Effect of Treated Bagasse on Feedlot Performance, Non Carcass Components and External Body Measurements of Sudanese Desert lambs

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Abstract
The present study was conducted to detect the effect of different level of treated bagasse on feedlot performance, non-carcass components and external body measurements of Sudanese desert lambs. Bagasse was treated by mixture consist of urea, molasse and calcium carbonate (Atron) and ensiled for a month. Then was chemically analyzed. According to this analysis three iso-caloric and iso-nitrogenous experimental diets were prepared. These diets contained different levels of treated bagasse (0%, 15% and 30%) respectively.
Twenty seven Sudanese desert lambs (Hammari ecotype) were randomly divided into three experimental groups with an average initial weight of 21.3 kg were used in feeding trials for 45 days. Following an adaptation period of two weeks. Each lamb group was offered one of the experimental diets for a feeding period of 45 days, during which feedlot performance was monitored.
External body measurements were taken at the beginning and the end of the experiment. Finally three experimental lambs from each group were slaughtered and non-carcass components were registered.
Results revealed that there was no significant difference (P>0.05) in feedlot performance, non-carcass components and external body measurements of Sudanese desert lambs fed different levels of treated bagasse.
Key words: Treated bagasse, Feedlot Performance, Body measurements,
Sudanese Desert lambs.

المستخلص:
أجريت هذه الدراسة لمعرفة البقاس المعامل باليوريا والمولاس والعطرون والطمر على الأداء وبيانات المكونات الأخرى غير الذبيحة ومقاييس الجسم الخارجية للحملان الصحراوية السودانية. استخدم سبعة وعشرون حمل من النوع الحمري ومن نفس الوزن الإبتدائي. قسمت الحيوانات عشوائياً إلى ثلاثة مجموعات ذات وزن إبتدائي متساوى (21.3كجم).
تمت معاملة مخلفات الموز بالمولاس واليوريا و العطرون والطمر لمدة شهر فى باطن الأرض . و بعد إخراجه من الأرض تم طحنه وتحليله و بناءً على هذا التحليل تم تكوين ثلاثة علائق متساوية الطاقة والبروتين . وزعت هذه العلائق على مجموعات الحملان الثلاثة.
تم تخمير الخليط المكون من البقاس المضاف له المولاس واليوريا و كربونات الكالسيوم المذابة فى الماء لمدة شهر. بعد استخراجه تم تحليله و بناءً على هذا التحليل تم تكوين ثلاثة علائق متساوية فى محتواها من الطاقة و البروتين . وزعت هذه العلائق على مجموعات الحملان الثلاثة. تمت التغذية لمدة 45 يوماً تم فيها رصد بيانات الأداء كالغذاء المستهلك والوزن

المكتسب ومعدل التحويل الغذائي. كما تم أخذ قياسات الجسم الخارجية عند بداية ونهاية التجربة. أيضاً فى ختام التجربة تم ذبح ثلاثة حملان من كل مجموعة تم تسجيل بيانات المكونات الأخرى غير الذبيحة.
أظهرت النتائج عدم وجود فروق معنوية فى الغذاء المستهلك والوزن المكتسب ومعدل التحويل الغذائى وبيانات المكونات الأخرى غير الذبيحة وقياسات الجسم الخارجية.

Introduction:

Sudan has one of the largest livestock populations in Africa. This wealth is estimated, in the year 2013, to a number of 103.570 million heads of which the contribution of cattle, sheep, goats and camels was 29.358, 39.137, 30.452 and 4.623 million heads, respectively (MARFR, 2013).

