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EFFECT OF FEEDING RATIONS CONTAINING SUN DRIED RUMEN CONTENT ON PERFORMANCE OF RAHMANI LAMBS

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ABSTRACT : Eighteen growing Rahmani lambs were randomly assigned to three comparative feeding trials (27.32, 27.36 and 26.96±2.002 kg BW for groups 1, 2 and 3 respectively). The feeding experiments lasted for 120 days to evaluate the effect of feeding sun dried rumen contents (SDRC) on the performance of lambs and the economical efficiency of production. The three tested diets were (1) concentrated feed mixture (CFM) + wheat straw (WS). (2) CFM + WS + 100 gm SDRC. (3) CFM + WS + 150 gm SDRC. Animals of all groups were fed the CFM and WS at the rate of 2% and 1% of body weight of the experimental groups, respectively. Three metabolism trials and some rumen liquor and blood parameters were determined (after 8 weeks of the exp: start) using three lambs from each treatment group. Results indicated that, ration (2) containing 100 gm SDRC had positive effects on most nutrient digestibilitys, nutritive value as TDN, DCP, nitrogen balance, number of rumen bacteria, serum total proteins, daily gain and feed efficiency (kg DM, TDN and DCP/kg gain), cost per 1 kg body weight gain and economical efficiency.

Under the circumstances of this study, it might be concluded that using SDRC in lambs rations at different amounts resulted in a decrease in feed cost and improved economic efficiency. Based on the obtained results SDRC can be used in lambs rations in a rate of 100 gm/day/head.

Key words: Rumen contents, digestibility, growth of Lambs.

INTRODUCTION

In Egypt, the reduction in local feedstuffs resources is considered one of the main constrains for improving and developing animal production. One of the available solutions for this problem is to use non-traditional feeding resources such as inedible by-products and waste logs.

Rumen contents possess great potential as a ruminant feed ingredient. It contains the partially digested feeds, ruminal flora (bacteria, protozoa, fungi, actinomyces), saliva, water, bacterial enzymes, volatile fatty acids (Tizzoni, 1964; Hungate, 1966; Whittemore and Moffat, 1976; Shehata et al., 1984 and Khattab et al., 1996). Also, rumen contents are rich in protein (Mann, 1985; Abdel-Rahman et al., 1997 and El-Gendy et al., 1997) and a good source of vitamin B12 (Ristic et al., 1994).

Several trials were conducted to utilize rumen contents in animal nutrition, cattle (Kiamphues, 1980 and Tartari et al., 1991), goats (Patra and Ghosh, 1991) and

sheep (Reddy and Raddy, 1980; Singer, 1995; Khattab et al., 1996; El-Gendy et al., 1997 and Abdel Rahman et al., 1997).

The aim of this study was to evaluate the effect of incorporation of sun dried rumen content (SDRC) on performance of Rahmani lambs during growing period and to study its influence on nutrients digestibility.

MATERIALS AND METHODS

Animal, rations and management:

This study was carried out in Animal Production Department, Faculty of Agriculture, Assiut Branch, Al-Azhar University, Egypt.

Eighteen male Rahmani lambs (average weight 27.21+2.02 kg) were divided into three equal groups according to the live body weight. The experiment extended for 120 days. Three experimental rations were tested as follow:

(1) Concentrated feed mixture (CFM) and wheat straw (WS) at 2% and 1% levels of live body weight, respectively (control).

(2) CFM and WS at 2 and 1% of L.B.W., respectively + 100 gm sun dried rumen content (SDRC).

(3) CFM and WS at 2 and 1% of L.B.W., respectively + 150 gm SDRC.

Rumen contents were collected from Assiut slaughter house after slaughtering of cattle and buffalo calves and were sun-dried for 6-7 days at 35-37°C, Chemical composition of ingredients and rations are shown in Table (1). Rations were offered twice daily at 6 a.m. and 3 p.m. Drinking water was available ad-libitum. Initial, final and biweekly body weights were measured prior to offering the morning meal. The average of ambient temperature and relative humidity were recorded at weekly intervals at 12 a.m. Three metabolism trials were conducted after 8 weeks of the beginning of the feeding trial using three lambs from each group. Lambs were housed at random in metabolic cages to determine the feeding values of the experimental rations. Feeds, feces and urine were collected during the collection week. At the last day of the collection period, rumen content was sampled by a stomach tube at zero and four hrs after morning feeding. Ruminal pH was determined immediately using a digital pH meter. The strained samples were immediately frozen at -20°C for later analysis. Blood samples were collected from the Jagular vein before feeding at the last day of collection period. Blood serum was separated by centrifugation and kept frozen for later analysis.

