PERFORMANCE OF LAMBS FED RATIONS CONTAINING BANANA WASTES.

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SUMMARY

In–vitro dry matter disappearance and digestibility trials were used to evaluate banana wastes. In addition, the effect of substituting part of hay by banana wastes on rumen activity and performance of growing Ossimi and Saidi lambs. According to the preliminary evaluation done by *In vitro* evaluation on levels of replacement of different banana wastes with Berseem hay, the best results obtained was evaluated by metabolism trials using adult Ossimi rams. Additional growing trials on forty-eight weaned lambs (of Saidi and Ossimi breeds) were implemented. Lambs were divided randomly into four equal groups according to their body weight and breed. Lambs were fed according to NRC, (1980). Where the control group (T1) was fed concentrate and Berseem hay. While the other banana wastes treated by urea (BW-3% urea) or banana wastes treated by sodium hydroxide (BW-3% NaOH) or untreated banana wastes (BW) replacing 50% from hay in treatments 2,3 or 4, respectively. *In-vitro* trials indicated that BW-3% NaOH, BW-3% urea and BW gave approximately the same values of IVDMD being 74.60, 72.10, and 70,10, respectively. Results of chemical analysis illustrated that concentrate feed mixture (CFM) and berseem hay contained the highest amounts of CP (16.4 and 13.33%), respectively, followed by BW-3% urea (11.8%), BW-3% NaOH (9.97%) and BW (8.67%). Digestibility trials results showed a highly significance difference for TDN estimates for control ration compared to different treatments. In growing trials results indicated that treatment had a highly significant effect on total gain and consequently on average daily gain. Treatments 1 and 2 had a higher growth rate than T3 and T4. In addition, treatment had a highly significant effect on feed intake where T1 and T3 had a higher feed intake as TDN than other treatments. It could be noticed that T1 and T2 had a highest value of ruminal NH3-N, while T4 showed the lowest value. The average value of total protein in blood for lambs fed T2 with 3% urea was higher significantly ($P< 0.05$) than those fed T3 and T4. Non-significant difference was detected between the two breeds of sheep in most of blood plasma parameters. The present study suggested the possibility of using banana wastes in rations for ruminants in place of using breseem hay up to 50%. Utilization of banana wastes could be improved by 3% urea treatment.

Key words: *Lamb performance, banana wastes.*

INTRODUCTION

In Egypt, animal feed resources are limited which do not allow increasing livestock population to a level satisfies human demands. Moreover, feed shortage is also unevenly divided between summer and winter, where in

winter season; berseem is the major forage crop covering 60 and 75% of yearly animal requirements of energy and protein, respectively Hathout, 1987; Dossouky and El-Nouby 1990). While, in summer season, the available feeds are mainly concentrates and straws which cover respectively 39% and 22% of the local animal requirements of energy and protein (El-Serafy, 1991). Encouraging results obtained that using crops wastes in animal diets could participate in reducing the shortage of animal feeds and subsequently increase milk and meat production. Efforts should be done to use all available waste products for feeding animals. Banana leaves and pseudostems have chemical analysis close to clover composition and can play an important role to cover some nutrient requirements of the animals (Abd El-Gawad *et al.*, 1994). Highest live weight gain was achieved when diet was supplemented with banana, this suggests that fodder supplement with green banana can improve cattle nutrition in the humid tropics (Ibrahim *et al.*, 2000). Wastes of banana trees are one of the solutions may share in solving this problem. The annual cultivated area by banana trees is about 44,000 feddans. The unconsumed parts, by human (leaves and pseudostems), came to be about 40 tons per feddan. Accordingly, the total waste product is 1,760,000 tons, which estimated to be about 176,000 tons dry matter (Ministry of Agriculture, 1997).

The objectives of this study are evaluation of banana waste by using *in vitro* dry matter digestibility and digestibility trials. In addition, the effect of substituting part of hay by banana wastes on performance of Ossimi and Saidi lambs while using rumen activity and some blood parameters for the evaluation purpose.

MATERIALS AND METHODS

This study was carried out at Sids Research Station, Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, and laboratory of the Department of Animal production, Faculty of Agriculture, Minia University.

In-vitro Digestibility Technique

An *in-vitro* dry matter digestibility (IVDMD) was conducted on different replacement levels of berseem hay with sun drying banana wastes (25, 50 and 75% levels). The wastes was either kept untreated (BW); treated with urea (BW-3% urea), or treated with NaOH (BW-3% NaOH). Tilley and Terry (1963) method was adopted to determine *In-vitro* Dry Matter Disappearance (IVDMD).

Digestibility trials

These trials were carried out after completion of chemical analysis and *in vitro* studies.

