Al-Qadisiyah Journal For Agriculture Sciences (QJAS)
ISSN : 2618-1479 Vol.13, Issue. 1 ,(2023), pp. 1-6
https://jouagr.qu.edu.iq/

The Zeolite and Urea Effect on the Fodder Consumed and Productive Performance and of Awassi Lamps

Hamid Ali Mohammad[1] and Ali Ahmed Alqutbi[2]

[1,2]Department of Animal Production, College of Agriculture, Al-Qasim Green University, Babylon, Iraq.

[1]E-mail: hasanfaraj@uowasit.edu.iq

Abstract. This experiment was applied in Al-Hussainiya district in Karbala governorate. The experiment was for the pierod 6/1/2022- 11/4/2022. The aim of the study was the effect of adding zeolite with and without urea on the performance of Awassi lamps and investigates its effect on the rumen fluid. Sixteen sheep with 3-4 months of age with 18 kg weight have been used in the experiment. This number was divided into four treatments. The first treatment was fed the control treatment without any added, while the second treatment was fed with 3% zeolite, the third treatment was 3% zeolite, 1.5% urea, and the fourth treatment was 3% zeolite and 3% urea. The factorial experiment using the complete randomly design randomized design has been used to analysis the data. The results have been showed that no significant differences at the level of $p<0.05$) in the primary weight rates among the experimental groups. There are significant differences in the final weight, as the third and fourth treatments were significantly superior to the level of ($p<0.05$), which were (37.35, 37.90) kg, respectively, while the control treatment was (31.80) kg. As for the second treatment, it was not significantly superior ($p<0.05$) with the first treatment, but it was superior to the first, which reached (31.80) kg. Also, the third treatment was superior to all treatments in the daily and total weight gain. There were significant differences ($P<0.05$) in the total increase among the experimental treatments. The treatment added to its diets T3 (3% zeolite 5.1% urea) superior with other treatment, which reaching (20.10) kg, while the control was (13.45) kg. In addition, there were no significant differences ($P<0.05$) in the average of the concentrated feed for the different experimental treatments, but there were arithmetic differences, as the first, second, third and fourth treatments, which reached (87.53, 86.59, 69.33, 77.08) kg, respectively. There are significant differences ($P<0.05$) between the different experimental treatments that were fed with wheat, where the animal was given 300 g/day. Also, no significant differences ($P<0.05$) found in the consumption of total feed provided to Awassi sheep. Finally, there were significant ($P<0.05$) differences in the efficiency of food conversion between the different treatments, where the first treatment superior the control at ($P<0.05$), which reaching (7.68) compared with the third treatment 5.37.

Keywords. Zeolite, Urea, Fodder, Productive performanc, Al-awassi lamps.

1. Introduction

The extensive use of fodder to increase the potential genetic efficiency of livestock, especially ruminants, has led to production and health problems which include low milk fat, low fiber digestibility, disturbances and mineral absorption, As well as, health risks related to the imbalance of acid-base concentration [1]. Many studies have been used to find alternatives to get rid of these

problems and reduce costs through the use of low quality feed, agricultural and industrial waste. The wild plants that are characterized by low nutritional value as a result of the high content of lignin that coats the cellulose, which makes the microorganisms in the rumen unable to benefit from cellulose as a source of potential energy [2].

Several studies have been used many treatments to improve the low nutritional value of these materials using physical and chemical treatments, such as treatment with urea, sodium hydroxide and ammonia [3], and biological treatments [4]. This is affecting the activity of microorganisms inside the animal's rumen, which affects the manufacture of microbial proteins, which represent an important part of the host animal's need in the small intestine. For biological treatments, they help break the link between lignin and cellulose, and increase free cellulose to facilitate use by ruminants [1]. Many strategies to reduce these problems associated with fodder, the inclusion of feed additives can be better at improving nutrient absorption. Thus, reducing environmental pollution caused by animal excreta. Feed minerals for animals are usually above requirements, especially when by-products are used to reduce feeding costs, and this may have a negative impact [1].

