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THE EFFECT OF USING TWO LEVELS OF CONCENTRATED FORAGE AND ADDING CUMIN SEEDS IN PRODUCTIVE QUALITIES AND SOME QUALITIES OF RUMEN FLUID FOR AWASSI LAMB

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ABSTRACT

This study aimed to assess the possibility of using cumin as an additive to the diet and its effect on productive qualities of Awassi lambs and some qualities of rumen fluid. Twelve lambs male were distributed (an age of 3 ± 0.5 and a mean weight of 19 ± 0.5 kg) randomly to 3 treatments (3 animals per treatment). Coarse forage given to the point of saturation, concentrated forage on a basis of 2 and 3% of body weight. The first treatment (T₁% 2) included concentrated forage without adding cumin, the second treatment (T₂) 2% and add 20g/kg/ concentrated forage, the third treatment (T₃% 3), concentrated forage without adding cumin, and the fourth treatment (T₄) 3% and Add 20g/kg/. The experiment continued duration of 12 weeks. The results did not show significant differences between the level of nutrition 2 and 3% in the initial weight, final weight, the rate of daily and total weight gain and the efficiency of the food conversion, there was no significant effect of adding cumin in the productive qualities. The results showed that there was no significant effect of the feeding level 2 and 3% on the pH of the rumen fluid. The results showed a significant decrease at ($P < 0.05$) for adding cumin 0 and 20 g in pH for the period 3 hours after feeding, reaching 6.93, 5.86. The results did not show significant differences in the concentration of total volatile fatty acids at the level of 2 and 3% feed and there was no significant effect of adding cumin, and the results showed that there were no significant differences in the concentration of ammonia nitrogen at levels 2 and 3% and there was no significant effect of adding cumin.

Keywords: Concentrated Forage, Cumin Seeds, Rumen Fluid

Introduction

The Awassi sheep breed is the most presence and widespread in Iraq (Al-Haboby, 1999) as it contributes to reducing the need for animal products (Iniguez, 2005). Feeding sheep accounts for 70% of the total costs of raising them (Abdullah et al. 1993).

And Increasing the levels of the forage intake causes a decrease in the digestibility factor due to the speed of the passage of the feed inside the digestive system and the less time available for the fermentation of the feed by the microbial community (Reid, 1966). Medicinal plants are used as food additives for animals because they contain substances that improve the environment of the digestive system (Hassan, 2009). Aromatic plants known as herbs and spices have been used in the Middle East region for their preservative and medicinal properties (Chang, 2000). They can be used to improve animal production and benefit of forages (Windisch *et al.*, 2009). Spices have an effect on ruminant animals and contribute to fermentation of forage materials (Khan and Chaudhry, 2010). Most spices it works to adjust of methane emissions without affecting nutrient absorption or fermentation, depending on the type and concentration of spices (Chaudhry and Khan, 2012). One of these additives is cumin seed *Cuminum cyminum* L. Cumin seed are used as a receptor stimulator in traditional medicine as well as veterinary treatments (Thippeswany and Naidu, 2005). Cumin improves digestion and reduces digestive disorders and is a good source of nutrients (Milan *et al.*,

2008). Cumin enhances the liver's ability to get rid of toxins and strengthens the immune system (Juhri, 2011).

Materials and Methods

This experiment was conducted in the field of animal production affiliated to the College of Agriculture, University of Diyala for the period from 2/2/2020 to 25/4/2020 for a period of 12 weeks. This study included 12 lambs from Awassi males, lambs were purchased after weaning at an age of 3 ± 0.5 months with an average Weight ± 19 kg. The lambs were placed in a semi-closed barn with individual cages within it 1.5 m in length and 1 m in width per cage. The lambs were divided into four treatments with two levels of concentrated forage, 3 lambs in each treatment, and a 10 day introductory period was given for the purpose of accustoming the lambs and adapting them to the barn, cages and the quality of the foragr. The lambs were weighed to record the initial weight. The concentrated forage at a ratio of 2% and 3% of the body weight was given one meal in the morning and every week the lambs were weighed and until the end of the experiment in order to change the amount of the concentrated forage according to the new weight and to calculate the daily and total weight gain and given coarse forage (wheat hay) to the saturation point. The lambs were given vaccine (Enterohaemia due to clostridium species) the Spanish 2 ml was given subcutaneous administration to avoid gastrointestinal toxicity when she consumed concentrated forage and was dosed with Albendazole as an antihelminthic at a rate of 2 ml / 20 kg live weight. The lambs were

distributed into four treatments at levels 2 and 3% of the body weight, concentrated forage and cumin was added 20 g/kg/concentrated forage and the first treatment was given 2% of the body weight without adding cumin and the second treatment at 2% of body weight with addition cumin 20 g/kg / concentrated forage , the third treatment with 3% of body weight without adding cumin and the fourth treatment at 3% of body weight with the addition of cumin 20 g/kg/ concentrated forage.

