THE EFFECT OF DIETARY PROTEIN LEVEL ON THE DEGRADADILITY OF DRY MATTER AND PROTEIN OF SOME FEEDS IN THE RUMEN OF SHEEP.

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ABSTRACT

The present work aimed to investigate the effect of dietary protein level on the degradability of some feeds two rich in protein (SBM, UDCSC) and the other two rich in energy content (barley and corn).

Six adult Rahmany sheep were used in the present work, three males for digestibility and nitrogen balance trials and three females fitted with rumen permanent fistulae for *in sacco* study. Animals were fed three experimental diets based on, 40% rice straw as a roughage and containing 60% concentrate mixture with different protein levels (14.55,16.66 and19.28%) crude protein .

Results could be summarized as follow:

Regarding the differences due to diets no significant difference was detected among diets for crude protein and NFE digestibility, where the values ranged between (66.52±3.19 and 63.89±2.13) for crude protein and between (72.24±3.13 and 70.34±1.84) for NFE.

A significant difference was detected among diets for both EE and crude fiber digestibility. Values ranged between (71.49±2.82 and 66.56±3.83) for EE and between (45.25±4.08 and 50.04±3.56) for crude fiber, respectively ($p< 0.05$).

No significant difference was detected among diets for the total digestible nutrients TDN values, where the highest value was 61.00±1.55 %, and the lowest value was 60.77±1.79 %, while a significant difference was detected among diets for digestible crude protein (DCP) and nitrogen balance (NB) where the highest value recorded was 12.83±1.23 and the lowest value was 9.29±1.13 for DCP, the highest value obtained for (NB) was 3.48±1.06 and the lowest value was 1.62± 0.76 expressed as g/h/day ($p < 0.05$).

Rumen pH did not show any significant difference before feeding and 2,4 and 6 post feeding while a significant difference was observed at 8 and 12 hours after feeding.

The effective degradability ED values obtained for dry matter and protein show significant differences among diets. The highest value obtained for dry matter degradability DM and crude protein degradability of barley was recorded with diet 1 (60.71± 0.76, 66.09±0.16) and the lowest value was recorded with diet 3 (56.12±0.45) for DM and 60.08±0.03) for crude protein degradability with diet 2 respectively ($p < 0.05$).

For corn dry matter and protein degradability the highest value was recorded with diet 1 (38.49±0.38 and 44.45±0.27) and the lowest value was recorded with diet 3 (35.97±0.40 and 42.13±0.32) respectively ($p < 0.05$).

The ED value obtained for cotton seed cake dry matter and protein degradability showed a significant difference with protein level where the highest value was recorded with diet 1 for both DM and protein degradability (50.41±0.17 and 47.93±0.96) and the lowest value was recorded with diet 3 (45.43±0.29 and 43.52±0.30) ($P< 0.05$).

The ED values obtained for dry matter and protein degradability of soy bean meal SBM showed a significant difference with protein level where the highest value

recorded was with diet 1 (65.87±0.51 and 64.94±0.74) and the lowest value was recorded with diet 3 (59.34±1.33 and 61.05±0.47) for DM and protein respectively ($p<0.05$).

In conclusion the level of protein affect significantly the ED value under the present experimental condition and this effect could be detected with higher level of protein while medium and low levels did not show a significant difference.

keywords: Digestibility, nitrogen balance digestible crude protein, TDN and effective degradability.

INTRODUCTION

The recent protein evaluation systems in the world are based on the amount of rumen degradable protein (RDP), rumen undegradable protein (RUDP) and the amount of the microbial protein synthesized in the rumen (Lindberg 1985).

The (RUDP) could be one of the most important sources of amino acid supply to the animal in addition to the microbial protein. (Messman *et al.,* 1996).

The crude protein content of a feed and its composition may affect ruminal degradability of the feed (Fahmy *et al.,* 1991). In addition, the crude protein content and the composition of the diet affect the degradability of all nitrogen containing compounds in the feed (Spencer *et al.,* 1988).

Protein level may affect the obtained value of effective degradability (ED) of different feeds in addition to other factors such as carbohydrates content, rate of outflow through the rumen (Michalet –Doreau and Ould –Bah 1992). Sample size can greatly affect the dry matter disappearance from nylon bags (Mehrez and Ørskov ,1977). Cell wall degradation also could affect degradability by increasing sample size and changing the microflora composition (Van Hellen and Ellis ,1977).