Natural zeolite (clinoptilolite) and artificial zeolite (zeolite A) may be suitable feed additives, which can be used to improve digestion and utilize minerals [5]. The use of urea in the diet of ruminants can reduce dependence on protein concentrates that benefit humans or monogastric animals [6]. As well as its use in improving the nutritional value of feed such as hay [7]. Therefore, this study aims to evaluate the use of different proportions of zeolite in feeding Awassi lamps with and without the addition of urea and its effect on production performance and nutrient digestibility coefficient.

2. Materials and Methods

2.1. The Location, History and Purpose of the Experiment

This study was applied in Karbala governorate in one of the fields (Al-Hussainiya district), which is located at a distance of 7 km, for the period 6/1/2022 to 11/4/2022. The aim of this to study the effect of adding zeolite and rapidly decomposing urea on weight gain and some characteristics of carcasses for Awassi lamps.

2.2. Experiment Plan

As a first step, after introducing the sheep to the field, they were numbered with plastic numbers to distinguish them. They were weighed and then divided randomly by lottery into four groups. The weights of the total sheep were (18.50, 17.25, 17.10, 18.35) kg for the four treatments, respectively. The four groups included a study of feeding concentrated ration without and with the addition of zeolite with and without rapidly decomposing urea and giving sheep a ratio of 4% of body weight as shown in the figure (1).

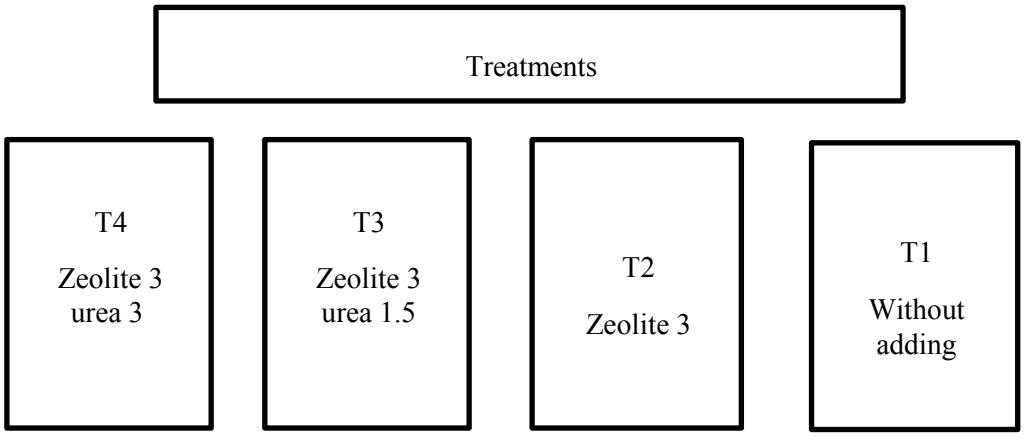

Figure 1. Shows the experiment treatments.

DOI: 10.33794/qjas.2022.136259.1090

2.3. Experiment Stockyard

The sheep were placed in the same location in a semi-closed stockyard divided into cages of 1 m x 1 m each, equipped with a concentrated feeder, a rough feed, and a water drinker. The metal salt molds were suspended after the sheep were distributed among their groups in the cages.

It was weighed before feeding the feed in the morning. The amount of feed given to each animal was determined at a rate of 4%. The weighing process was applied using a sensitive scale with a capacity of 600 kg equipped with a wooden cage. The weighing process was carried out every week in succession and the amount of feed given to each animal was determined until the end of the experiment period.

Table 1. Ratios of nutrients for experimental diets (%).

