

Effect of different level of zeolite and perlite on the physiological performance of Awassi lambs

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Abstract

A total of 24 male Awassi lamb aged (4-6) months were used, to determine the effect of different level of zeolite and perlite on the physiological traits of Awassi sheep. Results show that the use of zeolite led to the presence of high significant differences at the level ($P \leq 0.05$) of the studied values between the experimental groups and according to the weeks of the study, as the values varied between different weeks in the characteristics of the biochemical blood parameters and values, which are (both cholesterol values, the values of high-density lipoproteins, low-density lipoproteins, and fats). All treatments of zeolite and perlite and their mixture outperformed the control group, while the fourth treatment T4 outperformed the other treatments, followed by the third treatment T3 over the studied treatments T2 and T1.

1. Introduction

Zeolite mineral (natural and artificial) is formed by a change that occurs in volcanic rocks rich in glass by their interaction with sea water when the base conditions and appropriate temperatures are available [1].

167 types of synthetic zeolite mineral and 48 natural types. The properties of both types are similar in terms of effectiveness, crystal structure and high porosity, and differ in terms of pore size and impurities, as the synthetic has larger pores than natural, and zeolite mineral has a low density, because Every substance that makes up zeolite forms a crystal system full of voids, and the main reason for making the pores open is the presence of electrical repulsion between the oxygen atoms adjacent to the tetrahedral unit, so it is an effective material and a catalyst in the absorption process, and it has a high ability to ion exchange and high ion selectivity and particles and other substances that penetrate the pore network [2].

The mineral zeolite is formed chemically by the interaction of glassy volcanic materials with sea water with a reaction degree between (9-10) and an optimum temperature between (27-55) degrees Celsius, and that natural zeolite is rarely found in pure form due to contamination with other minerals, so It is excluded in industrial applications that require high purity, and high purity industrial zeolite is used, as industrial zeolite is similar to the properties of natural zeolite in terms of crystal structure and high porosity, and is used in agriculture and catalytic applications, and gas purification in chemical and oil processes, and in the separation of oxygen from the air Atmospheric separation of olefins from paraffins [3].

Perlite is a glassy volcanic rock that ranges in color from transparent gray to glossy black, made of hydrated aluminosilicates of alkali (K⁺, Na⁺) and alkaline earth cations. Perlite expands by 10-30 times its original volume when heated at a temperature of (700-1200) degrees Celsius, and this expansion is due to it containing (2-6)% of water. As clarified that the name Perlite is derived from the word (Pearl), which means pearl [4].

Perlite has been studied as an ingredient in toothpaste and a component of landfill liners for the treatment of leachate in landfill sites, as well as its use to remove cadmium, nickel and lead from aqueous solutions. Perlite has many distinctive and attractive physical properties for commercial applications such as low bulk density, low thermal conductivity, high heat resistance, low sound transmission and chemical inertness [5].

Perlite is used in many industrial applications such as sandblasting, as a slag coagulant. Special casting sand and metal finishing, also included in the installation of insulating ceiling tiles, pipes and insulating panels, installation of dams, plastics, packing materials, and used as a filter in sewage water and filtering vegetable and fruit juices, soft drinks, pharmaceutical applications and cultivation of soilless plants [6].

Aim this study determine the effect of different level of zeolite and perlite on the physiological traits of Awassi sheep.

2. Materials and Methods

2.1 Experimental animals:

The current experiment was conducted in the animal field of the first agricultural research and experiment station of the College of Agriculture, Al-Muthanna University, located in the Umm Al-Agaf region (12 km) southwest of Samawah, to reveal the effect of different concentrations of zeolite and perlite on some physiological characteristics of Awassi sheep, from 11/11 /2019 to 20/4/2020, 24 male pregnancies (4-6 months old) were used in the current study. The animals were randomly distributed to four adjacent treatments, the first treatment (control), the second, the third and the fourth. Each treatment was divided into two groups, each group containing 3 animals that were clinically examined. During the preliminary period, which lasted for 21 days, in order to ensure their safety and freedom from diseases, then the lambs were entered into the actual experiment, which lasted for four months.

2.2 Laboratory conditions and animal feeding:

The study animals were placed in iron pens with theaters designated for freedom of movement and with dimensions (3 x 2 x 4) m under controlled conditions represented by a temperature (20-30) °C and an almost natural light cycle (12 hours light-12 hours dark), noise was reduced. In the barns to avoid its effect on the animals and the values studied, and taking care of when dealing with the experimental animals, it included four sterile barns equipped for breeding with a theater containing feeders and plastic water fountains, and the barns numbered according to the numbers of the animals and their groups and divided from the inside with iron cutters into two parts, the lambs underwent a treatment program And Saned's vaccine to ensure that they are safe and free of diseases, as the animals were clinically examined before entering the experiment and given full vaccinations, Levozan to combat liver and intestinal worms, a subcutaneous American intestinal poisoning vaccine, and a vaccine to prevent smallpox, and Ivermectin Plus was injected subcutaneously to prevent external parasites while continuing Under veterinary supervision for the duration of the experiment.

