20kg) fallowed by group (T2) which shows higher water consumption (4782.89ml/day) compared with other groups. Total feed intake and feed conversion ratio were higher in groups T1 (62.2 kg and 4.813) respectively and T3 (62.00 kg and 4.015) respectively than group T2 (60.90 kg and 4.227) respectively. Blood glucose, serum albumin, serum total protein and cholesterol in all groups were in the normal range although cholesterol in T1 (41.650 mg/dL), T2 (51.975 mg/dL) and T3 (62.468 mg/dL) show minor elevation than normal range reported by other studies. Differences among the three groups in blood glucose levels were significant in day 30 after the treatment where group T2 (110.025 mg/dL) have higher values when compared with T1 (95.72 mg/dL) and T3 (88.903 mg/dL), while in day 70 differences are not significant. The same trends where shown in cholesterol, total protein and albumin. Serum glutamate oxaloacetate transaminase and serum glutamate pyruvat transaminase where higher in group T2 (37.500 IU/L), (30.500 IU/L) respectively when compared with other groups; but values where in the normal rang, but these values where decrease in their levels with time.

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تأثير مصادر مختلفة من العلف الخشن على بعض مكونات الدم في حملان العواسي

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المستخلص:

كان الهدف من هذه الدراسة معرفة تأثير معاملة تبن الحنطة باليوريا على أداء حملان العواسي مع بعض معايير الدم . تم استخدام ١٨ حمل عواسي، بعمر ٦ أشهر بوزن حي تراوح بين ٢٦-٢٩ كغم. قسمت إلى ثلاث مجاميع متساوية غذيت على تبن الحنطة غير المعامل (T1) والتبن المعامل باليوريا ٧% (T٢) والجت الأخضر مع العلف المركز (T3). أظهرت النتائج أن معاملة التبن باليوريا أدت إلى رفع نسبة البروتين فيهز كانت المجموعة T3 الأعلى في الوزن النهائي (٤٢.٢٠ كغم) تلتها المجموعة T2 في استهلاك الماء (مللتر/ يوم٤٧٨٢.٨٩) مقارنة بالمجموعتين الاخريتين، استهلاك العلف الكلي وكفاءة التحويل الغذائي كانت الأعلى في المجموعة T1 (٦٢.٢، ٤.٨١٣ كغم) على الترتيب والمجموعة T3 (٦٢.٠٠، ٤.٠١٥كغم) على الترتيب قياسا" بالمجموعة T2 (٦٠.٩٠، ٤.٢٢٧ كغم). تراكيز الكلوكوز والبروتين والالبومين والكوليسترول في كل المجاميع كانت ضمن المعدلات، إلا أن تركيز الكولسترول في T1 كان (٤١.٦٥ملغم / دسيليتر) وT2 (٥١.٩٧٥ملغم / دسيليتر) و T3 (٦٢.٤٦٨ ملغم / دسيليتر) اظهر ارتفاعا عن المعدلات الطبيعية والتي ذكرت في العديد من الدراسات. كانت الفروق بين المعاملات الثلاثة في مستوى كلوكوز الدم معنوية عند اليوم ٣٠ من بداية الدراسة إذ أظهرت المجموعة T2 (١١٠.٠٢٥ملغم / دسيليتر) أعلى قيمة مقارنة مع T1 (٩٥.٧٢ملغم / دسيليتر) وT3 (٨٨.٩٠٣ملغم / دسيليتر) في حين أن الفروق عند اليوم ٧٠ لم تكن معنوية . نفس الانحدار في الكولسترول والبروتين الكلي والأح. أما بالنسبة لأنزيمات قياس فعالية الكبد SGOT (الأنزيم الناقل لمجموعة الأمين) و SGPT (الأنزيم الناقل لمجموعة الامين) كانت أعلى في المجموعة (T2) (٣٧.٥٠٠وحدة دولية / لتر)، (٣٠.٥٠٠ وحدة دولية / لتر) على التوالي مقارنة بالمجموعتين الاخريتين، ألا أن القيم كانت ضمن المعدلات الطبيعية كما أن هذه القيم انخفضت مستوياتها مع الوقت