Sheep population is still raised under nomadic conditions using traditional Methods of management and natural grazing which are affected by seasonality of rain fall. During the dry season which extends from November through to June animals experience under nutrition and water shortage that result in seasonality of reproduction, high mortality rate, and poor reproductive performance. In this system the production inputs are small and rarely farmers provide their animal with feed supplements during the critical periods of feed shortage which resulted in low sheep output (Fadul, 2007). Controlled grazing has several positive effects on the environment, as it favors the conservation of the wide variety of vegetation due to the different environmental and management conditions. In animal production systems, it is traditional to provide livestock with conventional feeds such as cereals, oil cakes and meals to all categories of livestock including ruminants, non-ruminants and poultry. This practice has been made possible by the use of developed technology that is applicable and viable mostly in temperate environments. This developed technology often advocated in textbooks is recommended with the belief that it is also applicable to tropical environments. This is coupled with the fact that there has been little demonstration of alternative technology developed in and suitable to specific situations in tropical environments (FAO, 1985).

A major gap exists between the demand and supply of conventional feed resources for feeding livestock in the world. In order to manage this problem of demand and supply, it is essential to increase the availability of conventional feed resources for the different livestock production and management systems.

One method is to exploit the use of non-conventional feed resources (NCFR) in livestock production systems (Ben Salem et al, 2003). Potentially available NCFR include crop residues, agro-industrial by-products, leaf and seed meals, such as the leaves and seeds of the African pear (*Dacroydesedulis*), *Gliricidiasepium*leaf meal, the seeds and leaves of *Gmelinaarborea*, the leaves of *Myrianthusarboreus*, browse foliage, slaughter house by-products, cassava leaf meal, tapioca waste, tea waste, mango seed kernels and animal organic wastes.

Most of these feed materials are low in energy, protein, minerals and contain high amounts of anti-nutritional components (BenSalem et al, 2003). The major constraints to the use of NCFR are collection, storage, dehydration (due to high

moisture content) and detoxification processes. There is an urgent need for processing techniques that are economic and practicable. Non-conventional feed resources (NCFR) generally refer to all those feeds that have not been traditionally used for feeding livestock and are not commercially used in the production of livestock feeds. Several known examples include palm leaf meals, palm press fiber, cassava foliage, spent brewer's grains, sugar cane bagasse, rubber seed meal and some aquatic plants (Chadhokar, 1984).

Raw bagasse is poor, fibrous roughage mostly used for ruminants. Its ingestibility, nutrient density and digestibility (about 30%) are very low. However, it is sometimes the only roughage available on farm. When production targets are high, its use must be accompanied by significant amounts of concentrate. As with all low-quality roughages, supplementation is required to bring minerals, nitrogen and fermentable energy to the rumen for optimal microbial activities, and energy and by-pass protein to be absorbed in intestines.

Various physical, chemical and biological treatments have been used to improve utilization of low quality forages such as crop residues. The most popular alkali for treatment has been sodium hydroxide, but its use is associated with health hazards. In parts of the world where small farms predominate, treatment with a urea solution followed by a period of storage under air-tight conditions may be more practical. Treatment of crop residues with urea has three primary interrelated benefits, namely increased nitrogen concentration, digestibility and feed intake (Hadjipanayiotou, 1984).

The objectives of this study are:

1. **Increase the awareness of livestock owners to adopt Non-Conventional Feed Resources (NCFR) in their animal feed.**
2. **Utilization of available agricultural by-products (bagasse) in the area as a dry season supplement to increase sheep productivity.**
3. **Improve the nutritive value of bagasse by some biochemical additives.**
4. **Study the effect of treated bagasse on performance, non-carcass components and external body measurements of Sudanese desert sheep.**

Materials and Methods:

Collected bagasse was spread on a plastic sheet and a mixture of, molasse, urea and calcium carbonate (Atron) dissolve in water was added. Deep stacking was prepared in an underground silo pit (2 x 2 x 2 m). Then, the treated baggase was stacked in the underground silo pit surrounded with plastic sheet and pressed manually. The pressed treated bagase was covered using plastic sheet. A thin layer of soil (3 –5 cm) was placed over the covered plastic sheet and left for a month. Samples of treated bagasse was taken after deep stacking and subjected to proximate analysis as outlined by AOAC (1990) and according to this analysis three iso caloric and iso nitrogenous experimental diets were formulated (Table1).