Roughage materials and their preparation:

According to the preliminary evaluation done *in vitro* on different replacements of banana wastes with berseem hay, the best result obtained were transferred to be evaluated by metabolic trials which done using BW, BW-3% urea or BW-3% NaOH to compose 50% of the roughage while berseem hay completed the remained 50%. After sun drying of shopped banana wastes, urea or sodium Hydroxide were sprayed to banana wastes piles at 3% levels. Treated piles were kept closed for 3 weeks, then opened and used for feeding.

Animals and their management

Twenty-seven adult Ossimi rams were individually placed into metal metabolic cages to evaluate the digestion coefficients of ingredient feedstuffs and formulated rations (Five trials for

ingredient feedstuffs and four trials for formulated rations), 3 rams in each trial. The trial started by two-weeks adaptation followed by 7 days collection where animals offered 90% of their intake. The daily allowance for each animal was given through two equal portions at 8 am and 4 pm. Samples of feces and urine were taken during the collection period and kept frozen (-20C°) until proximate analysis.

Proximate analysis

Feed samples and feces were analyzed for moisture, dry matter (DM), crude protein (CP), crude fiber (CF), either extract (EE) and ash according to the methods of the Association Official Agricultural Chemists (A.O.A.C.,1980). Organic matter (OM) and nitrogen free extract (NFE) were calculate by difference.

Growth trial

Performance of lambs was studied for 137 days from weaning to marketing. Growth trial was implemented to compare the growth performance of Ossimi and Saidi lambs under the experimental rations. Feed consumption, feed conversion, rumen liquor characteristics and some blood parameters were measured. Weaned lambs were divided randomly into four groups according to their body weight and breed; where each group included two subgroups each of 6 lambs, 3 males+ 3 females of Ossimi and 3 males +3 females of Saidi.

Rumen liquor and blood samples

At the end of the feeding trial, samples were taken from the males of each group using the stomach tube before feeding, then at 3 and 6 hour after feeding. Rumen liquor samples were filtrated through four layers of cheesecloth. The filtrated portion was used for measurement of pH, ammonia concentrations using the method of Conway (1962) and (VFA's) concentration and fractionation using HPLC system. Few drops of saturated solution of mercury chloride were added to the filtrate portion to stop microbial activity, before they were frozen and kept for analysis (Tabana 1994).

Also, at the end of feeding trial, blood samples were taken in the morning before feeding and 3 hours after feeding by puncturing the jugular vein and allowing blood to flow into heparinated tubes. Blood samples were immediately centrifuged at (3000 r p.m.), for 20 min. Plasma samples were stored at (-20C°) for analysis. Methodologies applied were; White *et al.* (1970) for Plasma urea-N, GOT and GPT, Stern and Lewis (1957) for plasma total calcium, Henry (1964) for plasma total protein, Jacobs and Henry (1962) for total lipids and Flain (1934) for plasma createnine.

Statistical analyses

Data were examined by statistical analyses (SAS.1990) using general linear model (GLM). The source of significant difference among variables was tested by Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Chemical composition and in vitro dry matter digestibility

Chemical composition of concentrate feed mixture (CFM), berseem hay, banana wastes (BW, BW-3% urea and BW-3% NaOH) on dry matter basis are presented in Table (1). Concerning *in vitro* dry matter disappearance (IVDMD), data in Table (1) revealed that concentrate feed mixture (CFM) and berseem hay had the highest IVDMD percentage (87.10 and 82.83%, respectively). Banana wastes had close digestibility values but could be arranged descending as BW-3% NaOH, BW-3% urea then BW where being

Table (1): Chemical composition and *In-vitro* dry matter digestibility (IVDMD) of some feedstuffs (%, DM basis).

Items	DM	OM	CP	EE	CF	NFE	Ash	IVDMD
Concentrate feed mixture*	90.50	89.10	16.40	3.20	13.66	46.34	10.90	87.10
Berseem hay	89.70	85.80	13.33	3.30	23.63	35.24	14.20	82.83
Banana wastes	90.60	88.60	8 .67	2 40	29.67	38.46	11.40	70.10
Banana wastes (3% urea)	92.80	81.70	11.80	2.20	26.23	34.27	18.30	72.10
Banana wastes (3% NaOH)	91.30	79.70	9 .97	2 30	25.03	33.70	20.30	74.60

* CFM = concentrate feed mixture consists of :- 44% wheat bran, 23% yellow maize ,22% decorticated cotton seed cake , 7% molasses, , 2.5% ground limestone., 1.5% common salt.

Table (2) : Chemical composition and IVDMD of banana wastes mixtures with berseem hay.

