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EFFECT OF DIFFERENT LEVELS OF DIATERY PROTEIN ON GROWTH PERFORMANCE, FEED EFFICIENCY, NUTRIENT DIGESTIBILITES, RUMEN LIQUOR AND SOME BLOOD PARAMETERS OF WEANED RAHMANI LAMBS.

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ABSTRACT

Eighteen weaned Rahmani male lambs with live body weight (LBW) ranging from 18 to 20 kg about 4 months of age were divided according to their body weight into three groups (6 lambs each) to study the effect of different levels of dietary protein on their growth performance, digestibility, rumen liquor and some blood parameters and the income over feed cost. Each group was fed ration (concentrate feed mix CFM) containing different levels of protein, but isocaloric for four month. Lambs in group 1 (G1), group 2 (G2) and group 3 (G3) fed CFM containing 14, 16, and 18 % crude protein as dry matter, respectively.

The results of the animal performance showed that the ADG significantly increased ($P<0.05$) when the level of protein increased. Lambs in G3 had higher ($P< 0.05$) ADG than those in G1 and G2. Daily feed intakes expressed as DM was slightly higher for G1 flowed by G2 and G3. The results of feed efficiency show that lambs fed high level dietary protein had the highest values of body gain related to the unit of DMI and TDN

The results of nutrients digestibility pointed that increasing dietary protein improved DM, OM, CP, EE and NFE digestibilites. Crude protein digestibility increased as level of protein increased. The same trend has been recorded with feeding value expressed as TDN and DCP.

The high level of protein in the ration in G3 were accompanied higher of total protein (TP), albumin (AL), globulin (GL) and glutamate-puruvate transaminase GPT. Lambs in G2 had slight higher glutamate-oxaloacetate transaminase GOT than those in G1 and G3. The differences among treated protein were significant ($P<0.05$) in TP and GL on weaning lambs , while the differences among treated protein were non significant in AL, GOT and GPT on weaning lambs

Ammonia – N concentration of rumen liquor tended to increase gradually as a result of increasing protein level. The highest value was recorded for G3 followed by G2 while the lowest value for G1. The highest income over feed cost were obtained from lambs of G3,while the lowest was with lambs of G 1.

In view of the obtained results, it could be concluded that increasing protein level in the ration of weaned lambs improved the animal performance, digestibility, feeding values and reduce the cost of the product (meat production) by increasing the feed efficiency. Furthermore, the level of 18% CP in the ration of weaned lambs is sufficient for good growth performance during this stage.

Keywords: Dietary protein, performance, nutrient utilization, blood parameters, sheep, digestibility, rumen parameters.

INTRODUCTION

Every living animal has a need for protein. It the basic structural material from which all body tissues are formed. There is a certain minimum level of dietary protein recommended for each class of animals, which it varies for

animals of different classes, depending on age and type of production .In general, high protein feeds are more expensive and therefore, it is economically desirable to feed only the amount of protein required to maintain normal performance of the animals in question (Cullison1979). Krishna Mohan *et al..*, (1987) found that apparent digestibility coefficients of DM, CP, EE, CF and NFE significantly increased as the level of protein increased in the diet of lamb.

Sahlu-T *et al..*(1993) reported that Plasma urea N was greater (23.2 vs. 10.9 mg/dl) in does receiving the 17%-CP diets than lower), also found that body weight increased with increasing CP intake. Protein deficiencies in the diet deplete stores in the blood, liver, and muscles, and predispose animal to a variety of serious and even fatal aliments. This deficiency further reduces rumen function and lower the efficiency of feed utilization (Singh and Sengar, 1970).

Gorbelick, (1956) found that after keeping rams and ewes for two months on low protein ration the quantity of protein in blood was reduced especially the albumin and fibrineogen fraction. The high level of protein was accompanied with higher concentration of albumin and lower concentration total protein and globulin concentration in control to the low level protein, Solouma, (1999). The normal value of TP, AL, and GL in sheep were 7.8, 3.6 and 4.2 g/dl, Olbrich *et al.* (1972).

