IMPACT OF REPLACING DIFFERENT ENERGY SOURCES AS SUBSTITUTE OF BARLEY CEREALS ON PHYSIOLOGICAL SIGNS AND BIOCHEMICAL BLOOD TRAITS OF AWASSI EWES

Alyaa S.K. AL-Shammari, Mozhir K.K. Almahdawi[1*] and Ali D.M. Al-Hashimi
College of Veterinary Medicine, Al-Qassim Green University, Babylon city-964, Iraq

Received on: 06.04.2021
Accepted on: 21.06.2021

ABSTRACT

This experiment was conducted in one of the private sheep farm sector in Al-Fayadhiya village which lies about 30 km to east of the Al-Qasim city of Babylon Governorate. Using of 60 heads of Awassi ewes were used at the beginning of experiment, and average of initial weight of all ewes between 43.5-44.2 kg.In order to find out effect of substituting two energy sources (sugar beet molasses and remnants of rashi industry) as a substitute for barley grains in basal diet so as to studying biochemical characteristics and blood proteins, physiological biology of Awassi ewes. These animals were randomly divided into three groups, at rate of 20 heads for each group. The ewes of the first group were fed on a basal ration that contained barley grains as a source of energy in bush, and then second animals group were fed on sugar beet molasses as an alternative energy source for barley grain. As for third group of ewes which ate diet that contained remnants of the rashi industry as an alternative energy source for grains barley for pregnant period (150 day). The results of the current study revealed highly significant improvement ($P \leq 0.1$) in levels of red blood cells (RBC), white blood cells (WBC), haemoglobin (Hb), packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), total protein, albumin, and globulin, and physiological biology (body temperature, heart pulse and respiration rate) in favor of experimental treatments for pregnant ewes consuming molasses and remnants of rashi industry compared to control group that consumed barley. The results of the red blood cell count were 6.840, 11.319, 11.735 × 10^6 corpus, white blood cell count 7171, 10506, 10543 cells, the haemoglobin concentration of 6.965, 10.076, 10.350 gm, packed cell volume 19.12, 20.63, 21.31% and mean size of red blood cells. 23,490, 24,495, 24,830 micrograms, average weight of erythrocyte haemoglobin 7.001, 9,300, 9,930 pg, mean erythrocyte haemoglobin concentration of 25,550, 31,933, 32,720 gm, total blood protein 8.37, 11.36, 11.66 gm, albumin 5.33, 6.10, 5.27 gm, and globulin 3.04, 5.26, 5.39 gm, body temperature 38.95, 38.56, 38.12°C, heart pulse rate 88.95, 76.45, 75.65 plus/minute and respiratory rate 52.90, 44.65, 40.30 times/minute for three treatments. We conclude from this study that most of the biochemical characteristics of blood, blood proteins and physiological aspects was improved significantly on blood serum of Awassi ewes that dealt with rations containing molasses and the remnants of rashi industry compared to the group of ewes that ate barley grains in control diet.