Chemical and statistical analysis:

Feeds, feces and urine were analyzed according to A.O.A.C. (1990). Cell wall contents of ration ingredients were analyzed according to Goering and Van Soest (1970). Rumen fluid samples were analyzed for TVFA's and ammonia-N concentrations according to Kromman et al. (1967) and Conway (1962), respectively. The number of bacteria that established in the rumen of each animal were determined as previously described (Fonty et al., 1987). Blood serum total proteins and albumin were determined by the method of Peters (1968) and Drupt (1974), respectively, and globulin was obtained by subtracting the albumin value from total proteins value. The data were statistically analyzed by GLM procedures of SAS (1992).

RESULTS AND DISCUSSION

Chemical composition:

Results of chemical composition of ingredients used and the experimental rations are shown in table (1). The chemical composition in (SDRC) are in agreement with those of Antongiovanni and Gorgetti. (1973), Kamphues (1980), El-Deek et al. (1984) and El-Tahan (1991). On the other hand, the present values of CF and its fractions in SDRC are higher than those of Abdel-Rahman and El-Sayed (1989), Khattab et al. (1996), Abdel-Rahman et al. (1997) and El-Gendy et al. (1997), who recorded of values ranged between 36.8-39.6%. This increase in CF in SDRC content may be attributed to the fact that the ration which was offered to the animal before slwgheing . On the other hand, the chemical composition of wheat straw is similar to values reported by APPRI (1997), Central lab for Foods and Feeds (2001) and Fouad and Ismail (2002). Chemical composition of the complete diets consumed in the three digestibility trials (Table 1) showed that CF and its fractions and ash were increased gradually while OM, EE and NFE values were decreased gradually with increasing level of SDRC in rations. This might be a result of higher CF, its fractions as welles ash, and low EE and NFE contents of SDRC.

Metabolism trials:

The results concerning nutrient digestibility, feeding values and nitrogen balance for the tested diets are presented in Table (2). The incorperation of at SDRC both levels of to diets resulted in increases in most nutrient digestibilities and nitrogen balance. On the other hand, data of Table (2) indicated that ration (2) containing 100 gm SDRC resulted in a significant ($P<0.05$) increases in digestibility, and nitrogen balance than control ration.

Moreover, the nutritive value as TDN and DCP were higher for SDRC supplemented treatments, which may be attributed to higher digestibility values of DM, OM, CF and NFE. These results are in line with those obtained by Abdel-Rahman et al. (1997) and El-Gendy et al. (1997).

Results of N balance (Table 2) in SDRC supplemented groups (group 2 & 3) indicate that it was significantly ($P<0.05$) higher than control group. This may been due to the improvement of nutrient digestibility (Table 2).

Rumen liquor parameters:

It is clear in Table (3) that similar pH values, Total VFA's and ammonia-N concentrations at zero and 4 hrs. post feeding were recorded for the three experimental rations. The lowest pH value was recorded 4 hrs. post feeding while, the highest value was noticed pre-feeding. This can be attributed to fermentation process by rumen microorganisms. Such results support the findings of Abdel-Hafez (1983), Fouad et al. (2002 and 2003), who found highest values of ruminal pH at zero time when sheep were fed diets of varying proportions of roughage to concentrate rations. On the other hand, the recorded pH values were within the range reported for normal rumen function (Abou-Akkada and Blachburn, 1963 and Hungate, 1966). Merteno (1979) found that optimum pH for cellulolytic bacteria activity is ranging between pH 6 and 7.

Results in Table (3) show that added SDRC appear to have no consistent significant effects on altering TVFA'S concentrations. It is of importance to point out that measuring VFA's at any given time represents its net production, absorption and out flow (Gabr et al., 1996). On the other hand, the lowest value of ruminal TVFA's was recorded at zero time, while highest was reached at 4 hrs. post feeding. These results seem to agree with those of Tawila (1991), Taie et al. (1996), Mohamed and Farag (2001) and Fouad et al. (2002), who reported the lowest values for total ruminal VFAís concentrations and roughage.

Ruminal ammonia-N was almost equal in three tested rations before and 4 hrs. post-feeding being on the average 10.68 and 16.84 mg/100 mL rumen liquor, respectively as shown in Table (3). This may due to that the protein contents of three rations are of equal level (Table 1). Roffier and Satter (1975), reported there is a positive correlation of ruminal NH3-N concentrations and level of protein in the diet.

The results in Table (3) showed that a bacteria population counts differed significantly ($P<0.05$) among different diets. The total number of bacteria in the rumen of lambs fed ration (2) containing 100 gm SDRC was highest ($P<0.05$) followed by ration (3) containing 150 gm SDRC ($P<0.05$) then the control ration. This result may be due to the improvement of rumen environment in the diets supplemented by SDRC (Nquyen, 1997). These findings may help to explain the increase in rate of digestion (Table 2). Generally, results in Table (3) indicated that rations supplemented with SDRC had no negative effect on ruminal fermentation.

