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NUTRITIVE VALUE OF DIETS CONTAINING POULTARY LITTER FOR SHEEP

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SUMMARY

The aim of this study was to evaluate rations containing Broiler Litter (BL) in-vivo. The first experiment was carried out to determine the nutrient digestibility and nutritive values of rations containing 0 and 14% BL (DM basis). The results indicated that the differences between the two rations were not significant ($P > 0.05$) for digestibility of CP, CF, EE, NFE and ash. The starch value and total digestible nutrients (TDN) were higher ($P < 0.05$) in control diet than BL diet. The difference between the two diets in the digestible protein (DP) was not significant ($P > 0.05$). The nitrogen balance was positive for the two diets.

The second experiment was carried out to identify problems associated with productive performance and weaned lambs weights when using BL in nursing ewe's rations. Also, to study the effect of feeding BL containing rations on some mineral content of milk produced from ewes.

The results indicated that the mean weight of lambs at weaning were 20.58 kg and 20.18 kg and average daily gain (ADG) were 191 g and 206 g for control diet and BL diet, respectively. Also, the age at weaning was significantly higher for control group than BL group (being 87.8 and 79.9 day's orderly). On the other hand, the amount of kg weaned per kg LBW per ewe was higher for BL treatment (0.53 kg) than control treatment (0.48 kg). The concentration of copper (ppm) in milk was significantly higher in BL (0.98) than control group (0.72). However, the concentration of Pb was 1.00 and 1.04 ppm respectively which did not differ significantly. On the other hand, the concentration of Cd was significantly higher in control treatment (77.34 ppb) than BL treatment (57.98 ppb). Total milk yields were 660.37 and 740.58 g/head/day for control and BL ewe group, respectively, but the difference was not significant. Also the feed efficiency was 2.04 and 1.85 g DMI/g milk yield for control and BL ewe groups, respectively. The percentages of total solids were 14.73 and 14.93 for control and BL ewe group, respectively. The blood analysis indicated that there was no problem related to the use of BL in ewe's ration.

Keywords: Lactating ewes, broiler litter, lambs, diet, feed efficiency, digestibility

INTRODUCTION

The annual requirements of animal wealth in Egypt are about 14 million-ton of TDN. The shortage of animal feeds is about 4 million-ton of TDN (Mohamed, 1993).

During winter and spring seasons livestock consume about 50 million tons of berseem containing about 6 and 1.2 million tons which representative about 60 and 75% respectively of the total yearly available TDN and protein from animal feeds (Hathout, 1987).

On the other hand during the drought season (summer and autumn) only about 3.707 million tons of TDN and 321.1 thousand tons of digestible crude protein (DCP) are available for livestock consumption, while the estimated requirements are found to be 5.371 million tons of TDN and 590.92 thousand tons of DCP. Therefore a gap of 1.665 million tons of TDN and 269.8 thousand tons of DCP (Abou akkada, 1984). Accordingly the gap during drought seasons is about 30.99 and 45.66% from TDN and DCP, respectively.

In order to correct feed balance during the last two decades Egyptian scientists have focused their researches on the utilization of all potential by products in the area of animal feeding.

Poultry waste contains a good profile of nitrogenous compounds, minerals and vitamins (Oltijen and Dinius, 1976). Results of different investigators indicated that N-of poultry wastes can be partially replaced successfully, from the protein of concentrate feed mixture (CFM) in growing male lambs diet (Saleh, 1990). Also inclusion of poultry wastes in the diet of growing buffalo heifers did not affect reproductive performance (Elwan, 1991).

MATERIALS AND METHODS

Metabolism trail was conducted at the experimental station of animal nutrition unit, Radiobiology application department, Nuclear Research Center, Atomic Energy Authority, Enshas, to evaluate rations containing broiler litter with sheep using metabolic cages. Feeding trial was also done on lactating ewes to determine the effect of rations containing BL on some mineral contents in blood serum and milk, and milk production on weaning weight of lambs at weaning.

1. Rations:

A feeding trial was carried out in this study by using BL as a basal diet. Two experimental rations were formulated to cover the requirements of ewes according to the allowances of fat tail, course-wool sheep recommended by Tommi (1963). The two diets and their chemical composition are presented in Table 1.