Introduction

The major constraint for the development of sheep production in Iraq and in many parts of the world is the shortage of feed in dry season in Iraq low quality roughages wheat and barley straw are available all the year specially after the harvesting season i.e. (from may to September). To improve their quality many studies were performed using either alkali treatment (12; 14) urea treated (12) and urea and molasses (15; 18). Most of these studies perform on this subject deal with digestibility, feed conversion and general performance of the animals, yet little was done on the adverse effect of urea addition to the feed on general health and blood parameters (30). Early studies on urea toxicity (19) recorded a dose of 166 mg/kg BW/day and 232 mg/kg BW/day cause a sudden death in sheep. In ruminants unaccustomed to urea, ingestion of 0.3 – 0.5 gm urea/kg may be toxic, the toxic dose of urea in presumably unaccustomed cattle is 0.45 gm /kg (50 gm total dose) but that animals can ingest more urea than this if the dose increased gradually (6; 23). Recently studies on growing male buffalo concluded that feeding ammoniated wheat straw has no adverse effect on blood parameters (22; 7). While (11) found blood plasma level of tyrosine, lysine, valine, and leucine were significantly lower in urea fed lambs compared to those fed soybean. Serum total protein and albumin levels decreased with time for lambs fed either soybean or urea but the decrease was greater for lambs fed urea.

The objective of present study was to investigate the effect of different sources of roughages on some blood components of growing Awassi lambs.

Materials and Methods

Location and climate: The experiment was conducted in a private farm at Tikrit, longitude: 43.700 E and latitude: 34.600 N the altitude is about 72 meters over the sea level. The climate of the region is subtropical, and the trial was conducted during July - October 2009 where weather is dry and hot summer time.

Eighteen Awassi males (6 months old and live body weights ranged 26-29 kg) were housed in individual pens with free access to clean water. The lambs were treated against parasites with injection of 0.25 ml /kg, of Ivermectin. The feed was offered twice daily, at 8 O'clock in the morning and at 17 O'clock afternoon. The wheat straw was chopped and offered either plan or urea treated. The urea treated wheat straw was prepared by pouring (28 kg of urea in 240 L, 60% of water over a stack to make7% urea treated wheat straw. Then covered with plastic sheet carefully to prevent in and out air for 21 days before feeding the lambs. The crude protein content of wheat straw was 0.3 % while the urea treated wheat straw was 3.6 %. The concentrate was provided on a base of 3% of the life body weight, which assumed to provide 75% of the total maintenances and growth requirements of the lambs. While the roughages was offered up to satiety limit. Water consumption was measured daily at 8 O'clock up to the nearest 100 ml.

Feed was composed of two types; concentrate and roughages (wheat straw or green alfalfa). The composition and the percentage of the concentrate ingredients were shown in table (1). The lambs were assigned into three groups, 6 lambs each and fed in individual nutrition system; T1, T2, and T3. T1 was offered untreated wheat straw plus the concentrate, T2 was offered 7% urea treated wheat straw plus the concentrate, and T3; group was offered green alfalfa plus the concentrate.

Table 1. Formulation of concentrate diet.

Feed stuff	%
Yellow corn	13
Wheat grain	30
Barley	35
Flour	10
Soya bean meal	10
inerals and vit.mix	2
Minerals and vit.mix	2

Table 2. Chemical composition of feedstuff %.

Ingredients %	DM	CP	EE	CF	Ash	In vitro DM digestibility
Concentrate mix	84.86	12.54	2.41	2.59	2.15	80.3
Wheat straw	87.2	3.0	1.72	34.23	4.62	56.43
Urea treated wheat straw	85.60	3.64	1.27	33.13	4.44	57.52
Alfalfa	25.3	3.89	0.44	7.5	2.25	85.92

DM= Dry matters. CP= Crud Protein. EE= Ether Extract. CF= Crud Fibers

Dry matters (DM), total crud protein (CP), Ether extract (EE), crud fibers (CF), Ash, and in vitro digestibility. Content of the concentrate, wheat straw and alfalfa were performed following methods (4). Blood samples were collected from jugular vein during day one, day 35 and day 70 of the experimental period from all lambs in morning. Blood total protein was determined by commercial kit biolab reagent (France). Blood serum glucose was determined by enzymatic colorimetric test using commercial kit (Biomaghreb- Tunis) (13), Blood serum albumin was measured by special commercial kit(Biomerieux - france) (9). Total blood serum cholesterol was determined by commercial kit (Biomerieux –France) (2). Blood serum glutamate oxaloacetat tranaminase (SGOT), and serum glutamate pyruvate transaminase (SGPT) (Biomaghreb-tunis) was determind according to (28). Data were subjected to one–way analysis of variance (ANOVA) using statistical program (29).

Results and Discussion

Treated wheat straw with urea improved crud protein percentage 3.0 to 3.6% (Table 2). Some of the fattening traits in the three groups including initial live body weights, final live body weights, daily gain, total feed intake (concentrate + roughages), feed conversion and daily water consumption are presented in Table 3. Data revealed significant differences in the benefit to group T3 which fed concentrate and alfalfa in the final body weights, feed conversion ratio and average daily gain and final live body weight and this was agreement with results obtained by (27). Group T2 showed higher daily water consumption. Both groups T2 and T3 show better performance than group T1 in the feed conversion ratio, final live body weight and average daily gain.