Nutrient	T1%	T2%	T3%	T4%
Barley	51	51	52	52
Bran	25	22	22.5	21
Corn	15.8	15.8	15.8	15.8
Soya	3	3	-	-
Molasses	4	4	4	4
Yeast	0.2	0.2	0.2	0.2
urea	-	-	1.5	3
zeolite	-	3	3	3
salt	1	1	1	1
total	100%	100%	100%	100%

3. Results and Discussion

3.1. Productive Performance of Awassi Lamps

3.1.1. Primary Weight

The results of this study indicated that the Awassi lamps used at the beginning of this experiment were highly homogeneous in weight, size and age (Table 2). The statistical analysis did not show significant differences at the level ($p<0.05$)) in the primary weight rates among the experimental groups. The correct random distribution at the beginning of the experiment led to a reduction in random error among the four treatments. The primary weight rates at the beginning of the experiment have been reached (18.50, 17.25, 17.10, 18.35) kg for the four treatments.

3.1.2. Final Weight

The results have been showed that there were significant differences in the final weight. The third and fourth treatments were significantly superior at the level of ($p<0.05$), which were (37.35, 37.90) kg, respectively, while the control treatment was (31.80) kg. For the second treatment, it was not significantly differences at ($p<0.05$)) with the first treatment, but it was superior to the first, which reached (31.80) kg (Table 2).

The study agreed with [8], where they confirmed that adding zeolite to diets increases the live weight of lamp. Walz et al. (1998) has been also confirmed that the use of zeolite in concentrated feed led to a positive improvement in live weight. However, the study did not agree with [9], as it was noticed that there was no significant effect on the final weight when adding zeolite to Merino sheep.

3.1.3. Daily Weight Ratio and Total Increase

The results showed the main effect of zeolite and urea on the daily weight ratio (g/day) and the total weight (kg). There were significant differences ($p<0.05$), where the third treatment was superior to all treatments in the daily and total weight gain (Table 2). In addition, to the interaction between the treatments, there was a difference ($p<0.05$) in the weight (g/day), as the third treatment recorded (239.29) outperformed the control treatment (160.12) and did not differ significantly with the fourth and second treatment (230.96) and (189.29) g/day respectively. Our results agreed with [10], where slight increases in weight of sheep were observed when adding zeolite and urea to the concentrated

feed compared with the control. However, the results disagreed with Toprak et al., (2016), where it was found that there was no difference in weight when adding zeolite by 2% or 3%.
The results have been also showed that there were significant differences (P<0.05) in the average total increase. The treatment added to its diets T3 (3% zeolite, 1.5 quick decomposition urea) excelled, reaching (20.10) kg, while the control treatment was (13.45) kg.
The third treatment did not differ significantly with the second and fourth treatment, as they have reached (19.40, 15.90) kg. These results agreed with [11], they have indicated an increase in the total weight when adding zeolite to the cows' feed.

Table 2. Effect of adding different levels of Zeolite and urea on the productive performance of Awassi lamps ± standard deviation (SD).

Treatments	Primary weight	Final weight	Total increase	Daily increase
T1	18.35 ± 0.54	31.80 ± 1.07	13.45 ± 0.96	160.12 ± 11.48
T2	18.35 ± 0.54	33.00 ± 2.27	15.90 ± 2.31	189.29 ± 27.50
T3	17.25 ± 0.25	37.35 ± 0.13	20.10 ± 0.19	239.29 ± 2.28
T4	18.50 ± 0.96	37.90 ± 0.31	19.40 ± 1.17	230.96 ± 13.29
P-value	0.2314	0.0105	0.0165	0.0165
Sig.	*	*	*	*

The results were analyzed at the level (P≤0.05).
*At the level of significance (P≤0.05); ** At the level of significance (P≤0.01); NS not significant.