Table 1. The formulation of experimental diets on dry matter basis (%)

Ingredient	Control Diet	BL Diet	Berseem
Crushed yellow corn Cotton	74	66.5	
seed meal	15	11	
Broiler litter	-	14	
Soybean meal	5	3.5	
Wheat bran	5	4	
NaCl	0.5	0.5	
Mineral mixture	0.5	0.5	
Total	100	100	
OM %	96.5	93.8	87.0
Ash %	3.5	6.2	13.0
CP%	14.2	14.1	20.2
EE %	3.9	2.9	03.3
CF %	9.9	10.2	24.0
NFE %	68.5	66.6	39.5

A. Metabolism Trial

Animals

Seven mature Barki Rams were used in this experiment. The animals were randomly assigned to two experimental groups: Treatment I contain 4 animals (control diet) and Treatment II contain 3 animals (BL diet) .The respective (LBW) of the two groups were 38.1 and 37.8 kg.

Each animal was offered daily 0.5 kg concentrate diet and 1.5 kg berseem for 7 weeks as a preliminary period followed by 7 days collection period. During the collection period the animals were placed on metabolism cages where complete quantitative collection of feces and urine was recorded to determination the digestibility coefficient of different nutrients as well as the nitrogen balance of the two nutritional treatments. A daily sample representing 10% by weight of fresh feces from each animal was dried in oven at 65°C for approximately 24 hours. Dried fecal samples were ground in hammer mill through a 1 mm diameter screen. Chemical determinations of representative samples were analyzed according A. O. A. C. (1996). Urine was collected in bottles to which 100 ml of 10% H_2SO_4 has been added to prevent nitrogen losses. Urine volume was measured daily and a 10% aliquot combined and stored for nitrogen determination by the Kjeldahl procedure.

B. Feeding Trial

Twelve late pregnant Barki ewes of an average age three years and 43.6 kg (LBW) were used in this experiment. The ewes were randomly assigned to two treatments. The treatment I (control diet) and treatment II (BL diet). Six ewes were used for each treatment.

This experiment was extended from approximately last 3 weeks of gestation to 12 weeks of lactation (suckling). Daily rations were offered twice daily in two equal portions at 8.30 a.m. and 3.30 p.m. The amount of feeds offered during the last 3 weeks of gestation and first two weeks of lactation were 7.50 kg/group/day concentrated diet and 18 kg /group/day berseem per treatment (6 ewes).

Starting from the 3rd week of lactation 6 kg /day of concentrated diet and 18 kg /day of berseem for each treatment group (6 ewes).

B.1. Weight of lambs

The lambs were weighted after lambing and weighted weekly until weaning. The ADG was calculated during this period (from birth to weaning).

B.2. Recording of milk production

Starting from the second week of lactation every Saturday all lambs were isolated out of their dams after the second meal at 3.30 p.m. and on Sunday morning, ewes were hand milked and milk samples of about 50g / ewe and stored at -20°C till analysis.

The lambs were weighted before and after suckling at 9.00 and 16.00 hr every week. The milk produced was calculated by difference before and after suckling.

B.3. Sampling of blood

Weekly blood samples were taken from the jagular vein. The sample was directly collected into vacuum tube after morning meal. The vacuum tube was centrifuged at 3000 r.p.m. for 15 min., then, blood serum was separated into polypropylene tube and stored at -18°C until analysis for subsequent estimation of total protein, serum albumin, urea, GOT and GPT.

B.4. Analysis of milk and blood

Milk samples were analyzed every two weeks during experimental period for T.S. and ash according to Leng. (1963).

Copper, Lead and Cadmium of milk and blood serum were determined according to Jackson. (1958) by Atomic Absorption spectrophotometer.

C. Statistical analysis

Data of feeding and metabolism trails were statistically analyzed according to SAS user's 1988 Guide SAS Institute Inc. Cary NC.

RESULTS AND DISCUSSION

A- Chemical composition of the experimental rations

The chemical composition of the two experimental rations, which are presented in Table 1, indicated that the lower ash content was found in the control diet which contained no BL. The ash content was increased from 3.5 to 6.2% by adding BL. Similar results were reported by Bhattacharya and Fontenot (1965), Smith and Calvert (1976), Hamdy *et al.* (1996) and Abdelmawla, (1997a and b), who reported that, the ash contents of the rations was increased with increasing the proportion of BL. No other remarkable differences were found among the chemical content in the two experimental rations.

B- Digestion and N balance trial

Data of feed intake by rams fed rations containing 0 and 14% BL containing ration are presented in Table 2.