The purpose of this study was to determine the minimum protein level of weaned lambs rations satisfactory for normal performance of lambs .

MATERIAL AND METHODS.

The present experiment was conducted at the experimental station which belongs to faculty of Agriculture, Al-Azhar University, Assiut Branch. Eighteen weaned rahmani male lambs with live body weight (LBW) ranging from 18 to 20 kg about 4 months of age were divided according to their body weight into three groups (6 lambs each) to study the effect of different levels of dietary proteins on their growth performance, feed efficiency digestibility, rumen liquor and some blood parameters and the income over feed cost.

Animals management:-

Each group was fed ration (Concentrate Feed Mix 'CFM') containing different levels of protein, but isocaloric for four month. Lambs in group 1 (G1), group 2 (G2) and group 3 (G3) fed CFM containing 14, 16, and 18 % crude protein as dry matter respectively. The CFM was formulated to supply the requirements using Stochastic Non Linear Programming Method (Abou'l-Ella, 2000) from available feedstuffs in the station. Each group were kept in separate shaded pen and adapted for the ration for 15 days. Lambs were weighed at the beginning of the experiment and thereafter at two weeks intervals till the end of the experiment to calculate gain and feed intake. The shrunk live body weight were recorded. Salt blocks as a mineral mix and fresh water were available at all over day. CFM (concentrate feed mix) was offered at the level of 3 % of body weight per group while berseem (Trifolium alexandrinum) hay was offered ad libtum. The CFM were offered to animals

once daily at 8 O'clock am, and after animals consumed it, berseem hay was fed offered. The residue of berseem hay was collected and weighed daily. The intakes of CFM were adjusted biweekly for each group according to increase in body weight to meet the required allowance. Lambs were vaccinated and treated against internal and external parasites before beginning the experiment. The experimental animals were kept under the roterinary supervision of the station during the experimental period.

xperimental diets:

Samples of feedstuffs used were subjected in duplicate for determining the proximate analysis (DM, CP, CF. EE and ash) according to A.O.A.C. (1990 (and NFE values were calculated by difference. Formulation and average chemical analysis of ingredients used are given in table (1 and 2).

Table (1): Formation of the Concentrate Feed Mixture (CFM).

Ingredients	Experimental diets		
	G1	G2	G3
Ingredients %			
Co – up concentrate	36.70	38.20	39.40
Yellow corn grain	34.00	26.80	19.80
Soybean meal	6.80	12.50	18.30
Wheat bran	20.00	20.00	20.00
Limestone, ground	1.50	1.50	1.50
Common salt	0.50	0.50	0.50
Min. mix.*	0.50	0.50	0.50

*** Mineral mixture: each 100g contains; 25.6g Na, 1.6g K, 4.6g Ca, 1.8g P, 4g Mg, 300mg Fe, 32mg Mn, 1.5mg Cu, 15mg I, 5mg Zn, 1mg Co and 1mg Se (AGRICO-international company.**

Table (2) : Chemical composition (%) of dietary ingredients (on DM basis).

Item	DM	OM	CP	CF	EE	Ash	NFE
Co-up concentrate	90.4	86.50	13.75	14.2	3.5	14.5	54.05
Yellow corn grain	88.7	97.40	9.3	0.9	4.2	2.6	83.00
Soya bean meal	90.71	93.65	43.75	6.45	3.80	6.35	39.65
Wheat brain	91.4	94.40	13.9	11.6	2.42	5.6	66.48
Berseem hay	90.30	89.60	14.15	29.20	1.80	10.4	44.45

Metabolism trials:-

At the end of the experimental period, three digestibility trails were carried out by the ordinary method to determine nutrients digestibility and nutritive values. Three lambs were chosen randomly from each group. Animals were left in metabolic cages for 21 days, for adaptation and 7 days for collection.

