International Journal of Biological, Life and Agricultural Sciences
ISSN: 2415-6612
Vol:4, No:11, 2010

Effect of Tonilisat and Roemin W2 Supplementations on the Performance of Lambs

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***Abstract*—**A thirty Rahmani weaned male lambs of average body weight (27.28±1.40 kg) were randomly allotted to three similar groups, ten lambs in each, to study the benefit of commercial feed additives Tonilisat (Saccharomyces cerevisiae) and Roemin W2 (Lactobacillus acidophilus, Lactobacillus thermophilus, Bifidobacterium and Lactose) as growth promoters on lambs performance, digestibility, rumen activity and some blood constituents. The experiment lasted about 107 days. Three experimental groups were allotted as control group: received the basal ration, T1 group: received the basal ration supplemented with Tonilisat as (0.5kg/ ton concentrate feed mixture) and T2 group: received the basal ration supplemented with Roemin W2 (1kg/ ton concentrate feed mixture).

Our study revealed that addition of Tonilisat significantly increased digestion coefficient of crude protein than that of the control group, Furthermore, the supplementation of Tonilisat or Roemin W2 increased ($p<0.05$) crude fiber digestibility than control group. Total digestible nutrients and crude digestible protein were not significantly changed between treatments. Retained nitrogen was higher in treated lamb groups than untreated but the different was non significant. Rumen activity of different rations showed that volatile fatty acids concentrations for Tonilisat and Roemin W2 groups were higher than control group, but the differences were not significant. There are no significant changes between groups in tested blood parameters but in T1 group ALT and AST were decreased. Conclusion: Supplementation of the lamb's rations with probiotics had a non significant effect ($p<0.05$) on blood constituents. While, growth performance and economic efficiency revealed that Tonilisat supplemented lambs had the best average daily gain followed by Roemin W2 treated group in comparison with control group. The best economic efficiency was recorded for T1 which fed Tonilisat followed by control group at whole period.

***Keywords*—**Rahmani sheep, Tonilisat, Roemin W2, Growth, Performance.

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I. INTRODUCTION

The lack of sufficient feed to meet the nutritional requirements of existing animal population is one of the most critical problems of animal production in Egypt. On the other hand, many attempts have been made for improving animal productivity, one of those are the use of feed additives and growth promoters including antibiotic and biological additives. In addition, probiotics have been used as a feed additive to young animals to protect them against enteropathic disorders and promoting increase feed conversion efficiency and live weight in young growing animals. Probiotics have been defined as bacterial preparations that impart clinically verified beneficial effects on the animal health when added to its ration [32]. In addition, Probiotics are widely used to prepare fermented dairy products such as yogurt or freeze-dried cultures. In the future, they may also be found in fermented vegetables and meats. Several health-related effects associated with the intake of probiotics, including alleviation of lactose intolerance and immune enhancement. Some evidence suggests a role for probiotics in reducing the risk of rotavirus-induced diarrhea and colon cancer [19]. Most probiotics are currently either lactic acid bacteria or bifidobacteria, but new species and genera are being assessed for future use. The selection of effective probiotics was based on general properties of probiotics [15]. More than 1000 strains of Saccharomyces cerevisiae are listed in the American Type Culture Collection Catalogue [4]. Live yeast supplements release essential enzymes, Vitamins and amino acids during digestion, all of which are thought to have a positive effect on the performance of ruminants [23] and increase average daily gain and feed efficiency [8], [10], [30]. Some of the benefits associated with *Saccharomyces cerevisiae* supplementation include increased DM and NDF digestion [6] and milk production [18], [38].

Intense research efforts are under way to develop dairy products into which probiotic organisms such as Lactobacillus and Bifidobacterium species are incorporated. Such probiotic foods may modulate gut microbial composition, thereby leading to improved gut health, for example, through improved tolerance to lactose in lactose-intolerant individuals or improved resistance to pathogenic bacteria [33]. Therefore, present study was carried out to compare the effect of Tonilisat and Roemin W2 as feed additives on nutrients digestibility, ruminal activity, blood constituents, feed efficiency and performance of growing lambs.