The method most closely related to environment in which protein degradation takes place is the nylon bag method as described by Mehrez and Ørskov (1977), Kristensen *et al.* (*1982)* and Setälä (1983).

The intention of the following investigation is to study the effect of protein level on the digestibility, nitrogen balance, dry matter and protein degradability in the rumen of some ingredients in complete diets based on rice straw as roughage.

MATERIALS AND METHODS

The present work was conducted at the experimental farm of the Faculty of Agriculture, Alexandria University.

Six mature Rahmany sheep, three males and three females were used in the present work. Males were used for digestibility trials and nitrogen balance. Females were fitted each with permanent rumen fistulae and were used for the *in sacco* study. The average body weight was 45 kg for both males and females.

The animals were fed three mixed diets (1,2 and 3) varying in crude protein content (19.28, 16.66 and 14.55%) respectively, while TDN content of diets was similar.

Animals were fed diets twice daily at 8 a.m. and 8 p.m. in such way that each animal was fed the three diets in a Latin square design. Water was offered freely before each meal. The feed was presented 1200 g for each animal the residuals was collected in order to calculate the intake for the digestibility and nitrogen balance trials. Females were fed *ad libitum.*

Animals were fed diets for three weeks as a preliminary period before recording any criteria, followed by one week collection period. The digestibility trials were conducted as described by El-Shazly (1958). Feed and feces analysis were carried out according to the methods of A.O.A.C. (1970). Diets formulation is presented in table (1), and their chemical composition is presented in table (2).

Rumen pH was measured by inserting pH electrode in the rumen of sheep, before feeding, 2,4,6,8and 12 after feeding.

In sacco study was carried by the incubation of nylon bags containing components in sheep rumen for 2,4,8,12,24 and 48 hours in order to calculate the effective rumen degradability (ED) of both dry matter and protein. Obtained data were fitted a non linear regression model (exponential model) as developed by Ørskov and McDonald (1979) and modified by Dhanoa (1988).

The different estimates of (ED) were calculated from fraction (*a)* (the proportion of water soluble N of the total nitrogen of tested feeds), fraction (*b)* (the proportion of potentially degradable N other than the water soluble N of the total N in the feed) and *c* (the fractional rumen degradation rate per hour of *b* of feed nitrogen and dry matter with time *t*), at k value (rate of outflow through the rumen) of 0.05 ,as described by Michalet-Doreau *et al*. (1987). To control the rumen activity , a reference feed (hay) was introduced in the rumen for 8 hours of incubation with each series of bags as described by Verité *et al*. (1989).

Nylon bags (6 X10 cm) with a 52 ц m average poor size were prepared . Bags were dried at 80^{o} C over night in a forced air oven before being weighed .Samples of feeds were ground through a 20 mm screen and 5.0 g from each bags tested feed (barley, corn , undecorticated cotton seed cake and SBM) was weighed into duplicate for each incubation time.

Bags were inserted in the rumen through the rumen fistulae with a nylon cord and incubated for 2,4,8,12,24 and 48 hours. A pair of bags of each feed was incubated for 30 minutes in a 39 ^{0} C saline solution to estimate washed material at zero time. After removal of bags from the rumen bags were washed gently under flowing stream of tap water for 1 hr until the rinse fluid became clear.

Bags were drained , dried for 24 hrs at 80^{0} C in a forced air oven then cooled in a desicator and weighed to estimate dry matter and nitrogen according to the methods of A.O.A.C. (1970).

Proximate analysis of feed and residual material nitrogen in bags was estimated according to the methods of A.O.A.C (1970).

Data were stastically analyzed by the analysis of variance using the general model procedure (SAS1990). Significance of results was rested by least square means F score ($p < 0.05$).

Table (1): Experimental diets formulation

Ingredients (%)	Diet		
	1	2	3
Rice straw	40	40	40
SBM*	16.5	10	5
UDCSC**	----	10	10
Barley grains	25	15	20
Corn grains	9	16	16
Urea	1.5	1.0	1.0
Molasses	5	5	5
Mineral Mixture and Vitamins***	0.5	0.5	0.5
Sodium Chloride	0.5	0.5	0.5
Limestone	2.0	2.0	2.0