Feedstuffs	level	DM%	DM composition %						IVDMD
			OM	CP	EE	CF	NFE	Ash	%
Berseem hay	100%	89.70	85.80	13.33	3.30	23.03	35.24	14.20	82.83
Banana	25%	90.00	84.80	12.80	4.30	26.10	31.20	15.60	7930
wastes (BW)	50%	89.53	83.90	11.90	3.80	2700	30.73	16.10	73.77
	75%	89.23	82.33	10.30	5.20	28.50	27.57	17.67	71.07
BW3%urea	50%	90.40	83.10	12.90	3.20	25.17	32.33	16.90	75.90
BW3%NaOH	50%	90.20	82.80	12.40	3.00	24.70	33.00	17.20	79.90

Table (3) : Chemical composition and *In-vitro* dry matter digestibility (IVDMD) of formulated ration (%).

Items	DM	OM	CP	EE	CF	NFE	Ash	IVDMD
II T1	89.87	89.23	15.20	3. 84	16.33	43.70	10.77	84.97
T2	90.73	89.13	14.83	2 .86	17.03	45.14	10.87	81.50
T3	91.73	87.87	14.07	2 .80	15.73	47.00	12.13	83.50
T4	89.37	89.67	13.37	2.57	18.60	44.50	10.33	80.43

T1= Control ration (50% CFM + 50% Berseem hay) . T2 = 50% CFM + (25%hay + 25% BW-3%urea) .
T3 = 50%CFM + (25%hay + 25% BW-3%NaOH) .T4 = 50% CFM + (25%hay + 25% BW untreated) .

74.60, 72.10. and 70.10 %, respectively.

Chemical composition and IVDMD of the banana wastes mixtures with berseem hay

Data of chemical composition and IVDMD of the banana wastes mixtures with berseem hay are shown in Table (2). There is a significant difference in feeding value between mixing levels of 25% and 75%. but there are no significant differences between 25 and 50% or 50% and 75% levels. Thus, using of 50% level for mixing roughages is economically better than 25%. It could be noticed that BW-3% NaOH had the highest rate of IVDMD (79.90%) followed BW-3% urea (75.90) and BW (73.77), when mixed at rate of 50% with berseem hay.. EL-Said (1994) reported that formulating the experimental ration using hay, CFM and three percentage (25, 50 and 75%) of banana and some crop by- products are varied in nutrients contents of these rations.

Chemical compositions and IVDMD of formulated rations during digestibility trial

Data of chemical compositions and IVDMD of the different formulated rations during the digestibility trial are presented in Table (3). In these experiment, percentage of 50% CFM and 50% hay served as control ration and the other rations were contained 50% CFM, 25% hay and 25% from different banana wastes as replacement of hay.

Results indicated that control ration recorded the highest values of CP content (15.2%), FE Content (3.84%) and IVDMD Rate (84.97%), while it revealed intermediate values in their content of OM, CF and ash compared to the other rations, it was found that CP content in different formulated rations were arranged descending as follow (T2, T3 and T4). Concerning IVDMD, the whole rations showed less digestion coefficients than the control ration and were arranged descending as follows T3, T2 and T4. Generally, values of chemical composition of the experimental formulated rations are in agreement with those reported by Awad (1978), Abd EL-Azeem (1992) for some crop by- products and EL-Said (1994); EL-Kady (1997); EL-Shewy (1998) and Abd EL-Ghani (1999) for banana wastes, but there are some deviations in the present study compared with other results, these deviations may be due to a lot of factors governing processing of the original crop, which affect consequently on composition of these by- products.

4.1.4 Digestion coefficients of the feedstuffs used in formulation the experimental ration

Data of digestion coefficients of the feedstuffs used in formulation experimental rations are presented in Table (4). The digestion coefficient and feeding values of berseem hay used in formulating experimental ration were obtained directly by sheep, while digestabilities of CFM were obtained indirectly using 50% berseem hay and 50% of the CFM (T1 as control). The digestion coefficients and feeding values of untreated BW, BW-3% urea and BW-3%NaOH as roughage feedstuffs were obtained indirectly using 50% CFM, 25% berssem hay and 25% of those bananas wastes.

Results in Table (4) indicated that the digestion coefficients for all components in berseem were higher except those for CP and NFE, which recorded nearly the same than those, reported by EL-Said (1994). It could be noticed that nutritive values (NV) of treated BW either by 3% urea or by 3% NaOH showed mostly better NV than untreated BW. Treating banana wastes with NaOH also had positive impact in

DCP content (6.66) compared to untreated ones (4.95).

Concerning the digestibility coefficients, treating banana wastes by NaOH seemed to evoke better digestion for ingredients than treating with urea. Results in Table (4) showed that the feeding value of banana wastes were lower, except DCP and its digestion coefficients were lower except DM and OM than reported by El-Said (1994). The differences in the ratio of banana plants components may by responsible for these differences.

