Egyptian J. Anim. Prod., 33, Suppl. Issue, Nov. (1996): 173-186

NUTRITIONAL EVALUATION OF RUMEN CONTENTS AS A SLAUGHTERHOUSE WASTE IN SHEEP RATIONS

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SUMMMARY

The fresh rumen contents (RC) were collected from a ruminants slaughterhouse, sun dried (SD) for 15 days, and tested for its chemical composition. The (SDRC) showed its highest crude protein (CP) content between days 3 to 5. The final SDRC proximate composition, (Dry matter (DM) 88.8, (CP) 11.7, Crude fiber (CF) 39.6, Ether Extract (EE) 1.8, Ash 14.6 and Nitrogen free extract (NFE) 32.0), was similar to that for berseem hay (BH). A 3X3 latin square digestibility (DGST) trial was carried out using three adult Rahmani rams. The SDRC was introduced into the experimental diets to replace 0 (control-T1) , 25 (T2) , and 50 % (T3) of the T1 BH, where the BH resembled 30 % of the T1 diet DM . Animals of T3 & T2 exhibited the highest DGST of DM, organic matter (OM), CP, CF, ($P<0.01$) compared to T1. (71.6, 71.1 vs 56.9; & 75.7; 75.2 vs 63.4; & 82.8, 82.0 vs 75.8; & 72.5, 70.1 vs 51.0%. Ruminal ammonia and total nitrogen were decreased as the SDRC level increased ($P<0.05$).Fifteen growing Rahmani lambs in three groups of five recieved the T1, T2 and T3 tested diets for performance evaluation. The average daily gain for T3 animals was the highest, 164, ($P<0.05$), while T2 and T 1 were 122 & 90 g/h/d, respectively. This study proved that utilizing the SDRC in ruminants diets is benifecial and economical for mutton production.

Keywords: Sheep, digestibility, growth, rumen contents, sun drying .

INTRODUCTION

Rumen contents (R. C.) , which is a kind of slaughter house wastes, that is usually disposed together with blood into sanitary drainage streames causing its blockage and many other problems. Also, surface disposal of this waste, allows expulsion of noxous gases and oudors from its aerobic decay, inhance insects and flies reproduction and atract rodents helping its multiplication, which create great threat to environment. Rumen contents possesses great potential for use as a ruminant feed ingredient , where it contains the partially digested feeds, ruminal flora (bacteria, protozoa, fungi, actinomyces), saliva, water, bacterial enzymes, volatile fatty acids and many other metabolites, (Hungate, 1966; Whittemore and Moffat, 1976 , and Tizzoni, 1964). One of the obstacles for using this material is its high moisture

content. Employing sun drying procedure is an excellent approach for tackeling this problem, (Abdelmawla, 1990).. Sun drying ,also, beside its efficiency in reducing moisture, undergoes a sterilizing process , making the material free of pathogenic microbes hazards, (Abdelmawla, 1990; and Meyer *et al.*, 1984). This study was designed to evaluate sun drying as a good way to preserve R.C. , and also, studying the chemistry and the nutritive value of the sun dried R.C. when included in rations for sheep as partial substitute for chopped berssem hay (a high quality roughage).

MATERIALS AND METHODS

Experimental materials, rations and animals: Rumen contents were collected from a public slaughterhouse immediately after slaughtering ruminant animals. The collected material batches were sun dried, in 5 centimeter layer depth, for 15 days. During this period they were turned upside down and well mixed two times a day till 10 % moisture content was reached ,then, collected and stored in woven plastic bags till feeding time.

Three adult male Rahmani rams were used in a 3X3 latin square arrangement digestibility trial (21 days for preliminary period and 7 days for collection period), for determining the SDRC nutrients digestibility and nutritive value as introduced to experimental diets. In another trial (lasted 180 days), for performance and nitrogen utilization evaluation, fifteen growing Rahmany male lambs were randomly alloted to the three experimental groups of 5 animals each, with an average weight of 27 kg. The daily rations were designed to cover maintenance and growth requirements according to Tome (1971). The daily ration (Table 2), was offered individually twice daily, drinking water was available all day time. Animals were weighed every 15 days. The three experimental rations used with sheep were: T 1, (basal ration): (70% concentrate mixture (CM) + 30% BH)., T 2, (70% CM + 7.5% SDRC + 22.5 BH)., T 3, (70% CM + 15% SDRC + 15% BH). The CM of the experimental diets consisted of a commercial concentrate feed mixtur (CFM) (composed of; 32.5% cotton seed cake, 17.5 yellow corn, 32% wheat bran, 12.5% rice bran, 3% molasses, 1.5 limeston and 1% salt), and waste wheat flower 14 %,. Both rumen contents and BH were mixed at time of feeding with the concentrate portion of the diet.

