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FEED INTAKE, BODY WEIGHT CHANGES, BLOOD CONSTITUENTS AND CARCASS CHARACTERISTICS OF MALE NGUNI GOATS FED UREA-IMPROVED ROUGHAGE

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ABSTRACT

The study established the effects of urea-improved roughage on intake, weight changes, blood metabolites and carcass characteristics of Nguni goats.Hay roughage was treated and sprayed with 5% (40days) and 2.5%, respectively (before feeding) urea to achieve Improved Roughage (IR) and Semi-Improved Roughage (SIR) respectively, while a third treatment was non-treated Poor Roughage (PR). Eighteen goats were blocked into two weight groups (16.94 ± 2.51 kg; 33.6 ± 5.00 kg) and randomly allotted into the 3 treatments with each treatment having 6 goats. Voluntary feed intake, digestibility, blood parameters and carcass properties were determined. Results revealed that,Dry matter intake and nutrients digestibility were enhanced by improving roughage quality with urea. It prevented loss of body weight by 16.25g/day and yielded lean carcass. Goats in IR had significantly higher ($P<0.0001$) blood urea concentration (7.55 mmol/L vs 5.71 mmol/L in SIR and 1.04 mml/L in PR) but similar ($P>0.05$) to SIR and PR in blood creatinine and blood glucose. Blood creatinine for all goats was below normal range (88.40 – 159 µmol/L) but blood glucose was maintained fairly at minimum level of its normal range (2.78 – 4.16 mmol/L) with goats in PR having the least (2.75 mmol/L). IR increased (<0.0001) slaughter weight, hot carcass weight and cold carcass weight, and had highest dressing percentage (38.56).It can be concluded that,Urea Improved Roughage increased feed intake, blood urea and glucose concentrations; influenced weight changes and carcass characteristics; tending to keep the animal close to maintenance.

Keywords: Blood metabolites, Carcass characteristics, Feed intake, Nguni goats, Urea-improved roughage

INTRODUCTION

Africa has witnessed increasing trend of 374 million goats in 2014 up to 388 million in 2016 thereby contributing approximately 36% and 39% to world population of goats in each of the years (FAOSTAT, 2016). Goats only yield over 5 million metric tonnes of global meat (Onzima *et al.*, 2017). Goats, among other domestic ruminants, are very diverse in their adaptive nature to different environmental conditions and feeding regimes. They do not only subsist but relish roughages (Adebayo, 2015). In Africa, grasses that are major roughage-based diet of ruminant are attributed with high growth potential but low nutritional quality in terms of crude protein concentration and other nutrients. To increase the population of goats in Africa and upsurge its metric tonnes contribution of goat meat, efforts need to be geared towards improving roughage diets, goats' welfare and their nutritional status (Chikwanda and Muchenje, 2017).

Urea treatment is an effective means of optimizing the use of low quality feeds for ruminants, as it delignifies fibre and makes it amorphous. It thus increases the nitrogen content of hay and straws, their

voluntary intake, rumen degradation and digestibility by 25 to 50%. Generally, nutritional adequacy of feed can be assessed using weight changes, body condition score, carcass characteristics and blood metabolites. Blood is also a pointer to and pathological reflector of the health status of animals, which can provide vital information for diagnosis, and prognosis of diseases (Chikwanda and Muchenje, 2017). Deficiency in nutrition activates body reserves mobilization and it reflects in body condition score and eventual weight loss. This study aimed at establishing the effect of urea-improved roughage on performance of Nguni goats.

MATERIALS AND METHODS

Ethical Approval

Procedures used on goats were approved by Animal Research Ethics Committee (AREC) of University of Kwazulu-Natal, South Africa and accorded ethical clearance certificate, with reference number: AREC (081/14/Animal).

Study location

The study was carried out at Ukulinga Research Farm of the University of KwaZulu-Natal, Pietermaritzburg, in the subtropical hinterland of KwaZulu-Natal Province, South Africa. The study site lies on the geographical coordinates 30°24'S and 29°24'E at an altitude of 700m.