The lambs were fed on the ration designated for them before starting the experiment and gradually as an introductory period that lasted for three weeks, during which the concentrated ration was provided twice daily and in sufficient quantities for the purpose of perpetuation and daily growth of 150 g. Barley + wheat bran + salt) were mixed manually in order to accustom the lambs before starting the experiment, then the quantities of concentrated

feed provided were adjusted on the basis of the new weight of each lamb (1 kg concentrated feed / lamb) after adding zeolite and perlite to it, and the first treatment diet (control)) stripped of the addition, and the second treatment ration was added only zeolite by 10%, while the third treatment ration was added only by 10% perlite, while the fourth treatment ration was added zeolite by 5% and perlite by 5%, the experimental rations for animals were presented on Two morning meals at 7 in the morning and evening meals at 3 in the evening, provided that the remaining feed for all animals is collected before serving the new meal for the purpose of calculating the amount of feed daily intake, in addition to providing daily feed For rough (green fodder such as jet) and mineral salt blocks throughout the experiment period, clean water was continuously provided in special containers where they were cleaned daily, and between periods of feeding the lambs were taken out to the barns stage for movement and movement, and the chemical analysis of the concentrated feed used in the experiment was conducted in Central Nutrition Laboratory of the College of Agriculture, University of Baghdad.

2.3 Experiment design:

In the current study, 24 male lambs aged (4-6) months were used, divided into four groups as follows:

T1: Included 6 male lambs fed on a diet devoid of supplementation and considered as a control group.

T2: Included 6 male fed on a diet to which only 10% of the zeolite was added, and it was considered the zeolite group.

T3: Included 6 male lambs fed on a diet to which only 10% was added perlite, and it was considered the perlite group.

T4: Included 6 male lambs fed on a ration supplemented with zeolite 5% + perlite 5%. The group was considered a mixture of zeolite and perlite.

2.4 Studied traits

2.4.1 Blood traits

2.4.1.1 Blood samples:

Blood samples were collected from sheep directly at the end of the experiment period from the jugular vein by means of sterile medical syringes, and (10) ml (5) ml was drawn for the complete blood picture and (5) ml for measuring hormone values and measuring biochemical values {, were placed (5 ml) of them were in special tubes containing an anticoagulant substance Ethylene Diamine Tetra Acetic Acid (EDTA), and transferred to the laboratory in a container containing ice cubes to avoid cases of hemolysis to measure blood values, while the remaining 5 ml blood sample was placed in A test tube free of any anticoagulant material, in order to allow the blood to coagulate in order to facilitate the process of isolating the serum from it after leaving the tubes containing the blood in a slightly tilted position in the refrigerator at a temperature of 4 °C for a period of 24 hours, then separating the blood the next day, by placing the container tubes The blood was collected in a centrifuge at 3500 rpm for 15 minutes, after which the serum formed was withdrawn using a sterile medical syringe, and the serum was placed in clean, sterile test tubes and kept in the freezer at a temperature of (-16) to (-20) C until the procedure was performed. All analyzes of biochemical components.

2.4.1.1.1 Biometric blood parameters:

A Blood Analyzer was used to examine the blood samples, they were placed in empty glass tubes and left at a tilt until clotting, and then the serum was obtained and then placed in a centrifuge for 15 minutes at a speed of 3500 rpm, then the serum was isolated in sterile and special tubes. The analysis is ready-made (kit) of French origin to measure cholesterol, albumin and total protein.

2.4.1.1.1 Cholesterol concentration:

The cholesterol concentration was calculated using ready-made solutions (Kit) produced by the French company Biolabo. This method of cholesterol measurement is based on enzymatic hydrolysis and oxidation. Cholesterol esters are decomposed by the action of the cholesteol esterase enzyme to cholesterol and fatty acids, then cholesterol is oxidized by the action of the enzyme Cholesteol oxidas to Cholest-4 one. and hydrogen peroxide that reacts with 4-Aminophenazone to form the red Quinonimine formula [7].

2.4.1.1.2 High-density lipoprotein (mg/100ml serum) (HDL):

The method of enzymatic lysis is based on the measurement of high-density lipoproteins (HDL) in serum using ready-made kits from the Spanish company Linear and by precipitation of HDL using Phosphotungstic acid / MgCl₂ [8]. The float and the reading of the optical absorption coefficient at a wavelength of 500 nm by a spectrophotometer.