Growing lambs performance, and nitrogen utilization trial: Three animals were taken randomly from each of the three experimental groups for N-utilization trails (after 2 months of the experiment start), 7 days as preliminary period followed by collection period of 7 days. The samples of diets, faeces and feed residues were analysed for crude protein, ether extract, crude fiber and ash according to the A.O.A.C (1980), methods. Urine samples were analysed for nitrogen according to A.O.A.C. (1980) methods. Rumen liquor samlpes were withdrown (four times / run, at 2, 4, 6 and 24 hours (hrs.), post morning feeding (pmf.), bimonthly ,(2, 4, and 6 months from trial strart), from the 3 animals of each group (N-utilization trial animals), by using a rubber stomach tube inserted into the rumen via the mouth and oesophagus. The ruminal PH was measured as soon as the rumen liquor was collected using an EIL PH-meter. Ammonia nitrogen in rumen liquor was determined using Conway method, (1957). Total volatile fatty acids (TVFA's) were determined according to the method of Petroonkina (1961). Total nitrogen and NPN were determined by the modified semimicro kjeldahl digestion method of A.O.A.C., (1980). True protein was calculated by difference. Blood samples were bimonthly (after 2, 4,

and 6 months of the trial), withdrown via the jugular vein, from the same 3 animals from each group every month. Blood serum samples in 5 ml's vials were preserved at (-20 C) till analysis. Serum total proteins were determined by a colorimetric method using the biuret reagent as described by Armstrong and Carr, (1964). For detrminig serum albumin the method of Doumas *et al.*, (1971) was employed. Serum globulin concentration was calculated by difference (total proteins- albumen). Serum cholesterol determination was carried out according to Watson (1960), while the determination of transaminases (SGOT and SGPT) was done according to Reitman and Frankel (1957). Serum urea and creatinine determinations were carried out according to marshal (1991).

Statistical analysis was performed using least square methods described by Snedecor and Cochran (1982) and Harvey (1987). Significance means were tested for differences according to the Duncan's New Multiple Range test (1955).

RESULTS AND DISCUSSION

1- Effect of sun drying on chemical composition of rumen contents

It is well known that sun light is the cheapest source of heat and ultraviolet rays, where rays rise the temperature of the processed rumen contents (R.C) causing heating of the stuff. Hence, it activates microorganisms to work and decompose R.C. nutrients. Also, it helps hatching insects ova, producing larvae (Calvert *et al.*, 1969 and Miller and Shaw 1969). All together, heat, fermentation products and ultraviolet combine to destroy pathogenic microbes (Abdelmawla 1990, Abdelmawla, 1983; Burnett *et al.*,1973). During the 15 days sun curing period, major changes in some nutrients and minor changes in others took place. It appeared (Table 1), that 15 days sun drying period is enough to reduce moisture of rumen contents from about 81.6% to about 11.2%.

Data of showed a slight decrease in OM content, from 87.5 to 85.4% during the drying period. This reduction in OM of rumen contents may be attributed to consumption by microflora, insects and house fly larvae. It was noticed that CP content sharply increased in rumen contents around days 3,4 and 5, in which it became double the CP value at day one. This can be attributed to the presence of intensive generation of house fly larvae. The development of larvae to pupa and then to intact flies that left the processed material leaving its pupas shells behind is considered the main factor that sharply reduced CP content by the day 6 through day 15 of the drying period. About 4.2% reduction in NFE of RC was noticed between the first and last day of dring period. This may probably be due to the consumption of the easy -to- utilize carbohydrate by the acting flora to build their bodies and to reproduce. The increase in ash% of RC by time progress may possibly be due to contamination during the drying period and/or consumption of OM by microflora, insects and fly larvae. The present results of the chemical composition of sun dryied rumen contents (SDRC) are in agreement with those of Tizzoni *et al.*, (1964); Antongiovanni *et al.*, (1973); Kamphues (1980); Reddy and Reddy (1980); El-Deek *et al.*, (1984 a,b) and El-Tahan (1991) where they reported values ranging between 81.1-90.30 for OM, 20.36-37.6 for CF and 31.42-42.02 for NFE. On the other hand, the present values of E.E. and ash of SDRC are lower than those of Abd El-Rahman (1989) who recorded values to be 3.35 and 18.56%, respectively. On the basis of chemical composition values of SDRC, one would have suggested that this

material may be considered as a roughage source for ruminants (because of its high C.F content). Also, SDRC seems to be nearly similar in chemical composition to berseem hay (Table 1).

Table 1. Sun drying of rumen contents (SDRC)*, effect on chemical composition, chemical composition of ration ingredients and experimental rations**. (Dry matter basis).

Days	DM	OM	CP	CF	EE	Ash	NFE
Drying SDRC:							
1	14.4	87.5	9.3	39.6	2.1	12.5	36.4
2	14.8	88.0	9.4	39.6	2.2	12.0	36.8
3	21.1	86.7	16.4	39.7	2.1	13.3	28.5
4	27.8	84.9	18.9	39.7	2.9	15.1	23.9
5	29.5	80.8	17.6	39.5	2.6	19.2	21.1
6	31.7	86.9	11.4	39. 5	2.3	13.1	33.7
7	39.1	83.5	11.4	39.5	2.4	16.5	30.6
8	43.9	82.1	11.2	39.4	2.5	17.9	28.9
9	46.5	81.9	11.5	39.5	2.7	18.1	28.2
10	59.2	87.4	11.5	39.4	2.6	12.6	33.8
11	68.3	83.0	11.5	39.5	2.4	17.0	29.5
12	74.8	83.8	11.5	39.5	1.9	16.2	30.9
13	84.1	84.6	11.5	39.5	1.9	15.4	31.7
14	84.9	84.6	11.7	39.6	2.0	15.4	31.3
15	88.8	85.4	11.7	39.6	1.8	14.6	32.3
Ration ingredients:							
CFM***	86.7	92.8	16.9	17.1	2.7	7.2	56.1
Berseem hay	84.2	85.2	18.1	24.3	2.8	4.8	40.0
S.D.R.C.****	92.0	88.4	10.8	37.3	1.6	14.2	38.7
Wheat flower	91.5	97.3	11.3	4.5	3.7	2.7	77.8
Experimental rations:							
Control	85.9	88.9	18.6	21.2	3.0	11.1	46.2
25 % SDRC	86.7	89.2	17.5	22.3	2.8	10.8	46.5
50 % SDRC	87.5	89.4	16.5	23.6	2.6	10.6	46.7