Key words: Barley, beet molasses, remnants of rashi, blood proteins, Awassi ewes

Introduction

The steadily increasing numbers of population and rise in living standard of the consumers which had leads to an increasing demand of sheep meat due to its huge palatability and good flavor (Al-Jalili *et al*.,1985 and Leward *et al*.,1995). Therefore, it requires increasing the marketed quantities of red meat by following modern scientific methods of feeding on cheap forage materials in order to bring about standard changes in fattening and production of heavy weight lambs (Abd *et al*., 2009, Al-Sayegh and Al-Qass, 2006), which are evidence of their body filling with muscle tissue, by using various sources of energy for feeding of Awassi sheep (Kashmoula and Almahdawi, 2009 and Al-Zubaidi, 2013). As the weight increases are result of improving of nutritional conversion of lambs which represented by deposition of muscle tissue and fat (Shams Al-Din, 1997).The Sheep are distinguished by their ability to consume industrial - agricultural waste, including bakery waste that can be used as an energy source in ruminant diets and its ability to convert those industrial agricultural waste into products suitable for human consumption such as meat and milk and vitamins (Passini *et al*., 2001). The sheep breeders in Iraq are looking to obtain a profitable economic return by using food processing factories waste so that are locally available and inexpensive to replace grains in preparation for reducing the cost of producing one unit of meat under the conditions of increasing population growth (Al-Zubaidi, 2013). In this direction, Abo-Donia (2003) was using the oil refining waste produced from palm oil and second product from sunflower oil at rate of 5% of based on dry matter of the total diet instead of corn grains as unconventional sources of energy on growth diets of Osimi sheep and diets were balanced in energy and nitrogen. The results showed of serum analyzes of animals were fed on both sources of oil refining waste was a significant increase in values of total lipids, triglycerides, total cholesterol, total protein, globulin, as well as AST and ALT enzymescompared to the group was consumed on diet free of oil refining waste. From the results of this study, it is possible to use oil refining waste, product of palm oil refining, while the oil refining waste which must be used, the refining product of sunflower oil, because it contains a high percentage of unsaturated fatty acids. Also, Khoshnau (2009) Jalil *et al.* (2020) added restaurant leftovers and poultry residues as energy sources to replace part of the barley of lambs fattening diets. In another study, Al-Issawi *et al*. (2011) added nutritional enhancers to poor fodder as a source of energy to activate rumen microbes, which led to improved digestion and absorption of food compounds.Also, Al-Zubaidi (2013) worked on dry bread as a source of energy in diet, as it

[1*]Corresponding author present address: College of Agriculture and Forestry, University of Mosul, Iraq, Email: mozhir2007@uomosul.edu.iq, ORCID ID: https://orcid.org/0000-0001-9667-0890

is one of the components of diets for fattening Awassi lambs, as it is available throughout the year and method of its use as ruminant fodder has led to an improvement in growth rates of Awassi lambs, which comes as a result of the cumulative effect of all the factors affecting ongrowth,which includes genetic and environmental factors that effect onindividual growth and development (Kashmoula and Almahdawi, 2009). In recent times, Iraq has witnessed presence of many stores that trade in sale and purchase of bakery waste, as it is cheaper than grain or waste processing grains such as bran as an important source for energy production, so that one gram of it produces 2.79 calories (Al-Zubaidi, 2013). Many countries have given great importance of bread remains in it. Germany, the quantities of bread residues reached 600 thousand tons per year, and in Saudi Arabia, the amount of imported fodder barley reached about 7 million tons per year, which is one of the alternatives that researchers and breeders were using as an energy source for animals as an alternative to barley grains (Almahdawi and Alltalib, 2020).Al- Mosawi (2015) who noticed a significant increase in glucose and cholesterol concentrations of blood serum for Awassi sheep , which reached 33.05, 34.24, 33.47 mg/100 ml serum and cholesterol, 42.55, 50.75, 56.26 mg/ 100 ml blood serum, and at the same time, a significant decrease was found at concentration of triglycerides that were 21.00, 19.25, 18.11 mg/100 ml blood serum when using sunflower oil in partial replacement rates of 0, 2.5, 5% substitute wheat bran of fattening diets of Awassi lambs. In Iraq, most breeders depend on barley grains as an energy source to feed the sheep, because of increase in prices of traditional concentrated feed materials, including grains that are widely used for fattening sheep, this has led to high animal production costs, low production of red meat and low consumption rates of protein from individuals, due to lack of pastoral land areas and the ignorance of breeders about the components of the feed, the costs of feeding animals have increased (Khoshnau, 2009). Therefore, studies have tended to search for other unconventional feed sources of energy with high nutritional value and reasonable prices that can be used in feeding ruminants (Ibrahim, 2007) In another direction, Altalib *et al*. (2016) noted the existence of high significant differences in hematological measurements (red blood cell count, white blood cell count, haemoglobin level, packed cell volume, total protein and albumin) between three energy sources (barley, molasses, and rice polishings) was using to fattening diets of Awassi lambs for a fattening period of 105 days.The researchers attributed significant decrease in red blood cell counts, white blood cell count, haemoglobin level, and packed cells volume in second-treated of animals with fed on molasses compared to animals consumed on barley and rice polishings that leads to increased acidity of ruminal fluids of lambs which reached pH (5.84). As a result of the presence of molasses with a high percentage in rations in comparison to pH level in rumen liquid than for the 1stand 3rd lamb groups with (pH levels 6.57,6.62 ,respectively) which was consumed barley and rice flake for energy requirements in the 1st and 3rd rations.As for concentrations of blood proteins, they found a significant superiority in mean total protein and albumin in serum lof the lambs consuming barley and rice polishings as sources of energyrequirements in first and third rations compared to the lambs group that consuming beet molasses in second ration. The reason of this result may be attributed to increased glucose formation from amino acids of animals that consume barely and rice orchid in their rations (Al-Mallah, 2007). In a study by Saeed *et al*. (2019), they observed a significant effect of energy source (yellow corn) added in diet on white blood cells account, on the one hand, and on the other hand, they found no significant effect on other hematological measurements (red blood cell count and haemoglobin concentration and packed cell volume) between three treatments when using yellow corn with partial replacement rates of 0, 5 and 10% replacing with percentages of palm oil cake in feeds of fattening Dorper lambs for a fattening period of 120 days.In a study by Almahdawi and Altalib (2020), their results indicated a huge significant ($P\leq0.01$) superiority in rates of blood protein and glucose concentrations in favor of groups of sheep that dealt with dried bread leftovers used as a partial energy source at rates (12, 24, 36%) of barley grains ofAwassi ewes' diets compared to comparison group.The mean values of albumin 3.26, 3.86, 4.20, 4.49 gm/dl, globulin 2.87, 3.19, 3.39, 3.85 gm/dl, total blood protein were 6.13, 7.05, 7.59, 8.34 gm/dl, respectively, while mean values of blood glucose were 58.63, 64.49, 68.96, 69.84 mg/dl respectively to replace dried bread leftovers in order. some studies (Shams Al- Din *et al*., 2012) reported that changes in some blood characteristics can be good detectors for some disease conditions, such as change in white blood cell count (WBC) and compacted blood cell volume percentage (PCV%). The results of some scientific research also showed that the values of blood lipids and cholesterol (Zeinab *et al*., 1994) and values of total blood protein and globulin (Shams Al-Din and Taha, 1999) are affected by the different components of the food provided to animals (Shams al-Din *et al*., 2006) and type of feed consumed (Al-Nasir and Kharoufa, 1994). However, blood biochemical values were not significantly affected by age of the animal (Ajibaye, 2011).

