The Use of Treated Poor Quality Roughages in Growing Animals Rations.

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Two experiments were conducted to study the effect of using treated poor quality roughages in rations for growing calves and lambs.

In the first experiment, twenty growing male buffalo calves with average 180 kg body weight were divided into three groups of animals (A, B and C). Group A fed the control ration (untreated rice straw, wheat bran and co-op concentrate) In ration B rice straw was supplemented with 0.3 liter liquid feed (LF) to replace 33% of dietary co-op concentrates. Rice straw in ration C was treated with 3% anhydrous ammonia to replace 16.5% of the dietary co-op concentrates.

In the second experiment, 21 Rahmany lambs (Av. body weight 19 kg) were divided into 3 groups. Ration A (control) consisted of co-op concentrates, wheat bran and clover hay. In ration B clover hay was replaced with ammoniated corn stover, while in ration C it was replaced with corn stover supplemented with LF.

Results showed that calves fed diets A and B grew at higher rate (674 and 663 vs. 543 g/d) and were more efficient in converting their feed into gain in comparison to those fed ammoniated rice straw.

Lambs fed either clover hay or supplemented corn stover showed 13.4% and 16.0% improvement in the total gain than those fed the ammoniated-corn stover. While no significant differences in daily gain or feed efficiency of lambs fed clover hay or supplemented corn stover were noticed.

A large number of chemical are known to react with lignocellulose materials and might therefore be considered potential upgrading agents for poor quality roughages (Sundstøl and Owen, 1984). In order to rationalize what might otherweise be a long catalogue, it is useful to recollect characteristics of the "ideal" chemical from the standpoint of upgrading roughages for animal feeding. Clearly it must be (1) effective in improving digestibility and intake, (2) the cost of treatment in ration to improve nutritive value must be economic, (3) the high costs of energy and its future shortage calls for a chemical that is energy-sparing in its production and application (4) chemical residue in treated roughages should be nontoxic to animals and the feces and urine voided should be non-polluting to soil and water courses.

In addition to improving roughage digestibility and intake the ideal chemical should it self be a nutrient required by the animals (or has a fertilizer value).

Owing to the shortage of animal feedstuffs in Egypt, a great deal of research is directed to utilize non-traditional agricultural by-products by several treatments including mechanical, chemical and biological means (Abou-Raya et al., 1975; Borhami and Johnsen, 1981; Naga and El-Shazly, 1983; El-Serafy et al., 1983 and Hathout et al. 1983). Side supplementation with NPN materials, molasses, minerals and vitamins are tried to raise the nutritive value of low quality roughages (Abdel-Rahman and Ahmed, 1984 and 1986).

The present work was conducted to study the effect of feeding ammonia-treated and supplemented corn stover and rice straw on the performance of growing calves and fattening lambs.

Materials and Methods

The following two experiments were carried out in order

to determine the efficiency of treated and supplemented rice straw and corn stover utilization in feeding of:

1. Growing calves,
2. Fattening lambs.

The chemical composition of rations ingredients for the two experments is presented in Table 1.

Table 1: The proximate analysis of feedstuffs used in the present study

Ingrediet	Chemical composition						Feeding value*		
	DM	CP	EE	CF	NFE	Ash	DP	SE	TDN
	----------				%		----------		
Co-op[1]	90.6	16.2	4.2	11.2	51.7	7.3	12.1	51.8	60.7
Wheat Br.[2]	90.4	11.8	2.7	10.8	59.6	5.5	5.7	46.5	61.0
Clover h.[3]	89.1	12.8	1.7	18.6	47.8	8.2	8.3	31.6	44.0
Rice st.[4]	93.1	1.9	0.5	39.7	32.8	18.2	--	24.9	47.7
NH_3-RS[5]	93.4	7.8	0.5	36.0	33.9	15.2	4.0	26.0	49.5
Ground c.[6]	91.4	8.6	3.9	2.4	74.6	1.9	5.9	81.8	82.6
NH_3-CS[7]	86.2	10.2	1.3	34.9	31.9	7.9	7.5	34.3	58.4
Suppl-CS[8]	85.7	8.4	1.1	28.8	39.1	8.3	6.5	32.7	52.?

*The digestibility trials for the nutritional evaluation of the untrated and treated materials were described in a previous work (Abdel-Rahman and Ahmed, 1986).

Ingredients; 1, co-op concentrates; 2, wheat bran; 3, clover hay; 4, rice straw (untreated); 5, ammonia-treated rice straw; 6, ground corn; 7, ammonia-treated corn stover and 8, liquid feed-supplemented-corn stover.