* Sun dried rumen contents. ** All values were clculated on DM basis except for dry matter.
*** Commercial concentrate feed mixture. **** Determined at the trial strat.

2. Nutrient digestibility and nutritive value of diets containing SDRC by rams

Results of Table (2) clearly indicate that the inclusion of SDRC in the rations of adult sheep had no palatability problems. Dry matter intake, either calculated as g/d or as g/kg LBW $^{0.75}$/d, increased ($P<0.05$), as the level of SDRC in the ration increased. Digestibilities of DM, OM, CP, CF and NFE were significantly higher ($P<0.05$), in SDRC groups than control. The noticeable improvement in nutrients digestibilty of the rations containing SDRC may probably attributed to that SDRC is considered semidigested material and/or to unknown factors presented in SDRC that enhance rumen microorganisms to improve nutrients utilization specially crude fiber. he 25% and the 50% SDRC diets exhibited higher TDN content ($P<0.05$) over the control.

Table 2. Nutrients Intake*, digestibility* and nitrogen utilization** of the experimental diets fed to sheep.

Items	Treatment		
	Control	25% SDRC	50% SDRC
DM Intake* (Rams):			
DM (g/day)	1781.85	1799.62	1817.39
DM, g/ kg, $LBW^{0.75}$	92.96	93.88	94.81
Digestibility, (%)*:			
DM	56.92b	71.05a	71.63a
OM	63.38b	75.23a	75.67a
CP	75.78b	82.03a	82.57a
CF	51.04b	70.05a	72.45a
EE	76.23ab	81.04a	71.27b
NFE	65.62b	75.20a	76.31a
TDN	62.33b	70.62a	69.29a
DM Intake** (Growing Lambs):			
DM, g/day	1403.0b	1443.0ab	1513.0a
DM, $kgW^{0.75}$/day	92.2a	93.0b	92.8b
CPI, g/h/d	261.0	252.0	248.0
Nitrogen Utilization**:			
N. Intake (g/day)	52.3a	46.6b	49.4b
Fecal-N,(g/day)	9.8b	11.7a	12.9a
Urinary -N (g/day)	31.2a	14.9b	14.2b
Urinary-N% intake	59.7a	31.9b	28.7b
N. balance	11.2b	20.0a	22.2a

* By adult sheep.** By growing sheep.
a,b Values in the same row with different superscripts differ significantly (P<0.01).

3. Effect on feed intake and N-utilization of growing sheep

Results of DMI, (Table 2), exhibited that DMI of the 50 % SDRC group was higher than control (P<0.05). The overall mean indicated that DMI increased, (P<0.05), as the SDRC level increased in the ration in favor of the 50 % SDRC ration. However, DMI as g / kg $LBW^{0.75}$ / d, showed a slight, but significant (P<0.05), increase, as the level of SDRC Increased. Results of feed intake suggested experiencing no acceptability problems, that SDRC can be considered a palatable feed ingredient for sheep.

Nitrogen intake (NI) results, (Table 2), showed that the control diet was higher (P<0.05) than both the 25% and 50% SDRC diet. This is a result of the relatively lower CP content of the SDRC than berseem hay. Fecal nitrogen excretion data showed that the animals received diets containing SDRC excreted more N (P<0.05) than the control. (12.96, 11.66 VS 9.82 for 50%, 25% SDRC and control, respectively). The control animals excreted more urinary-N (P<0.01) over both the SDRC diet, suggesting that the protein of the 50 % SDRC diets is utilized more efficeintly than that of control diet. This also, would be explained by the results of N-balance in SDRC animals that were significantly, (P<0.01) higher than the control, indicating that the SDRC protein has a distinguished characteristics that inhance protein deposition in the SDRC groups, where nitrogen balance was lmost double

the amount of that gained by the control animals

4. Effect on some rumen liquor parameters:

It is clear (Table 3), that rations containing SDRC caused a slight increase in pH values of rumen liquor (RL), than that of control. However, almost similar pH values were noticed for both SDRC treatments. These findings may probably be related to the relatively higher CF content of rations containing SDRC than that of control promoting more saliva and higher buffering in the rumen. The lowest pH value ($P>0.05$) was recorded 2 hrs. post feeding where the highest value ($P<0.05$) was noticed prefeeding. This can be attributed to fermentation process by rumen microorganisms which took place on the soluble carbohydrate very soon producing more propionate, decreasing pH value, while fermentation of the structural cabohydrats needs more time producing more acetate, delaying the decrease in pH value. Such results support the findings of Abd El-Hafez (1983), who found highest values of ruminal pH at zero time when sheep were fed diets of varying proportions of roughage: concentrate ratios.