II. MATERIALS AND METHODS

A. Experimental design

The field experiment was carried out at the experimental station of Faculty of Agriculture, Alexandria University, Damanhour Branch, Al-Bostan district during the period from June to October 2008 to study the effect of adding either Tonilisat or Roemin W2 as growth promoter to the ration of lambs in growing trial which lasted for 107 day.

Thirty Rahmani weaned male lambs, aging about 6 months old of an average weight of about 27.28±1.40 kg were allotted randomly according to their live body weight and age into three equal groups, ten lambs each. Each group was housed in a separate part of a shaded pen.

Experimental animals were fed on 2.75 % of their live body weight on concentrate feed mixture without (control) or with Tonilisat (T1) or Roemin W2 (T2) as growth promoters. These feed additives were added at the rate of 0.5, 1 kg per ton of concentrate feed mixture for Tonilisat and Roemin W2, respectively. Animals through growing trail were fed free in feedlot and weighed in the morning before drinking or feeding at the beginning of the trial and biweekly thereafter. Concentrate feed mixtures were adjusted to the changing of body weight every two weeks. Concentrate mixtures were given twice daily at 10 a.m. and 2 p.m. while wheat straw was offered (*ad lib*.). The offered and the refusals were weighed daily. Drinking water was available for animals all day time. Body weight changes and daily gain were recorded for each animal. The chemical composition and cell wall constituents of concentrate mixture and wheat straw were illustrated in Table I.

TABLE I
CHEMICAL COMPOSITION AND CELL WALL CONSTITUENTSOF FEED CONCENTRATE MIXTURE AND WHEAT STRAW (ON DM BASIS)

Items	Feed concentrate mixture[Ŧ]	Wheat straw
Chemical composition		
DM	91.51	93.48
OM	89.64	89.58
CP	14.34	3.26
CF	8.47	40.23
EE	2.24	1.32
NFE	64.59	44.77
ASH	10.36	10.42
Cell wall constituents		
NDF	34.62	78.24
ADF	16.24	54.13
Hemi cellulose	18.38	24.11
NFC[¤]	38.44	6.76

[¤]NFC: Non fibrous carbohydrates = 100 - % (CP+ NDF + EE + ASH) [5].

[Ŧ] Concentrate feed mixture consisted of 25% undecorated seed cake, 12% linseed cake, 41% yellow corn, 16% wheat bran, 3% vinass, 1.5% limestone, 1.4 sodium chloride and 0.1 % common salt.

B. Feed additives

The following two tested feed additives were used: Tonilisat dry yeast which consists of *Saccharomyces cerevisiae* active live yeast $80x10^8$/gram and Roemin W2 a water soluble powder each gram of Roemin W2 contains Lactobacillus acidophilus $2x10^8$ CFU, Lactobacillus thermophilus $2x10^8$ CFU, Bifidobacterium 1 $x10^8$ CFU and Lactose.

Economic efficiency = Price per kg live body weight/ feed cost (LE/kg gain).

The price of feed stuffs and products: Concentrate feed mixture (1800 L.E/ ton), wheat straw (300 L.E/ ton), Tonilisat (100L.E/ Kg), Roemin W2 (40 L.E / Kg) and live body weight (22 L.E/ Kg).

C. Digestibility and nitrogen balance trials

At the end of the growing trial three animals from each treatment were used in the digestibility trial for fourteen days as a preliminary period followed by six days as a collection period. The animals were fed according to the normal allowances according to the experiment assignment. The animals were fed individually. During the collection period feces and urine were quantitatively collected from each animal. Representative samples (10 %) of the collected feces were taken and dried in oven at 60^0C for 48 hrs. The dried feces samples from each animal were mixed and saved for chemical analysis. Urine samples were daily collected by a graduated cylinder and 10 % daily samples were taken as a representative samples. The representative samples from each animal were mixed and stored for chemical analysis.

D. Ruminal liquor samples

Ruminal liquor samples were collected at the end of the digestibility trial using clean and sterile stomach tube at 0, 2 and 4 hrs after feeding. Three animals from each treatment were used to obtain ruminal liquor samples which were prepared for later analysis.