Method of collecting rumen liquid

The rumen fluid was collected at the end of the first month of the experiment by means of a plastic stomach feeding tube. To facilitate the withdrawal process a large syringe (syringe) was placed at the tip of the tube with a volume of 50 ml. The rumen fluid was withdrawn in three periods per hour (0) before feeding , at hour (3) after feeding , and in the hour (6) after feeding , and placing the rumen liquid in a plastic test tube bearing the number of each animal and timing of withdrawal, the rumen fluid was filtered by a dull cloth according to (Shamoon , 1983). and the samples were frozen for the purpose of later analysis.

Measurement of rumen fluid variables

Measurement of pH in Rumen Liquid

The measurement of the pH of the rumen fluid samples drawn by an electronic meter was carried out immediately after the withdrawal process.

Concentration of total Volatile fatty acids TVFA in Rumen Liquid

The rumen fluid samples were analyzed in the laboratories of the College of Agricultural Engineering Sciences / University of Baghdad according to (Warner, 1964) method. Through the following law :

$$\text{TVFA(MLg/100ML)} = \frac{\text{volume NaOH} \times 0.1 \times 100}{\text{sample value (ml)}}$$

Determination of Ammonia Nitrogen in Rumen Liquid

Ammonia nitrogen concentration was measured in rumen liquid samples after dissolving it and withdrawing 2 ml of it according to (A.O.A.C., 2005) through the following law:

$$\text{NH}_3 - \text{N(MLg/100)} = \frac{\text{volume HCL} \times 0.05 \times 100 \times 14.008}{\text{sample value (ml)}}$$

Statistical Analysis

The experiment data were analyzed statistically by the ready-made program (SAS) for a factor experiment 2 x 2 according to the complete random design (CRD) according to the following mathematical model :

$$Y_{ij} = M + A_i + B_j + AB(ij) + e_{ijk}$$

It represents all of :

(Y_{ij}) is the view j of transaction i .

(M) is the general mean of the studied trait.

(A_i) was the effect of the first factor, nutritional level (2% and 3%).

(B_j) effect of the second factor adding cumin (0 and 20 g).

AB (ij) The effect of overlap between the first and the second factor.

(e_{ijk}) is a normally distributed random error.

The significant differences between the averages were compared with the Duncan test (1955 polynomial).

Results and Discussion

Productive qualities

The results in Table (1) did not show significant differences between the level of nutrition 2% and the level of nutrition 3% of body weight concentrated forage in the productive qualities and the results for the initial weight were 18.16 and 20, and the final weight reached 26.83 and 32 respectively, and the average daily weights were (gm) The total weight gain (kg) is 103.16, 142.85 g, 8.66, 12 kg, respectively. The feed conversion efficiency was 6.24 and 6.74 kg. The results in Table (1) showed that there were no significant differences when adding cumin to the concentrated forage by 0 and 20 g/kg forage in productive qualities and the initial weight was 19.50 and 18.66 and the final weight reached 30 and 28.83, respectively, and the increase was The daily weights were 124.99 and 121.02 g, the total weight increase was 10.50 and 10.16 kg, respectively, and the feed conversion efficiency was 6.75 and 6.23 kg, respectively.

Rumen fluid variables

PH in Rumen Liquid

The results in Table (2) did not show significant differences between the level of nutrition 2% and the level of nutrition 3% of body weight concentrated forage in the pH of the rumen fluid and the pH value for The periods (0, 3, 6) was 6.88, 6.94, 5.89 and 5.90. 5.97 and 5.97. The results in Table (2) showed significant differences in the pH of the rumen liquid when adding cumin to the concentrated forage by 0 and 20 g / kg / concentrated forage, where there was a significant decrease in the 3-hour period after feeding, reaching 5.92 and 5.86.