Table 3. Some fattening traits, feed intake, feed conversion and daily water consumption in Awassi lambs under different treatments.

Treatments	T1	T2	T3
Initial body weight (Kg)	27.00 ± 0.35a	26.9 ± 0.18a	27.20 ± 0.25a
Final body weight (Kg)	40.0 ± 0.57 a	41.40 ± 0.51 a	42.20 ± 0.37 b
Daily weight gain (DWG gm/day)	173 ± 6.99 a	196 ± 8.05 ab	200 ± 7.60 a
Total DM intake (Kg)	62.2 ± 0.663 a	60.90 ± 0.678 a	62.00 ± 0.273 a
Feed conversion ratio (kg dm /gm DWG)	4.813 ± 0.184 a	4.227 ± 0.180 b	4.0157 ± 0.157 b
Daily water consumption (Ml/ Day)	2964.89 ± 27.180 a	4782.89 ± 101.64 b	2843.56 ± 27.648 a

ab= Different letters in the same raw indicate significant differences (P< 0.05)

Table 4 shows some blood parameters which were measured in day one, day 35 and day 70. Serum glucose in day one was 78.038, 77.348 and 69.225 mg/dL for groups T1, T2 and T3, respectively. These values were increased to 119.875, 125.550 and 112.110 mg/dL in day 70 for T1, T2 and T3, respectively. Serum cholesterol show increase with time, from 16.156 to 41.56 mg /dL in T1, from 15.975 to 51.975 mg /dL in T2 and from 12.493 to 62.468 mg /dL in T3. However differences between groups are not significant. The same trend was found in Total protein. While serum albumin values show no apparent changes. On contrast SGOT activity showed decrease values with time though differences were not significant except in group T2 in which the values decrease from 52.00 to 37.500 IU/L in day one and day 70, respectively. The range values of SGPT among the three groups were 26.250 to 43.250 IU/L and the differences among the groups and time are not significant. Treatment of wheat straw with urea improves crud protein content of the straw this was in agreement with result obtained previously by others (8; 24; 25).

In this trial lambs fed concentrate plus alfalfa (T3) show higher final live body weight and higher average daily weight gain when compared with group of lambs fed concentrate plus untreated wheat straw (T1), whereas differences between (T3) and (T2) where not significant (Table 2). This can be attributed to the high protein content in the green alfalfa and to the additional nitrogen in the urea treated wheat straw, which is utilized efficiently by rumen microflora (10; 31).

There are no significant differences in the results between (T1) and (T3) in total feed intake which were higher than (T2). This was also reflected to the feed conversion which was higher in (T1) when compared with other two groups (Table 3) and this could be explained due to lower total digestible energy required for group T1 feed, and low total dry matter in group (T3) feed because of the higher moisture content of green alfalfa, which affect both total energy and feed volume. Whereas in group (T2) there was increasing of apparent organic matter digestibility. (12) stated that urea treated straw improved digestibility of dry matter, crude protein and nitrogen free extract. Our results were in agreement with those obtained by (26).

Water consumption was increased significantly in group T2 when compared with other two groups, (Table 3). These results were in agreements with results obtained by (21), as there are many factors affecting water consumption including feed type, feed constituents, feed additives, urea treated, and climate and more water consumption per day with urea treatment is related to high pH related to the buffering of rumen or alkaline, so to decrease pH the animal will consumed more water to dilute the rumen liquid (3; 17). Blood serum glucose, albumin and total protein concentrations were in the normal ranges

reported by (1; 5; 16) while cholesterol levels were higher in the present study than those reported previously by (5; 16). These parameters are usually affected by the level of nutrition and closely associated with metabolic activities of individual animals.

Table 4. Some measured blood parameters.