E. Blood samples

During the last week of the growing trial, three animals from each treatment were used to obtain 10 ml blood from the jugular vein before feeding. Blood samples were centrifuged at 3000 r.p.m. for 15 min to separate serum. Collected serum samples were kept frozen until used for biochemical analysis.

F. Chemical and biochemical analysis

Wheat straw, concentrate feed mixture, orts and feces samples were analyzed for moisture, ash, crude protein, ether extract, crude fiber and urinary nitrogen according to Official Methods [3]. Cell wall constituents were estimated according to the methods described by [36]. Ammonia nitrogen concentrations and Total volatile fatty acids were measured in ruminal liquor samples. Ammonia nitrogen concentrations were estimated by using Magnesium oxide (MgO) and the Markham microdistillation apparatus [21].Total volatile fatty acids were determined by steam distillation as described by [37].

Serum samples were subjected to laboratory analysis for total serum proteins and albumin [13], globulins [7] urea [16], ALT and AST [29] and cholesterol [40] in serum were performed by using commercial kits purchased from Biomerieux.

G. Statistical analysis:

Data were statistically analyzed by GLm fixed model procedures [34] Differences between mean values were compared by Duncan's multiple rang test.

III. RESULTS AND DISCUSSION

A. Digestibility

Results of feed intake in all groups shown in Table Π cleared that Roemin W2 group tended to increase total dry matter intake more than control or Tonilisat group but the differences were not significant (p<0.05).

Total dry matter intake was improved by treatment with Roemin W2. Similar results reported by [8]; [30]. While total dry matter intake did not affected by Tonilisat supplementation this result was in accordance with that reported by [8], [30] who concluded that the dry matter intake was not affected by the addition of Tonilisat to the rations of ruminants.

TABLE Π
DRY MATTER INTAKE OF LAMBS RECEIVES DIFFERENT EXPERIMENTAL TREATEMNET DURING THE DIGESTABILITY TRAIL

Items	Control	Tonilisat	Roemin W2	SEM	LSD
No of animals	10	10	10	——	——
Dry matter intake					
Concentrate	1007.22	986.47	1006.61	51.19	353.53
Roughage	141.15	139.28	183.53	10.04	48.31
Total	1148.37	1125.75	1190.14	56.63	386.49
%Concentrate	87.52	87.65	84.48	0.70	3.23
% Roughage	12.48	12.35	15.52	0.70	3.23

Digestibility coefficients and nutritive values of experimental rations are presented in Table III. The data revealed that DM, OM, EE, NFE digestibility had insignificantly (p<0.05) affected by Tonilisat or Roemin W2 supplements. In addition, the data showed that crude protein and crude fiber digestibility significantly improved in lambs fed Tonilisat compared to control. The values were 77.41, 45.4 vs. 73.79, 40.29 for Tonilisat and control, respectively. Moreover, crude fiber digestibility was increased by adding Roemin W2 (p< 0.05) more than control group. On the other hand, dry matter, organic matter, ether extract and nitrogen free extract digestibility were not significantly differing with Tonilisat or Roemin W2 supplementation compared with control lambs.