Digestion coefficients and feeding values of formulate rations

Digestion coefficients and feeding values of the rations containing banana wastes (BW 3% urea, BW3% NaOH and BW) are presented in Table (5). Results showed a significance difference for TDN estimates due to replacement of 50% of berseem content of the control ration with different roughages consideration. EL-Said (1994) reported that using 25% of banana wastes as replacement to half of berseem hay non-significantly affected the feeding value as TDN or digestion coefficients. However the DCP was reduced Significantly. This might be due to higher CP content of berseem hay than banana wastes.

Concerning TDN values, a great reduction in its values accompanied the exchange of 50% of hay with other roughages. Treating Banana with either urea or NaOH improved significantly the TDN values. The control ration significantly had the highest DCP (10.38%) followed by treated banana with urea (9.40%) then with NaOH (9.08%) untreated banana.

Digestibility coefficients of different nutritive contents had been the highest for the control ration with commonly clear differences than other formula. Treatment of banana caused noticeable improvement in digestibility's values of most ingredients compared to untreated roughages included in the rations. Crude fiber showed wider differences in digestibility values among feedstuffs tested (42.67 to55.80%), indicating that such plants differ in their fiber structure, i.e., their contents of lignin, hemicelluloses and cellulose.

Generally, the difference of digestibility coefficients and consequently their feeding values might be due to differences in chemical composition of the material used and / or differences in the associative effect between the rations used.

Growing trials and economical efficiency

Results presented in Table (6) showed that average daily gain (ADG) for Ossimi lambs was higher ($P<0.01$) than Saidi lambs (128.04g /head/ day vs. 105.23g / head / day, respectively). Breed had no effect on feed conversion. These results are agree with Hassan and EL- Feel (1988).

Treatment had a highly significant effect on total gain and consequently on average daily gain. Treatments 1 and 2 had a higher growth rate than T3 and T4. Also, treatment had a highly significant effect on feed intake where T3 and T1 had a higher feed intake as TDN than other treatments. Shoukry *et al.*, (1999) reported that feed intake and utilization of banana waste hay could be improved by 3% urea treatment with a superior result from ensiling. Feed conversion, as TDN was better for T2 and T1 than other treatments which, reflected on economic efficiency. Feed cost in total periods (137day) presented in Table (6) showed insignificant differences for Input/L.E and economic efficiency between Ossimi and Saidi lambs, the values were 107.49 VS 88.98 and 1.47 VS 1.46 respectively. While output was highly significant ($P<0.01$) between

Table (4): Digestion coefficients and feeding value (%) of the ingredient feedstuffs used in formulating the experimental rations .

Items	DM	OM	CP	EE	CF	NFE	Nutritive value	
							TDN	DCP
Concen-trate feed mixture	68.40a	77.40a	70.20a	85.53a	45.23b	89.17a	56.40a	11.51a
Berseem Hay	60.17b	57.80d	61.33c	50.30c	41.40cd	65.70b	49.70b	8.17b
Banana wastes	50.13c	52.07e	57.13d	45.57e	40.56d	58.07d	45.70d	4.95e
Banana wastes (3%urea)	57.07b	62.56c	65.83b	51.86cd	43.80bc	61.20c	46.17c	7.77c
Banana wastes (3%NaOH)	66.43a	67.16b	66.80b	58.83b	54.13a	64.37b	48.00b	6.66d
±S.E	1.25	1.09	0.91	0.92	0.60	0.63	0.18	0.06
Sig.	**	**	**	**	**	**	**	**

A, b. c .. within each columns means having different letters are significantly different (P< 0.05)

Table (5) : Digestion coefficient and feeding value (%) of formulated rations.

Items	DM	OM	CP	EE	CF	NFE	Nutritive value	
							TDN	DCP
T1	70.73a	75.80a	68.27a	80.03b	48.57b	83.83bc	65.00a	10.38a
T2	67.03ab	71.90ab	63.40bc	64.17c	43.67c	89.40a	58.70c	9.40b
T3	70.00a	73.80a	68.27a	89.20a	55.80a	89.23a	59.20b	9.08bc
T4	60.37c	65.13c	59.23c	66.60c	42.67c	82.90bc	55.60d	8.42c
± S.E	1.57	1.57	1.40	1.95	1.59	1.40	0.16	0.28
Sig.	**	**	**	**	**	**	**	**

a.b,c ..Means in the same columns with different superscripts are significantly (P <0.01).
T1= Control ration (50% CFM + 50% Berseem hay). T2 = 50% CFM + (25%hay + 25% BW-3%urea). T3 = 50%CFM + (25%hay + 25% BW-3%NaOH). T4 = 50% CFM + (25%hay + 25% BW untreated) .

Table (6) Least square means (±S.E) of factors affecting the performance of growing lambs during feeding trials.