This study aimed to know effect of adding different types of energy sources, namely (barley, sugar beet molasses, remnants of rashi industry) in growth diets of Awassi ewes on some blood characteristics without a deterioration in health status of animals.

Materials and Methods

This study was applied in a sheep breeding farm in Al-Fayadhiya village, about 30 km to east of Al-Qasim city of Babel Governorate. Eighty heads of Awassi ewes were using in this experiment, with similar in live weight (43.5-44.2 kg) and age (2.5-3 years). The animals were randomly divided into three groups with twenty heads/group. During the period of the experiment, the ewes with doses of Albendazole to eliminate internal parasites, and dosing was repeated after 21 days of the first dose. The sheep were dipped in dip ponds to eliminate external parasites and the ewes prepared preventive program for the duration of the experiment. The three diets shown in proportions of their components and their chemical analysis in Table 1. Barley grains were used as they contain a high percentage of starch as a source of energy from complex carbohydrates in first diet. Another is sugar beet molasses, which contains a high level of simple soluble sugars that dissolve easily in the rumen liquid and as for third feed, the residues of the sesame industry, which contains high crude fat, were replaced as a source of energy as an alternative to

Table 1: Chemical analysis of diet components used in rations of Awassi ewes.

Forage materials	Ration (1) %	Ration (2) %	Ration (3) %
1. Barley	32	---	---
2. Beet Sugar Molassess	---	25	---
3.Sesame waste industries	---	---	25
4. Wheat bran	35	38	30
5. Sugar beet pulp**	12	13	15
6. Wheat straw	3	5.5	8
7. Sunflower seed meal	14	11	9
8. Sunflower oil	0	0	4
9. Yellow corn cobs	2.25	4	7
10. Urea (48%N_2)	0.75	1.5	---
11. Limestone	1	1	1
12. Salts	1	1	1
Total	100%	100%	100%
Dry matter (%)	97.24	98.08	97.29
Crude protein (%)	14.88	14.56	14.34
Ether extract (%)	2.41	1.96	8.04
Crude fiber (%)	16.47	12.42	19.93
Ash (%)	4.89	6.85	6.45
Nitrogen free extract (%)	60.14	56.46	44.89
Metabolize energy (kcal/kg)	2425	2409	2463

