

Free choice intake of Red Sokoto goats offered wheat offal- and brewers' dried grains-carried pineapple wastes

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Abstract

The blends of WO and BDG with the highest PW contents (1WO:2PW and 1BDG:2PW) were evaluated for free choice intake alongside equal mixtures of each blend with a formulated conventional concentrate (CCON); that is {50(1WO/2PW):50CCON} and {50(1BDG/2PW):50CCON} respectively, relative to the sole conventional concentrate (CCON) using Red Sokoto goats. Free choice intake was significantly highest ($P < 0.05$) for CCON while an equal mixture of 1WO:2PW with CCON {50(1WO:2PW):50CCON} resulted in a slight but non-significant ($P > 0.05$) reduction in free choice intake. The levels of interaction between the values of free choice intake for CCON, {50(1WO:2PW):50CCON} and 1WO:2PW (28.83^a, 26.61^{ab} and 20.85^{bc} % respectively) indicate that WO-carried pineapple wastes would be more readily accepted by the animals as alternatives to CCON if and when necessary, rather than BDG-carried pineapple wastes. Further research is required to improve the acceptability of BDG-carried pineapple wastes in order to optimize their potential as probable dry season protein supplements for ruminants.

Keywords: Pineapple waste, dry season supplementation

Introduction

The Red Sokoto goat is the most important Nigerian indigenous goat breed, accounting for about 70% of the goats in Nigeria (Akpan *et al.*, 1998). Even though they cope fairly well in the southern part, they are more adapted to the climatic conditions of northern Nigeria (Hoste *et al.*, 1988). They are meat breeds, and the skin of Red Sokoto goat is reputed to be of high quality and used in the leather industry locally and internationally (Akpan *et al.*, 1998). In the sub-Saharan region of Nigeria where this goat breed is endemic, these potentials are, however, limited by seasonal shortages of feed availability; in quantity and quality. The situation has been reported (Alaku and Moruppa, 1983) to result in drastic loss of body and organ weights of these animals such that they mostly fail to survive to the next rainy season, with those that survive looking extremely miserable. Considerable research efforts (Uguru, 2000; Mubi *et al.*, 2015) have been directed towards averting such losses through the use of alternative feedstuffs to natural pasture. Efforts are currently going on by our research team to incorporate pineapple waste (peelings and pulp) into the diet of this notable goat breed with the use of wheat offals and brewers' dried grains as vegetable carriers/moisture absorbents.

Palatability has been described by Mirzaei-Aghsaghalhi and Maheri-Sis (2008) as an

important feature in determining the potential value of by-products in animal feeding. This study was therefore designed to assess the free choice intake of Red Sokoto goats that were offered wheat offal- and brewers' dried grains-carried pineapple wastes relative to a conventional feed concentrate using a cafeteria technique.

Materials and Methods

Experimental site

The study was conducted at the Small Ruminant Unit (SRU) of Ladoke Akintola University of Technology Teaching and Research Farm (LAUTECH T&RF), Ogbomoso, Oyo State.

Procurement of fresh pineapple fruit waste, absorbents and other feed ingredients

Fresh pineapple wastes (the peelings and the pulp) were collected between 8.30 and 9.00 hours from the Lafia Canning Factory of Fumman Agricultural Products Nigeria Ltd, Moor Plantation, Ibadan, Nigeria. Wheat offals, brewers' dried grains and other feed ingredients were obtained from a reliable feed ingredient store in Ogbomoso. Formulation of a conventional feed concentrate. The formula of Isah and Babayemi (2010) for a conventional feed concentrate, as shown in Table 1, was adopted.

Free choice intake evaluation protocol

The blends of WO and BDG with the highest PW contents (1WO:2PW and 1BDG:2PW) respectively that dried to $\leq 10 - 12\%$ moisture