I. Feeding growing calves:

Twenty growing male buffalo calves with average 180 kg body weight were divided into 3 groups (7, 7 and 6 animals in groups A, B and C, respectively). They were fed

according to NRC (1976). Ration A served as control, and consisted mainly of untreated rice straw, wheat bran and co-op concentrates. In ration B rice straw was supplemented with 0.3 liter LF to replace 33% of dietary co-op concentrates. Rice straw in ration C was treated with 3% anhydrous ammoia to replace 16.5% of the dietary co-op concentrates. All the rations were iso-nitrogenous and iso-caloric (Table 2). Liquid feed contained (g/l), urea, 200; molasses, 400; mineral mixture, 129; vitamin A, D_3 and E were added at 132000, 13200 and 53 IU/l, respectively. LF is completely prepared in our laboratory and mixed with rice straw just before feeding. Calves were individually fed twice/day. Drinking water was always available. The feeding trial lasted for 175 days during which live weight and feed intake were recorded at weekly intervals.

II. Feeding fattening lambs:

This work was carried out at the Experimental farm of the Faculty of Agriculture, Monoufia University.

In this experiment, 21 Rahmany lambs (average body weight of 19 kg) were divided into three groups, 7 animals each. The experimental rations were formulated to supply the requirement allowances according to ARC (1980). Ration A served as control and consisted of co-op concentrates, wheat bran and clover hay. In diet B clover hay was replaced with corn stover treated with 3% anhydrous ammonia while in ration C it was replaced with corn stover-supplemented with LF. Description of the stack method of ammonia treated corn stover can be seen in the previous study of the same authors (Abdel-Rahman and Ahmed, 1986). The three rations are shown in Table (3). The feeding trial lasted for 145 days.

Data were statistically analyzed according to Snedecor (1961).

Table 2: Composition of the experimental rations containing supplemented and ammoniated rice straw in place of a portion of dietary co-op concentrates for growing buffalo calves.

Item	Rations		
	Control	Suppl. RS	Ammon. RS
	g/kg DM		
Rice straw	333	333	333
Wheat bran	167	167	167
Co-op feed	500	333	416
Ground corn	-	108	84
Liquid feed	-	59	-
Nutritive value:			
SE, %	46.1	47.7	48.0
CP, %	11.6	12.2	11.9
Feed intake:			
Rice straw (kg/d)	2.0	2.0	2.0
Wheat bran (kg/d)	1.0	1.0	1.0
Co-op feed (kg/d)	3.0	2.0	2.5
Ground corn (kg/d)	-	0.65	0.5
Liquid feed (l/d)	-	0.3	-
Urea (in LF) (g/d)	-	60	-
DM (kg/d)	5.49	5.24	5.33
SE (kg/d)	2.53	2.50	2.56
CP (g/d)	638	638	634

Table 3: Composition of the experimental rations fed to fattening lambs and their feed intake.

Ingredients	Rations: Clover hay	Ammon. CS	Suppl. CS
	g/kg		
Co-op concentrates	318	318	318
Wheat bran	227	227	227
Clover hay	455	-	-
Ammoniated-CS	-	455	-
Supplemented-CS	-	-	455
Nutritive value:			
TDN, %	51.4	57.4	58.8
SE, %	41.2	42.0	41.8
CP. %	13.6	12.4	11.8
Feed intake:			
Co-op concentrate (g/d)	350	350	350
Wheat bran (g/d)	250	250	250
Clover hay (g/d)	500	-	-
Ammoniated-CS (g/d)	-	500	-
Supplemented-CS (g/d)	-	-	500
DM (g/d)	988	985	980
TDN (g/d)	590	632	647
SE (g/d)	453	462	460
CP (g/d)	150	137	129

Results and Discussion

I. Feeding growing calves:

The results regarding mean values of daily live weight gain and feed efficiency are presented in Table 4.

Table 4: Mean performance of growing calves given rations containing co-op feed (control, A), supplemented rice straw (B) and ammoniatedrice straw (C).

Item	Rations A	B	C
No. of calves	7	7	6
Period (days)	175	175	175
Av. initial weight (kg)	182	179	180
Av. final weight (kg)	300	295	275
Av. total gain (kg)	118	116	95
Av. daily gain (g)	674^{a}	663^{a}	543^{b}
Improvement %	24	22	-
Feed efficiency:			
kg DM/kg gain	8.15^{a}	7.90^{a}	9.82^{b}
kg SE/kg gain	3.75^{a}	3.77^{a}	4.71^{b}
g CP/g gain	0.95^{a}	0.96^{a}	1.17^{b}
PER*	1.06^{a}	1.04^{a}	0.86^{b}

^{a,b}means not sharing the same superscript are significantly different ($P < 0.05$).

*PER, protein efficiency ratio, $\frac{\text{g gain in body weight}}{\text{g protein consumed}}$

Statistical analysis showed a significant differences in daily gain and feed efficiency among the three groups. Calves fed co-op feed and LF-supplemented-RS grew at a higher rate (674 and 663 vs. 543 g/d) and were more

efficient in converting their feed into gain in comparison to calves fed ammoniated-RS.

The groups given co-op feed and LF-supplemented-RS (A and B) showed a 24 and 22% improvements in total gain than ammoniated-RS (group C).