Experimental animals and procedure: Twenty seven Sudanese desert male lambs (Hamari ecotype) were used. They were rested, ear tagged and kept for a pre-experimented period of two weeks. During this period animals were treated with

antibiotic and Albendazole and fed by a mixture of experimental diets. At the end of the adaptation period animals were weighed and divided into three groups of nine lambs and equal average live weight of (21.3Kg). Each group was separately penned and provided with watering and feeding facilities.

Feeds and Feeding: The three animal groups were fed the experimental diet (Table 1). During the feeding period, animals were fed daily the assigned diet adlibitum at 7:30 AM for 45 days. Thereafter the feed was offered at 7:30 AM and 1:00 PM throughout the study period which extended for 150 days. Barseem (Medicago Sativa) was also offered weekly at a rate of one kg/head/week. Clean water and salt licks were made available throughout the experimental period.

Data records:

Feed intake: Total feed offered and residual for each pen were recorded daily to calculate group and individual feed intake by difference.

Live weight gain: The animals were weight weekly using a spring balance. The animals were fasted overnight except for water before weighing to reduce the error due to variation in gut fill. The average weekly weight gains of each animal and feed conversion ratio were calculated.

Non carcass components: At the end of the experiment three experimental lambs from each group were selected randomly and slaughtered and non-carcass components were registered.

External Body measurements: This was recorded at the beginning and at the end of the experiment as described by Brown et al (1973).

Statistical procedure: The data was analyzed by complete randomized design according to (Snedecor and Cochran, 1980).

Results and Discussion:

Performance and Feedlot:

The results indicated that the average initial and final body weights, weight gain, daily and final weight gain and feed conversion ratio of the experimental animals were not significantly (P>0.05) affected by experimental diets.

Effect of treated bagasse on feed intake:

Total and daily feed intake and feed conversion ratio of the lambs (Table2) were not significantly (P>0.05) affected by Experimental diets. The average total daily feed intake (kg) for Group A, B and C were 43.87±0.69, 42.87±2.0 and 41.36±1.55 respectively. Daily Feed Intake (kg) were 1.04±.02, 1.02±.05 and 0.99±.04 for three group.

No significant differences were detected in total dry matter intake (TDMI) due to different treatments, while a slight reduce noticed by increased the baggase added diets compared with the control. These results may be due to that control has more palatability than bagasse silage. This result agree withby Salama et al (2011) and A Sudheer et al (2013) who reported that there was no difference with regard to average daily gain when used bagasse.respectively along with concentrate in (50:50) on feeding lambs in India also this result in same line with these results were in harmony with those obtained by Lewis *et al*. (1999) who suggested an

increase in dry matter intake with fungal or enzymatic treatment. Kamra and Zadrazil (1988) found that during microbial processes for conversion of lignocelluloses wastes into food, at least one of three objectives must be reached: an increase in the protein level, an increase in the digestibility of the lignocellulosic material and an improvement in the dry product palatability, although this last factor can be easily improved by ensiling or mixing the substrate with other more palatable food.

Effect of treated bagasse on weight gain:

There were slight a reduction in the weight gain for lambs fed the highest baggase added diet._These results were different from those obtained by Deraz (1996) and Allam *et al*. (2006) who found that animals fed biologically treated roughages were the most efficient group followed by those fed chemically treated roughages. The average daily weight gain was considerably higher for lambs fed rations contained biological and biochemical treated sugarcane bagasse. This is due to the higher nutritive value (Salman *et al.,* 2011) and feed intake of fermented sugarcane bagasse than untreated one. Fazaeli *et al.* (2002) showed that the improvements in the animal performance could reflect the use of more available nutrients due to the substitution of untreated wheat straw by the fungal treated wheat straw.