Rumen Parameters Analysis :-

Samples of rumen fluid were collected, using stomach tube. Samples were withdrawn just before morning diet and at 3 and 6 hours post feeding. Samples were strained through two layers of cheese cloth and were immediately used for determination of ruimnal pH and ammonia nitrogen (NH_3 – N). pH values were measured by using a digital pH meter. Rumen

liquor samples were stored in glass bottles with 3 drops of toluene and a thin layer of paraffin oil just to cover the surface to stop microbial activity and to prevent volatilization and frozened for VFA'S determination.

Blood Serum Sampling and Analysis: -

Blood samples were taken from Jugular vein using (10 ml) glass tubes, from all experimental animals at monthly intervals. The collected blood samples were centrifuged at 4000 r.p.m. for 20 min. The obtained serum was stored at –20 °C till analysis. Serum total protein (TP), albumin (AL), globulin (GL) and liver enzymes GOT and GPT activities were measured as desevibed by Reitman and Frankel (1957), were estimated using kits supplied by Biocon Egypt. Serum globulin was calculated by subtraction of albumin in from total protein and globulin concentration.

Chemical analysis:

Dry matter (DM), crude fiber (CF), crude protein (CP), ether extract (EE) ,and ash of feces and urinary N were determined according to A.O.A.C. (1990) procedures. TVF,s was determined by steam distillation method according to Warner (1964). Ammonia nitrogen was determined in the filtered rumen liquor (as mg %) according to Abou-Akkada and Osman (1967).

Statistical Analysis :-

The data were analyzed according to SAS User's Guide, 1988. Separation among means was carried out by using Duncan multiple range test, (Duncan,1955).

RESULTS AND DISCUSSION

Growth performance and feed efficiency:

Data of growth performance is presented in Table (3). The average daily gain (ADG) significantly increased ($P<0.05$) when the level of protein increased. Lambs in G3 had higher ($p < 0.05$) ADG than those in G1 and G2. The differences of ADG of lambs between G1 and G3, also between G1 and G2 was significantly ($P<0.05$), while this differences between G2 and G3 was not significant ($P<0.05$). This might be due to the increase in nutrients digestibility for high level protein. Similar result was found by Ahmed and Abdellatif (1995) and Abou'l Ella *et al.*, (2004). This suggested that a level of about 18% in the dry matter of diet is sufficient for weaned Rahmani lambs at that age and stage of growth. In addition, These results agreement with resultes obtained by Mckinnon *et al.* (1993) who found that the growth rate of steer increased lineary with dietary increase in CP level within the energy level Boraei *et al.* (2002) who reported that daily gain increased with the increase of protein level in diets of buffalo calves.

The results of feed conversion show that lambs fed high level protein (18 % cp) had the highest values of body gain related to the unit of DMI and TDN. The intake from DCP increased with increases in protein level as shown in table (3) which in turn was reflected on improving the body weight gain. These results are in good agreement with those obtained by Boraei *et*

al. (2002) and Abou'l ella *et al.*. (2004) who found that feed conversion was increased as dietary protein increased.

Table (3) show, also the feed efficiency for G1, G2 and G3 were 17.70, 21.14 and 23.81% respectively. The efficiency of feed conversion was higher in high protein ration than low protein ration (Balakrishna *et al.*., 1997 and Abou'l ella *et al.*. 2004). On the other hand, DCP conversion ratios were found to be 0.447, 0.481 and 0.535 kg DCP for each kg gain in live weight for G1,G2 and G3, respectively.

Table (3): Effect of dietary protein level on live body weight gain, feed consumption and feed conversion of weaning lambs.