2.4.1.1.3 total protein:

The total protein was estimated by means of ready-made solutions (Kit) produced by the French company Biolabo and according to what was stated [9] the blood serum samples were placed in the tubes designated for the sample, then the tubes were shaken and incubated for 10 minutes at room temperature, and the color intensity was read at a wavelength of 600 nm by means of a spectrophotometer.

2.4.1.1.4 Albumin concentration:

The serum albumin concentration was estimated by means of ready-made solutions (kit) produced by the French company Biolabo, based on the method [10]. The tubes were agitated and the absorbance was read after 5 minutes at a wavelength of (628 nm).

2.5 Statistical analysis :

The data were analyzed using factorial experiments according to the complete random design (CRD) to study the effect of the studied treatments of the Awassi sheep breed on different traits and the significant differences between the means were compared with Duncan [11] multinomial test, and the ready-made statistical program SPSS [12] was used.

3. Results and Discussion

3.1 Results of the analysis of blood values and standards for the study lambs:

The results of the current study showed no significant differences for the studied blood values among the experimental groups or the treatments, where the studied blood values varied and varied (Cholesterol, HDL, LDL and Triglycerides) were among the study parameters (Table 1.). And Albumin, Globulin and total protein (Table 2.). These results are in agreement with the results of Camiron and Cotter [13], who studied blood values and different criteria for measuring the blood of sheep, cows and goats, while they do not agree with the results of [14] in European goats and sheep of different European breeds, and this difference in results is due to the difference The incidence between different species and breeds of animals with study animals

The current results also showed no significant differences for the studied blood values among the treatments. These results are in agreement with the results of [15] while not in agreement with the results of [16] in sheep and goats, and this difference in the results is due to the difference between the different types of animals.

The results of the current study for the analysis of blood values also showed no significant increase in the values of the normal values of sheep for these values. These results are in agreement with the results of [16] in sheep and goats, as well as the results of the researcher [17] in the alpaca and deer, while they do not agree with the results of (Forman et al, 1998) in the African sheep and goats, and this difference in the results This is due to the difference in the environmental and physiological conditions, the nature of nutrition and the breeding system among the different species and study animals, where the increase in the values of red blood cell count, hemoglobin rate, red blood cell sedimentation rate, platelet percentage and average volume of aggregated blood cells is due to the improvement of the animal's physical condition in The studied station animals are due to the type of ration provided. These results are in agreement with the results of [16] in sheep and goats, and also agree with the results of [15] in sheep and goats, as well as the results of the researcher [17] in the alpaca and deer. , while it does not agree with the results of [18] in African sheep and goats and does not agree as well. With the results of [17] in European sheep and goats, and this difference in results is due to the difference between the different types of animals studied.

In general, and when observing the current results in Tables 1. and 2., it becomes clear that these studied values and their obtained results are similar or equal to their natural values in sheep and according to the global concentrations and values of these animals, which means that the animals in general are somewhat sound from acute and severe diseases whose indications are the high or severe decrease in the blood values studied above in our current study, which is an indicator of failure and failure in the work of the heart, the cardiovascular system, or the endocrine system in the body and the program or mechanical, blood, hormonal, neurological in the body, or as well as a defect in the work of Urinary system and kidney function, or a defect in the work of the liver and its enzymes, which were studied above, which is an indication of the failure of the work of the liver, bile and others. Which explains and confirms the safety and freedom of the sheep of the studied station from these infections above, with the exception of some minor cases of internal parasite invasion or simple infections as a result of fever or colds (winter) or cases of stress and physical fatigue (summer) as a result of high temperature and unfavorable environmental conditions and health management and care Non-integrated ones, which by treating them and completing successful and sound management, can get rid of these simple cases and reach the integrated and ideal health condition without any problems or obstacles. This summary is the most important thing that lies in our research and study above, which includes the ways to find problems in the study animals and the effective method or mechanism to treat them, and it is one of the basics and means of purposeful scientific research.

Table 1. Effect of zeolite and perlite and their interaction on the averages of blood cholesterol, high-density lipoprotein, low-density lipoprotein and triglycerides of Awassi sheep (mean \pm standard deviation).