3.2. Concentrated Fodder Consumption

The results indicated that there were no significant differences (P<0.05) in concentrated fodder for the different experimental treatments, but there were statistical differences, where the first, second, third and fourth treatments have been reached 87.53, 86.59, 69.33, 77.08) kg, respectively (Table 3). This is because zeolite leads to an improvement in body acquisition and the efficiency of food conversion. The reason for this is to increase protein storage and digestion of crude protein in rations containing zeolite and urea. The properties of zeolite lead to an increase in microbial protein synthesis in the rumen. It causes better digestion and absorption of protein and increases its deposits in body tissues.
These results agreed with [11,12], where the intake of fodder was not significantly affected when zeolite was added in different proportions to the sheep diets. However, feed intake increases slightly when zeolite is added to sheep diets [8,10].

3.3. Rough Fodder Consumption

The results have been recorded that there were significant differences (P<0.05) between the different experimental treatments that were fed with wheat straw, where the animal was given 300 g/day throughout the 84-day experiment period. It has showed a significant superiority (P<0.05) for the control to all the different treatments, which amounted (24.13) g/day. Also, the results showed a significant differences (P<0.05) for the second treatment (22.55 g/day compared with the third and fourth treatment, where they have reached (21.38 and 20.25) g/day, respectively (Table 3). This may be due to the determining the amount of concentrated fodder at 4% of the body weight was sufficient to meet the animal's needs of nutrients, and this in turn determined the amount of rough fodder (wheat hay) and thus no significant differences occurred between the treatments. The current study agreed with [3], that untreated hay with urea has no significant effect.

3.4. Total Fodder Consumption and Conversion Efficiency

The results have been found that there were no significant differences (P<0.05) in the consumption of total fodder provided to Awassi lamps between the different experimental treatments throughout the experiment period. There were a significant difference between the third, fourth, first and second treatments, which recoded (107.96, 107.78, 101.92 and 91.88) kg, respectively (Table 3). [7], have been found that adding zeolite with urea to the diets led to an increase in the consumption of fodder for sheep. Our results did not agree with the results of [9], where the benefit that adding zeolite to the fodder increases feed consumption and improves nutrition. Also, [7], have been reported that the addition of urea with Zeolite to the fodder led to a decrease in the consumption of fodder that provided to the animals.

DOI: 10.33794/qjas.2022.136259.1090

Table (3) also indicated that there were significant (P<0.05) differences in the efficiency of food conversion between the different treatments. The first control treatment outperformed significantly (P<0.05), which reaching (7.68) compared with the third treatment (5.37). The results also indicated that there was no significant difference for the first treatment with the second and fourth treatment (5.62 and 6.08) respectively. Our study did not agree with studies by [8], that the addition of zeolite led to an improvement in nutritional efficiency and an improvement in the growth of animals.

Table 3. Effect of using zeolite with different percentages urea on the amount of fodder consumed and conversion efficiency.

Treatments	Concentrated fodder	Rough fodder	Total fodder	Conversion efficiency
T1	77.8 ± 2.24	24.13 ± 0.47	101.92 ±2.01	101.92 ± 2.01
T2	69.33 ± 6.34	22.55 ± 0.21	91.88 ± 6.54	6.08 ± 0.72
T3	86.59 ± 1.63	21.38 ± 0.24	107.96 ± 1.70	5.37 ± 0.13
T4	87.53 ± 7.28	20.25 ± 0.14	107.78 ±7.17	5.62 ± 0.51
P-value	0.0796	0.0001	0.1346	0.0315
Sig.	NS	*	NS	*

The results were analyzed at the level (P≤0.05).
*At the level of significance (P≤0.05); ** At the level of significance (P≤0.01); NS not significant

Conclusion

The study has been concluded that no significant differences in the primary weight rates among the experimental groups. There were significant differences in the total increase among the experimental treatments. The treatment added to its diets T3 (3% zeolite 5.1% urea) superior with other treatment. In addition, there were no significant differences in the average of the concentrated feed for the different experimental treatments, but there were arithmetic differences, as the first, second, third and fourth treatments. Also, no significant differences found in the consumption of total feed provided to Awassi lamps. Finally, there were significant differences in the efficiency of food conversion between the different treatments, where the first treatment superior the control.