The results in the present study showed that rations supplementation with Tonilisat or Roemin W2 didn't affect on digestibility coefficients of DM, OM and EE. However, the highest values (64.81, 67, 27 and 73.61 respectively) were obtained from Tonilisat treated lambs. The results obtained are in harmony with those reported by [10], [17] who found that addition of *Saccharomyces cerevisiae* had no significant effect on dry matter and organic matter digestibility in digestive tract of cows. [10] Demonstrated that *Saccharomyces cerevisiae* improved OM plus NDF digestibility compared with control diet. Some researches have shown that treatment with some yeast cultures increased the number of total and cellulolytic bacteria in the rumen and increased cellulose degradation (Miller *et al*., 2002; and [24]. Furthermore, [12] reported that addition of *Saccharomyces cerevisiae* at 5 or 10 g/ day has significantly modified the proportions of the different protozoa types and improved ruminal cellulolytic activity. On the other hand, the significant improving effect of Tonilisat supplementation on crude protein and crude fiber digestibility or *Saccharomyces cerevisiae* and Roemin W2 on crud fiber digestibility observed in this study is in agreement with many other investigations among them the study stated that the digestibility coefficients of crude protein was improved almost linearly with increasing amounts of *Saccharomyces cerevisiae* from 5 at 15 g added to the basal diet of lactating buffaloes [20]. In addition [1] reported that digestibility coefficients of DM, CP and CF were improved with Naemy lambs fed the yeast culture at 4 and 8 g yeast/ ram/ day in comparison with those fed yeast culture-free diet. Moreover, digestibilities of DM, OM, NDF and ADF of berseem hay were increased (p<0.05) when the supplementation level of *Saccharomyces cerevisiae* was 22.5 g where as 11.25 g had no effect [9]. yeast supplementation significantly (p<0.05) increased digestibility of DM, OM, CP, NDF and ADF of tomato pomace at 2 and 4 g yeast per head per day in rams [27].

Table III showed the nutritive values expressed as total digestibility nutrients (TDN) and digestible crude protein (DCP) were not significantly differ with Tonilisat or Roemin W2 supplementation compared with control lambs. Control group had the highest value of TDN (62.03 %) while, Tonilisat showed the lowest value (61.47%) while, the highest value of digestible crude protein recorded with Tonilisat group (10.04 %).

TABLE III
APPARENT DIGESTABILITY AND NUTRITIVE VALUE OF DIFFERENT EXPERIMENTAL TREATMENTS

Items	Control	Tonilisat	Roemin W2	SEM	LSD
No of animals	10	10	10	———	——
Digestibility coefficients					
DM	59.75	64.81	61.48	1.12	5.77
OM	65.27	67.27	65.78	0.47	2.51
CP	73.79^{b}	77.41^{a}	76.21^{ab}	0.64	2.46
CF	40.29^{b}	45.4^{a}	43.46^{a}	0.85	2.85
EE	73.18	73.61	72.45	0.43	2.78
NFE	70.78	68.31	69.34	0.79	4.85
Nutritive values					
TDN	62.03	61.47	61.52	0.49	3.32
DCP	9.56	10.04	9.62	0.11	0.54

B. Nitrogen balance

The data illustrated in Table IV revealed that supplementation of lambs with either Tonilisat or Roemin W2 had a non significant effect (p<0.05) on nitrogen intake, fecal nitrogen, digestible nitrogen, urinary nitrogen and retained nitrogen. It could be seen that the highest retained nitrogen (10.18 g) was obtained from those lambs treated with Tonilisat group followed by Roemin W2 treated lambs when compared with control group. It seems that the yeast treated lambs improved nitrogen balance as percentage of intake or digested (43.50, 56.22 vs. 36.22, 47.46 and 34.46, 46.69) for Tonilisat, Roemin W2 and control groups, respectively. This improvement was resulted of less of excretion of urinary nitrogen and fecal nitrogen in lambs fed *Saccharomyces cerevisiae* compared with lambs fed Roemin W2 and control group.

Nitrogen intake, fecal nitrogen, digested nitrogen; urinary nitrogen and retained nitrogen were not affected significantly by addition of Tonilisat or Roemin W2 to the basal diet (Table IV). However, the highest value of retained nitrogen (10, 18 g) was obtained from the lambs supplemented with Tonilisat in their ration. When recalculating the difference between these two values as percentage of the control value it is equal to 23.84 %.

In the results section study of nitrogen balance it can be seen that the only pronounced significant effect of Tonilisat was on retained nitrogen as % nitrogen intake (Table IV). Retained nitrogen as % nitrogen intake was higher in lambs given Tonilisat in their diet as compared with control lambs. Pronounced effect of *Saccharomyces cerevisiae* in improving nitrogen utilization could be attributed to reduction nitrogen excretion in fecal and urine. Similar results were reported by [1], [8].