Results of metabolism trial (table 2) showed that the intake of dry matter per kg LBW and unit metabolic body size (MBS) were insignificantly ($p>0.05$) higher for control diet than BL diet. The decrease of DMI by adding BL may be due to increasing ash content of diet containing BL. These results are in agreement with those reported by Saleh, (1990), who indicated that DMI for growing sheep was decreased by adding cage layer dropping (CLD) in the ration. Also, El-Ammary (1995) found that DMI per kg LBW and unit MBS of growing rabbit were decreased by including broiler litter in the ration.

The apparent digestibility of DM, OM, CP, CF, EE, NFE and ash % tended to decrease by the inclusion of BL in the ration. The differences in digestibility coefficient values between control diet and BL diet were not significant for OM, CP, CF, EE, NFE and ash, but, significant ($P > 0.05$) for DM. These results generally agree with those reported by Abdelmawla, *et al.* (1997b). Also, EL-Ashry *et al.* (1987) reported that the digestibility of DM, OM, EE, CF and NFE were decreased by the inclusion of BL in the ration at levels of 8.8 and 12.0% (DM basis). Moreover, Bajracharya (1992) found that, DM digestibility by sheep were 69.3 and 62.8% for concentrate diet containing 0 and 30%

poultry litter, respectively. Also, Ibeawuchi *et al.* (1993) reported that addition of dried poultry manure (DPM) considerably reduced digestibility of DM, CP and gross energy.

Table 2. Mean values of feed intake, apparent digestibility and nutritive value for rations containing two levels of broiler litter

Item	Control Diet	BL Diet
No. of animal	4	3
Percentage of BL	0	14
Daily DM Intake g (berseem)	182.7	176.5
Daily DM Intake g (CFM)	448.5	414.9
Total DM Intake g/day	631.2	591.4
DM Intake g / kg LBW /day	16.69[a]	15.63[a]
DM Intake g / kg $^{.75}$ /day	41.36[a]	38.77[a]
Apparent digestibility		
DM %	77.35[a]	74.3[b]
OM %	79.93[a]	78.1[a]
CP %	71.40[a]	70.50[a]
CF %	50.00[a]	47.10[a]
EE %	79.08[a]	76.40[a]
NFE %	89.20[a]	87.70[a]
Ash %	37.80[a]	32.40[a]
SV estimated	70.48[a]	66.20[b]
TDN estimated	78.63[a]	74.40[b]
DP estimated	11.40[a]	11.20[a]

Means followed by same letter do not differ from each other (alpha < .05).

Table 3. Nitrogen utilization for rams given diets containing either 0 or 14% broiler litter

Item	Control Diet	BL Diet
No. of animal	4	3
Percentage of BL(dry basis)	0	14
Nitrogen intake g/day	16.16	15.12
Nitrogen excretion g/day		
Fecal-N	4.62	4.43
Urinary-N	9.32	8.54
Total N excretion	13.94	12.97
Nitrogen balance g/day	+2.22	+2.15
Nitrogen balance mg/kg LBW	+58.3	+56.8
Nitrogen balance mg/unite MBS	+144.7	+141.1
Urinary N. as % of N. digested	80.76	79.89
Nitrogen balance as % of N. intake	13.74	14.22
Nitrogen balance as % of N. absorbed	19.24	20.11

Moreover, Meneses and Wiedmeier (1992) found no significant differences between groups in the apparent digestibility of CP, NDF, ADF, hemicellulose, organic matter and total ash when fed on complete diet supplemented with dried poultry manure at 0, 5.6, 11.0, 21.7 or 31.8%. However, Rude *et al.* (1994) reported that the apparent digestibility of N was less ($P < 0.05$) by lambs given broiler litter diet compared to those given the control diet.

Such decline in apparent digestibility values of DM may be due to high content of ash in ration containing BL.

Table 2 also, indicate that, adding BL decreased the SV and TDN of the diet. The SV values were 70.48 and 66.20% for control and BL diet, respectively, while the corresponding TND values were 78.63 and 74.40%.

Similar results were obtained by EL-Ashry *et al.* (1987), who reported that increasing BL level in the diet decreased the TDN. The digestible protein was 11.75 and 11.27% for control and BL diets; respectively however difference did not attain significant (P>0.05).

Nitrogen intake as g/day tended to decrease insignificantly by adding BL due to decreasing DMI with adding BL (being 16.16 and 15.12 for control and BL group, respectively). Also, total excretion of N was absolutely decreased with adding BL. Nitrogen balance as percentage of N intake was decreased by adding BL. These results are comparable to those reported by Khattab *et al.* (1982) who reported that nitrogen balance as percentage of N intake were 45.5, 45.4 and 44.4 for sheep fed rations containing 0, 20 and 40% duck litter on DM basis, respectively.