Total Volatile fatty acids in Rumen Liquid

The results in Table (3) did not show significant differences between the level of nutrition 2% and the level of nutrition 3% of body weight Concentrated forage in the concentration of total volatile fatty acids in the rumen liquid and the concentration of volatile fatty acids for the periods (0, 3, 6) 58.83, 59.50, 54.16 and 57.00, 60.33, 54.89. The results in Table (3) did not show differences in the concentration of total volatile fatty acids in the rumen liquid when adding cumin to the concentrated forage by 0 and 20 g/kg forage in the volatile fatty acids concentration for the periods (0, 3, 6) 59.00, 61.33, 55.00 and 56.83, 58.50 , 54.00.

Ammonia nitrogen NH₃-N in Rumen Liquid

The results in Table (4) did not show significant differences between the level of nutrition 2% and the level of nutrition 3% of body weight Concentrated forage in the concentration of ammonia nitrogen in the rumen liquid and the ammonia nitrogen concentration for the periods (0, 3, 6) 22.75 , 27.42, 18.08 and 30.93, 35.60 , 25.09. The results in Table (4) did not show significant differences in the concentration of ammonia nitrogen in the rumen liquid when adding cumin to the concentrated forage by 0 and 20 g / kg feed and the ammonia nitrogen concentration for the periods (0, 3, 6) was 25.67, 30.93 , 21.59 and 28.01 , 32.10 and 21.59.

Table 1 : The effect of feeding level and addition of cumin on the initial weight , final weight, total and daily weight gain rate, and feed conversion efficiency for Awassi lamb's (mean \pm standard error).

Conversion efficiency kg	Daily weight gain g	Total weight gain kg	Final weight kg	Initial weight kg	Treatments
Effect of feeding level					
0.81 \pm 6.24	16.74 \pm 103.16	1.40 \pm 8.66	1.32 \pm 26.83	1.01 \pm 18.16	A1%2
0.38 \pm 6.74	8.13 \pm 142.85	0.68 \pm 12	1.41 \pm 32	1.34 \pm 20	A2%3
N.S	N.S	N.S	N.S	N.S	Level of Significant
Effect of cumin					
0.65 \pm 6.75	15.29 \pm 124.99	1.28 \pm 10.50	1.57 \pm 30	1.20 \pm 19.50	B1 (0)
0.62 \pm 6.23	16.38 \pm 121.02	1.37 \pm 10.16	1.95 \pm 28.83	1.28 \pm 18.66	B2 (20)
N.S	N.S	N.S	N.S	N.S	Level of Significant

Table 2 : Effect of feeding level and addition of cumin on the pH of rumen fluid for Awassi lamb's (mean \pm standard error).

The pH of the rumen fluid at hours			Treatments
6 Hours after feeding	3 Hours after feeding	0 Before feeding	
Effect of feeding level			
5.97 a \pm 0.00	5.89 a \pm 0.01	6.88 a \pm 0.02	A1 %2
5.97 a \pm 0.00	5.90 a \pm 0.02	6.94 a \pm 0.02	A2 %3
N.S	N.S	N.S	Level of Significant
Effect of cumin			
5.97 a \pm 0.00	5.92 a \pm 0.00	6.93 a \pm 0.02	B1 (0)
5.97 a \pm 0.00	5.86 b \pm 0.01	6.90 a \pm 0.02	B2 (20)
N.S	*	N.S	Level of Significant

Table 3 : The effect of feeding level and addition of cumin on the concentration of total volatile fatty acids in the rumen fluid for Awassi lamb's (mean \pm standard error).

The concentration of total volatile fatty acids (mg / 100 mL) in the rumen fluid			Treatments
6 Hours after feeding	3 Hours after feeding	0 Before feeding	
Effect of feeding level			
54.16 \pm 2.42	59.50 \pm 2.43	58.83 \pm 2.30	A1 %2
54.83 \pm 2.57	60.33 \pm 2.90	57.00 \pm 2.65	A2 %3
N.S	N.S	N.S	Level of Significant
Effect of cumin			
55.00 \pm 3.19	61.33 \pm 3.21	59.00 \pm 2.76	B1 (0)
54.00 \pm 1.50	58.50 \pm 1.82	56.83 \pm 2.13	B2 (20)
N.S	N.S	N.S	Level of Significant

Table 4. : Effect of feeding level and addition of latency on the ammonia nitrogen concentration in the rumen fluid for Awassi lamb's (mean \pm standard error).