Animal and Dietary Treatments

Eighteen Nguni goats were blocked into two groups, which comprised of nine lightweight (average initial body weight of 16.94 ± 2.51 kg) and nine heavyweight (average initial body weight of 33.6 ± 5.00 kg) goats. Goats were further randomly divided into 3 treatments with each treatment having 6 goats. For one dietary treatment, roughage quality was enhanced by treating veld hay with 5% urea for 40 days to give hay of Improved Roughage (IR). In the second treatment, veld hay was sprayed with 2.5% urea before feeding to give semi-Improved Roughage (SIR), and the third treatment was untreated veld hay, which is qualified as Poor Roughage (PR) (Table 1).

Feed Management and Growth Performance

Each goat was individually kept and reared in a pen under same environmental condition. The experiment lasted for 83 days comprising 14-day acclimation, 63-day feeding trial and 6-day slaughtering periods. Fresh water and salt licks were made available at all time. Feed was dispensed to goats *ad-libitum* at 0800 h (morning) and at 1500 h (afternoon). Throughout the experiment, feed intake for each goat was measured weekly simply by weighing a bag of food and subtracting the leftover feed in each bag. The initial live weight of each goat was measured before the start of the experiment and thereafter weekly, till the end of the experiment.

In-Vivo Digestibility Study

At the end of the 7th week within feeding trial period, goats were fitted with faecal bags in their individual standing and allowed a 4-day acclimation during which goats got used to the management of emptying faeces from bags (mid-day and early morning before offering fresh feed and water). Data of voluntary feed intake and faecal weight were recorded. Then faecal samples were sub-sampled to 1/10th of the total mass. The technique described by Juko *et al.*, (1961) was used for the digestibility trials.

Blood Constituents Study

Jugular venipuncture was done for each goat and blood samples were collected into two 5ml vacutainer tubes fortified with anticoagulant, for each sample. Blood samples were preserved in a cooling flask containing ice and taken to Vetdiagnostix -Veterinary Pathology Laboratory, Pietermaritzburg, where urea, creatinine and glucose constituents were determined.

Slaughtering of Goats

All goats were slaughtered at the Ukulinga Research farm abattoir with three goats selected randomly from each of the treatment per day. Slaughter weight (SW), hot carcass weight (HCW), cold carcass weight (CCW), dressing percentage (DP %) and chilling loss percentage (CL %) were determined. DP % = HCW/SW × 100 and CL % = [(HCW-CCW)/HCW] × 100.

Chemical Analysis

All samples of feed and faeces were analyzed for moisture, dry matter (DM), organic matter (OM) and ash using procedures described by AOAC (1991). Neutral detergent fibre (NDF) and acid detergent fibre (ADF) were analysed in accordance to the method of Van Soest (1991). Crude protein content = nitrogen content×6.25. Also, intake of digestible organic matter (DOM) and metabolizable energy (15.06 x DOM) intake in MJ/day (MEI) or MJ/kg $BW^{0.75}$ were calculated.

Statistical analysis

Data collected were analyzed using the GLM procedure of SAS (2013) and means were separated using LSD.

RESULTS AND DISCUSSION

Diet Quality

The quality of diets (IR, SIR and PR) varied markedly (Table 1). The crude protein and ADF of IR were highest followed by SIR. Urea reduced the DM, OM and NDF in IR and SIR. In the process, ammonification breakdown the lignocellulose complex of roughage (Van Soest, 2006) and reduced both NDF and ADF. In the current study, NDF was reduced but ADF increased as also observed in rice straw. Urea in IR and SIR was likely insufficient and a catalyst is required for optimization.

Table 1. Chemical composition (g/kg) of diets and effects on Nguni goats

Variabeles	Diets			*P-Value*
	IR	SIR	PR	
Nutrient composition (g/kg)				
DM	904	920	923	
OM	70	83	89	
CP	75.6	47.5	20.0	
NDF	723	723	735	

ADF	632	592	581	
Dry matter intake (kg/week)				
Wk1	5.07	5.24	5.99	0.0010
Wk5	7.18^{a}	6.64^{b}	5.04^{c}	<0.0001
Wk9	5.28	6.18	3.54	0.0084
Nutrients intakes				
DMI	0.772	0.807	0.553	0.0008
OMI	0.778	0.804	0.515	0.0002
Apparent digestibility of nutrients				
DMD	656	641	567	0.0844
OMD	689	669	567	0.0111
Available nutrient intake				
DOM	0.5420	0.5404	0.3003	0.0001
MEI (MJ/kgBW$^{0.75}$)	0.3155	0.3178	0.1730	0.0001

