SHORT NOTE

Effects of urea treatment on Adar (*Sorghum arundinaceum* L.) proximate analysis and the performance of Desert sheep in Gadarif State, Sudan

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Sheep production is very important in the Sudan due to high population, wide distribution and socio-economic impacts (Ministry of Animal Wealth and Fisheries, 2004). Sheep is the main non- oil export in the Sudan and there are increasing efforts to increase it in Gadarif State. Desert sheep is the main ecotype in the Sudan and is important in Gadarif State. Nutrition is one of the main constraints for sheep production in the State, as the animals are mainly reared in traditional systems based on natural pastures which are deteriorating due to many factors (Mohmed, 2001).In addition, there are seasonal fluctuations in feeds quantity and quality associated with seasonal rainfall leading to serious shortages in the dry season with impacts on animals health and performance (Hamed, 2007).

Crop residues are abundant in Gadarif State, but generally have low nutritive value due to low CP and high CF and usually fed unimproved with low animals performance. It is important to exploit unconventional feeds to fill the nutritional gap and reduce feed costs. Overgrazing and poor pasture management led to the disappearance of favourable plants and increased unfavourable low quality plants such as Adar (*Sorghum arundinaceum* L.) in large areas. Adar is an annual grass in the family Poaceae and abundant in Rahad area and in the Gezira and occasionally found on the Nile banks (Braun *et al.*, 1991). It is a wide spread weed in sorghum areas in Gadarif. Adar proximate analysis was 6.7 CP, 50.4 CF, 1.2 EE, 12.32 ash, 29.3 NFE and 8.32 ME (Ellis, 1981), 10.0 CP, 32.0 CF, 1.00 EE and 6.00 ash (Suliman, 1986) and 8.0 CP, 31.0 CF, 1.0 EE, 6.0 ash and 54.0 NFE (Elimam *et al.*, 2013).

Mature Adar is not preferred by animals and can be an important feed in the dry season if the nutritive value is improved. Different methods are used to improve the nutritive value of crop residues including physical, biological and chemical methods (Preston, 1986), but are generally not feasible in rural areas in the Sudan (Hamed, 2007). Urea is used to improve the nutritive value of crop residues and ammonia hydrolyzes bonds between lignin and fibres and urea and ammonia improve CP, digestibility and feed intake (Salem *et al.*, 1994). Concentrates improved urea treated straws metabolizable energy (ME), digestibility and feed intake (Abdel Gadir, 1994). Concentrates and protein supplements improved straw intake and animals performance (Dzowela, 1987; Adebowale, 1988) and the effects were higher for improved straws (Salih, 1998; Liu *et al*., 2001). The information on the effects of urea treatment on the nutritive value of Adar and Desert sheep performance is meagre. Hence, this experiment was launched to evaluate the effects of urea treatment on the nutritive value of Adar and the performance of Desert sheep fed with Adar treated with urea in Gadarif State, Sudan.

The experiment was conducted in the Animal Production and Pasture Farm in Tawawa, Faculty of Agriculture and Environmental Sciences, University of Gadarif, Gadarif State, Sudan in January 2011.

Eight male lambs, 6-7 month old, were selected at random from the sheep flock in the farm and injected with Ivomet against internal and external parasites. They were weighed and divided into two groups according to body weight (21.7kg) and allocated at random to untreated and urea-treated Adar.

They were housed at random in individual wire pens with feed and water troughs. A batch of Adar stover was divided into two parts and one part was treated with 5.3% urea as described by Preston (1986). The first sheep group was fed Adar and the second one was fed urea-treated Adar. The animals were fed Adar and urea-treated Adar *ad libitum* for one week as an adaptation period and then 2kg daily for 21 days in two equal meals at 8.0 am and 4.0 pm. The animals were supplemented with 300g concentrates daily in two equal meals after the Adar. Table 1 shows the concentrates ingredients and calculated ME and CP. Samples of Adar and urea treated Adar were stored in polyethylene bags, ground and analyzed in triplicates for DM, EE, CP, CF and ash as

described by AOAC (1995). The means and standard deviations were calculated for different parameters and the data were statistically analyzed using t test.

Table1. Ingredients and composition of concentrates given to Desert sheep fed untreated and treated Adar (*Sorghum arundinaceum* L.) in Gadarif, Gadarif State, Sudan.