Effect of treated bagasse on feed conversion ratio:

The Feed Conversion Ratio for Group A,B and C were 7.06[a] ±1.68, 6.09[a] ±2.61 and 7.00.48[a] ±1.55.respectively ,however was not significantly (P>0.05) affected by experimental diets this obtain result in same line with Sauder et al (2013) who reported that there was no difference with regard to average feed conversion ratio when used bagasse respectively along with concentrate in (50:50) on feeding lambs in India, but disagreement with reported by Salman et al (2011) she mentioned that Feed Conversion Ratio was significantly affected by type of roughage and treatment besides intervals of the study period. Also, Abdelhamid *et al*. (2007) and Mohamed (2005) reported better feed conversion by feeding the biological fermented roughages.

Effect of feeding treated baggase on non- carcass components of lambs:

As seen in Table (3), results indicated that the average on non carcass components as a (% of live weight) of lambs were not significantly (P>0.05) except in Intestine full affected by experimental diets,Head, Hide, hooves and Liver are the same. Intestine full. Intestine empty and rumen full increased by the baggase diet but they were same in the results Rumen empty reduced by increased the baggase level in group C but not have a change by increased the baggase level in group B . Lungs and heart, fat, Reproductive organs, kidney with fat and kidney reduced by increased the baggase level. Pancreas, esophagus and Mesenteric were higher in group B but lower in group C and A.

The results indicated there were no significantl difference (P>0.05) on non carcass components, these results were similar to those obtained by A Sudheer et al (2013) who reported that there were no differences in weights of organs on % pre

slaughter weight when used bagasse respectively along with concentrate in (50:50) on feeding lambs.

Also agree with Nagi et al (2006) who reported that paddy straw based complete diets fed in Deccani lambs showed no difference in wholesale cuts and concluded that paddy straw incorporated in complete diets improved the various carcass characteristics.

Effect of feeding treated baggase treated on External body Measurements of lambs:

External body measurements (Table 4) were not affected by using treated bagasse on the diet of experimental lambs. Wither height was higher in group A (control) and group C than group B. Neck length, height at the hipand thigh circumference increased by increase the baggase level in group B and C. Chest Circumference decreased by the increase the baggase level in group B and C. this is result in same line with Fadelssed (2007) who reported that was no significant effects were found on body measurements in shugor sheep in the Rahad Scheme in Sudan.

Conclusion:

It could be concluded that using treated bagasse up to 30% of the rations had no adverse effect on animal performance as well as it will lower rations cost.

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Table .1.Ingredients proportions of experimental diets.

Items	A	B	C
Sorghum grain	35	35	42
Wheat bran	30	35	20
Groundnutcake	10	5	5
Groundnut hulls	23	8	1
Treated Bagasse	0	15	30
Lime stone	1	1	1
Salt	1	1	1

Table.2. Effect of treated bagasse on feedlot performance of experimental animals

Parameter	Experimental diets			L.S
	A	B	C	
Initial weight (kg)	21.3 [a] ±0.51	21.07[a] ±0.05	20.51[a]±0.51	N. S
Final weight(kg)	27.66 [a] ±1.13	27.28 [a] ±0.86	26.42 [a] ±0.53	N. S
Total gain(kg)	6.21 [a] ±0.73	6.21[a] ±0.79	5.91[a] ±0.57	N. S
Daily gain(g)	156.3[a] ±17.36	147.9[a] ±18.66	140.7[a] ±13.49	N. S
Total Daily Feed Intake	43.87±0.69	42.87±2.0	41.36±1.55	N. S
Daily Feed Intake	1.04±.02	1.02±.05	99±.04	N. S
Feed Conversion Ratio	7.06[a] ±1.68	6.90[a] ±2.61	7.00[a] ±1.55	N. S

Table.3. Effect of treated bagasse on non carcass components of experimental animals