The 50% SDRC group showed the lowest value of NH3-N ($P<0.05$) , whereas, control group recorded the highest value. This may suggest that protein of SDRC is of lower degradability than that of berseem hay. It was noted that the lowest ruminal NH3-N was recorded at zero time, ($P<0.01$), while the highest was reached 6 hrs. post feeding. These results agree with those of Cottyn and Boucque (1968), Bartley *et al.*, (1976); Bartley *et al.*, (1981); Abd El-Hafez (1983); Abdelmawlla (1990) and Salim (1991).

A graduall increase ($P<0.05$) in ruminal TVFA's as the level of SDRC was increased in the ration, that may suggest that the cured SDRC contained more nutrients of more fermentable value than that of berseem hay and/or that SDRC contained unkown factors that inhance rumen microorganisms to utilize feed nutrients. It was noticed that the lowest value of ruminal TVFA's was recorded at 0 time, while the higest was reached at 4 hrs post feeding, (Table 3). These results seem to agree with those of Tawila (1991), who found -on sheep- that the highest value of TVFA's was recorded at 4 hrs. post feeding.

Ruminal total-N indicated that incorporation of SDRC in the ration negatively affected ruminal total nitrogen. A linear signifcant ($P<0.01$) decrease in ruminal total nitrogen was detected as the level of SDRC was increased. These results may be attributed to the gradual decrease in crude protein intake with increasing level of SDRC in the rations (Table 2). It should be noted that similar low values of ruminal total-N was recorded at zero and 2 hrs. post morning feeding then increased gradually to reach the highest value at 6 hrs post feeding. These results seem to agree with those of Mahmoud (1993) who found that the highest value was recorded at 6 hrs. post feeding for total nitrogen of rumen liquor of sheep fed non conventional rations containing poultry wastes.

Ruminal NPN content data (Table 3), indicated a gradual decrease in ruminal NPN with increasing level of SDRC in the rations, ($P<0.01$) . The present results may confirm the previous findings that SDRC contained protein of lower degradability than that of berseem hay. It was noted that the lowest value of ruminal NPN was recorded at 24 hrs. post feeding and then increased gradually after feeding to reach the highest value at 6 hrs. post feeding. The present results seem to be similar to that obtained by Mahmoud (1993).

Ruminal true protein nitrogen (TPN), results (Table 3) indicated a gradual decrease of TPN content as the level of SDRC increased in the rations. It is of interst to note that these results are in line with ruminal NPN and TN disscused above. With respect to values of true protein nitrogen at the different sampling time, data clearly show that highest values were recorded at 6 hrs. post feeding. Our results show an agreement with results obtained by Mahmoud (1993) who found highest value of true protein nitrogen after 6 hrs. post feeding for goats fed different levels of non conventional rations (poultry litter).

Testing ruminal parameters throughout the three experimental periods (Table 3), indicated that increasing values with age progress, may probably be attributd to progressing ruminal adaptation and / or to the gradual increase in DMI and mainly crude protein intake.

5. Effect of including SDRC in sheep diets on some blood serum parameters

Serum total proteins, indicated that values of the control group was higher by about 3.17% ($P<0.05$) and 1.14% ($P<0.05$) than those of 25% and 50% SDRC groups, respectively. Several factors seem to affect serum total protein, the status of animals, nutrtional status of species, health status of animals and the dietry protein consumption,(Marsh *et al.*, 1969 ; Chandra and Jackson 1971; O'Kelly 1973; Kummar *et al.*, 1980). The present values of serum total protein are within the normal range recorded by several investigators (Varly 1969 and O'kelly 1973). Moreover, Khattab *et al.*, (1982) recorded values of serum total protein ranging between 7.4 to 7.6 g/100 ml in sheep fed different levels of a dust duck litter. In addition, Mahmoud (1993) obtained serum total protein values ranging between 7.41 and 7.86 g/100 ml in goats fed rations containing different levels of broiler litters. Results obtained from the present study indicated that the experimental rations which contained SDRC (up to 50%) had sufficient level of proteins to maintain animal health and performance. Results throughout the experimental periods showed that mean value of the first period was higher by 6.0% ($P<0.01$) and 4.18% ($P<0.05$) than those of 2nd and 3rd period, respectively, that may be due to changes in the turnover of proteins and urea or its back-diffusion (Marshal, 1991).

Results of serum albumin concentration exhibited that the 50% SDRC group was higher ($P<0.01$) by about 4.26 and 6.35% than those of control and 25% SDRC groups, respectively. With respect to the period effect, the value of the third period was higher ($P<0.01$) by about 4.82 and 7.25% than those of the second and the first period, respectively.

Results of serum albumin are in the range of values reported by several investigators, Garther *et al.*, (1966), Singh *et al.*, (1973); Kholif (1989) and Abo El-Nor (1991) obtained values of serum albumin ranging between 3.25 to 3.74 mg/100 ml serum. The values of serum albumin of the treatment groups confirm that animals were healthy under our treatments arrangement. No deletorious effect could be observed on growing sheep receiving the rations contained the SDRC up to 50% of the diet berseem hay.