*Calculated metabolize energy representing all components of the forages from (AL-Khawaja *et al.*, 1978) except molasses sugar beet calculated by MAFF (1977).
** Calculated metabolize energy of sugar beet pulp by AL-Badrany (1997).

barley grains. These three diets were taken into account to cover the needs of the ewes of nutritional compounds, especially protein and energy, and the diets were similar in their content of crude protein (14.88, 14.56, 14.34% crude protein) and the metabolize energy (2425, 2409, and 2463 Kcal/kg feed) for the three diets, respectively. Where the feed was provided to animals at eight in the morning, and at four in the afternoon during the period of the experiment. In the last week of the experiment period, blood samples were drawn twice from the jugular vein of the animals by using test tubes with a tight cover. The first time, the tubes contain anticoagulant (EDTA) to separate the blood serum from the blood samples. The tubes of blood samples were placed in a centrifuge at a speed of 3000 per minute for10 minute of blood serum isolation from thrombus for determination of blood proteins (albumin, globulin, and total protein) using a French -made Biobala kit, as well as triglycerides and cholesterol were determined according to the method used by Kaneko *et al*. (1997). While on the second time, blood samples were drawn in empty test tubes with anticoagulant for determination of red blood cell (RBC), white blood cell (WBC), packed cell volume (PCV), haemoglobin (Hb), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) according to the method used of (Coles, 1986; Weiss and Wardrop, 2010). Also, at the end of the experiment, the physiological aspects of all animals were measured (body temperature, respiratory rate per minute, and heartbeats per minute) according to the method used in Saadoun *et al*. (2009).The statistical analysis of the data was conducted according to the reports of AL-Zubaidy and AL-Falahy (2016).The significant differences between the studied traits means were tested at probability of 0.05 and 0.01 levels with using Duncan test (1955). Statistical analysis of the studied traits was performed using SAS System (2012).

Table 2: Effects of energy source in diet on the biochemical blood parameters of Awassi ewes.

Energy source	Group 1 (barley)	Group 2 (molasses)	Group 3 (sesame waste)
1. No.of ewes	20	20	20
2. RBC ($\times10^6$)**	6.840 ± 0.19 B	11.319 ± 0.18A	11.735 ± 0.19A
3. WBC ($\times10^3$)**	7171 ± 8.47B	10506 ± 125.37A	10543 ± 121.65A
4. Hb (gm)**	6.965 ± 0.13B	10.076 ± 0.17A	10.350 ± 0.20A
5. PCV (%)**	19.20 ± 0.14B	20.63 ± 0.44A	21.31 ± 0.15A
6. MCV(μ^3)**	23.490 ± 0.18B	24.495 ± 0.18A	24.830 ± 0.22A
7. MCH (pico gm)**	7.001 ± 0.13C	9.300 ± 0.16B	9.930 ± 0.15A
8. MCHC (gm/100 ml)**	25.550 ± 0.09C	31.933 ± 0.24B	32.720 ± 0.20A