Item	Experimental diets			L.S
	A	B	C	
Head	.08^{a}±.00	.08^{a}±.00	.08^{a}±.00	N. S
Hide	.09^{a} ±00	.09^{a} ±.00	.09^{a} ±.00	N. S
Hooves	.03^{a} ±.00	.03^{a} ±0.00	.03^{a} ±.00	N. S
Intestine full	.08^{a}±.00	.082^{a} ±.00	.11^{b} ±.01	*
Intestine empty	.04^{a}±00	.05^{a} ±00	.05^{a} ±003	N. S
Liver	.02^{a}±.00	.02^{a} ±.00	.02^{a} ±.00	N. S
Rumen full	.12^{a}±.00	.13^{a} ±02	.13^{a} ±.02	N. S
Rumen empty	.04^{a}±.00	.04^{a}±.00	.03^{b} ±.00	N. S
Lungs and heart	2.10^{a}±.16	1.91^{a} ±.16	1.88^{a} ±.16	N. S
Fat	.38^{a} ±.00	.35^{a} ±.01	.28^{a} ±.07	N. S
Kidney	.67^{a} ±.15	.61^{a} ±.03	.54^{a} ±.04	N. S
Pancreas	.29^{a}±05	.17^{a} ±00	.18^{a} ±.01	N. S
Reproductive organs	1.04^{a}±.25	.69^{a} ±.02	.63^{a} ±.05	N. S
Esophagus	.19^{a}±00	.17^{a} ±00	.18^{a} ±.01	N. S
Mesenteeric	.57^{a}±.01	.85^{a} ±.15	.63^{a} ±.08	N. S
Kidney with fat	1.05^{a}±.14	.95^{a} ±.02	.81^{a} ±.09	N. S

Table.4. Effect of treated bagasse on the external body measurements of experimental animals:

Measure ments	Item	Experimental diets			L.S
		A	B	C	
Height at Wither	Initial (cm)	67.22^{a}±0.58	66.78^{a}±0.64	65.94^{a}±0.90	N. S
	Final (cm)	72.00^{a}±0.97	69.89^{a}±0.26	70.67^{a}±0.82	N. S
	The increase (%)	7.13^{a} ±1.36	4.73^{a} ±0.99	7.27^{a} ±1.50	N. S
Neck Length	Initial (cm)	27.39^{a}±0.77	26^{a}·±0.69	26.28^{b}±0.83	N. S
	Final (cm)	29.22^{a}±0.43	29.89^{a} ±0.70	28.56^{a} ±0.88	N. S
	The increase (%)	6.23^{a} ±2.47	7.70^{a}±2.70	7.83^{a} ±2.02	N. S
Height at Hip	Initial (cm)	69.78^{a}±0.47	69.39^{a}±0.39	69.56^{a} ±0.54	N. S
	Final (cm)	71.89^{a}±0.86	71.78^{a} ±0.40	72.07^{a} ±0.33	N. S
	The increase (%)	3.03^{a} ±1,05	3.46^{a} ±0.57	3.61^{a} ±0.46	N. S
Chest Circumfe rence	Initial (cm)	66.22^{a}±0.31	66.44^{a}±0.59	66.11^{a} ±0.63	N. S
	Final (cm)	72.67^{a}±0.60	72.33^{a} ±0.40	70.89^{a} ±0.42	N. S
	The increase (%)	9.74^{a} ±0.81	8.92^{a} ±1.26	7.31^{a} ±0.66	N. S
Thigh circumfer ence	Initial (cm)	30.72^{a}±0.71	31.17^{a}±0.33	28.78^{a} ±1.33	N. S
	Final (cm)	34.56^{a}±0.56	35.67^{a} ±0.47	33.67^{a} ±0.78	N. S
	The increase (%)	12.97^{a}±0.04	14.57^{a}±0.02	18.77^{a}±0.05	N. S
Back Length	Initial (cm)	39.33^{a}±0.65	38.78^{a} ±1.13	39.61^{a} ±0.94	N. S
	Final (cm)	43.44^{a}±0.97	44.67^{a} ±1.06	43.78^{a} ±0.49	N. S