Items	Experimental groups		
	G1	G2	G3)
Int. body weight (kg)	20.40±2.1909	20.40±3.7815	18.60±2.7019
Fin. Body weight (kg)	36±6.3246	38.67±5.9217	39.00±3.2249
Total weight gain (kg)	15.60±0.6283 [b]	18.27±2.4398 [a]	20.40±1.3416 [a]
Av. Daily gain (g)	130 [b]	152.00 [a]	170 [a]
Growth rate (%)			
DM intake,kg			
CFM (kg)	388.800	388.800	387.600
CFM (g/head /day)	540	540	538
Brseem hay (kg)	140.400	129.600	126.00
Brseem hay (g/head / day)	195	180	175
Total DM)	529.200	518.400	513.600
Feed conversion:			
Kg DM / Kg gain	5.09	4.73	4.20
Kg TDN / Kg gain	3.750	3.308	4.061
Kg DCP / Kg gain	0.447	0.481	0.535
Feed efficiency (%)*	17.70	21.14	23.81

a,b Means at the same row with different superscripts are significantly different at (p<0.05).

*** Feed efficiency % = $\frac{1}{\text{Feed consumed per kg gain}} \times 100$ (Krishna Mohan *et al.*.., 1987)**

Nutrient Digestibility:-

The results of nutrients digestibility of experimental rations are shown in Table (4). There were significant (P<0.05) increases in apparent digestibility coefficients of DM, OM, CP, EE, CF and NFE as the level of protein increased. Similar result was obtained by Krishna Mohan *et al.*. (1987) who found that the apparent digestibility of DM, CP, EE, CF and NFE increased as the level of protein increased in the diet of sheep and these may be attributed to that low protein may reduce rumen function and lower the efficiency of feed utilization. Also the results are in line with those of Kumar and Narange (1991 Singh *et al.* (1991) and Etman (1985), who reported that the increase of dietary protein improved the digestibility of all nutrients. These results, also are in good agreement with those obtained by Ahmed and Abdellatif (1995), Safinaz *et al.* (2001), Boraei *et al.* (2002) and Abou'l Ella *et al.* (2004) who reported that high level of diet protein increase nutrients digestibilites. The increase in digestibility was more pronounced when the level of protein increased from low to high level. The low level of protein might be insufficient to achieve optimum microbial digestion of food consumed, and hence the

increase in digestibility was maximum when protein level was increased from low to medium level.

The results in Table (4) indicated that TDN, DCP contents were increased linearly with increased of level of protein in the rations. Beter digestibilites in ration containing high level of protein was reflected on improving its nutritive value expressed as total digestibile nutrients (TDN), digestible crude protein (DCP) are summarized in Table (4). These results were in agreement with those recorded by Abou'l Ella *et al.* (2002 ,2004), Lashein *et al.*, (2001) who reported that, increasing DCP in the ration of sheep lead to higher feed values.

Table(4): Digestion coefficient (%) of nutrients for different experimental Groups and its feed values.

Items	Experimental groups		
	G1	G2	G3
Dry matter	62.23±1.02 ^{b}	67.55±0.95^{a}	72.35±1.13 ^{a}
Organic matter	65.83±1.21 ^{b}	71.78±1.50 ^{a}	75.45±0.81 ^{a}
Crude protein	56.65±1.10 ^{b}	63.55±0.74 ^{a}	70.54±0.63 ^{a}
Ether extract	72.47±1.22 ^{b}	79.87±0.93 ^{a}	83.76±1.03^{a}
Crude fiber	46.76±1.09 ^{b}	49.13±0.78 ^{a}	53.54±1.07 ^{a}
Nitrogen free extract	75.81±1.05 ^{b}	80.15±0.97 ^{a}	83.04±1.102^{a}
Nutritive value, %			
TDN %	66.37 ^{b}	69.94 ^{a}	72.87 ^{a}
DCP %	7.91 ^{b}	10.16 ^{a}	12.73 ^{a}

a,b, mean at the same row having the same superscripts are not significantly different (P<0.05)

Rumen liquor characteristics:

Ruminal microbial activity was evaluated as pH and concentrations of ammonia – N and total volatile fatty acids (TVFA). The data of rumen pH values are shown in Table(6). The results showed that there a significant differences between experimental group ($p<0.05$). The results revealed that the highest value was found in G3 (6.79) followed by G2 (6.43) and G1 (6.18), this could be due to the increase of dietary protein level which lead to highest value of pH in the rumen (rumen N-NH3 concentration in G1, G2 and G3 were 22.23, 23.84 and 24.88 mg/ml, respectively). All average values were above pH 6.0 which indicated a better digestion of cellulolytic materials (Martens,1988). Results of rumen pH indicated that the highest values was obtained from pre-feeding samples, while the lowest value was observed at 3 hours post feeding and tended to increase again after 6 hours. This trend was similar to findings of Abou'l – Ella *et al.* (2002) and Lashein *et al.* (2001) who found that ruminal pH value of sheep was the highest shortly before the morning meal then declined to the minimum at 3 – hours after feeding then begin rise again .

Concentration of VFA's of rumen liquior as affected by the dietary protein level are shown in Table (6). It has been observed that the minimum value before feeding and increase after 3 hours, to the maximum values, again decreased after 6 hours. The differences were not significantly .The increase in VFA concentration at 3 h post feeding lead to the decreases

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increased with further increase in the CP content of the diet. Similar result were reported by Hatfield *et al.*. (1998) and Abou'I Ella *et al.* (2004), who found that total VFAs concentration was increased with increasing protein in the diet of sheep from 10 to 16%.

Table (6): Effect of dietary protein level on rumen liquor parameters of weaning lambs.

Groups	PH Time hour				VFA's (meq / 100 ml) Time hour				NH3-N (mg / 100ml Time hour			
	0	3	6	Average	0	3	6	Average	0	3	6	Average
G1	6.57	5.89	6.13	6.18 ^{a}	7.55	9.82	8.45	8.61 ^{a}	18.65	27.62	20.42	22.23 ^{a}
G2	6.92	6.04	6.33	6.43 ^{b}	7.79	10.95	8.92	9.22 ^{b}	19.51	30.16	21.85	23.84 ^{b}
G3	6.95	6.56	6.86	6.79 ^{c}	7.85	11.86	9.55	9.75 ^{c}	19.85	32.25	22.55	24.88 ^{c}

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G2	6.92	6.04	6.33	6.43 ^{b}	7.79	10.95	8.92	9.22 ^{b}	19.51	30.16	21.85	23.84 ^{b}
G3	6.95	6.56	6.86	6.79 ^{c}	7.85	11.86	9.55	9.75 ^{c}	19.85	32.25	22.55	24.88 ^{c}

a,b,c Means at the same column with different superscripts are significantly different at ($p<0.05$).

Blood serum parameters:

The high level of protein in the ration in G3 was accompanied higher of TP, AL and GL. The overall mean TP in lambs was 8.47 ± 0.44, 7.85±0.44 and 6.97±0.11 g/dl in G3, G2 and G1 respectively. The maximum TP value 9.48±1.1g/dl was recorded 2nd month in G3, while the minimum TP value 6.68 ± 0.58 g/dl was recorded at 4th month in G1. The differences among treated proteins were significant ($P<0.05$) on TP.

The overall mean in AL 3.74±0.23, 3.25 ±0.11 and 3.2 ±0.6 g/dl in G3, G2 and G1 respectively. The maximum AL value 4.34 ± 0.38 g/dl was recorded at 2nd month in G3, while the minimum AL value 2.95±0.15 g/dl was recorded at 1st month in G2. The differences among treated protein was no significant on AL. The overall mean GL in lambs were 4.77 ± 0.21, 3.99 ± 0.11 and 3.65±0.07 g/dl in G3, G2 and G1 respectively. The maximum GL value 4.86 ±0.47g/dl was recorded at 3rd month in G3, while the minimum GL value 3.46 ± 0.26 g/dl was recorded at 4th month in G1. The differences GL among treated protein was significant ($P<0.05$).

There were general tendency of serum TP, Al and GL to decreased with the elongation period, the higher TP, AL and GL were recorded 2nd month, while the decreased value TP, AL and GL were recorded 1st month (Table 6). The differences among months were significant ($P<0.05$) in TP and GL.