On the other hand, these results are not comparable to those by Gad (1990) who reported that nitrogen balance as percentage of nitrogen intake were 5.78, 9.92 and 8.44 for sheep fed rations containing 0, 21 and 37% broiler litter, respectively. Also, El-Ammary (1995) found that nitrogen balance as percentage of N intake were 27.5, 33.6 and 34.6% for ewe lambs fed diet containing 0, 15 and 30% BL (on dry matter basis), respectively.

In general, Murthy *et al.* (1995), reported that all lambs and goats were in positive nitrogen balance when fed diets containing 0, 30% CLD and 15% CLD + 15% BL mixed ration.

C- Feeding trial

C.1. Milk yield

Milk yield of ewes, were not affected by adding BL. The milk yields were 660.37 and 740.58 g/ h/ d; 15.39 and 16.71 g/ kg LBW/d and 39.38 and 43.11 g/ h/ d/ unit MBS for control and BL diets, respectively Table 4. The results were comparable with those reported by EL-Ashry *et al.* (1994), who reported that the milk yields of buffalo were 5.54 and 6.34 kg/ h/ d when fed ration-containing zero and 34.5% BL on dry matter basis, respectively.

Also, Hamdy *et al.* (1996) reported that the milk yield of buffaloes were not affected by treatment levels (being 5.3, 5.6 and 5.3 kg/ h/ d as mean values for buffalo cows fed 10, 20 and 30% BL levels in their diets orderly). Also, they found that the milk yield of goats were 0.705, 0.857 and 0.876 kg/ h/ d for the same previous treatments of BL, respectively.

Table 4. Milk yield and performance of ewe groups fed either control or BL containing diets.

Item	Control diet	BL diet
DMI as		
- g/h/d	1346.90	1369.77
- g/kg LBW	31.38	30.90
- g/ unit MBS	80.32	79.73
Milk yield as		
- g/h/d	660.37[a]	740.58[a]
- g/h/d / kg LBW	15.39[a]	16.71[a]
- g/h/d / unit MBS	39.38[a]	43.11[a]
Feed efficiency as		
g DMI/g milk yield	2.04	1.85

Means followed by same letter do not differ from each other (alpha < .05).

On the other hand, Muwalla *et al.* (1995) reported that the mean daily milk yield of Awassi ewes were 0.716 and 0.626 kg when fed rations containing zero and 30% poultry litter, respectively, but the difference was not significant.

The mean dry matter intakes were 1340.9 and 1369.77 g/ h/ d, 31.38 and 30.90 g/ h/ d/ kg LBW and 80.32and 79.73 g/ unit MBS for control and BL treatments, respectively. The corresponding feed efficiency values were 2.04 and 1.85 g DMI/ g milk yield.

Hamdy *et al.* (1996) reported that, feed efficiency values for buffaloes and goats were 1.54, 1.65 and 1.73 kg DMI/ kg FCM, and 1.72, 1.71 and 1.72 kg DMI/ kg FCM for rations containing 10, 20 and 30% BL, respectively.

C.2. Chemical composition of milk

As shown in Table 5, the percentage of ash was decreased by the inclusion of BL, but the difference was not significant. These results were in agreement with the results of EL-Ashry, *et al.* (1994). They found that the total solids mean yields by buffaloes were 270 and 310 kg for treatment diets containing zero and 34% BL, respectively during the experimental period (39 week).

Also, El-Feel *et al.* (1995) reported that the addition of dehydrated poultry manure (DPM) in the concentrate mixture at 15 or 30% levels did not affect significantly the yield of milk, fat corrected milk, solid not fat and total solids.

Table 5. The percentages of total solids and ash contents of milk produced from ewes fed rations Containing different levels of BL

Item	Control Diet	BL Diet
No. of ewes	6	6
Percentage of BL	0	14
Percentage of total solids	14.73 [a]	14.93 [a]
Percentage of ash (as fresh weight basis)	1.06 [a]	1.03 [a]
Percentage of ash (as dry matter basis)	7.34 [a]	6.96 [a]

Means followed by same letter do not differ from each other (alpha < 0.05).