***Soy bean meal** ****Undecorticated cotton seed cake**

*****Vitamins and mineral premix per kilogram contained: Vit .A 2,000,000 IU, Vit.D_3 150,000 IU, Vit.E 8.33 g, Vit B_1 0.33g, B_6 1.7 mg, B_2 1.0g , B_5 8.33 g, Vit K 0.33 mg, Pantothanic acid 3.33 g , Biotin 33 mg, Folic acid 0.83 mg, Choline chloride 200 mg, Mg 66.7 g ,Cu 0.5 g ,Se 16.6 mg , Zn 11.7 g and Fe 12.5 g.**

Table (2): Chemical composition of experimental diets (%DM basis)

Item / Diet	1	2	3
OM	91.74	91.35	91.56
CP	19.28	16.66	14.55
EE	1.42	1.88	1.95
CF	20.13	21.59	21.76
NFE	50.91	51.22	53.30
Ash	8.26	8.65	8.44

RESULTS

Digestibility coefficients and nutritive values of the experimental diets are presented in table (3). No significant differences were detected among diets in crude protein and NFE digestibility coefficients where the highest values were recorded with diet 1 (66.52± 3.19 and 72.24±3.13) and the lowest values were observed with diet 3 (63.89±2.13 and 70.34±1.84) for crude protein and NFE respectively, on the other hand a significant differences were obtained among both diet 1and 3 and diet 2 for EE digestibility coefficients where the highest value was (71.49±2.82) for diet1 and the lowest value was (66.56±3.83) for diet2.The lowest crude fiber digestibility was recorded with diet 1 (45.25±4.08) while the highest value was obtained with diet 3 (50.04±3.56) with a significant difference ($P < 0.05$).

No significant difference was detected among diets for the TDN values where the highest value was (61.00±1.55) for diet 1 and the lowest

value was (60.77±1.79) for diet 3, while a significant difference was obtained among diets for the digestible crude protein where the highest value was obtained with diet 1 (12.83±1.23) and the lowest value for diet 3 (9.29±1.13) respectively.

Nitrogen balance shows a significant difference among experimental diets where diet 1 showed the highest nitrogen balance (3.48±1.06 g/day) and the lowest value was obtained with diet 3 (1.62±0.76 g/day).

Table 3: Digestibility coefficients and nutritive value of experimental diets (Means± SE)

Item / Diet	1	2	3
CP	66.52±3.19	65.38±4.71	63.89±2.13
EE	71.49±2.82^{a}	66.56±3.83^{b}	70.80±1.39^{a}
CF	45.25±4.08^{b}	47.33±5.09^{b}	50.04±3.56^{a}
NFE	72.24±3.13	72.07±2.74	70.34±1.84
TDN	61.00±1.55	60.83±2.85	60.77±1.79
DCP	12.83±1.23^{a}	10.89±2.28^{b}	9.29±1.13^{c}
NB (g/h/day)	3.48±1.06^{a}	2.25±0.85^{b}	1.62±0.76^{c}

a,b and c=Means in the same raw with different superscripts differ significantly (p < 0.05)

Table (4) represent pH values obtained before feeding and 2,4,6,8 and 12 hours post feeding. No significant difference was detected in pH values before feeding and 2,4 and 6 hours post feeding , but a significant difference was obtained among diets at 8 and 12 hours post feeding where the highest value recorded were (6.4±0.18 and 6.4±0.05) for diet 2 and the lowest values obtained were (5.8±0.17 and 6.0±0.05) for diet 1 at 8 and 12 hours post feeding respectively (P<0.05).

Table 4: Rumen pH of sheep fed the experimental diets (Mean ±SE)

Diet	Time of sampling (hr after feeding)					
	0	2	4	6	8	12
1	6.1±0.12	5.3±0.08	5.4 ±0.12	5.5±0.18	5.8±0.17^{b}	6.0±0.05^{b}
2	6.3±0.05	5.8±0.14	5.8 ±0.08	5.8±0.05	6.4±0.18^{a}	6.4±0.05^{a}
3	6.3±0.03	5.5±0.17	5.9 ±0.14	5.9±0.04	6.2±0.08^{a}	6.3±0.08^{a}

a,b and c=Means in the same column with different superscripts differ significantly (p < 0.05)

For the *in sacco* study, tables (5 and 6) represent the estimates of dry matter and crude protein degradability of barley incubated with the experimental diets . No significant difference was detected among diets for (*a*) fraction in dry matter and protein estimates for effective degradability (ED) where the highest value was (23.45±0.71 and 23.35± 0.81) for diet 1 and the lowest value was (21.99±0.28) for dry matter with diet 3 and (21.23±0.06) for protein with diet 2.