Table (6): Effect of dietary protein levels on some blood parameters of weaning lambs

Parameters	1st month	2nd month	3rd month	4th month	Overall means
TP g/dl					
G1	6.89±0.38	7.04±1.1	7.3±0.56	6.68±0.58	6.97±0.11[a]
G2	6.86±0.43	7.26±0.99	7.36±0.92	7.48±0.78	7.85±0.44[ab]
G3	7.09±0.56	9.48±1.1	8.4±0.82	8.92±0.67	8.47±0.44[a]
Overall means	6.95±0.05[b]	7.93±0.49[a]	7.7±0.22[ab]	7.69±0.55[ab]	7.76±0.35
AL g/dl					
G1	3.12±0.18	3.35±0.3	3.31±0.29	3.02±0.23	3.2±0.6[a]
G2	2.95±0.15	3.33±0.35	3.25±0.36	3.45±0.32	3.25±0.11[a]
G3	3.05±0.23	4.34±0.38	3.65±0.29	3.92±0.22	3.74±0.23[a]
Overall mean	3.04±0.1[a]	3.67±0.27[a]	3.4±0.1[a]	3.46±0.21	3.93±0.15
GL g/dl					
G1	3.9±0.25	3.54±0.88	3.71±0.31	3.46±0.26	3.65±0.08[b]
G2	3.91±0.23	3.76±0.57	4.03±0.54	4.03±0.46	3.93±0.10[ab]
G3	4.04±0.22	5.45±0.83	4.86±0.55	5.0±0.47	4.79±0.25[a]
Overall means	3.95±0.04[b]	4.25±0.49[ab]	4.09±0.21[ab]	4.61±0.37[a]	4.12±0.28
GOT U/L					
G1	25±4.16	28.2±3.6	26.3±1.1	36.2±0.66	28.92±2.1[a]
G2	20.1±3.38	26.8±1.1	47.6±5.16	40.4±3.42	33.73±1.35[a]
G3	27±1.69	28.8±6.61	40.2±5.69	36.8±1.63	33.2±2.7[a]
Overall mean	24±1.3[b]	27.93±0.48[b]	38.13±5.1[a]	39.67±2.99[a]	31.94±1.1
GPT U/L					
G1	29.1±1.69	32.6±0.73	26.1±3.58	27.4±1.51	28.8±2.92[a]
G2	34.8±1.5	36±2.99	24.4±0.73	23.2±1.9	29.6±2.4[a]
G3	31.1±0.95	26.6±3.24	35.4±2.12	30.2±1.1	30.8±3.13[a]
Overall means	31.67±1.36[a]	31.73±2.2[a]	28.63±2.79[a]	26.9±1.66[a]	29.37±0.47

a,b Means at the same row with different superscripts are significantly different at (p<0.05).

These results agreement with results obtained by Abou'l ella *et al.*. 2004 who reported that serum albumin and globulin concentrations were significantly (P<0.05) increased when protein level increased from low (2.10 and 2.97 g/100ml) to medium (3.35 and 4.30 g/100ml, respectively), while no significant (P0.05) difference when was recorded increased from medium to high level (4.53 and 4.27 g/100ml). Similar results were found by Hoffman *et al.*. (2001) who reported that animals fed on high protein diets had significantly higher total protein, albumin and total globulin than those on low protein. Total protein concentration of serum increased in response to the rising level of ruminal concentration of ammonia-N.

El-Ashry, *et al.* (1994) found that of plasma protein mean values were between 7.8-8.6 g/100m, however, mean values of albumin were 4.8 – 5.0 g/100m, while globulin in mean value were between 2.8-3.8 g/100m,. This count be attributed to the fact that the animals of this study consumed more crude protein.