Blood serum parameters:

Results in Table (3) indicated that, values of serum total proteins for Lambs of control group fed ration without SDRC was lower by about 2.13% ($P<0.05$) and 1.71% ($P<0.05$) than those supplemented with 100 and 150 gm SDRC groups, respectively. Several factors seem to affect serum total proteins, such as the status of animals, nutritional status of species, health status of animals and the dietary protein consumption and utilization (Kummer et al., 1980). On the other hand, rations containing SDRC (2 and 3) caused a slight increase in albumin and globulin values and a slight decrease in A/G ratio than that of control ration. Values of serum albumin and globulin (g/100 mL) of the present study are within the range of values reported by Fouad (2002), Fouad and Deraz (2002) and Fouad et al. (2003) who obtained values of serum albumin and globulin ranged between 3.84-4.02 and 3.01-3.19 g/100 mL serum, respectively, when lambs fed rations containing CFM and roughage. Generally, results in Table (3) indicated no harmful effects on blood serum parameter, when lambs daily ration were supplemented with either 100 or 150 gm SDRC / head.

Growth trial:

Results of Table (4), indicate that the highest daily gain was obtained by lamb group fed 100 gm SDRC (123.67g/day), while the lowest daily gain was obtained by the control lamb group (104.83 g/day). It is of interest to note that lambs groups fed the diet supplemented with 100 gm and 150 gm SDRC showed 17.31% and 10.02% respectively, faster gain than lamb group fed control diet. These results are comparable to those reported by Khattab et al. (1996) with lambs. While increasing the proportion of the SDRC in the diet from 100 gm to 150 gm decreased in the daily gain, from 123.67 to 115.33 g/day. This results is comparable to those report-

ed by Patra and Gosh (1991) with kids and Abdel-Rahman et al. (1997) who found that the daily gain of growing lambs was decreased with increasing amount of SDRC in rations.

Results of values in Table (4) illustrated that the higher efficiency of DM and TDN utilization ($P<0.05$) were found with 100 gm SDRC group followed by control group, then by 150 gm group. No significant differences were detected in efficiency of CP utilization among the three tested rations.

Results in Table (4), showed that the feed costs to produce one kg gain, were lowest for the 100 gm SDRC group followed by the 150 gm SDRC group whereas the control came last. Economical efficiency data showed that the 100 gm SDRC diet clearly reflected that it is economically superior to both the 150 gm SDRC and the control groups.

Under the circumstance of this study, it might be concluded that the supplement SDRC supplement in lambs rations at different amounts resulted a decrease in feed costs/kg gain and improved economical efficiency. The best economical efficiency was recorded for lamb , group supplemented with 100 gm/day/head.

Table (1): Chemical composition of ration ingredients and experimental rations.

Items	DM	OM	CP	CF	EE	Ash	NFE	NDF	ADF	ADL	Hem.	Cel
Ration ingredients												
CFM*	88.61	95.65	14.25	9.03	3.41	4.35	68.96	36.40	10.62	2.02	25.78	8.60
W.S.	88.23	85.24	4.22	36.21	1.32	14.76	43.49	69.23	41.61	3.52	27.62	38.09
SDRC	89.23	83.45	10.69	41.07	1.76	16.55	29.93	79.70	40.34	7.06	39.36	33.28
Experimental ration (calculated)												
Ration (1)	88.49	94.18	12.83	12.86	3.11	5.82	65.38	41.03	14.99	2.23	26.04	12.76
Ration (2)	88.63	93.47	12.83	14.74	3.03	6.53	62.87	43.69	16.57	2.60	27.12	13.97
Ration (3)	88.61	92.52	12.86	17.23	2.86	7.48	59.57	46.77	19.28	2.80	27.49	16.48

CFM consisted of, 60% yellow corn, 28.5% undecorticated cotton seed meal, 10% wheat bran, 1% limestone and 0.5% salt.
SDRC: Sun dried rumen content.
Ration (1): CFM + wheat straw.
Ration (2): CFM + wheat straw + 100 gm SDRC.
Ration (3): CFM + wheat straw + 150 gm SDRC.

Table (2): Digestibility of different nutrients , feeding values and nitrogen balance as affected with experimental diets fed to lamb.