The *(b)* fraction and the ED values differed significantly,(p<0.05) among diets for both dry matter and crude protein where the highest values recorded were with diet 1 (59.88±0.79 and 67.09± 0.74) and the lowest values recorded

were (56.80±0.80 and 62.49±0.29) for dry matter and crude protein respectively. On the other hand, ED value differed significantly among diets where the highest values obtained were (60.71±0.76 and 66.09±0.16) and the lowest values were (60.08±0.03 and 56.12±0.45) for dry matter and protein respectively (P<0.05).

Table 5: Estimates of effective degradability of DM of barley incubated in the rumen of sheep fed the experimental diets (Mean ±SE)

Diet	*a*	*b*	*c*	k	ED
1	23.45±0.71	59.88±0.79^{A}	0.0825±0.002	0.05	60.71±0.76^{A}
2	22.81±0.40	56.82±0.36^{B}	0.0835±0.004	0.05	58.33±0.67^{2B}
3	21.99±0.28	56.80±0.80^{B}	0.0755±0.001	0.05	56.12±0.45^{3C}

A,B and C =Means in the same column with different superscripts differ significantly (p < 0.05)

Table 6: Estimates of effective degradability of protein of barley incubated in the rumen of sheep fed the experimental diets (Mean ±SE)

Diet	*a*	*b*	*c*	k	ED
1	23.35±0.81	67.09±0.74^{A}	0.0879±0.002	0.05	66.09±0.16^{A}
2	21.23±0.06	62.49±0.29^{B}	0.0825±0.001	0.05	60.08±0.03^{B}
3	22.09±0.24	63.29±0.09^{B}	0.0813±0.006	0.05	61.28±018^{C}

A,B and C =Means in the same column with different superscripts differ significantly (p < 0.05)

Table (7and 8) represent estimates of ED for corn dry matter and crude protein. A significant difference was observed among diet 1 and both of diets 2and 3 in (*a), (b)* and ED values, where the highest values of (*a)* fraction was (10.99±0.26 and 19.58± 0.13) and the lowest value was (9.86±0.05 and 17.20±0.12) for dry matter and protein respectively, the highest value of *b* fraction was (52.98±1.49 and 65.23±0.55) for dry matter and crude protein respectively .The highest value of ED recorded was with diet 1 for both dry matter and protein (38.49±0.38 and 44.45±0.27) and the lowest values were obtained with diet 3 (35.97±0.40 and 42.13±0.32) . (P< 0.05)

Table 7: Estimates of effective degradability of DM of corn incubated in the rumen of sheep fed the experimental diets (Mean ±SE)

Diet	*a*	*b*	*c*	k	ED
1	10.99±0.26^{A}	52.98±1.49^{A}	0.046±0.002	0.05	38.49±0.38^{A}
2	9.93±0.28^{B}	49.74±0.63^{B}	0.045±0.001	0.05	36.22±0.28^{B}
3	9.86±0.05^{B}	48.93±0.41^{B}	0.043±0.002	0.05	35.97±0.40^{B}

A,B and C =Means in the same column with different superscripts are differ significantly (p < 0.05)

Table 8: Estimates of effective degradability of protein of corn incubated in the rumen of sheep fed the experimental diets (Mean ±SE)

Diet	*A*	*b*	*c*	k	ED
1	19.58±0.13^{A}	65.23±0.55^{A}	0.081±0.01	0.05	44.45±0.27^{A}
2	17.92±0.29^{B}	63.20±0.68^{B}	0.078±0.01	0.05	42.60±0.69^{B}
3	17.20±0.12^{B}	62.21±0.03^{B}	0.075±0.003	0.05	42.13±0.32^{B}

A,B and C=Means in the same column with different superscripts differ significantly (p < 0.05)

Table 9 and 10 represent the estimates of ED for DM and crude protein of UDCSC where a significant difference was recorded among diets in (*a),(b)* and ED values .These values ranged between (16.12±0.06 and 14.11±0.10) for dry matter and (21.44±0.68 and 19.02±0.44) for crude protein for (*b)* fraction between (57.01±0.31 and 52.23±0.62) for dry matter and (54.95±0.46 and 51.73±0.31) for protein. The rate of degradation of UDCSC protein shows a significant difference between diets where the highest value was (0.0830±0.001) with diet 1 and (0.0795±0.003) for diet 3, while the ED values was significantly different between diets where the highest value observed for DM was (50.41±0.17) and the lowest value was (45.43±0.29), for crude protein values ranged between (47.93±0.96 and 43.52±0.30) with a significant difference (p<0.05).