The highst serum globulin ($P<0.05$), value of 4.3 g/100 ml was recorded for the control group whereas lowest value of 4.0 was shown for the 50% SDRC group. The value of the first period was higher by about 13.1 and 14.1% than those of the second and third period, respectively. The current values of serum globulin are within the range of values recorded by Kholif (1989) and Abo El Nor (1991) who obtained

Table 3. Rumen liquor and blood serum parameters of sheep fed diets containing different levels of SDRC.

	Treatment			±SE	Sampling time (hrs.),pmf.				±SE	Exptl. Period (month)			±SE
	Control	25% SDRC	50% SDRC		0	2	4	6		2	4	6	
Rumen liquor parameter													
PH	6.4a	6.5a	6.5a		6.9a	6.3b	6.4b	6.4b		6.4b	6.5a	6.6a	
Ammonia-N mg/100ml	33.8a	33.4a	30.1a	1.44	27.2c	31.4bc	33.3ab	37.8a	1.7	32.0a	34.5a	30.8a	0.2
TVFA's*meq/100m	7.7a	8.1a	8.3 a	0.40	5.1c	9.1a	9.6a	8.4b	0.7	7.7b	8.2a	8.2a	0.4
Total-Nmg/100ml	174.8a	149.6b	139.8 b	7.1	142.8b	141.4b	153.8b	181.0a	8.2	125.9b	167.7a	170.6a	7.1
NPNmg/100ml	83.7a	74.7b	68.2b	3.1	69.5b	70.2b	71.8b	90.6a	3.6	65.7b	83.9a	77.0a	3.1
True protein mg/100ml	91.1a	7.9ab	71.6b	6.0	73.3b	71.2b	81.9b	90.4a	6.9	60.2b	83.8a	93.6a	6.0
Blood serum parameters													
Total proteins, g/100ml	7.7a	7.4b	7.6ab	0.1						7.8a	7.4b	7.5b	0.10
Albumin, g/100ml	3.4b	3.3b	3.6a	0.1						3.2b	3.4b	3.6a	0.10
Globulin, g/100ml	4.3a	4.1ab	4.0b	0.2						4.5a	4.0b	3.9b	0.20
Urea, mg/100ml	38.4b	47.6a	39.5b	1.4						41.0b	39.7b	44.8a	1.40
Creatinin, g/100ml	1.6a	1.3b	1.4b	0.1						1.2c	1.4 b	1.7a	0.10
Cholesterol, mg/100ml	59.3a	58.8a	55.3b	1.2						57.9b	63.9a	51.5c	1.20
GOT, u/100ml	177.1b	168.3b	100.4a	7.3						189.5a	194.0a	162.3b	7.30
GPT, u/100ml	47.9a	24.7b	56.8a	4.4						49.5a	44.9ab	35.0b	4.40

*TVFA's : Total volatile fatty acids.

a,b,c Values in the same row with different superscripts differ significantly (P<0.01)

values of serum globulin ranging between 2.72 to 3.74 g/100 ml. According to the present values of serum globulin, it seems possible to emphasize that the immun system of the experimental animals was not influnced by incorporation of SDRC in the ration and consequently the experimental animals appeared healthy.

Data (Table 3) showed that the control group had the lowest serum urea value, while the 25% SDRC group recorded the highest one. The 25% SDRC group was higher ($P<0.01$) by about 20.28% and 23.82% than those of the 50% SDRC and the control groups, respectively. The results showed also that the value of the third period was higher ($P<0.05$) by about 9.36 and 13.07% than those of the first and second periods, respectively.

Serum creatinine of the control group was higher significantly ($P<0.01$) by 20.63 and 13.55 % than those containing 25% and 50% SDRC, respectively. This may possibly be related to higher dietary protein of the control group than the other groups. Inspection of serum creatinine throgh the three experimental periods indicated significant linear increase ($P<0.01$) with period progress which may probably be related to the increase in dieatry protein intake. These results are in accordance with those obtained by Owen *et al.*, (1954). They also, suggested that the blood level of creatinine is a useful indicator for glumerular filtration. Also, they found that the normal plasma creatinine level ranging between 0.8 and 1.4 mg / 100 ml and increased with failling glomerular filtration, Moreover, Blanch and Setchell, (1960) indicated that plasma cretinine ranged between 0.9 and 1.2 mg/100ml in fasted sheep. In addition, Mahmoud (1993) found that serum creatinine values ranged between 1.78 and 2.35 mg/100 ml in goats fed different levels of broiler litter.

Serum total cholesterol data, showed that the mean control value was higher than the 25% SDRC ($P<0.05$) and 50% SDRC ($P<0.05$) by about 0.92 and 7.22%, espectively. In addition, the second period was significantly higher than both the first and the third period by 10.4 and 24.05%, respectively. These results are in good agreement with Abo El-Nor (1991) and Mahmoud (1993) findings, where values ranged between 54.7 and 71.1 mg %.