Blood biochemical parameter	No	Days	Groups		
			T1	T2	T3
Glucose mg/dL	٦	١	a ٧٨.٠٣٨ ± ١.862	a ٧٧.٣٤٨± ٢.٦٦٩	b ٦٩.٢٢٥± ٠.٣٠٠
		٣٥	a ٩٥.٧٢ ± ٢.١٣٦	a١١٠.٠٢٥±١.٩٧٨	c٨٨.٩٠٣±١.٧٣٦
		٧٠	ab١١٩.٨٧٥ ±1.388	a١٢٥.٥٥٠± ٢.٠٧٤	a١١٢.١١٠±٥.١٩٣
Cholesterol mg/dL	٦	١	a١٦.١٥٦ ± ٢.٣٧٦	a١٥.٩٧٥±٥.٩٥٤	a١٢.٤٩٣± ٢.٠٠٣
		٣٥	a ٣٢.٣١٣ ±٤.٧٥٢	a٣١.٩٤٩± ١١.٩٠٩	b٣٩.٦٦٥±١.٣٠٠
		٧٠	a ٤١.٦٥٠ ± ٥.٩٦	a٥١.٩٧٥± ٥.٩٥٤	a٦٢.٤٦٨±١.٠٠١
Total protein g/dL	٦	١	ab ١٥.٠٥٩ ±٠.٣٣	a ١٦.٦٣٣±١.٥٢	b١٤.١٦٢±٠.٢٣٢٨
		٣٥	a ١٨.٢٩٦±٠.٣٦٨	ab١٨.٠٣٧±٠.٩٠٨	b ١٦.٠٨٥±٠.٤٨
		٧٠	a ٢٠.٦٧٨±٠.٦٧٥	b١٩.٥٥٥±٠.٦٢٢	b ١٧.١٣٠±٠.٣٥٠
Albumin g/dL	٦	١	b ٢.٨٥٠±٠.٠٦٢	a ±٠.٠٧٢3.321	b ٢.٧٥٩±٠.٠٤٥
		٣٥	b ٣.٦٣١±٠.١٤٩	a ٤.٠٩٢±٠.٠٣٧	c٢.٠٥٩١±٠.٠٤٢
		٧٠	a ٤.٠٦٧±٠.٠٥٢	b ٢.٥٣٤±٠.٢٠١	b ٢.٢٦٩±٠.٠١٧
SGOT IU/L	٦	١	b٣٣.٢٥٠±٣.٠١٠	a ٥٢.٠٠٠ ±١.٦٣٣	b ٣٠.٧٥٠±٣.٩٨٧
		٣٥	b ٢٣.٥٠٠±١.٥٠٠	a ٣٧.٥٠٠±١.٨٩	b ٢١.٧٥٠±٣.١١٩
		٧٠	b ٢١.٥٠٠±١.٠٤١	b٣٧.٥٠٠±١.٧٠٨	b١٧.٥٠٠±١.٦٥٨
SGPT IU/L	٦	١	a٤٣.٢٥٠ ±١٣.٧٣١	a ٢٨.٥٠٠±٢.٥٠٠	a٣٤.٠٠٠±٣.٦٥١
		٣٥	a ٢٧.٧٥٠±١.٧٤٧	a٣٠.٥٠٠±٣.٦٦	a ٢٦.٥٠٠±١.٣٢٣
		٧٠	a 26.250±0.854	a ٣٠.٥٠٠±٣.٦٦٣	a٢٦.٢٥٠±١.٤٣٦

a, b, c= Different letters in the same raw indicate significant differences (P< 0.05).

The trends of these blood parameters in this study seem to be increased with age to a certain limits in healthy animal. Differences in blood glucose among the three groups were significant in day 30, where group T2 have higher levels when compared with T1 and T3 while in day 70 although T2 have higher level of blood glucose but differences were not significant. The same trends were found in total serum cholesterol, protein, and albumin.

Serum glutamate oxalo acetate transaminase (SGOT) is a sensitive indicator of liver damage from different type of diseases and toxins and serum glutamate pyruvate transaminase (SGPT) give us information about liver function. These enzymes play important role in triglyceride cycle, cellular energy metabolism and protein synthesis. Urea is a toxic end product of protein catabolism, yet rumen flora can utilize its nitrogen for microbial protein synthesis and increase its concentration may produce toxic effect.

Data obtained in the present study show higher values in SGOT in group T2 when compared with T1 and T3 ($P < 0.05$) yet the values show decrease with age and fall within the normal concentrations (40 – 96

IU/L) of references values (20). The reduction in these values could be explained due to the adaptation of the animals on urea treated wheat straw. On the other side the activity of the enzyme SGPT in the present study were higher (26.250 to 43. 250 IU/L) than those reported by (20) and (28) which were in the range of (5 -17 IU/L). This variation may be attributed to individual variation or due to analytical method used previously (11). Differences among the three groups in the activity of SGPT obtained in this study show no significant differences.

Results obtained in this study indicated that urea in controlled concentration improve crud protein value of the ration and, as a result, improve the performance of the lambs, and it seem that there is no risk of urea poisoning if it used in the concentration of 7 % (used in the present experiment) though many researchers advice sheep producer to increase urea concentration in the ration gradually to adapt the ruminant to it.

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