C. Ruminal activity

The data in Table V showed the effect of supplementation of lambs with Tonilisat or Roemin W2 on volatile fatty acids concentrations (meq/ 100 ml R.L.) at 0, 2 and 4 hrs after feeding. The differences between control group and either of Tonilisat treated or Roemin W2 treated lambs were not significant. The volatile fatty acids concentrations averaged 10.47, 8.96 and 10.17 meq/ 100 ml R.L. for control, Tonilisat and Roemin W2 treated lambs, respectively.

TABLE IV
NITROGEN UTILIZATION OF LAMBS FED DIFFERENT EXPERIMENTAL TREATMENT

Items	Control	Tonilisat	Roemin W2	SEM	LSD
No of animals	10	10	10		
Nitrogen intake (g)	23.85	23.36	24.05	1.20	8.28
Fecal nitrogen (g)	6.19	5.29	5.70	0.28	1.72
Digested nitrogen (g)	17.66	18.07	18.35	0.96	6.60
Urinary nitrogen (g)	9.44	7.89	9.49	0.50	2.94
Retained nitrogen (g)	8.22	10.18	8.86	0.71	4.48
Retained nitrogen as %					
% nitrogen intake	34.46^{b}	43.50^{a}	36.22^{ab}	1.78	7.72
% Digested nitrogen	46.69	56.22	47.46	2.06	9.59

Means with the different letter are significantly different at (0.05)

The differences between these averages were not significant (p< 0.05); however, volatile fatty acids concentrations were slightly decreased by treatment with Tonilisat or Roemin W2. The highest improvement (10.47 meq/ 100 ml R.L.) was obtained with Tonilisat.

Volatile fatty acids concentrations of sheep fed the experimental diets were ranged between 6.1 to 12.88 meg/100 ml R.L for Tonilisat at 0 hr and control group at 2 hrs post feeding, respectively .No significant differences were found among diets with different additives. The total volatile fatty acids were increased after feeding for all treatments. These results in accordance with those reported by [12] who found that addition of Tonilisat to the concentrate-enriched ration didn't induce any significant variation of total volatile fatty acids concentrations in ruminal fluid in sheep. Others emphasized that *Saccharomyces cerevisiae* supplementation had a non significant effect on total volatile fatty acids concentrations in ruminants [39] and [10].

The result of ammonia nitrogen concentrations (MEG/ 100 ML R.L.) of the rumen liquor of the experimental diets are presented in Table v. The differences between experimental groups were not significant at 0, 2 and 4 hrs after feeding. Ammonia nitrogen concentrations were increased after feeding than before feeding. At 4 hrs post feeding, the highest value of ammonia nitrogen concentration was recorded with Roemin group (33.38 mg /100 ml R.L), while the lowest value was recorded with control group (27.85 mg / 100 ml R.L). These results were agreed with those obtained by [12] and [11]. On the other hand, optimal concentration of ammonia nitrogen for microbial growth and protein synthesis ranged from 0.35 to 29 mg/ 100 ml R.L [26].

TABLE V
VOLATILE FATTY ACIDS CONCENTRATIONS (MEG/ 100 ML R.L.)AND AMMONIA-N CONCENTRATIONS (MG/ 100 ML R.L.) IN RUMEN LIQUOR FOR LAMBS FED DIFFERENT EXPERIMENTAL TREARMENTS

Time after feeding	Control	Tonilisat	Roemin W2	SEM	LSD
Volatile fatty acids concentrations					
0 h	6.78	6.10	7.91	0.40	2.12
2 h	12.88	11.75	11.98	0.56	3.72
4 h	11.75	9.04	10.62	0.61	3.22
Average	10.47	8.96	10.17	0.52	1.53
Ammonia-N ($NH_3 – N$) concentrations					
0 h	16.15	17.11	16.93	0.42	2.72
2 h	26.38	20.71	24.89	1.54	8.91
4 h	27.85	29.93	33.38	1.38	7.73
Average	23.46	22.58	25.07	1.28	3.31

D. Blood parameters

Differences in some serum parameters in lambs of all treatments were summarized in Table VI which revealed that no significant differences were observed between treatment groups in serum total protein, albumin and globulin levels, however addition of Tonilisat gave the highest values (6.20, 3.71 and 2.49) respectively. In addition, in Tonilisat treated group alanine aminotransferase and aspertate aminotransferase activities and cholesterol levels were none significantly decreased.