References

[1] Davis, C.L. The use of buffers in the rations of lactating dairy cows. In Regulation of Acid-Base Balance; Hale, W.H., Meinhardt P., Eds.; Church and Dwight Co. Inc.: Piscataway, NJ, USA, 1979.
[2] Medeiros, T.T.Bde, de Silva, A.M.A., da Silva, A.L., Bezerra, L.R., da Silva, D.L.A., de Oliveira, D.L.V., Mazzetto, S.E., Kotzebue, L.R.V. https://doi.org/10.1016/j.smallrumres.2019.09.005
[3] Hassan, Shaker Abdul-Amir and Suzan Muhammad Nour Muhammad. (2008). The response of the karadi lambs For feeding with treated and untreated straw with urea with two levels of unchanged nitrogen decaying in the rumen Journal of Agricultural Sciences Studies. Amman, Jordan.
[4] Cardoso, A.M., Horn, M.B., Ferret, L.S., Azevedo, C.M.N. and Pires, M.(2015). Integrated synthesis of zeolites 4A and Na– P1 using coal fly ash for application in the formulation of detergents and swine wastewater treatment. Journal of Hazardous Materials .287. 69 – 77. https://doi.org/10.1016/j.jhazmat.2015.01.042
[5] Iwaniuk, M.E.; Erdman, R.A. Intake, milk production, ruminal, and feed efficiency responses to dietary cation-anion difference by lactating dairy cows. J. Dairy Sci. 2015, 98, 8973–8985, doi:10.3168/jds.2015-9949. https://doi.org/10.3168/jds.2015-9949
[6] Holder, V.B., Tricarico, J.M., Kim, D.H., Kristensen, N.B., Harmon, D.L. 2015. The effects of degradable nitrogen level and slow release urea on nitrogen balance and urea kinetics in Holstein steers. Anim. Feed Sci. Technol. 200, 57–65. https://doi.org/10.1016/j.anifeedsci.2014.12.009
[7] Camara, L.R.A., Valadares, Filho, S.C., Leao, M.I., Valadares, R.F.D., Dias, M., Gomide, A.P.C., Barros, A.C.W., Nascimento, V.A., Ferreira, D.J., Fae, J.T., Carneiro, C. & Cardoso, L.L., 2012. Zeolite in the diet of beef cattle. Arq. Bras. Med. Vet. Zoo. 64, 631-639. https://doi.org/10.1590/s0102-09352012000300015
[8] Stojković, J., Adamović, M., Lemić, J. and Jašović, B., 2005. The effects of feeds based on natural zeolite on production results for fattening lambs. Biotech. Anim. Husband., 21: 49-52.
[9] Oliveira,J.R.,Souto,G.S.B.,deBarrosCarvalho,A.,Netto,A.J.,Oliveira,R.L.,2018.Carnaubawaxasawallmaterial for urea microencapsulation. J. Sci. Food Agric. 99, 1078–1087.

DOI: 10.33794/qjas.2022.136259.1090

[10] Forouzani, R., Rowghani, E. and Zamiri, M.J., 2004. The effect of zeolite on digestibility and feedlot performance of Mehraban male lambs given a diet containing urea-treated maize Silage. Anim. Sci., 78: 179-184. https://doi.org/10.1017/s1357729800053960

[11] Stojković, J., Ilić, Z., Ćirić, S., Ristanović, B., Petrović, M.P., Caro Petrović, V. and Kurčubić, V., 2012. Efficiency of zeolite basis preparation in Fattening lambs diet. Biotech. Anim. Husband., 28: 545-552. https://doi.org/10.2298/bah1203545s

[12] Toprak, N.N., Yılmaz, A., Öztürk, E., Yigit, O. and Cedden, F., 2016. Effect of micronized zeolite addition to lamb concentrate feeds on growth performance and some blood chemistry and metabolites. S. Afr. J. Anim. Sci., 46: 313-320. https://doi.org/10.4314/sajas.v46i3.11