DM=dry matter, OM=organic matter, CP=crude protein, NDF=neutral detergent fibre, ADF=acid detergent fibre, DMI=dry matter intake, OMI=organic matter intake, DMD=dry matter digestibility, OMD=organic matter digestibility, DOM= digestible organic matter, MEI=metabolizable energy intake, Wk=Week

Voluntary Feed Intake, Nutrients Intake and Digestibility

The intake of DM, OM, NDF and ADF were all high in goats fed IR and SIR compared to goats fed PR and may be adduced to the beneficial effect of urea in low quality roughage utilization (Tesfayohannes*et al.*, 2013). IR has a difference of 140 g/kg when SIR has 53 g/kg and by inference, simply showing that treating hay with 5% urea for 40 days is almost three times superior to spraying with 2.5% urea before feeding. This outcome still agrees with previous reports by (Tesfayohannes*et al.*, 2013). Just as the consumption of IR and SIR were fairly improved compared to that of PR, the digestibility of dry matter in these roughages was improved for IR and SIR by 1.2 and 1.1 times, respectively. The organic matter digestibility for both also increased by 1.2 times (Van Soest, 2006). Nonetheless, it suffices to say that the variation in the nutrient digestibility of IR, SIR and PR was due to the effect of varying nutritional composition (Tesfayohannes*et al.*, 2013).

Table 2. Effects of diets on blood parameters, weight and carcass of Nguni goats

Parameters	Diets			P-Value

	IR	SIR	PR	
Blood constituents				
BU (mmol/L)	7.55[a]	5.71[b]	1.04[c]	<0.0001
BC (µmol/L)	58.44	70.03	63.69	0.0793
BG (mmol/L)	2.80	2.78	2.75	0.9706
Body Weight and Carcass Characteristics				
IWT (kg)	26.19	26.19	26.19	-
FWT (kg)	25.95[a]	25.56[b]	24.66[c]	<0.0001
DifWT (kg)	-0.24[a]	-0.64[b]	-1.54[c]	0.0008
SW (kg)	26.11[b]	26.20[a]	24.68[b]	<0.0001
HCW (kg)	10.29	10.04	9.52	<0.0001
CCW (kg)	10.00	9.76	9.26	<0.0001
CL%	2.98	2.73	3.14	0.2522
DP (%)	38.56	37.09	37.63	0.0407

BU=Blood Urea, BC=Blood Creatinine and BG=Blood Glucose concentrations, IWT=initial body weight, FWT=final body weight, DifWT=weight difference, SW=slaughter weight, HCW=hot carcass weight, CCW=cold carcass weight, CL%=chilling loss percentage, DP=dressing percentage

Blood Constituents, Body Weight and Carcass Characteristics

Concentration of urea in blood of Nguni goats increased significantly (P<0.0001) and below normal range (3.57 – 7.14 mmol/L) for healthy goats (Kaneko *et al.*, 2008) except IR. It reflects that goats are physiologically impaired. IR is thus, a nutritional health booster for goats and their feed intake was between 2-3% of body weight and sufficient nutrients flow (Van Soest, 2006). Blood glucose, though not significant; within normal range for goats (2.78 – 4.16 mmol/L); adequate to carry out life processes at cells level (Chikwanda and Muchenje, 2017) and for minimum nutrients uptake. Creatinine phosphate compound in muscles is often broken down to produce creatinine. The lower it is, the more the leanness of muscles. Goats of bigger sizes are expected to have more creatinine because of their large muscle mass. Hence, blood creatinine correlates to carcass mass body live weight of animals (Chikwanda and Muchenje, 2017). Apparently, blood creatinine of goats in this study is low, below the normal range (88.40-159 µmol/L) and evident in dwindling weight of goats and leanness of their muscles (Webb *et al.*, 2005). Live weight of goats was significantly affected (<0.0001) with IR, likewise all weight related

carcass characteristics obtained from this study. Attributable to goats are low fat; lean carcass; and muscle mass prone to high chilling loss most especially for those that are masculine and bigger in size (Kaneko *et*

Van Soest, P. V., Robertson, J. B., & Lewis, B. A. (1991). Methods for dietary fiber, neutral detergent fiber, and nonstarch polysaccharides in relation to animal nutrition. *Journal of dairy science*, *74*(10), 3583-3597.

Webb, E. C., Casey, N. H and Simela, L. (2005). Goat meat quality. *Small Ruminants Resources*. 60 (1): 153-166.