Meyreles et al. (1979) used a basal diet of derinded sugar cane and minerals with low or high urea levels and supplemented with sweet potato forage (25% of diet DM) and/or cotton seed meal (12% of diet DM), calves response was increased from 0 to 500 g/d live weight gain by a supplement of urea and other high quality forage or cotton seed meal. Nevertheless, performance was further increased by another 100% to reach 1 kg/d when all the supplements were combined in the same ration. It is appropriate to note that urea only gave a response when both the good quality forage and/or by-pass nutrients were also provided

II. Feeding fattening lambs:

The effect of feeding the experimental rations on lamb performance is presented in Table 5 . The results showed no significant differences in daily gain or feed efficiency in the two groups fed either clover hay (A) or supplemented-CS (C). The animals fed these rations showed 13.4 and 16.0% improvement in the total gain than those fed ration (B) containing ammoniated-CS-

In the previous study, Abdel-Rahman and Ahmed (1986) reported that the animals fed LF-supplemented-CS showed higher N-balance than those fed ammoniated-CS. Also the supplemented ration had mineral and vitamin mixture which are essential growth factors.

Garrett et al. (1979) reported that at 35% rice straw in the diet, the effect of alkali treatment was small and not significant, while treatment when the rice straw constituted 72% of the diet DM significantly improved both growth rate and feed efficiency.

Table 5: Mean performance of fattening lambs fed rations containing clover hay (A), ammoniated corn stover (B) and supplemented corn stover (C).

Item	Rations A	B	C
No. of lambs	7	7	7
Av. initial BW (kg)	18.7	19.5	19.1
Av. final BW (kg)	39.9	38.2	40.8
Av. total gain (kg)	21.2	18.7	21.7
Expt. period (d)	145	145	145
Av. daily gain (g)	146.2	128.9	149.6
Improvement %	13.4	-	16.1
Feed efficiency:			
kg DM/kg gain	6.7	7.6	6.5
kg TDN/kg gain	3.87	4.90	4.32
kg SE/kg gain	3.10	3.58	3.07
g CP/g gain	1.02	0.98	0.86
PER*	0.97	0.94	1.18

*PER, protein efficiency ratio, $\frac{\text{g gain in body weight}}{\text{g protein consumed}}$

Feed efficiency and PER were higher for the supplemented-CS followed by clover hay and lastly ammoniated-CS.

Our data concerning average daily gain and feed efficiency are in harmony with those reported by Kalinowski (1974) and Owen (1981), who indicated that lambs fed basal ration of chopped straw supplemented with molasses minerals plus urea gained more weight than those fed basal ration only.

Tubei and Said (1980) and Sundstøl and Owen (1984) reported that feeding ammonia-treated corn stover or supplemented corn stover with urea and molasses increased ADG of sheep than the untreated corn stover.

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إستخدام مواد العلف الخشنة المعاملة فى علائق الحيوانات النامية

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أجريت تجربتان بهدف دراسة تأثير استخدام مواد العلف الخشنة المعاملة على أداء العجول و الحملان النامية .

فى التجربة الاولى استخدم عشرون عجلا جاموسى نامية متوسط أوزانها ١٨٠ كجم ، قسمت الى ثلاث مجموعات أ ، ب ، ج . غذيت المجموعة (أ) على العليقة المقارنة و المكونة من قش الارز غير المعامل و نخالة القمح و العلف المصنع . فى العليقة (ب) تم استبدال ٣٣ ٪ من العلف المصنع بما يعادلها من البروتين و الطاقة من السوائل المغذية بينما فى العليقة (ج) تم استبدال ١٦٫٥ ٪ من العلف المصنع بما يعادلها من قش الارز المعامل بغاز الامونيا (٣ ٪) .

فى التجربة الثانية أستعمل ٢١ حملا رحمانى متوسط الوزن ١٩ كجم ، قسمت الى ثلاث مجموعات أ ، ب ، ج . غذيت المجموعة الاولى على العليقة المقارنة و المكونة من دريس البرسيم ونخالة القمح و العلف المصنع . فى العليقة (ب) استبدل دريس البرسيم بما يعادله من حطب الذرة المعامل بالامونيا ، بينما استبدل الدريس فى العليقة (ج) بحطب الذرة المعامل بإضافة السوائل المغذية .

أشارت نتائج التجربة الاولى الى أن العجول المغذاه على كل من العليقتين أ ، ب نمت بمعدلات أعلى من مثيلاتها فى المجموعة ج (٦٤٧ ، ٦٦٣ مقابل ٥٤٣ جم / اليوم على التوالى). كما أظهرت نفس المجموعات كفاءة غذائية أعلى .

وأظهرت نتائج التجربة الثانية أن الحملان المغذاه على كل من دريس البرسيم أو حطب الذرة المعامل بإضافة السوائل المغذية أظهرت تحسنا فى معدلات النمو مقداره ١٣٫٤ ، ١٦٫٥ ٪ على التوالى عن المجموعة المغذاه على حطب الذرة المعامل بالامونيا ولم يكن هناك اختلاف معنوى فى النمو أو الكفاءة الغذائية بين المجموعتين المغذيتين على دريس البرسيم أو حطب الذرة المعامل بالسوائل المغذية .