Zeolite	Perlite	Cholestrol		HDL		LDL		Triglecyrides	
		Start	End	Start	End	Start	End	Start	End
0	0	0.21 \pm 40.17	0.06 \pm 40.90	0.15 \pm 28.16	0.04 \pm 28.68	0.01 \pm 2.97	0.01 \pm 2.97	0.16 \pm 30.34	0.04 \pm 30.20
	5	0.29 \pm 40.01	0.14 \pm 40.65	0.21 \pm 28.05	0.09 \pm 28.50	0.01 \pm 2.97	0.00 \pm 2.98	0.22 \pm 30.22	0.10 \pm 30.01
	10	0.27 \pm 39.98	0.08 \pm 40.49	0.18 \pm 28.03	0.06 \pm 28.39	0.00 \pm 2.97	0.00 \pm 2.98	0.19 \pm 30.20	0.06 \pm 29.90
Mean		40.05	40.68	28.08	28.52	2.97	2.98	30.25	30.04
Sig.		N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
5	0	0.25 \pm 40.19	0.15 \pm 40.73	0.18 \pm 28.18	0.10 \pm 28.56	0.01 \pm 2.98	0.00 \pm 3.00	0.19 \pm 30.36	0.11 \pm 30.08
	5	0.17 \pm 40.15	0.13 \pm 40.62	0.12 \pm 28.15	0.09 \pm 28.48	0.00 \pm 2.97	0.01 \pm 2.99	0.13 \pm 30.33	0.09 \pm 29.99
	10	0.28 \pm 40.16	0.17 \pm 40.39	0.20 \pm 28.16	0.12 \pm 28.32	0.00 \pm 2.97	0.00 \pm 3.00	0.21 \pm 30.34	0.12 \pm 29.82
Means		40.17	40.58	28.16	28.45	2.97	3.00	30.34	29.96
Sig.		N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
10	0	0.27 \pm 39.99	0.13 \pm 40.56	0.19 \pm 28.04	0.09 \pm 28.44	0.01 \pm 2.98	0.00 \pm 3.01	0.20 \pm 30.21	0.09 \pm 29.95
	5	0.17 \pm 39.92	0.11 \pm 40.45	0.12 \pm 27.99	0.07 \pm 28.36	0.00 \pm 2.97	0.00 \pm 3.02	0.13 \pm 30.16	0.07 \pm 29.87
	10	0.63 \pm 39.99	0.20 \pm 40.08	0.45 \pm 28.04	0.14 \pm 28.10	0.00 \pm 2.97	0.01 \pm 3.03	0.48 \pm 30.21	0.15 \pm 29.59
Means		39.97	40.36	28.02	28.30	2.97	3.02	30.19	29.80
Sig.		N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

N.S. indicates that there are no significant differences between the levels of perlite and zeolite

Table 2. Effect of zeolite and perlite and their interaction on the averages of albumin, globulin and total protein of Awassi sheep (mean \pm standard deviation).

Zeolite	Perlite	Albumin		Globulin		Total protein	
		Start	End	Start	End	Start	End
0	0	0.04 \pm 2.60	0.01 \pm 2.60	0.05 \pm 3.67	0.02 \pm 3.67	0.10 \pm 6.27	0.03 \pm 6.27
	5	0.01 \pm 2.59	0.00 \pm 2.62	0.01 \pm 3.66	0.01 \pm 3.70	0.02 \pm 6.26	0.01 \pm 6.33
	10	0.01 \pm 2.60	0.01 \pm 2.63	0.02 \pm 3.67	0.01 \pm 3.71	0.04 \pm 6.27	0.02 \pm 6.34
Mean		2.59	2.61	3.67	3.69	6.26	6.31
Sig.		N.S	N.S	N.S	N.S	N.S	N.S
5	0	0.01 \pm 2.61	0.01 \pm 2.62	0.02 \pm 3.69	0.01 \pm 3.70	0.04 \pm 6.29	0.02 \pm 6.32
	5	0.01 \pm 2.61	0.00 \pm 2.63	0.01 \pm 3.68	0.01 \pm 3.72	0.02 \pm 6.29	0.02 \pm 6.36
	10	0.01 \pm 2.61	0.01 \pm 2.64	0.02 \pm 3.69	0.01 \pm 3.73	0.04 \pm 6.30	0.02 \pm 6.37
Means		2.61	2.63	3.68	3.71	6.29	6.35
Sig.		N.S	N.S	N.S	N.S	N.S	N.S
10	0	0.01 \pm 2.60	0.00 \pm 2.62	0.02 \pm 3.67	0.01 \pm 3.71	0.04 \pm 6.26	0.01 \pm 6.33
	5	0.02 \pm 2.60	0.00 \pm 2.63	0.02 \pm 3.67	0.01 \pm 3.72	0.04 \pm 6.27	0.02 \pm 6.36
	10	0.01 \pm 2.61	0.00 \pm 2.65	0.02 \pm 3.69	0.00 \pm 3.74	0.03 \pm 6.29	0.01 \pm 6.40
Means		2.60	2.64	3.67	3.72	6.27	6.36
Sig.		N.S	N.S	N.S	N.S	N.S	N.S

N.S. indicates that there are no significant differences between the levels of perlite and zeolite

4. References

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