Ammonia nitrogen concentration (mg / 100 mL) in rumen fluid			Treatments
6 Hours after feeding	3 Hours after feeding	0 Before feeding	
Effect of feeding level			
18.08 \pm 4.98	27.42 \pm 3.55	22.75 \pm 2.96	A1 %2
25.09 \pm 5.67	35.60 \pm 3.88	30.93 \pm 4.73	A2 %3
N.S	N.S	N.S	Level of Significant
Effect of cumin			
21.59 \pm 5.60	30.93 \pm 4.82	25.67 \pm 4.39	B1 (0)
21.59 \pm 5.53	32.10 \pm 3.31	28.01 \pm 4.24	B2 (20)
N.S	N.S	N.S	Level of Significant

References

- Abdullah, N.M.; Nasser, A.K. and Mahmoud, A.T. (1993). Feeding two levels of concentrated feed with different sources of coarse feed on growth and fattening of Awassi lambs. *Iraqi J. Vet. Sci.* 6(2): 57- 63.
- Al-Haboby, A.H.; Saman, A.D. and Abdul-kareem, T.A. (1999). Influence of protein supplementation on reproduction traits of Awassi sheep grazing cereal stubble. *Small Rumin. Res.* 34: 33 - 43.
- AOAC (2005). (Association of Official Analytical Chemists). Official methods of analysis. 18th ed. AOAC International, Gaithersburg, Maryland, USA, AOAC International.
- Chang, J. (2000). Medicinal herbs: Drugs or dietary supplements? *Biochem. Pharmacol.* 59(3): 211- 219.
- Chaudhry, A.S. and Khan, M.M.H. (2012). Impacts of different spices on in vitro rumen dry matter disappearance, fermentation and methane of wheat or ryegrass hay based substrates *Livestock Sci.* 146(1): 84-90.
- Duncan, D.B. (1955). Multiple Range and F test. *Biometrics.* Multiple. 11(1): 1-142.
- Hassan, S.A. (2009). Effect of some medicinal plants supplementation on daily intake, live weight gain and carcass characteristics of Awassi lambs. accepted for publication in *Egyptian J. Ntr. and Feed.*12(1): 65-73.
- Iniguez, L. (2005). Characterization of Small Ruminants Breeds in West Asia and North Africa. Vol.(2): Eds. International Center For Agricultural Research In Dry Areas (Icarda). Aleppo. Syria.
- Johri, R.K. (2011). *Cuminum cyminum* and *Carum carvi*: An update. *Pharmacogn Rev.* 5(9): 63-72.
- Khan, M.M.H. and Chaudhry, A.S. (2010). Chemical Composition of Selecte Forages and Spices and the Effect of These Spices on in vitro Rumen Degradability of Some Forages. *Asian-Australasian Journal of Animal Sci.* 23 (7-8): 889-900.
- Milan, M.K.S.; Dholakia, H.; Tikku, P.K. and Vishveshwaraiah, P. (2008). Enhancement of digestive enzymatic activity by cumin (*Cuminum cyminum* L.) and role of spent cumin as abionutrient. *J Food Chem.* 110(3): 678-683.
- Reid, J.T., Moe, P.W. and Tyrrell, H.F. (1966). Energy and Protein Requirements of Milk Production1, 2. *J. Dairy Sci.*, 49(2) : 215-223.
- SAS (2001). SAS/STAT User's Guide for Release Computers Personal. 6 - 12 .SAS. Institute Inc. Cary. NC. USA.
- Shamoon, S.A. (1983). Amino Acid Supplements for Ruminant Farm Livestock With Special Reference to Methionine. Ph.D. Thesis. Glasgow University. U.K.
- Thippeswamy, N.B. and Nadiu, K.A. (2005). Anti-oxidant potency of cumin varieties cumin black cumin and bitter cumin on oxidant systems . *Eur. Food Res Technol Res Technol.* 220 (5-6): 472 - 476.
- Warner, A.C.I. (1964). Production of volatile fatty acids in the rumen: methods of measurement. *Nutrition Abstracts and Reviews.* 34: 339-352.
- Windisch, W.; Rohrer, E. and Schedle, K. (2009). Phytogetic feed additives to young piglets and poultry : Mechanisms and application. In *Phytogenics in Animal Nutrition: Natural Concepts to Optimize Gut Health and Performance*, Steiner, T.Ed. Nottingham University Press : Nottingham. UK. pp. 19 - 38.