Table 9: Estimates of effective degradability of DM of CSC incubated in the rumen of sheep fed the experimental diets (Mean ±SE)

Diet	*a*	*b*	*c*	k	ED
1	16.12±0.06^{A}	57.01±0.31^{A}	0.0755±0.002	0.05	50.41±0.17^{A}
2	14.65±0.08^{B}	52.23±0.62^{B}	0.0728±0.01	0.05	45.61±0.22^{B}
3	14.11±0.10^{B}	52.69±0.58^{B}	0.0734±0.002	0.05	45.43±0.29^{B}

A,B and C =Means in the same column with different superscripts differ significantly (p < 0.05)

Table 10: Estimates of effective degradability of protein of UDCSC incubated in the rumen of sheep fed the experimental diets (Mean ±SE)

Diet	*a*	*b*	*c*	K	ED
1	21.44±0.68^{A}	54.95±0.46^{A}	0.0830±0.001^{A}	0.05	47.93±0.96^{A}
2	19.17±0.37^{B}	53.04±0.04^{B}	0.0809±0.0001^{B}	0.05	45.02±0.28^{B}
3	19.02±0.44^{B}	51.73±0.31^{B}	0.0795±0.003^{B}	0.05	43.52±0.30^{B}

A,B and C =Means in the same column with different superscripts are differ significantly (p < 0.05)

Table11 and 12 show the estimates parameters of ED for SBM dry matter and protein. The same trend observed with the UDCSC was observed with soybean meal for (*a)* ,(*b)* and ED values where the highest value of *a* fraction ranged between (27.99±0.17and 23.53±0.41) for dry matter and between (27.09±0.18 and 24.68±0.23) for protein , for (*b)* fraction values ranged between (56.24±0.80 and 53.71±0.60) for dry matter ,and between (60.71±0.26 and 58.96±0.53) for protein, while values of ED ranged between

(65.87±0.51 and 59.34±1.33) for dry matter and between (64.94±0.74 and 61.05±0.47) for protein with a significant difference ($p < 0.05$

Table 11: Estimates of effective degradability of DM of SBM incubated in the rumen of sheep fed the experimental diets (Mean ±SE)

Diet	*a*	*b*	*c*	k	ED
1	27.99±0.17^{A}	56.24±0.80^{A}	0.103±0.037	0.05	65.87±0.51^{A}
2	25.08±0.62^{B}	54.75±1.08^{B}	0.0963±0.004	0.05	61.08±0.89^{B}
3	23.53±0.41^{B}	53.71±0.60^{B}	0.100±0.004	0.05	59.34±1.33^{B}

A,B and C =Means in the same column with different superscripts differ significantly ($p < 0.05$)

Table 12: Estimates of effective degradability of protein of SBM incubated in the rumen of sheep fed the experimental diets (Mean ±SE)

Diet	*a*	*b*	*c*	k	ED
1	27.09±0.18^{A}	60.71±0.26^{A}	0.083±0.009	0.05	64.94±0.74^{A}
2	25.68±0.14^{B}	58.70±0.45^{B}	0.084±0.002	0.05	61.98±0.38^{B}
3	24.68±0.23^{B}	58.96±0.53^{B}	0.081±0.003	0.05	61.05±0.47^{B}

A,B and C =Means in the same column with different superscripts differ significantly ($p < 0.05$)

DISCUSSION

The aim of the present work was to investigate the effect of different dietary protein level on digestibility, nutritive value and dry matter and protein degradability of the feed ingredients.

Results presented in table (3) show that the protein levels in the experimental diets did not affect neither crude protein digestibility nor NFE digestibility. This result could be due to the digestion enhancement as a result the presence of rice straw in diets resulting from its higher rumination which was probably associated with longitudinal breakdown by physical mastication (Goto *et al* 2000). While EE and crude fiber digestibility coefficients were affected by protein level. The results obtained for crude fiber digestibility showed that increasing protein level lead to a decrease in digestibility of crude fiber. That could be due to a decrease in number of cellulolytic bacteria accompanied with an increase in proteolytic bacteria caused by the increase of intake of crude protein. This explanation can be supported with the previous results obtained by El-Shazly and Hungate (1965) and Mould and Ørskov (1983/1984) which explain that the level of protein intake may affect the composition of the rumen microflora, which could be explained by the effect of diet on the diurnal, changes for different rumen microorganisms according to Eadie and Mann (1970).