Items	No of obs.	Body weight				Feed consumption (kg)		Feed conversion		Feed cost LE		
		In.W (kg)	Final W (kg)	Total gain (kg)	ADG (g)	DM	TDN	DM	TDN	Input	Output	E.E
Overall men		16.88	32.86	15.98	116.6	176.7	105.18	11.06	6.59	98.24	143.81	1.47
Breed (B)	48	**	**	**	**	**	**	Ns	NS	NS	**	NS
Ossimi	24	19.96	37.50	17.54	128.04	193.29	115.11	11.02	6.56	107.49	157.86	1.47
Saidi	24	13.79	28.21	14.42	105.23	160.00	95.25	11.10	6.61	88.98	129.75	1.46
S.E		0.58	0.82	0.44	3.22	0.81	0.51	0.30	0.19	29.48	3.97	0.05
Treatment (T)	48	NS	*	**	**	**	**	**	**	NS	**	*
T1	12	17.67	35.42a	17.75a	129.56a	166.68d	108.18a	9.85c	6.08b	101.70	159.75a	1.57a
T2	12	16.67	33.00ab	16.33ab	119.22ab	173.78c	102.20b	10.77bc	6.33b	97.28	146.97ab	1.51ab
T3	12	17.08	23.75ab	15.67bc	114.36bc	181.15b	107.26a	11.67b	6.68ab	97.83	141.03bc	1.44bc
T4	12	16.08	30.25b	14.17c	103.41c	184.98a	103.08b	13.22a	7.35a	97.52	127.53c	1.31c
S.E		0.82	1.17	0.62	4.54	1.15	0.72	0.44	0.27	41.61	5.61	0.77
Sex (S)	48	NS	**	**	**	**	**	NS	NS	NS	**	**
Male	24	17.46	35.12	17.66	128.95	193.30	115.11	10.95	6.52	107.50	159.00	1.48
Female	24	16.29	30.58	14.29	104.32	160.00	95.25	11.20	6.67	88.98	128.63	1.45
S.E		0.58	0.82	0.46	3.21	0.81	0.51	.0.31	0.19	29.29	3.97	0.05
B*T		NS	Ns	NS	NS	NS	NS	NS	NS	NS	NS	NS

a,b,c,d.. Means in the same columns with different letters are significantly (p ≤ 0.01 or 0.05).

Output =TG(KG) X 9.0L.E

Input = DM KG (T1) * 0.61, (T2) * 0.56 ,(T3) *0.54 ,(T4) *0.53

Table (7) : Effect of sampling time and type of ration on ruminal pH, ammonia and Total Volatile Fatty Acids.

Items	Time	Treatment				Among treatments	
		T1	T2	T3	T4	±S.E.	Sig.
pH	0	5.6	5.8	5.9	5.7	0.27	NS
	3	5.1	5.4	5.8	5.4	0.26	NS
	6	5.4	5.4	5.9	5.5	0.15	NS
	±S.E	0.29	0.22	0.24	0.18	-----	-----
±S.E and sig among time	Sig.	NS	NS	NS	NS	-----	-----
NH3-N	0	24.5A b	24.7A c	23.6B b	13.4B c	0.18	**
Mg/100ml	3	27.0B a	29.2A a	18.3C a	18.4C a	0.33	**
	6	22.4B c	26.8A b	16.0C b	15.3C b	0.31	**
	±S.E	0.48	0.22	0.10	0.13	-----	-----
±S.E and sig among time	Sig.	**	**	**	**	-----	-----
Total volatile	0	5.7A b	b6.2A	5.3A b	4.0B c	0.40	**
fatty acids	3	8.9 a	9.1	8.7 a	7.3 a	0.66	NS
Meq/100ml	6	6.5 b	b7.1	b6.8a	5.8 a	0.50	NS
	±S.E	0.55	0.40	0.69	0.42	-----	-----
±S.E and sig among time	Sig.	**	**	*	**	-----	-----

A, B.C.. Means in the same columns and (a, b, c) rows with different superscripts are significantly ($p < 0.01$ or 0.05) .

T1= Control ration (50% CFM + 50% Berseem hay).

T2 = 50% CFM + (25%hay + 25% BW-3%urea) .

T3 = 50%CFM + (25%hay+25% BW-3%NaOH) .

T4 = 50% CFM + (25%hay + 25% BW untreated) .

Ossimi, 157.86 L.E and Saidi lambs 129.75 L.E in total period (137 day) /head.