Results of serum glutamate-oxaloacetate transaminase (SGOT) results, showed that the value for the 50% SDRC group was higher ($P<0.05$) than the 25% SDRC and the control groups by about 19.08 and 13.10%,respectively. Results, also, showed that the second period recorded the highest value whereas the third period showed the lowest significant value ($P<0.05$).

Data of serum glutamate pyruvate transaminase (SGPT), showed that the 25% SDRC group had significantly lower value than those of the other two groups.

It is clear from the results that SGPT gradually decrease with age progress. A significant difference ($P<0.05$) was detected between the first and the third periods. The present results match the range, 32.2 to 60.6 ul/100 ml), obtained by Kholaif (1989), Abo El-Nor (1991) and Mahmoud (1993).

6. Average daily gain

Results of (Table 4), indicated that the highest daily gain was that for animals fed the 50% SDRC (164.91 g/day), while the lowest daily gain was obtained by the control lambs (90.92 g/day). It is of intrest to note that lambs in treatment 50% SDRC and 25% SDRC showed 81.37% and 35.17% respectivly, faster gain thanlambs fed control diet. While increasing the proportion of the sun dried rumen contents in the diet from 25% to 50% caused an increase in the daily gain, from

122.9 to 164.91 g/day. Differences were significant only between the 50% SDRC group and control. These results are comparable to those reported by Patra (1991) who found that Black Bengal goats fed diets contained rumen contents gained 2.58% faster than goats fed control diet.

Table 4. Feed intake, growth performance and economical efficiencyof lambs on rations with different levels of SDRC.

Items	Treatment		
	Control	25% SDRC	50% SDRC
Daily feed intake, g/h:			
CFM	906.0	931.6	977.0
WF	214.7	220.8	231.5
BH	500.1	385.7	269.7
SDRC	0	117.6	246.7
CP	261.0	252.0	248.0
DM	1403.0	1443.0	1513.0
DM, g/kg BW0.75	93.2	93.0	92.8
ADG, g	90.9b	122.9ab	164.9a
Feed cost/d (pt.)	51.1	49.2	48.1
Daily gain price, (pt)	63.6	86.0	115.4
Cost of g gain, (pt)	0.56	0.40	0.29
Economical efficiency	1.24	1.74	2.39

a,b Values in the same row with different superscripts differe significantly (P<0.01).

The gradual improvment in average daily gain of growing sheep fed the gradual levels of SDRC may suggest that rumen contents may contain protein of a higher quality than of berseem hay and/or it contains an unidentified factor(s) that somehow enhance growth.

It is of interest to note that the results of the present study cocerning nutrients digestibility, N-utilization, rumen liquor parameters and performance results, all of them confirm results obtained for gain.

7- Economical evaluation

The economical efficiency results (table 4), clearly exhibited that SDRCdiets reflected superiority (P>0.05), over the control diet . The monetary value of the experimental diets (pound/ton) reflected that the cost decreased as the SDRC increased in diet formula. The cost of 25% SDRC diet was 94% (297.40 pound / ton) of that for the control diet cost (315.52), while the cost of 50% SDRC diet was 88% (279.08) of that for the control diet. This clearly give a return or profit of 18.19 and 36.44 pound for both the 25% and 50% SDRC diets over the control diet, respectively.

Results in (Table 4) , showed that the feed costs of the experimental groups which received the SDRC diets versus the control groups, to produce one gm gain, were lower for the 50% SDRC group followed by the 25% SDRC group whereas the control came last because it had the highest cost (0.58 ,0.66 and 0.89 P.T. for 50%, 25% SDRC and control groups, respectively).

Economical efficiency data showed that the 50 % SDRC diet clearly reflected that it

is economicaly superior to both the 25%SDRC and the control groups, where the 50%SDRC had the highest coefficient value (2.3) followed by the 25% SDRC(1.71), while that for the control was (1.22) . Both 25% and 50% SDRC were significant higer (P<0.01)than control.

These results strongley exhibit the high potential of the SDRC as waste material efficiently replace a high quality roughage like berseem hay .

REFERENCES

Abdel-Hafez, G .A .A., 1983. Comparative nutritional studies between sheep and goats. M. Sc.Thesis, Cairo Univ., Fact. of Agric., Egypt.

Abdemawla, S. M., 1990. A Study on the performance of weanend male buffaloe calves fed ration containing poultry waste. Ph.D. Thesis , Anim. Prod. Dept., Fac. Agric Ain Shams University. Hadaiek Shoubra 11241, Cairo, Egypt.

Abdelmawla, S. M., 1983. A study on the chemical composition and nutritive value of animal and poultry wastes in ration for sheep. M. Sc. Thesis , Anim. Prod. Dept., Fac. Agric. Ain Shams University . Hadaiek Shoubra 11241, Cairo, Egypt.

Abo EL-Nor, S. A. H., 1991. Effect of feeding varying levels of leucaena on productive performance of goats. Ph.D.Thesis , Fac. Agric. Univ.of Ain Shams.

Abd EL-Rahman, G.A. and G.A.E. Elsayaad, 1989. Inclusion of rumen contents in rations for rabbits. Third Egyptain-British conference of animal ,fish and poultry production ,Alexandria, 7-10 October, 1989. pp.1009-1015.