NS:Non significant *Significant 0.05 ** High Significant 0.01

Results and Discussion

Biochemical analysis of blood

Through the results presented in Table 2, the results of study current indicated high significant effect ($P\leq0.01$) of energy source was used in diet on red blood cell count (RBC), white blood cells (WBC), haemoglobin level (Hb), and packed cell volume (PCV%) and mean corpuscular volume (MCV) between the first energy source (barley grains) than for second treatments (sugar beet molasses) and third (sesame industry residues) in feeding of Awassi ewes. The red blood cells count were 6.840, 11.319, 11.375 × 106 corpus/100 ml, white blood cells 7171, 10506, 10543 cells/100 ml, haemoglobin concentration of 6.965, 10.076, 10.350 gm, packed cell volume 19.20, 20.63, 21.31%, and the Mean corpuscle volume was 23.490, 24.495, 24.830 microgram. The results of this study were compatible with the results of Altalib *et al*. (2016**),** who reported significant differences in levels of red blood cell, white blood cell, haemoglobin concentration, and packed cell volume between three energy sources (barley, molasses and rice reeds) in the rations of growing Awassi lambs for a period of 105 days. The results of the current study were contrary to results of Saeed *et al*. (2019), who observed no differences in levels of erythrocytes, leukocytes, haemoglobin concentration, and volume of red blood cells between three energy sources used in fattening diets of Dorper lambs, when replacing yellow corn grains as partial proportions (0, 5, 10%) with palm oil cake used in basal ration. With regard to the mean corpuscular volume of the red blood cell, the results showed in Table 2 revealed presence of high significant difference ($P\leq0.01$) between first group (control), second group (sugar beet molasses) and third group (sesame processing wastes) on mean corpuscular volume, which amounted to 23.490, 24.495, 24.830 μg and mean corpuscular haemoglobin 7.001, 9.300 and 9.930 pg for three treatments, respectively. In present study the results revealed presence of high significant differences in levels of mean corpuscular haemoglobin concentration between the three energy sources which were 25.550, 31.933 and 32.720 gm/100 ml, respectively. The results show a significant improvement in most haematological characteristics in favor of sugar beet molasses and sesame processing wastes compared to barley as an energy source in the control treatment. This is possibly due to the rumen revival preferring to attack simple, easy-to-dissolve sugars with a percentage (51% simple sugars) in beet molasses (Kakheya,

2012) in the second bush and was using it to build their bodies.Also, the rumen will be able to take advantage of other energy source, which is remnants of the sesame industry, which contain fat at a rate of up to 9.72% (Shams Al- Din *et al*., 2014) in the third bush, so that the rumen revival can easily exploit of molasses in the second ration and the residues of the sesame industry as an energy source in the third bush without presence of obstacles in the rumen fluid and thus organisms rumen will be activated, their activity and energy increase and their growth improves, and the multiplication of microorganisms in the rumen is thus able to digest and absorb food nitrogen and ammonia liberated from non-protein nitrogen sources and finally will contribute to building and formation of the bacterial protein in their bodies that digest and absorb in stomach and intestine and thus lead to end is a significant improvement in most of the haematological characteristics mentioned in Table 2 compared to the barley ration contains starch, which is a complex sugars, as well as barley contains a high percentage of fiber estimated at about 7%.Thus, the growth and activity of micro-organisms stops in the rumen.

Blood proteins

From an overview of results of the blood protein tests in Table 3, we find that energy source was using in diets of Awassi ewes at last period of pregnancy had high significant effect ($P \leq 0.01$) on levels of total blood protein, albumin and globulin between energy sources such as molasses and residues of sesame industry was using in second and third diets, compared to comparison diet (barley). This concentrations of total blood protein were 8.37, 11.36, 11.66 gm, albumin 5.33, 6.10, 6.27 gm and globulin 3.04, 5.26, and 5.39 gm for barley, molasses and sesame industry residues, respectively. The results of blood protein tests in Table 3 revealed a high significant improvement ($P \leq 0.01$) on the values of blood proteins (total blood protein, albumin, and globulin) in favor of the ewes that consumed molasses and sesame-making residues compared to ewes that consumed barley grains. This leads to an improvement in digestibility of dry matter and protein, and this increased amount of protein of ewes that led to a significant increase in blood proteins and globulin (Pani and Sivaiah, 1999), as there was a positive and significant relationship between dietary protein levels and total protein levels in serum of the animals (Boulos, 1983). The findings of the current experiment are consistent with what was reported by Annett *et al*. (2005) and Shams Al-Din *et al*. (2006) who indicated significant effects of dietary components and quality of feed materials used in sheep feeding on concentration of total blood protein and globulin

Physiological features of ewes

The results presented in Table 4 indicates a high significant effect ($P \leq 0.01$) between the two treatments of molasses and sesame industry residues than for barley treatment on average body temperature of ewes, where the body temperature of ewes was 38.95, 38.56 and 38.12 for the three treatments, respectively. With regard to characteristics of number of heart pulse and the speed of breathing per minute for ewes, the results of statistical analysis of symptoms revealed a high considerable reduction ($P \leq 0.01$) in the second and third groups in comparison to the control group**.** The levels of heart beatsreached 88.95, 76.45, 75.65 beat/minute, on the one hand, and on the other hand, was accompanied by a high considerable reduction ($P \leq 0.01$) in the second groups of ewes consuming molasses and the third consuming sesame industry wastes in average of respiratory rate per minute compared to the first treatment consumed with barley. The respiratory rate of Awassi ewes was 52.90, 44.65 and 40.30 times/minute, respectively. The significant decrease in body temperature, number of heartbeat, and respiratory rate of ewes