The results in the present study indicated that rations supplementation with Tonilisat or Roemin W2 didn't affect blood constituents significantly. However, the highest total protein, albumin and globulin concentrations (6.20, 3.71 and 2.49, respectively) were obtained from Tonilisat treated lambs. Moreover, A/G ratio and urea, ALT, AST and cholesterol concentrations were not affected significantly by addition of Tonilisat or Roemin W2 to the basal diet (Table VI). Although, the lowest concentrations of ALT, AST and cholesterol were recorded for the lambs supplemented with Tonilisat in their ration. These results are constituent with previous data in sheep [12], [22], [35].

TABLE VI
SOME BLOOD PARAMETERS FOR LAMBS FED DIFFERENT EXPERIMENTAL TREATMENTS

Items	Control	Tonilisat	Roemin W2	SEM	LSD
Total protein (g/dl)	5.75	6.20	5.87	0.15	0.95
Albumin (g/dl)	3.58	3.71	3.40	0.12	0.80
Globulin (g/dl)	2.17	2.49	2.47	0.10	0.63
A/G ratio	1.65	1.52	1.40	0.09	0.55
Urea (mg/dl)	24.40	25.39	23.76	1.98	13.58
ALT (U/L)	31.00	29.67	31.33	1.00	6.69
AST(U/L)	37.00	36.33	36.33	1.53	10.55
Cholesterol (mg/dl)	38.79	25.95	33.33	3.55	20.89

E. Fattening trails

1) Live body weight changes

Growth performance data of lamb groups fed different experimental treatments during growth trial are shown in Table VII. Initial body weight was almost the same for different lamb groups. From data illustrated in Table VII we found that the total gain during the entire period for the experimental lamb groups ranged between 17.33 kg (Tonilisat treated lambs) and 16.17 kg (control). The differences between groups were not statistically significant. Average daily gains at the first period (60 d) were highest for Tonilisat then Roemin W2 and control (being 150, 141.67 and 133.33 g). Average daily gain during the second period (47 d) tended to increase in all groups however the difference between the control group and any other treated group was not statistically significant.

The results in Table VII showed that addition of Tonilisat or Roemin W2 to the basal diet generally increased the average daily gain at the whole period (107 d). However, no significant differences were detected between experimental groups. The highest value 161.99 g was obtained from Tonilisat treated lambs which gave about increasment in the average daily gain over the control group (151.09). These results are consistent with the findings of [1], [8] in lambs. [14] reported that the administration of yeast cultures Yea-

Sacc 1026 (*Saccharomyces cerevisiae*, strain 1026) at a level of 10 g / calf / day in male Holstein calves from day 4 to day 56 of age did not alter final body weight, body weight gain, Dry matter intake and feed conversion ratio. In a similar study with Holstein calves, dietary supplementation of *Saccharomyces cerevisiae* (1g / day/ calf) did not affect body weight gain and feed conversion ratio [28]. On the other hand, [10] concluded that the supplementation of *Saccharomyces cerevisiae* to the forage sorghum hay for male Nubian goat's kids had significant effect ($p < 0.01$) on body weight gain. The improvement in daily gain as a result of adding Saccharomyces *cerevisiae* may be due to its effect on microbial efficiency and organic matter, crude protein and crude fiber digestibilities. Supplementation of yeast culture in steers could increase organic matter digestibility in the grazing season [25]. It is of interest to report that the results of total gain and average daily gain are in harmony with the results obtained in digestibility and nitrogen balance trial (Table 3 and 4) which showed that supplemented lambs with Tonilisat improved the digestion coefficients of crude protein and crude fiber and retained nitrogen as compared with control group. Also, they are in agreement Synchronization with the results of ruminal activity and blood constituents (Table 5 and 7) which revealed that ruminal volatile fatty acids, total protein, albumin and globulin concentrations of Tonilisat treated lambs were higher than those of control lambs.