Total ash secreted in milk per day per ewe was higher for BL treatment (7.63 g/d) than control treatment (7.0 g/d). These results are in agreement with those reported by EL-Ashry *et al.* (1994). They found that the overall mean of milk ash secreted during 39 weeks of lactation by buffaloes was 15.0, 14.6 and 16.8 kg for diets containing 0, 16.2 and 34.5% BL, respectively. These results may be due to the high ash content of BL diet.

C.3. Mineral content of milk and blood serum

The concentration of some elements in the rations used in feeding trial are presented in Table 6. The results indicated that the concentration of Cu and Cd were increased by inclusion of BL in the diet. These results are in agreement with the results of Abo El-Nor *et al.* (1993). They reported that the concentrations of Cu and Cd in rations were increased by increasing dehydrated poultry excreta. Also, Trukulchang and Balloun (1975) reported that the concentration of Cu, Mg, Mn and Zn were increased significantly ($p < 0.05$) by increasing dried poultry waste (DPW) in the diet.

Table 6. Concentration of some trace elements in the ingredients included in the daily rations of feeding trial

Item	Cu (ppm)	Pb (ppm)	Cd (ppb)
Control diet	7.36	5.15	161
BL diet	13.50	4.83	238
Berseem	11.59	17.4	549

On the other hand, Ben-Ghedalia *et al.* (1996) found that the apparent digestibility of Cu, Zn, Mn and Se were increased by adding poultry litter. They reported that the apparent digestibility of the control diet was 15.6% for Cu, 39.6% for Zn, 8.51% for Mn and 41.6% for Se, while the corresponding values for the treatment diet (10% poultry litter) was 27.9% for Cu, 54.0% for Zn, 17.8% for Mn and 63.9% for Se.

The results in Table 7 indicated that the concentration of Cu in milk were significantly ($P < 0.05$) increased by adding BL. However, the lead content of milk was not significantly ($P < 0.05$) increased by adding BL. Also, Abo-El-Nor *et al.* (1993) reported that the concentration of Cu in milk was 0.325, 0.454 and 0.559 ppm for zero, low and high levels of dehydrated broiler litter containing ration, Whereas the concentrations of Pb were 1.110, 1.181 and 1.389 ppm for the same previous treatment levels, respectively.

Table 7. Mineral content of milk and blood serum of ewes fed rations containing different levels of BL

Item	Control diet		BL diet	
	Milk	Blood serum	Milk	Blood serum
Cu (ppm)	0.72^{a}	1.05^{A}	0.98^{b}	0.89^{B}
Pb (ppm)	1.00^{a}	0.097	1.04^{a}	0.156
Cd (ppb)	77.34^{a}	44.4	57.98^{b}	49.0

Means followed by same letter do not differ from each other (alpha < 0.05).

Also. Table 7 showed the concentration of Cd in milk, which was significantly higher ($p < 0.05$) in control treatment than BL treatment (being 77.34 and 57.98 ppb for control and BL treatments, respectively). On the other hand, Abo-El-Nor *et al.* (1993) found that increasing poultry litter in the rations significantly increased the concentration of Cd in milk.

Also, Table 7 showed that the concentration of blood serum Cu was significantly lower in BL treatment than control treatment (1.05 ppm for control treatment and 0.89 ppm for BL treatment). These results were comparable to those reported by El-Ammary (1995). She reported that the concentration of Cu in blood serum in mature ewes was 1.55, 1.51 and 1.49 ppm for ewes fed rations containing 0, 15 and 30% broiler litter. The concentration of Pb in blood serum was 0.097 and 0.156 ppm for control and BL treatment, respectively. Whereas the normal concentration of Pb in blood serum for mature ewes was 1.77 mg/ liter (El-Ammary, 1995).

C.4. Productive performance of lambs

Data in Table 8 show that weight of lambs at weaning were 20.58 and 20.18 kg for control and BL treatments, but the difference was not significant ($P>0.05$). These results are comparable to those reported by Muwalla *et al.* (1995), who found that the mean weaning weight of lambs of control group was (20.6 kg) while for 30%BL group was (18.4 kg). On the other hand, the ages at weaning for lambs in control treatment were significantly older than lambs in BL treatment (87.7 vs. 79.9 day). ADG for lambs in BL treatment were insignificantly higher than lambs in control treatment (191 vs.206 g/day) ($p >0.05$).

Also, the number of kilograms weaned per kilogram LBW of ewes was higher for BL treatment than in control treatment being 0.53 and 0.48 kg, respectively.