Table 3: Effects of dietary energy source on blood protein levels of Awassi ewes

Energy source	Group 1 (barley)	Group 2 (molasses)	Group 3 (sesame waste)
1. No. of ewes	20	20	20
2. Total Protein(gm)**	8.37 ± 0.16B	11.36 ± 0.27A	11.66 ± 0.14A
3. Albumin (gm)**	5.33 ± 0.17B	6.10 ± 0.26A	6.27 ± 0.12A
4. Globulin (gm)**	3.04 ± 0.13B	5.26 ± 0.18A	5.39 ± 0.07A

NS: Non significant *Significant 0.05 ** High Significant 0.01

Table 4: Effects of dietary energy source on physiological parameters of Awassi lambs

Energy source	Group 1 (barley)	Group 2 (molasses)	Group 3 (sesame waste)
1.No.of ewes	20	21	20
2.Temperature(ºC)**	38.95 ± 0.13A	38.56 ± 0.09A	38.12 ± 0.17B
3.Pulse (Time/min)**	88.95 ± 1.22A	76.45 ± 0.89B	75.65 ± 0.72B
4.Respiratory speed (time/mine)	52.90 ± 1.28A	44.65 ± 0.81B	40.30 ± 0.45C

NS:Non significant *Significant 0.05 ** High Significant 0.01

that eat molasses and sesame industry waste is attributed to the fact that these animals' eating sugars and fats led to the synthesis of high thermal energy in the body and this stimulated to secrete vitamin C, which directly affected the activity of the adrenal gland and thus led It reduced the production of corticosterone as a result of inhibiting the formation of steroids in the blood plasma and thus, led to inhibition of formation of glucose sugar in the liver which led to an increase of secretion of insulin hormone (Webster, 1983). Consequently, the processes of burning glucose sugar in the body decrease as a result of the effect of vitamin C, which acts as a heat stress reliever and an antioxidant, resulting to decrease in body temperature, number of heart beat and respiratory rate.

We conclude from the results of the current study presence of a significant elevation in red blood cell (RBC), white blood cell (WBC), haemoglobin concentration (Hb), packed cell volume (PCV) and other biochemical parameters of the blood. The results of this study were for benefit of animals consuming energy sources such as molasses and sesame industry wastes than to compare to animals consuming barley ration (control ration). Regarding to blood proteins, were significantly improved to the groups of ewes consuming sugar beet molasses and sesame wastes compared to the group of ewes consuming barley as energy source in this comparison diet, on the one hand, and on the other hand, the results showed significantly decreased of body temperature, pulse rate and respiratory rate per minute in favor of the groups ewes consuming sugar beet molasses

and sesame industry waste than compared to ewes groups which consuming barley as an energy source in the comparison ration.

Acknowledgement

We dedicate our scientific effort to the Department of Animal Production, College of Agriculture and Forestry, University of Mosul and to the Internal and Preventive Medicine Branch, College of Veterinary Medicine/Al-Qasim Green University, Babylon, Iraq, for their support and permanent encouragement and provision of requirements research that have helped to completion this scientific research.

References

Abd Hamid Obaid, Khudair Alwan and Adil Jamil Sarhan (2009) Improving the nutritional value of chemically poor fodder and its effect on economic performance of Awassi lambs. *Karbala Univ. Scientific J.* **7**(3): 93 - 98.

Abo-Donia Fawzy Mohammed (2003) Using different sources of soap-stock as non-conventional source of energy in sheep rations. *Egyptian J. Nutr. Feed*. 1381-1395.

Ajibaye TO (2011)Genetic and non-genetic factors affecting serum biochemical Parameters in Nigerian sheep.Matric No.2006/ 0403.University of Agri. Abeokuta, Nigeria.

Al- Jalili, Zahir Fakhry, Atallah Saeed and Salwa Lilo Aziz (1985) Meat Production and Preservation. Ministry of Higher Education and Scientific Research. Technical Institutes Foundation/ Baghdad - Iraq.