The percentage of digestible crude protein (DCP) showed a significant difference among diet which is a reasonable result according to the presence of different levels of protein, which is clearly reflected by the

nitrogen balance (NB) g/day where diet 1 (19.28% crude protein) showed the highest value of (NB) in comparison with the other diets.

The pH of the rumen may play be an important factor affecting the type of rumen microorganisms present in the rumen (Therion *et al.,* 1982). Table (4) illustrates the variation in rumen pH before feeding and during 12 hours post feeding .The pH values recorded seems to be stable at 2,4and 6 hours ,while a significant difference was recorded among diets at 8 and 12 hours post feeding .The lowest value was obtained with diet 1 .This result could reflect the high level of protein in this diet and could be related to results obtained in table 3 in which the same diet showed the lowest value of fiber digestion. That may be due to a decrease in cellulolytic bacteria in the rumen. In addition the level of protein intake may lead to a lower rumen pH which is usually accompanied by a higher level of protein intake especially with diets containing high cereals percentage, which may reduce bacterial activity (Hemsley *et al.,* 1975 NRC ,1985). On the other hand this reduction in pH value could be explained by a high utilization of rumen ammonia due to the presence of a high concentration of fermentable carbohydrates in the diet (Kennedy *et al*., 1982) (Erasmus and Botha 1994). Further more pH could influence the N disappearance in sacco (Loerch *et al* . 1983)

The protein entering the reticulorumen may be degraded by rumen bacteria, protozoa and anaerobic fungi (Fonty,1991). That degradation involves basically two steps hydrolysis of the peptides bond (proteolysis) to produce peptides and amino acids, deamination and degradation of amino acids (Russell and Strobel,1993).

Some studies indicate that the hydrolysis of peptides to amino acids is the rate-limiting step (Russell and Strobel, 1993). Free amino acids concentration in ruminal ingesta is normally low (Annison *et al.,* 1959, Lewis, and Emery,1962), suggesting that proteolysis is normally the rate-limiting step in protein degradation. This view is supported by Nugent and Mangan, (1981). The proteolytic enzymes appear to be associated primarily with the bacterial cell wall with a small amount of cell free activity probably resulting from cell lysis (Allison ,1970).

Effective degradability is a function of the following parameters (*a)* the quickly degradable fraction, (*b)* the potentially degradable fraction (*c)* the rate of degradation per hour with time *t* and (k) the rate of outflow through the rumen . This rate has been fixed in this work at 0.05 according to previous result obtained by Fahmy (1990) that the rate of outflow of roughage is 0.049 and for concentrate is 0.059.

The dry matter and protein degradability values of barley showed that the protein level in diets affect both (*b)* fraction and the ED value.(Table 5 and 6). These results is in agreement with the previous results obtained by Lindberg (1985) and Madsen and Hvelplund (1985) ,in which they indicate that the ED value of barley ranged between74 to 60% with an average of 67% according to the protein level in diet .This value increased by increasing the protein level. This could be due to the change in (*a)* and,*(b)* fractions values which may be due to the change in concentration of cellulolytic bacteria to proteolytic bacteria EL- Shazly and Hungate (1965).

The same trend was observed with the dry matter and crude protein degradability values of corn tables (7 and 8). Increasing level of protein in diet lead to an increase in the ED value due to the increase in (*b)* fraction which leads to an increase the ED value Beauchemin and Rode (1997).

The estimates of ED value obtained for dry matter and crude protein of cotton seed cake are presented in table (9 and 10). The effect of protein level in diets is clearly reflected on the ED value accompanied with an effect on both (*a)*and ,*(b)* fraction for dry matter in addition to (*c)* for protein .These obtained values agree with different results obtained by Michalet-Doreau and Ould- Bah (1992) and Madsen and Hvelplund (1985). That phenomena indicate a significant relation between nitrogen content in dry matter and the degradability of protein .The low protein levels in diets lead to a lower values of ED due to the presence of lag period specially in diets containing high levels of cellulolytic materials.

The estimates of ED value of both dry matter and protein of soy bean meal are presented in table (11 and12) Value obtained are in the range obtained by several workers where these values ranged between 59 to 65 % with a mean of 60% according to the protein content of the diet.(Broderick , 1982).