Item	DM	OM	CP	CF	EE	NFE	NDF	ADF	ADL	Hem	Cell	TDN	DCP	NB g/hld
Control	68.58^{b}	72.54^{b}	63.85^{b}	52.68^{b}	70.03^{b}	78.23^{b}	57.13	51.43^{b}	30.02^{c}	60.39	55.13	70.68^{ab}	8.20^{ab}	4.11^{c}
Ration (2)	70.68^{a}	73.97^{a}	65.92^{a}	55.20^{a}	71.59^{a}	80.08^{a}	57.67	52.38^{b}	35.14^{b}	60.91	55.83	71.45^{a}	8.46^{a}	4.98^{a}
Ration (3)	70.16^{a}	72.59^{b}	63.30^{b}	56.06^{a}	69.60^{b}	79.34^{ab}	58.20	54.11^{a}	43.28^{a}	60.81	56.37	69.71^{b}	8.14^{b}	4.69^{b}

a,b values in the same column with different superscripts differ significantly ($P<0.01$).

Table (3): Rumen liquor and blood serum parameters of lambs fed diets containing different level of SDRC.

Item	G1		G2		G3	
	0	4	0	4	0	4
R.L. parameters						
pH value	6.90	6.30	6.89	6.34	6.87	6.32
TVFA'S meq/100 mL	3.79	7.46	3.84	7.27	3.88	7.36
Ammonia-N mg/100 mL	10.64	16.82	10.71	16.83	10.68	16.88
Bacteria count ($x10^7$) mL R.L.	2.33^c	-	2.77^a	-	2.60^b	-
Blood serum parameters						
Total proteins g/100 mL	6.88^b		7.03^a		7.00^a	
Albumin g/100 mL	3.87		3.92		3.91	
Globulin g/100 mL	3.01		3.11		3.09	
A/G ratio	1.29		1.26		1.27	

a,b,c, values in the same raw with different superscripts differ significantly ($P<0.01$).

Table (4): Performance of lambs fed rations containing different levels of SDRC.

Item	Control	100 gm SDRC	150 gm SDRC
Body weight gain			
No. of lambs	6	6	6
Duration (day)	120	120	120
Initial weight (kg)	27.32	27.36	26.96
Final weight (kg)	39.90	42.20	40.80
Total gain (kg)	12.58	14.84	13.84
Daily gain (kg)	104.83^c	123.67^a	115.33^b
Daily Feed intake:(DM. g/h/d)			
CFM	598.12	616.73	600.78
W.S.	296.45	307.04	299.10
SDRC	-	89.23	133.85
TDMI	894.57^b	1013.00^a	1033.73^a
TDNI	632.28^b	723.39^a	720.73^a
DCPI	73.35^b	85.70^a	84.15^a
Feed conversion kg/kg gain			
DM	8.53^{ab}	8.19^b	8.96^a
TDN	6.03^{ab}	5.85^b	6.25^a
DCP	0.70	0.69	0.73
*Cost/kg gain (L.E.)	6.53	5.71	5.97
**Economic efficiency	2.19	2.50	2.36

a,b and c, means with different superscripts in the same raw differ significantly ($P<0.05$).

* Based on the assumption that the price of one ton of CFM, wheat straw and SDRC were 630, 160 and 50 L.E. in order, the price of 1 kg gain was 10.00 L.E.

**The ratio between the price of the weight gain and cost of feed consumption.

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تأثير تغذية الحملان الرحمانى على علائق تحتوى على محتويات الكرش المجففة شمسياً على أداء النمو

صابر جمعه عبده

جامعة الأزهر – فرع أسيوط – كلية الزراعة – قسم الإنتاج الحيوانى

تم إجراء تجربة تغذية (١٢٠ يوم) استخدم خلالها ١٨ حمل رحمانى قسمت إلى ثلاثة مجاميع بمتوسط وزن ٢٧,٢١ كجم/رأس . غذيت المجاميع الثلاث كالتالى (١) علف مركز + تبن قمح (كنترول) (٢) علف مركز + تبن قمح + ١٠٠ جم محتويات كرش مجففة . (٣) علف مركز + تبن قمح + ١٥٠ جم محتويات كرش مجففة . قدم العلف المركز والتبن بنسبة ٢% ، ١% من وزن الجسم . تم فى منتصف تجربة التغذية إجراء ثلاث تجارب هضم واتزان أزوتي وتم اجراء بعض القياسات علي سوائل الكرش وسيرم الدم . أوضحت النتائج أن علية المجموعة رقم (٢) المحتوية على ١٠٠ جم محتويات كرش أعطت أفضل معاملات هضم وقيم غذائية فى صورة مجموع المركبات الكلية المهضومة أو بروتين مهضوم . وأفضل ميزان آزوت وأعلى كمية بروتين سيرم الدم وأكبر نمو يومى وأفضل كفاءة اقتصادية وأقل تكلفة لانتاج كيلو النمو ومن تلك النتائج ينصح بإستخدام مكونات محتوى الكرش فى علائق الحملان لخفض تكلفة كيلو النمو .