The use of high protein was non significant increased GOT and GPT. The activity of plasma glutomate-oxaloacetate transaminase and glutmate-puruvate transaminase were slightly increased in G2 than in both G3 and G1 (Table 6). The maximum value GOT 47.6 ± 5.16 was recorded at 3rd month in G2, while the minimum value GOT 20 ±3.38 at 1st month in G2. On the other hand, the maximum value in GPT 36.0±2.99 was recorded at 2nd month was

recorded at 3rd month in G2, while the minimum value GPT 24.4±0.73 was recorded at 3rd month in G2. Similar results were found by Hoffman *et al.*. (2001) who reported that animals fed on low protein diets slightly higher GOT and GPT than those on high protein.

Economic efficiency:-

From the economic point of view ,the feed cost / 1 kg weight gain (LE/ kg gain) decreased and the income increased with increasing of dietary protein level as shown in Table (7). It could be noticed that the lowest feed cost per unit gain (LE/ kg gain) for lambs of G3 followed by G2 and G1, therefore the highest income over feed cost per unit gain was for lambs of group G3 and G2. Income per unit gain were lower for lambs of G1l. Similar results were reported by Boraei *et al.*, (2002) who, reported that the economic feed efficiency of the feed decreased insignificantly with each increase in protein level fed from 12 to 16 % .

Table (7) : Effect of dietary protein levels on economic efficiency of weaning lambs.

Economic efficiency	G1	G2	G3
Total feed cost (LE)*	512.76	532.27	553.42
Feed cost / head /day (LE /day)	0.712	0.739	0.769
Feed cost per unit gain(LE/kg)	5.48	4.86	4.52
Income over feed cost (LE) **	117.34	148.80	172.96
Income over feed cost / head/ day (LE / day)	0.98	1.24	1.44

*** Feed cost /unit gain(LE/kg gain) =Total feed cost (LE) ÷ body weight gain (kg)**

**** Income (LE) = (body weight gain (kg) x price (LE) per kg body weight) – Total feed cost (LE) (Abou'l Ela 2000). Where,price of 1 ton CFM = 1048,1116 and 1184LE for G1,G2 and G3, respectively and Berseem hay = 750 LE.Price of 1 kg live body weight = 13 LE as the dominant market price of finishing ram lambs at Assiut market in this period, respectively.**

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تأثير مستوى بروتين العليقة على معدلات الأداء و بعض مقاييس الدم و الكرش في الحملان الرحماني المفطومة .

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تم استخدام عدد ١٨ من حملان الرحماني المفطومة مقسمة إلى ثلاثة مجموعات (٦ حيوانات / مجموعة) لمدة أربعة شهور لدراسة مدى تأثير مستويات مختلفة من البروتين على الأداء ومعدلات هضم المواد الغذائية و كفاءة التحويل الغذائية بالإضافة إلى دلالات التخمر فى الكرش و بعض مقاييس الدم. غذيت المجاميع الثلاثة علي ٣ مستويات من البروتين (١٤ و ١٦ و ١٨ % بروتين خام و فى نهاية التجربة تم إجراء ثلاث تجارب هضم بالطريقة المعتادة لتقدير معاملات الهضم للعناصر الغذائية. وقد خلصت الدراسة إلى النتائج التالية: زاد كل من معدل الزيادة في وزن الجسم زيادة معنوية مع زيادة البروتين في العليقة. وجود زيادة معنوية في معدلات هضم كل من المادة الجافة والعضوية والبروتين الخام والدهون والألياف ومستخلص خالي النتروجين بالإضافة إلى تركيز كل من الأحماض الطيارة والأمونيا مع زيادة مستوى البروتين في العليقة. أدات الزيادة في نسبة البروتين في العليقة إلى زيادة معنوية في كلا من البروتين والجلوبيولين في الدم. كذلك كان هناك زيادة ولكنها غير معنوية في كلا من الالبيومين وكذالك GPT ولكن كان هناك انخفاض فى مستوى GOT. زيادة الكفاءة الاقتصادية بزيادة مستوى البروتين بالعليقة. استخلص من هذه الدراسة أن حملان الرحماني المفطومة تحتاج إلى مستوى لا يقل عن ١٨% من البروتين الخام في علائقها للحصول على معدلات أداء عالية و أيضا كفاءة اقتصادية عالية.