2) Dry matter intake

The effect of Tonilisat or Roemin W2 on feed intake of lambs during growth trial is shown in Table VII. The data showed that addition of Tonilisat or Roemin W2 to the basal diet slightly increased total dry matter intake at different experimental periods. Addition of Tonilisat resulted in the highest total dry matter intake (1108.91, 1427.99 and 1249.05 g) followed by Roemin W2 treatment (1091.89, 1400.46 and 1227.73 g) then control group (1088.25 and 1222.17 g).

3) Feed conversion ratio and economic efficiency

The tabulated data in Table VII showed that the feed conversion ratio for the experimental groups ranged between 7.71 kg gain (Tonilisat treated lambs) and 8.09 kg DM /kg gain (control) at entire period (107 d). In addition, Table VII revealed that supplementation of Tonilisat decreased feed cost / kg gain at entire period. Moreover, the highest economic efficiency at entire period (2.07) was obtained from Tonilisat treated lambs followed by control lambs. In contrary, the lowest economic efficiency was obtained from lambs in Roemin W2 group.

Data in the present study showed that Tonilisat group was more efficient in covering DM to gain than Roemin W2 or control group. The improvement of feed conversion ratio and economic feed efficiency may be due to the increase of growth rate in Tonilisat group comparing with control and Roemin W2 groups. These results are in harmony with those suggested by [2], [8], [31].

TABALE VII
BODY WEIGHT GAIN, DRY MATTER INTAKE, FEED CONVERSION RATIO AND ECONOMIC EFFICIENCY OF LAMB GROUPS FED DIFFERENT EXPERIMENTAL TREATMENTS DURING GROWTH TRAIL

Items	Control	Tonilisat	Roemin W2	SEM	LSD
No of animals	10	10	10	——	——
Body weight gain					
Initial body weight (kg)	27	27.5	27.33	1.40	7.8
Body weight at 60 day from trial(kg)	35	34.33	35.83	1.37	7.6
Final body weight (kg)	43.17	44.83	43.83	1.38	7.6
Total gain during the entire period (kg)	16.17	17.33	16.50	0.40	2.1
Body weight changes (g)					
First period (0-60 d)	133.33	150	141.67	4.71	24
Second period (61-107d)	173.76	177.30	170.21	3.94	21
entire period (0 – 107 d)	151.09	161.99	154.21	3.78	20
Dry matter intake (g/d)					
First period (0-60 d)					
Concentrate	779.74	777.83	794.31		
Roughage	308.51	331.08	297.58		
Total	1088.25	1108.91	1091.89		
Second period (61-107d)					
Concentrate	983.57	995.93	1002.03		
Roughage	409.52	432.06	398.43		
Total	1393.09	1427.99	1400.46		
Entire period (0-107 d)					
Concentrate	869.27	873.63	885.86		
Roughage	352.90	375.42	341.87		
Total	1222.17	1249.05	1227.73		
Feed conversion ratio and economic efficiency					
Feed conversion ratio kg DM / kg gain					
0 – 60 d	8.16	7.39	7.71		
61 – 107 d	8.02	8.05	8.23		
0 – 107 d	8.09	7.71	7.96		
Feed cost / kg gain (L.E)					
0 – 60 d	11.17	10.27	10.94		
61 – 107 d	10.88	11.11	11.51		
0 – 107 d	10.98	10.61	11.15		
Economic efficiency					
0 – 60 d	1.97	2.14	2.01		
61 – 107 d	2.02	1.98	1.91		
0 – 107 d	2.00	2.07	1.97		

IV. CONCLUSION

It could be concluded that supplementation of the ration for growing lambs with Tonilisat at 0.5 kg per ton of concentrate feed mixture improves the growth performance, digestibility coefficient of dry matter , organic matter, crude protein and crude fiber, feed conversion ratio and economic feed efficiency. Results didn't show any negative effects on blood proteins and kidney and liver functions.

ACKNOWLEDGMENTS

I would like to express my deepest thanks and appreciation to all breeders of our farm for their help. Also, veterinary nurses and supervisors were also acknowledged.

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