Ingredients and composition	%
Sorghum grains	47.0
Wheat bran	33.5
Groundnut cake	09.0
Molasses	08.0
Salt	10.0
Oyster shell	01.5
CP	16.0
Metabolizable energy (Mj/kg)	11.2

Table 2 shows the proximate analysis of untreated and urea-treated Adar. Adar CP, EE and CF were lower in Gadarif State than that reported by some authors in the Sudan (Ellis, 1981; Suliman 1986 and Elimam *et al.*, 2013). Adar ash in Gadarif State was lower than that reported by Ellis (1981) and higher than that reported by Suliman (1986) and Elimam *et al*. (2013). Adar had lower CP, EE, CF and ash and higher NFE than sorghum stover and millet and sesame straws in Gadarif area (Hamed, 2007). It had higher CP, ash and NFE and lower CF and EE than sorghum stover in the Sudan (Elhag, 1984). Urea treatment increased Adar CP, EE and ash and decreased CF and NFE. The decreased CF was mainly because ammonia hydrolyzed bonds between lignin and fibres (Salem *et al.*, 1994). The increased CP was due to nitrogen in urea which improved CP (Salem *et al.*, 1994).

Table 2.Proximate analysis of untreated and urea-treated Adar (*Sorghum arundinaceum* L.) in Gadarif, Gadarif State, Sudan.

Parameters	Adar straw	Urea- treated Adar straw
DM	97.94± 0.26	98.21± 0.26
E.E	0.23± 0.10	1.95± 0.33
CP	3.3± 0.17	12.41± 0.12
CF	25.62 ± 0.1	21.1± 0.14
Ash	6.24± 0.16	8.92± 0.43
NFE	62.56± 0.14	53.85± 0.27

Table 3 shows the performance of Desert sheep fed urea-treated and untreated Adar. Urea treatment increased sheep final weight, weight gain and feed intake and its effects on daily weight gain were significant ($P<0.05$). The increased weight gain and daily weight gain were due to increased feed intake and improved Adar nutritive value associated with urea treatment. It was reported that ammonia improved CP, digestibility and feed intake (Salem *et al.*, 1994). In addition, concentrates improved urea-treated straw ME, digestibility and feed intake (Abdel Gadir, 1994).It was also reported that concentrates and protein supplements improved straw intake and animals performance (Dzowela, 1987; Adebowale, 1988). The weight gain in sheep fed urea-treated Adar was lower than that fed Raba ash alkali treated sorghum stover with 600 and 900g concentrates (Eltayeb, 2009).

Table 3. Performance of Desert sheep fed untreated and urea-treated Adar (*Sorghum arundinaceum* L.) in Gadarif State, Sudan.

Parameters	Adar	Urea-treated Adar
Initial BW	22.0±1.66	21.50±1.43
Final BW	22.3±1.35	23.50±2.45
Mean weight gain (g/day)	14.3±2.66	95.23±3.43
Mean feed intake (kg\day)	0.99±0.023	01.23±0.098

BW= Body weight.

It is recommended to use urea-treated Adar as a nonconventional feed in Desert sheep rations to improve animals performance.

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أثار معالجة العدار باليوريا على التحليل التقريبي واداء الأغنام الصحراوية في ولاية القضارف، السودان

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الخلاصة

تمت دراسة أثار معالجة العدار باليوريا على التحليل التقريبي واداء الأغنام الصحراوية في ولاية القضارف في السودان في يناير 2011م. إختير ثمانية من ذكور الحملان بعمر 6-7 أشهر عشوائيا من قطيع الأغنام الصحراوية بمزرعة الانتاج الحيواني في جامعة القضارف. قسمت الحيوانات على أساس الوزن الى مجموعتين بكل منهما 4 حيوانات ومتوسط وزنهما 21.7 كجم ثم قسمت عشوائيا على العلفين. وضعت الحيوانات في حظائر فردية من السلك بها أوعية للعلف والماء. قسم العدار الى قسمين تمت معاملة أحدهما باليوريا (5.3%) وترك الأخر كشاهد. أعلفت الحيوانات2 كجم تبن/ اليوم لمدة 21 يوما ثم أعلفت المجموعة الاولى العدار (الشاهد) و المجموعة الثانية العدارالمعامل باليوريا مع 300 جم/حيوان/ اليوم عليقة مركزة في وجبتين متساويتين صباحا لمدة 40 يوما.أجري التحليل التقريبي لعينتي العدار. زادت المعاملة باليوريا البروتبن الخام والمستخلص الأثيري والرماد وخفضت الألياف الخام والجزء الخالي من النتروجين في العدار. كما زادت المعاملة باليوريا الوزن النهائي والوزن المكتسب في الحملان والمادة الجافة المأكولة وكان التأثير معنويا على الوزن المكتسب يوميا ($P<0.05$). كان تناول المادة الجافة اعلى في العدار المعامل باليوريا (1.23 كجم/ اليوم) وادنى في العدار غير المعامل (0.99 كجم/اليوم). أدت المعاملة باليوريا الى اعلى زيادة في الوزن اليومي (95.23 جم/ اليوم) مقارنة مع مجموعة الشاهد (14.29 جم/ اليوم). بينت الدراسة امكانية الإستفادة من العدار كمورد علفي غير تقليدي لتسمين الأغنام بعد معالجته باليوريا.