In conclusion the level of protein in diets affected both digestibility ,DM and crude protein degradability where increasing the level of protein lead to increase the ED values obtained under the experimental conditions of the present study and needs more investigation with different materials in addition to study the effect of changing the level of energy in diets to get a relation between the effect of crude protein and energy content with the effective degradability values obtained.

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تأثير مستويات بروتين الغذاء المختلفة على تحلل المادة الجافة و البروتين لبعض الأغذية فى كرش الأغنام

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استهدفت هذا البحث دراسة اثر استخدام مستويات مختلفة من البروتين 19.28%و 16.66%و 14.55% على هضم و تحلل المادة و البروتين فى كرش الأغنام المغذاة على علائق متساوية فى مجموع المواد الغذائية المهضومة و مختلفة نسب البروتين. و كانت نسبة المادة المالئة الى المادة الخشنة 40% الى 60%.

تم استخدام عدد 6 من رؤوس الأغنام ثلاث من الذكور استخدمت لتجارب الهضم و الاتزان الآزوتي و ثلاث من الإناث مزودة بفستيولا مستديمة فى الكرش لدراسة تحلل المادة الجافة و البروتين. و يمكن تلخيص النتائج فيما يلى:

1- لم يكن هناك فروق معنوية بين العلائق فى معاملات هضم البروتين و تراوحت القيم بين 69.52±3.19 و 63.89±2.13% للبروتين و بين 72.24±3.13 و 70.34±1.84 للكربوهيدرات الذائبة.
2- كانت هناك فروق معنوية فى معاملات هضم الدهون بين العلائق و تراوحت القيم بين 71.49±2.82 و66.56±3.83 و بالنسبة لمعامل هضم الألياف الخام تراوحت القيم بين 45.25±4.08 و 50.04±3.56%.
3- لم تكن هناك فروق معنوية فى قيم مجموع المواد الغذائية المهضومة وتراوحت القيم بين 61.00±1.55و بين 60.77±1.79 % و كانت هناك فروق معنوية فى البروتين المهضوم كنسبة مئوية و تراوحت القيم بين 12.83±1.23 و9.29±1.13 و كذلك كانت هناك فروق معنوية فى ألا زوت المحتجز فى الجسم حيث تراوحت القيم بين 3.48±1.06 و 1.62±0.76 جم/رأس/يوم.
4- درجة pH لم تظهر فروق معنوية قبل التغذية,2و4و6ساعات بعد التغذية و كانت هناك فروق معنوية عند 8 ساعات و 12 ساعة.
5- درجة تحلل كل من المادة الجافة و البروتين للشعير أظهرت فروق معنوية تبعا لنسبة البروتين حيث تراوحت قيم بالنسبة للمادة الجافة بين 60.71±.و76 و 56.12±.و45 و للبروتين بين 66.09±.و16 و 60.08±.و03.
6- بالنسبة للذرة كانت أعلى درجة تحلل للمادة الجافة و البروتين مع العليقة الأولى المحتوية على أعلى نسبة بروتين و تراوحت القيم بين 49و38±0و38 و 97و35±0و40 للمادة الجافة و بين 45و44±0و27 و 13و42±0و32 للبروتين.
7- القيم المتحصل عليها لتحلل كل من المادة الجافة و البروتين لكسب القطن كانت الفروق بينها معنوية حيث تراوحت بين 41و50±0و17 و 43و45±0و29 للمادة الجافة و بين 93و47±0و96 و52و43±0و30 للبروتين.
8- تحلل المادة الجافة و البروتين لكسب فول الصويا اظهر فروق معنوية و تراوحت قيم تحلل المادة الجافة بين 87و65±0و51 و34و59±33و1 أما للبروتين فقد كانت 94و67±0و74 و 05و61±0و47 .

و عموما يمكن القول إن مستوى البروتين فى العليقة يؤثر معنويا على درجة تحلل كل من المادة الجافة و البروتين للماد التى درست تحت ظروف التجربة الحالية و هذا الأثر قد يبدو واضحا فى العلائق المحتوية على مستويات عالية من البروتين فى الغذاء و يكون اقل وضوحا فى المستويات المتوسطة والمنخفضة من البروتين. و إن كانت هذه النقطة تحتاج الى مزيد من الدراسة مع عدد اكبر من المواد الغذائية و مستويات مختلفة من البروتين