Antongiovanni, M., A. Giorgetti and B. M. Poli, 1973. Nutritive value of dried rumen contents. Alimentazione, Animal-Italian, 17, (4), 47-54. Zootechnia, Univ. Firenze, Italy. (E. Sum.).

A.O.A.C., 1980. Association of Official Analytical Chemists. Official methods of analysis, 13rd. Ed. Washington, D.C., U.S.A.

Armostrong, W. D. and C. W. Carr, 1964. Physiological chemistry Laboratory, 3rd. Ed. p. 75, Burges publishing Co. Minneapolis, Minnesota.

Bartley, E. E., A. Davidovich, G. W. Barr, G. W. Griffel, A. D. Dayton, D. W. Deyoe and R.M. Bechtle, 1976. Ammonia toxicity in cattle. 1. Rumen and blood changes associated with toxicity and treatment methods . J. Anim. Sci. 48 : 835.

Bartley, E. E., T. B. Avery, T.G. Nagarafo, B. R. Watt, A. Davidorich, S. Galitzer and B. Lassman, 1981. Ammonia toxicity in cattle. V. Ammonia concentration of lymph and portal, Caroted and jugular blood after the ingestion of urea . J. Anim. Sci. 53 : 494.

Blanch, E. and B.P. Setchell, 1960. Chemical defermination of creatinine with deroteiniz - ation. Austr. J. Biol. Sci. 3: 356.

Burnett , G. W. and G.S. Schuster , 1973. Pathogenic Microbiology. Saint Louis, The C .V. Mosby Company.

Calvert, C. C., 1969. Use of animal excreta for microbial and insect protein synthesis. J. Anim. Sci., 48, No.1.

Chandra, S. and M.G. Jackson, 1971. A study of various chemical treatment to remove lignin from coarse roughges and increase their digestibility. J. Agric. Sci. Camb. 77 : 11.

Conway, E. J., 1957. Micro-diffusion Analsis and volumetric error (4th ed.). The McMillan Co., New York.

Cottyn, B. G. and C.V. Boucque, 1968. Variation in camposition of rumen fluid as

function of time of sampling. Rev. Agric. Brussels, 21 : 1651.
Doumas, B., W. Watson and H. Biggs , 1971. Albumin standards and measurment of serum with bromocresol green. clin. chem. Acta., 31 : 87.
Duncan, D. B., 1955. The multiple range and F test. Biometric.11,1-45
El-Deek, A. A., N.S. Isshak, A.H. Raya and Neamat, A. Badawy, 1984 a. Anote on the effects of rumen contents on growing pekin dieckes. Egypt. Poultry Sci. 4: 23-33.
Garther, R. J. W., J .W. Ryley and A. W. Beatti , 1966. Values and variations of blood constituents in grazing hereford cattle. Res. Vet. Sci. J. : 424.
Harvey, W.R., 1987. User's guide for mixed model least squares and Ohio state University. U.S.A.
Hungate, R. E., 1966. The rumen and its microbes. New York and London: Academic Press. Jovanovic, M. and Cuperloric, M. , 1977). Nutritive value of rumen contents for monogastric animals. Anim. Feed. Sci. Technol. 2 : (4) 351.
Kamphues, J., 1980. Possibilities and limits of recycling rumen contents of slaughtered cattle for feeding animals. Ubersichten Zu tier Ernahrung 9, (3) (E. Sum.).
Khattab, H.M., M.A. El-Ashry, A.H. El-Serafy and H.S. Soliman, 1982. Wood shaving duck litter in ration for growing lambs . Agric. wastes. 4 : 25.
Kholif, A. M.M., 1989. Effect of supplementing rations with buffers on the productive performance of dairy buffalo. Ph.D. Thesis. Anim. Prod. Dept., Fac. of Agric. Ain Shams Univ. Hadaiek Shoubra 11241, Cairo, Egypt.
Kumar , N. U., B. Singh, and D. N. Verma , 1980. Effect of different levels of dietary protein and energy on growth of male buffalo calves. Ind. J. Anim. Sci., 51 : 513.
Mahmoud, S. Z., 1993. Effect of radiation treatment on nutritive value of poultry wastes. Ph. D. Thesis, Anim. Prod. Dept., Fac. Agric. Ain Shams Univ. Hadaiek Shoubra 11241, Cairo, Egypt.
March, C. I., A. M. Charles and N. R. Underdahl , 1969. Loss of serum proteins via the intestinal tract in calves with infections diarrhea. Am. J. Vet. Res., (2) 30 : 163 -166.
Marshal, W. J., 1991. Clinical Chemistry, An illustrated outline. David Cooke & Catherine Duffy, Editors. Gower Medical Publishing, 34 - 42 Cleveland Street, London W1P 5FB.
Miller, B.F. and J.H.H. Shaw, 1969. Digestion of poultry manure by Diptera . Poult. Sci. 48 : 1844.
O'kelly, Jc., 1973. Seasonal variations inplasma lipids of genetically different types of cattle steers on different diets. comp. Biochem. Physiol., 44 : 303 - 312.
Owen, J. A., B. Iggo, F.F. Scandrett, C.P. Stewart, 1954. The determination of creatinine in plasma on serum and in urine. Acritical exmination. Biochem. J. 58: 426.
Patra, U. and T.R. Ghoh, 1991. Nutritive value of rumen contents and utilization and effect of their feeding on growth per formance in plack Bengal goats. Ind. J. Anim. Scl. 61 (3) : 328 - 331.
Petroonkina, M. M., 1961. Practical biochemistry ,3rd ed . (in Russin). Med. Giz. Linengrad.
Reddy, M. R. and K.V.S. Reddy, 1980. A short note on the proximate composition of rumen digest from bovine and orine species and its utilization as acomponentof livestock feed. Ind. Vet. J., 57 (5), 429 - 431.