Table 8. Productive performance of lambs suckling from ewes fed diets containing different levels of broiler litter

Item	Control Diet	BL diet
No. of lambs	6	7
Birth weight (kg)	3.84	3.80
Weaning weight (kg)	20.58^{a}	20.18^{a}
Age at weaning (day)	87.7^{a}	79.9^{b}
ADG (g)	191^{a}	206^{a}
No. of kg weaned / kg LBW of ewe	.48	.53
No. of kg feed / kg weaned	5.73	4.65

Means followed by same letter do not differ from each other (alpha < 0.05).

C.5. Blood Parameters

C.5.1. Serum total Protein

The mean values of total serum protein were 6.769 and 6.025 g/ dl for control and BL treatments, respectively Table 9. Statistical analysis showed difference between treatments was not significant. These results are in agreement with those found by Badr (1993) who reported values of total serum protein of sheep ranging from 6.28 to 6.94 gm %.

Table 9. Effect of feeding rations containing different levels of BL on some blood serum parameters of nursing ewes

Item	Control Diet	BL Diet
No. of ewes	6	6
Percentage of BL	0	14
T.P (g/dl)	6.769	6.052
Albumin (g/dl)	3.365	3.266
Globulin (g/dl)	3.404	2.786
A/G Ratio	0.99	1.17
Urea (mg/dl)	43.550	49.249
GPT (unit/ml)	23.376	19.758
GOT (unit/ml)	67.581	72.992

All means in this table were not significantly different (alpha < 0.05)

On the other hand, these results were lower than that reported by El-Ammary (1995). She reported that the mean value of total serum protein in mature ewes fed normal diet was 7.41 g/ 100ml. Also, Khalil (1994) reported that the range of total serum protein in sheep was ranging from 7.27 to 7.36 g/100 ml.

C.5.2 Serum Albumin

The mean values of serum albumin (Table 9) were 3.365 and 3.266 g/ dl for control and BL groups respectively and the difference was not significant. These values are comparable with the result reported by Khalil (1994) who found that the concentration of serum albumin ranged from 3.23 to 3.53 g/ 100 ml in sheep. Also, Badr (1993) found that serum albumin content ranging from 2.59 to 3.13 g/ 100 ml for Ossimi sheep.

C.5.3. Serum Globulin

The mean values of serum globulin content were 3.404 and 2.786 g/ dl for control and BL treatments, respectively Table 9. Statistical analysis indicated no significant differences between treatments. These results are in agreement with those reported by El-Ammary (1995). She found that the value of serum globulin content was 3.84 g / 100 ml for control treatment. Also, Badr (1993) found that the values of serum globulin content ranging from 3.54 to 4.00 gm percent in sheep.

C.5.4 Serum Albumin Globulin Raito A/ G

The mean value of A/ G ratio were 0.99 and 1.17 for control and BL treatments Table 9. The value reported by El-Ammary (1995) was 1.56 for mature ewes when fed normal ration. On the other hand, Salama (1995), Khalil (1994) and Badr (1993), found that the A/ G ratio ranged from 0.77 to 1.5.

C.5.5 Serum urea

The data of Table 9 indicated that the mean values of serum urea concentration of BL treatment were non-significance higher than that of control treatment. These results are in agreement with those reported by El-Ammary (1995). On the other hand, these values are lower than those reported by Maareck (1997) for buffaloes.

C.5.6 Glutamic Oxaloacetic Transaminase (GOT)

The data of Table 9 indicated that the mean values of GOT were 67.581 and 72.992 units/ L for control and BL treatment, respectively.

On the other hand, El-Ammary (1995) found that the mean values of GOT were 154.09, 132.52 and 143.92 units/ ml for ewes fed ration containing zero, 15and 30% BL. Also, Soliman (1994) found that the mean value of GOT for control treatment of ewes was 130.2 units/L.

C.5.7 Glutamic Pyruvic Trasaminase (GPT)

The data of Table 9 indicated that the mean value of GPT for BL treatment was lower than value of control treatment (19.758 vs. 23.376 unit/ L). These values are lower than those reported by El-Ammary (1995), who reported that the values were 26.81, 23.65 and 24.95 units/ L for ewes fed rations containing zero, 15 and 30% BL. Also, Soliman (1994) found that the mean values of GPT for

ewes fed ration consisted of yellow corn, barseem hay and rice straw was 27.6 units/ L. These means of the present study are with the normal range reported by different investigators.

CONCLUSION

The use of BL up to 14% of the dry matter of rations in feeding pregnant or/and lactating ewes did not affect neither reproductive nor productive performance of both ewes and their lambs.

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