Rumen liquor characteristics

Data of ruminal pH values, NH_3- N and total TVFA'S concentrations are presented in Table (7). Results indicated that neither time nor treatments had a significant effect on ruminal pH. These results are in harmony with those reported by Rakha (1988), who summarized the work of several workers and reported that the normal value of ruminal pH of sheep ranged between 4.96 and 7.92. Also, EL-Said (1994) stated that ruminal pH ranged between 5.37 and 6.66. In this connection Koufman (1972) reported that the regulation mechanism of the ruminant are not directed towards maintaining a medium or normal pH, but rather for adjusting the pH according to the composition of the ration to that value most appropriate for the degradation of specific type of feed. Church (1973) reported that there were considerable variations between sheep concerning the period after feeding, the nature of the diet and consumption of water.

Ammonia- N is one of the most important end product of protein breakdown in the rumen and greatest part of ammonia is utilized by ruminal microorganisms into microbial protein and the rest is converted to urea in the liver (Lewis *et al*, 1957). The effects of sampling time (0, 3 and 6 hrs post-feeding) and treatment on ruminal ammonia-N are presented in Table (7). It could be noticed that both of sampling time and treatments has a highly significant ($P<0.01$) effect on concentration of ruminal ammonia-N. The mean values of NH_3-N concentration with some few exceptions were lower before feeding and increase after feeding to reach the beak 3hrs post feeding then decreased at 6hrs after feeding. The high concentration of NH3-N determined at 3hrs post feeding might be due to the effect of fermentation process on degradation of CP to NH3-N derived from the treated banana wastes and /or the use of urea which degraded to NH3- N after feeding. These results are in harmony with those reported by several workers (Abd- EL-Kareem,1990; EL- Said ,1994; Abd- EL-Aziz *et al*, 1995; Khamis ,1989 and Abd El-Ghani, 1999), They reported that NH3-N concentration in the rumen liquor was minimum value before feeding and increased to maximum level at 3 hrs post feeding, then decreased at 6 hrs after feeding.

Concerning the effect of treatment on ruminal NH3-N, It could be noticed that T1 and T2 had a highest value of NH3-N, while T4 showed the lowest value. Adding urea for ration in T2 may be the reason of increased the ruminal NH3-N concentration than that of unureated rations (T1, T3 and T4), where the addition of urea to ration (T2) causing a rapidly converted to ammonia in the rumen. Similar results have been reported by Add EL- Rahman, (1996) and EL- Kady, (1997). Moreover, Deraz (1996) and Khamis (1989) reported that the ruminal NH_3-N concentration for lambs fed ureated corn stover was higher than those fed untreated Corn Stover.

The effect of sampling time and type of ration on ruminal TVFA'S concentration (meq/100ml) of sheep fed the tested and control rations are shown in Table (7). It could be seen that treatments had a non-significant effect on ruminal TVFA values except before feeding at zero time. Ruminal TVFA's concentrations are affected significantly ($P<0.05$ & $P<0.01$) by sampling time. The levels of ruminal TVFA'S concentrations reached its maximum at 3 hours post feeding and

Table (8) : Effect of sampling time and type of ration on ruminal volatile fatty acids fractions in rumen liquor.

Items	Time	Treatment				Among treatments	
		(T1)	(T2)	(T3)	(T4)	± S.E	Sig
	0	44.40	46.32	45.45	45.40	0.64	NS
Acetic acid	3	45.49AB	47.50A	44.90AB	44.68B	0.88	NS
	6	46.10	45.96	44.83	44.51	0.90	NS
± S.E	----	0.64	0.63	0.87	1.04	----	----
sig. among time	----	NS	NS	NS	NS		
	0	32.83Ab	32.12B b	35.07A	35.23A	0.88	*
Propionic	3	37.11 a	35.40 a	33.52	35.81	0.89	NS
acid	B	35.53 ab	34.38 a	33.95	35.22	1.03	NS
±S.E	----	0.99	0.73	1.09	0.91	----	----
Sig. among time	----	*	*	NS	NS		
Iso Butyric	0	1.21	129	1.37	0.96	0.30	NS
Acid	3	0.52	0.98	1.07	1.39	0.31	NS
	6	1.05	0.91	067	0.83	0.15	NS
± S.E	-----	0.28	S0.15	0.26	0.33	----	----
Sig. among time	-----	NS	NS	NS	NS		
	0	16.40 a	13.94 a	12.64	14.17	1.12	NS
Butyric acid	3	11.96 b	10.38 b	15.61	15.41	1.81	NS
	6	11.17 b	14.13 a	16.74	14.82	1.48	NS
±S.E	-----	1.20	0.91	1.86	1.80	----	----
Sig. among time	-----	*	*	NS	NS		
	0	2.31	2.76	2.08	1.55	0.34	NS
Iso Valyric	3	1.97	2.62	1.82	2.17	0.31	NS
acid	6	2.68	2.18	1.63	1.80	0.46	NS
±S.E	-----	0.48	0.30	0.33	0.35	----	----
Sig. among time	-----	NS	NS	NS	NS		
	0	2.93	3.56	3.38	2.70	0.47	NS
valeric acid	3	3.10	3.12	3.07	2.33	0.54	NS
	6	3.33	2.30	2.19	2.77	0.55	NS
±S.E	-----	0.57	0.45	0.56	0.50	----	----
Sig. among time	-----	NS	NS	NS	NS		

A. B.C.. Means in the same columns and (a. b, c) rows with different superscripts are significantly ($P < 0.01$ or 0.05) .