Al-Badrany Muthanna Ahmad Muhammad Tayeb (1997) Replacing barley with a mixture of barley brewers and sugar cane in fattening diets of lambs. Master Thesis. College of Agriculture and Forestry - University of Mosul.

Al-Issawi, Amer Jaber Abees and Anmar Abdul-Ghani Majeed Al-Wazeer (2011) Effect of adding the probiotic and black seed to the diet of Awassi lambs on some body and test measurements. *Al-Kufa J. Vet. Med. Sci.* **2**(1).Iraq.

Al-Khawaja,Ali Kadhim, Elham Abdullah and Samir Abdul-Ahad (1978) The chemical composition and nutritional value of Iraqi feed materials, a bulletin issued by the Nutrition Department of the Directorate of Livestock, the Ministry of Agriculture and Agrarian Reform. Iraq.

Almahdawi Mozhir KK and Ali AT Altalib (2020) Impact of using dried bread residue as substitution of energy source for cereals on milk production and its ingredients of Awassi ewes. *Eur-Asian J. Bio Sci.* **14**:407- 416 . Iraq.

Al-Mallah Omar Dhiaa Muhammad (2007) Effect of protein level in formaldehyde-treated diets on digestibility and production performance of Awassi lambs. PhD thesis, Faculty of Agriculture and Forestry - University of Mosul. Iraq.

AL-Mosawi Jassim E (2015) Effect of adding sunflower oil in the ration on some productive traits in Awassi ewes. *The Iraqi J. Vet. Medi.* **39**(2): 108-112.

Al-Nasir, Abbas Allawi and A Deeb Dawood Kharoufa (1994) A study of some blood and biochemical values of Awassi and Kurdish lambs fed on reeds and their comparison with different relationships. *Iraqi J. Vet. Sci.* **7**(3): 131-138.

Al-Sayegh Muzaffar Nafi 'Rahho and Jalal Elia Al-Qas (2006) Sheep and Goat Production, Ibn Al Atheer House for Printing and Publishing - University of Mosul., Chapter 3, pp.57-154.

Altalib A Ali, Mozhir K Almahdawi Ossama Y Younis (2016) Effect of energy source varieties on biochemical blood traits and carcass sensory evaluation in fattening rations of Awassi lambs Mosul, Iraq. *J. Kerbala Univ.* **14**(1): 45-53.

Al-Zubaidi Khudair Alwan Fadheeh (2013) Effect of adding bread scraps to fattening diets of Awassi lambs on weight increases and body measurements for different periods. Department of Animal Production - Technical Institute / Musayyib - Technical Education Authority/Iraq. *Babylon Univ. J. Pure Applied Sci.* **21**(3): 1102-1108.

Al-Zubaidy KMD and MAH Al-Falahy (2016) Principles and procedures of statistics designs and experimental designs.Ministry of Higher Education and Scientific Research, University of Duhok, College of Agriculture.,page (183-187).Kurdistan Region / Iraq.

Annett RW, AF Carson and LE Dawson (2005) The effect of digestible undegr- dable protein (UDP) content of concentrate on colostrums production and lamb performance of triplet-bearing ewes fed on grass-based diets during late pregnancy. *Anim. Sci.* **80**: 101- 110.

Boulos L (1983) Medicinal Plants of North Africa. Reference Publications Inc., Igonac, Michigan, USA.

Coles EH (1986) Veterinary Clinical Pathology. 4th ed. W.B.Saunders.Co.Philadelphia. London, Toronto. pp. 15-90.

Duncan CB (1955) Multiple range and multiple "F" tests Biometrics. **11**:1-2,USA .

Ibrahim Shaker Hassan (2007) Using of dried broiler waste in feed for growing and fattening of local lambs. Master Thesis, Faculty of Agriculture, Salahaddin University, Iraq.

Kakheya Tariq Ismail (2012) Molasses-based industries. Arab Federation for Food Industries. The second conference on food security in the Gulf region and the Island.

Kaneko JJ, Harvey JW and Bruss ML (1997) Clinical biochemistry of domestic animals. 5thed. Academic Press San Diego, California, USA. pp. 661- 668.

Kashmoula Osama Yusef and Mozhir Kadhum Kuaiber Almahdawi (2009) Using of various sources of energy in diet depends on the productive characteristics and some characteristics of carcasses of local lambs. *Tikrit J. Agri. Sci.* **9**(2): 534-545.