Reitman, S. and S. Frankel., 1957. A colorimetric method for the determination of serum glutumic -oxaloacetic and glutamic- pyruvate transaminase. Am. J. Clin. Path., 28 : 56.

Saleh, H. M., 1990. The effect of poultry wastes inclusion in lambs diet on age at puberty and semen quality. M.Sc.Thesis. Anim. Prod. Dept., Fac. Agric. Ain Shams Univ. Hadaiek Shoubra 11241, Cairo, Egypt.

Salim, F. A., 1991. The effect of the inclusion poultry wastes in the ration for lactating farm animals on their milk yield and composition. Ph. D. Thesis, Anim. Prod. Dept., Fac. Agric. Ain Shams Univ. Hadaiek Shoubra 11241, Cairo, Egypt.

Snedecor, G.W. and W.G Cochhran, 1982. Statistical Methods. Ames, Iowa. Iowa state University press.

Tawila, M.A.E., 1991.Studies on the possible methods for improving utilization of low quality roughages for ruminants. Ph.D.Thesis, Anim. Prod. Dept., Fac. Agric. Univ. of Ain Shams. Hadaiek Shoubra 11241. Cairo, Egypt.

Tizzoni, E., 1964. Feeding value of rumen contents. Nutrition Abstract and Reviews., 34 : 677.

Tome, F.M., 1971. Nutrient allowances and composition of feeding stuffs for ruminants. Minestry of Agriculture and Fisheries. Tolcarne Drive Pinnes, Middle Sex HA5 2DT.

Varley, H., 1969. Practical clinical biochemistry "William, Heinmann Medical books Ltd. and interscience books Inc., London, New York.

Watson, D. , 1960. A simple method for the determination of serum cholesterol. Clin. Chem. Acta 5 : 637.

Whittemore, C. T. and I.W. Moffat, 1976. The digestibility of dried microbial cells grown on methanol in diets for growing pigs. J. Agric. Sci. 86, 407- 410.

التقييم الغذائى لمحتويات الكرش كمخلفات للمجازر فى علائق الاغنام

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أجريت عملية تجفيف شمسى لمدة ١٥ يوميا لمحتويات كرش مجترات طازجة تم تجميعها من مجزر للمجترات، وتم إجراء تقديرات كمية لمكوناتها من المادة الجافة ومشتقاتها. كيميائيا. أظهر التحليل النهائى أن أفضل مكونات المادة الجافة المختبرة وجدت فى الفترة بين ٣-٥ يوم من التجفيف. وكان التركيب الكيماوى (٪): المادة الجافة ٨٨,٨، البروتين الخام ١١,٧، الالياف الخام ٣٩,٦، الدهن الخام ١,٨، الرماد الخام ١٤,٦ والمستخلص الخالى من النيتروجين ٣٢,٣، وهذا التركيب يماثل التركيب الكيماوى لدريس البرسيم. أجريت عملية تقييم غذائى لتقدير الهضم على الاغنام فى مربع لاتينى ٣×٣. أدخلت محتويات الكرش المجففة فى علائق الاغنام التجريبية محل دريس عليقة المقارنة، (٧٠٪ مركزات + ٣٠٪ دريس برسيم)، بنسبة ٢٥٪ (معاملة ٢)، بنسبة ٥٠٪ (معاملة ٣). أظهرت حيوانات المعاملة (٣) والمعاملة (٢) أعلى هضمية لكل من المادة الجافة والمادة العضوية والبروتين الخام والالياف الخام (مستوى معنوية ١٪) لمقارنتها بالمعاملة الاولى حيث كانت القيم ٧١,٦، ٧١,١ مقابل ٥١,٥ للمقارنة. انخفض تركيز الامونيا الكرشية والنتروجين الكلى بزيادة مستوى محتويات الكرش المجففة فى العلائق (مستوى معنوية ٥٪). استخدم ١٥ حملا رحمانيا فى ثلاثة مجاميع من خمسة حيوانات لكل غذيت كل منها على أحد العلائق التجريبية السابقة لدراسة الأداء. أظهرت حيوانات المجموعة (٣) أعلى ميزان نتروجينى موجب ٢٢,٢ بينما المجموعة (٢) كانت ٢٠,٠ أما المجموعة المقارنة فكانت ١١,٢. كان معدل النمو اليومى للمجموعة الثالثة أعلاها ١٦٤ جم بينما كان للمجموعة (٢) ١٢٢ جم اما المجموعة الاولى فكان ٩٠ جم/ رأس/يوم. برهنت هذه الدراسة على أن الاستفادة بمحتويات الكرش المجففة شمسيا فى علائق المجترات يكون مجزيا واقتصاديا لانتاج اللحم من الاغنام.