Time 0 = before feeding. Time 3 and 6 = after feeding.

decreased afterwards. The highest levels of TVFA's with T2 (urea 3%) followed by T1, T3, however T4 showed the lowest levels at (0, 3 and 6 hours). Similar results was observed by Deraz (1996) and Khamis (1989). They recorded that the total VFA's concentration in rumen liquor of lambs fed ureated Corn Stover was higher than that fed unureated Corn Stover.

Concerning the effect of sampling time on total VFA's concentrations recorded in Table (7), The mean values of TVFA were low before feeding and increased after feeding to reach the peak at 3 hrs post feeding then tended to decreased at 6 hrs after feeding. These results are in agreement with the finding of Tabana (1994) and Khamis (1989) that feeding ureated Corn Stover silage resulted decrease the total VFA,S concentration before feeding and increased to reach the peak 2 to 4 hrs after feeding.

No significant difference was detected between two breed of sheep Ossimi and Saidi in ruminal pH, NH3-N and TVFA's. Since the two breeds, Ossimi and Saidi fed control ration T1, T2, T3 and T4.

Data presented in Table (8) showed the effect of treatments and sampling time on molar proportion of acetic, propionic, Isobutyric, butyric, Isovaleric and valeric acids percentage in the rumen liquor of lambs fed T1, T2, T3 and T4.

Individual TVFA'S were not affected significantly among treatments and among time except T1 and T2, where sampling time affected significantly ($P<0.05$) on propionic acid and butyric acid. The values of propionic acid for T1 and T2 were increased at 3 hrs then decreased at 6 hrs, in contrast with butyric acid which decreased at 3 hrs then increased at 6 hrs.

Blood parameters

Data presented in Table (9) showed the effect of breed, treatment and sampling time on total protein, albumin, GOT, GPT, urea, Total lipids, calcium and creatinine in blood plasma. Non significant difference was detected between the two breeds of sheep in most of blood plasma parameters since the two breeds fed similar rations during the growth trial.. Interaction between breed and treatment were insignificant except (GPT) was significant at ($P<0.05$).

The effects of treatment on blood parameters are shown in Table (9). Results indicated that the average value of total protein in blood for lambs fed T2 with 3% urea was higher significantly ($P<0.05$) than those fed T3 and T4. These results agreed with those found by Mohamed (1998) and Khamis (1989), they reported that protein content was slightly higher in blood plasma for sheep fed diet with urea compared with those fed diets without urea. Values of albumin, total lipids and creatinine were not significant between all treatments. Urea concentration tended to be significantly higher ($P>0.01$) in lambs blood fed diet with urea compared with those fed diets without urea. Mohamed (1988) and Khamis (1989) reported that the plasma urea was higher with lambs fed ammoniated or ureated diets than those fed untreated diets. The values in the Table (9) for plasma urea were within the normal range reported by Kaneko (1980) from several studies on sheep under normal condition being 17.15-42.86 mg /100ml.

The values of GOT in blood lambs fed diets with urea were significantly higher ($P<0.05$& $P<0.01$)) for lambs fed urea than those fed the same diets but without urea, These results were agreed with finding of Khamis (1989). Non significant difference was detected

Table (9) : Least square means (±S.E) of Factors effecting Some blood parameters in sheep.

Items	No of obs.	Total Protein	Albumen	Urea	Creati-nine	Total lipids	Ca	GOT	GPT
Overall mean		7.58	5.05	32.24	5.59	358.57	5.69	28.30	4.40
Breed (B)	48	NS	NS	NS	NS	NS	NS	NS	NS
Ossimi	24	7.50	5.34	36.21	5.54	362.50	5.94	32.04	4.42
Saidi	24	7.65	4.75	38.27	5.83	354.63	5.44	24.55	4.42
±S.E		0.18	0.30	1.69	0.20	24.43	0.23	2.74	0.14
Treatment (T)		*	NS	**	NS	NS	**	**	*
T1	12	7.76a	4.47	34.74a	5.92	363.33	6.04ab	30.92b	5.00a
T2	12	8.02a	4.71	40.91a	5.91	402.28	5.46bc	42.33a	4.42b
T3	12	7.54ab	5.50	25.62b	5.34	365.43	6.45a	22.33bc	4.08b
T4	12	6.98b	5.50	27.69b	5.60	303.13	4.80c	17.61c	4.17b
±S.E		0.25	0.42	2.39	0.19	34.54	0.23	3.87	0.20
Time (TI)		NS	NS	NS	NS	NS	NS	NS	NS
Ti1	24	7.50	5.04	30.41	5.79	349.12	6.06	30.13	4.50
Ti2	24	7.65	5.05	34.07	5.58	368.02	5.82	26.46	4.33
±S.E		0.18	0.30	1.69	0.20	24.42	0.23	2.74	0.14