content within 7 hours (Asaolu *et al.*, 2016) were produced and evaluated for free choice intake alongside equal mixtures of each blend with a formulated conventional concentrate (CCON as contained in Table 1); that is {50(1WO/2PW):50CCON} and {50(1BDG/2PW):50CCON} respectively, relative to the sole conventional concentrate (CCON). Hence, there were five experimental supplements, namely; 1WO:2PW; 1BDG:2PW; {50(1WO/2PW):50CCON}; {50(1BDG/2PW):50CCON} and CCON, with the CCON serving as the reference supplement. Ten (10) matured Red Sokoto goats, weighing 12.3 ± 1.69 kg were used in a cafeteria style. The animals were housed together in a free stall with dwarf walls and concrete floors covered with wood shavings. All the animals were pre-conditioned to the experimental supplements for a period of 4 days after which the animals were offered 4kg each (wet basis) of experimental supplements daily for a period of 10 days. Each 4kg-serving was simultaneously presented in two separate feeding troughs, thus making a total of ten feeding troughs at a time. The positions of the feeding troughs were randomly changed on a daily basis to avoid any of the animals associating a particular experimental supplement to a particular position. Fresh water was also offered daily on a free choice basis. Intake of supplements was measured 2 hours after they were offered by deducting remnants from the amount served, and animals were subsequently allowed to graze for the rest of the day.

Data analysis

The obtained data were subjected to 1-way analysis of variance using the GLM of SAS (2000). Significant differences between means were also separated using the DNMRT of the same package.

Results and Discussion

Cafeteria techniques, one of which was adopted for this study, have been used over time (Olorunnisomo and Fayomi, 2012; Ososanya and Olorunnisomo, 2015) to assess the free choice intake of various feeds by ruminants. Free choice intake was significantly highest ($P < 0.05$) for the sole conventional concentrate (CCON) while an equal mixture of wheat offal-carried pineapple waste with the conventional concentrate {50(1WO:2PW):50CCON} resulted in a slight but non-significant ($P > 0.05$) reduction in free choice intake by the experimental animals. In other words, the animals would opt

for the conventional concentrate in preference to any of the other experimental supplements. This is quite understandable, and corroborates an earlier finding (Ikhimoya and Imasuen, 2007) that small ruminants would readily accept diets with which they have had previous experience. These first two supplements accounted for more than 50 % of the total free choice intake, and they were followed by the wheat offal-carried pineapple waste (1WOP:2PW) with an intake value that was comparable to the values of both {50(1WO:2PW):50CCON} and {50(1BDG:2PW):50CCON}. The levels of interaction between the values of free choice intake (kg, DM) for CCON, {50(1WO:2PW):50CCON} and 1WO:2PW (1.20^a , 1.06^{ab} and 0.82^{bc} respectively) indicate that the wheat offal-carried pineapple waste would be more readily accepted by the animals as alternatives to BDG-carried pineapple wastes with corresponding values of 0.57^c and 0.23^d respectively. The free choice intake of the brewers' dried grains-pineapple waste (1BDG:2PW) was significantly ($P < 0.05$) least relative to all the other experimental supplements.

Conclusion and Recommendation

It can be concluded from the results of this study that Red Sokoto goats would opt for the conventional concentrate in preference to any of the other experimental supplements. Based on free choice intake, the supplements can be rated as follows: CCON > {50(1WO:2PW):50CCON} > 1WO:2PW > {50(1BDG:2PW):50CCON} > 1BDG:2PW. The observed wide disparity in the free choice intakes of the two vegetable-carried pineapple wastes needs to be investigated alongside their evaluation using more animal nutritional and production parameters.

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Table 1: Ingredient composition of a conventional feed concentrate for ruminant animal supplementation

Ingredients	Percent composition
Cassava peel	34.50
Wheat offal	24.00
Maize cob	15.00
Groundnut cake	10.00
Maize	6.00
Soybean	5.00
Bone meal	3.00
Oyster shell	2.00
Premix	0.25
Salt	0.25
Calculated analysis	
Crude protein (%)	15.92
Metabolizable energy (Mcal kg ⁻¹ DM)	2300.65

Source: Isah and Babayemi (2010)

Table 2: Free choice intake by Red Sokoto goats fed ratio one to two blends of wheat offal- and brewers' dried grains -carried pineapple waste (1 WO:2PW and 1BDG:2PW), a sole conventional concentrate (CCON), and equal mixtures of each blend with the conventional concentrate {50(1WO:2PW):50CCON} and {50(1BDG:2PW):50CCON}

Test supplement	Intake (kg, DM)	Ranking based on intake
1WO:2PW	0.82 ^{bc}	3 rd
1BDG:2PW	0.23 ^d	5 th
CCON	1.20 ^a	1 st
{50(1WO:2PW):50CCON}	1.06 ^{ab}	2 nd
{50(1BDG:2PW):50CCON}	0.57 ^c	4 th
SEM	0.11	-

^{abc}Mean values in each column for the same parameter at different mixing ratios with different superscripts are significantly different at P<0.05