Khoshnau Ali Hassan Hamad (2009) Effect of replacing part of barley with waste on carcass characteristics of Awassi lambs. Salah al-Din University - Faculty of Agriculture/Salah al-Din University - Erbil. *Tikrit Univ. J. Agri. Sci.* **9**(1): 367-376. Erbil - Iraq.

Jalil AT, Dilfy SH, Karevskiy A and Najah N (2020) Viral Hepatitis in Dhi-Qar Province: Demographics and Hematological Characteristics of Patients. *Int. J. Pharmaceutical Res.* **12**(1).

Leward CE, A Trend Hill and JL Derand (1995) Consumer perception of lambs compared with other meat. *Sheep Goat Res. J.* **11**: 64-70.

MAFF (1977) Ministry of Agriculture, Fisheries and Food Department of Agriculture and Fisheries for Scotland). Energy allowance and feeding system for ruminants, Technical Bulletin 33.

Pani DS and K Sivaiah (1999) Effect of different level of formaldehyde treated sesame Cake (*Sesame indicum*) feeding on nutrient utilization in Sheep. *Indian J. Anim. Res.* **33**(1):35-39.

Passini R, S Aleksandra's, de S lucci and Carlos E (2001) Effects of partial replacement of corn by bakery waste in the diet on performance of Holstein steers. pesq. *A grope. bars. Brasilia.* **36**(4):689-694.

Saadoon Abdul Sattar Salem, Hadeel Asim Muhammad and Khaled Hasani Sultan (2009) Effect of folic acid on some hematological and biochemical parameters in pregnant ewes and lambs. *Iraqi J. Vet. Sci.* **23**(2):299-306. Proceedings of the Fifth Scientific Conference, College of Veterinary Medicine - University of Mosul. Mosul/Iraq.

Saeed Osama Anwer, AwisQurniSazili, Henny Akit, Abdul Razak Alimon and Anjas Asmara Samsudin (2019) Effects of corn supplementation into PKC-urea treated rice straw basal diet on haematological, biochemical indices and serum mineral level in Lambs . *Animals*. **9**: 781. doi:10.3390/ani9100781. Malaysia.

SAS (2012) SAS User's quide Statistics. Statistical Analysis System Institute. Version 9.0 para windows.SAS Institute Inc., Cary, NC; New York, USA.

Shams Al-Din Qusay Zaki and Ahmad Hajj Taha (1999) Relationship between dietary protein and total blood protein 2. Effect of nitrogen source. *Al-Rafidain Agri. J.* **31**(2): 56-61Iraq.

Shams Al-Din and Qusay Zaki Ismail (1997) Effect of length of feeding time and the use of various nitrogen-genetic levels and sources of different energy levels in diet on performance of local lambs. Ph.D. thesis. College of Agriculture and Forestry, University of Mosul.Iraq.

Shams Al-Din, Qusay Zaki, Elham Abdel-Hamid Al-Rawi, Nahzad Hussein Qadir and Ismail Hussein Abdel (2006) Using of black seed meal in feeding of Awassi ewes. 2. Influence on some blood and chemical characteristics. *Mesopotamia Agri. J*. **34**(2): 55-61. Mosul, Iraq.

Shams Al-Din, Qusay Zaki, Elham Abdel-Hamid, Hussein Ahmad Salman and Yunus Ismail Hamad (2014) Study of the effect of replacement rates of sesame industry waste on production performance and some body measurements of Awassi lambs. *Kirkuk Univ. J. Agri. Sci*.**5**(2): 73-83.Iraq.

Shams Al-Din, Qusay Zaki, Issam Abdel-Wahid Zarzis, Muhammad Hussein Ali Shalal and Younis Ismail Hamad (2012) Effect of feeding with sesame industry waste on some blood and biochemical characteristics. *Al-Rafidain Agri. J.* **40**(2): 24-32. Iraq.

Weiss DJ and Wardrop KJ (2010) Schalms Veterinary Hematology. 6th ed. Ames, Wiley-182, Blackwell.

Zeinab IA, IA El-Syed and El Shehutta (1994) Effect of different sources of protein on the chemical composition of ewes colostrum and milk. *Alex J. Agri. Res*. **39**(1): 119-136.