,a, b,c.. Means in the same columns with different letters are significantly (P< 0.01 or 0.05).
Ti1= before feeding . Ti2 = 3 hrs after feeding.
T1= Control ration (50% CFM + 50%Berseem hay) .
T2= 50% CFM + (25%hay + 25% BW-3%urea) .
T3=50%CFM+(25%hay+25% BW-3%NaOH).
T4=50%CFM+(25%hay+25% BW untreated)

between the two breeds in most of blood plasma parameters.

CONCLUSION

The present study suggested the possibility of using banana wastes in rations for ruminants in place of using breseem hay up to 50%. Utilization of banana wastes could be improved by 3% urea treatment.

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كفاءة الحملان المغذاة على علائق تحوى مخلفات الموز

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أجريت بعض تجارب النمو والهضم وبعض تجارب الـــin-vitro التقييم واستخدام مخلفات الموز فى تغذية الأغنام وتاثيراتها على نشاط الكرش وكفاءة النمو للأغنام الاوسيمى والصعيدى .

طبقا للتجارب الأولية التى أجريت بواسطة الـــIn-vitro على مستويات مختلفة من مخلفات الموز مع دريس البرسيم فان أفضل النتائج التى تم الحصول عليها ثم تقييمها أيضا بواسطة تجارب الهضم مستخدما أغنام الأوسيمى . كما أجريت تجارب النمو على ثمان وأربعون من الحملان الاوسيمى والصعيدى . حيث قسمت الأغنام إلى أربعة مجاميع طبقا لوزن الجسم والنوع . وغذيت مجموعة الكنترول على الغذاء المركز ودريس البرسيم بينما كانت مخلفات الموز المعاملة باليوريا ٣% أو المعاملة بهيدروكسيد الصوديوم ٣% أو الغير معاملة تحل محل ٥٠% من دريس البرسيم فى المعاملات الثانية والثالثة والرابعة على الترتيب .

وقد أوضحت نتائج الـــIn-vitro أن مخلفات الموز المعاملة بهيدروكسيد الصوديوم والأخرى التى عوملت باليوريا وكذلك مخلفات الموز الغير معاملة ان قيم IVDMD ٧٤,٦٠،٧٢,١٠،٧٠,١٠ على الترتيب . كما أوضحت نتائج التحليل الكيمائى أن الغذاء المركز ودريس البرسيم حقق أعلى القيم لنسبة البروتين الخام (١٦,٤،١٣,٣٣) على التوالى ثم يليها مخلفات الموز المعاملة باليوريا ٣% (١١,٨%) ثم مخلفات الموز المعاملة بهيدروكسيد الصوديوم ٣% (٩,٩٧%) ثم يليها مخلفات الموز الغير معاملة حيث بلغت نسبة البروتين الخام بها ٨,٦٧% .

أوضحت نتائج تجارب الهضم أن هناك فروق معنوية لقيم TDN لمعاملة الكنترول مقارنة بمعاملة الأخرى . وفى تجارب النمو أوضحت النتائج أن هناك فرق معنوى فى الزيادة اليومية الوزنية حيث حققت المعاملة الأولى (الكنترول) والثانية أعلى زيادة يومية وزنية عن المعاملات الثالثة والرابعة . بالإضافة إلى أن المعاملة كان لها تأثير معنوى على المأكول من الغذاء حيث حققت معاملة الكنترول والمعاملة الثالثة أعلى كمية مأكول كـــTDN عن باقى المعاملات .

لوحظ أن معاملة الكنترول والمعاملة الثانية كانت أعلى القيم للأمونيا الكرش بينما كانت المعاملة الرابعة أقل القيم . كانت قيم البروتين الكلى فى الدم للحملان التى غذيت على المعاملة الثانية (٣% يوريا) أعلى معنويا عن المعاملات الثالثة والرابعة . كما لم يلاحظ أى فروق معنوية فى صفات بلازما الدم بين المعاملات .

أوضحت الدراسة أنه يمكن استخدام مخلفات الموز فى علائق المجترات لتحل محل دريس البرسيم حتى ٥٠% ويمكن تحسين القيمة الغذائية لمخلفات الموز باستخدام المعاملة باليوريا (٣%) .