ECONOMY OF SUPPLEMENTATION ON RED SOKOTO BUCKS DURING EARLY RAINY SEASON GRAZING

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ABSTRACT
The study was conducted to evaluate the economy of supplementing Red Sokoto bucks' feed with concentrate during early rainy season grazing. Four supplements were formulated to contain 12% CP. Twelve bucks (12) were used for the experiments in a completely randomized design with four treatments of three animals each as a replicate randomly allocated into four (4) treatment diets containing varied inclusion levels of soybean hulls. Supplement 1 served as control diet, while 2, 3, and 4 contained varied levels of soybean hulls at 15.00, 22.50 and 30.00% respectively. Animals were offered their respective supplements at 400g per head per day (200g each in the morning and evening) and thereafter allowed to graze the available forages. The experiments lasted for 84 days. Results of the experiments revealed that total cost of feed (₦) differs significantly ($p<0.05$) across the diets. Though, the total weight gain were similar ($p>0.05$) highest (1.23kg) value was recorded in T4. Also cost of feed per (₦) per (kg) weight gain were similar, lowest (1397.56) value was obtained in the same T4. It is therefore concluded that supplimentation of Red Sokoto Buck's feed with soybean hulls at 30.00% had least cost of production with a concomitant reduction in cost of feed per (₦) per (kg) weight. As such is recommended for supplementation of Red Sokoto bucks during early rainy season grazing.
Keywords: Red Sokoto bucks, soybean hulls, supplements, supplementation

INTRODUCTION

In Africa, small ruminants are of great economic and social importance. They are often kept by small-scale farmers in rural areas who rely on them for food and income. Small ruminants are well-suited to Africa's diverse climates, and they play an important role in the cultural and religious practices of many communities. Goats and sheep are particularly valued for their meat, milk, and skin, and they provide a valuable source of nutrition for households in remote areas. Furthermore, small ruminants are an important source of foreign exchange earnings through exports of meat, skins, and wool. (Ayantunde and Fernandez (2013). According to Bamgbose and Adetunji (2018) goat production is of particular significance in many parts of the world, including Nigeria. Goats are highly adaptable and can survive in harsh environments, making them an excellent choice for small-scale farmers in areas where other livestock species cannot thrive. Goats are known for their high fecundity, rapid growth, and excellent meat quality. They also have a wide range of uses, including meat, milk, and hides, and they are highly valued in many cultural and religious practices. ivestock production in Nigeria is faced with numerous challenges, including feed scarcity and high cost of conventional feeds, which have negative effects on the sector. According to Akinfala *et al*. (2021), feed scarcity is one of the biggest challenges facing livestock production in Nigeria. This is due to unavailability of arable land, unpredictable weather patterns, and inadequate investment in the sector. As a result, farmers struggle to find enough feed to sustain their animals, leading to low productivity and profitability.

Furthermore, the high cost of conventional feeds is another major problem facing livestock production in Nigeria. According to Okpara *et al.* (2021), the high cost of feed ingredients such as maize, soybean, and wheat bran, which are commonly used in livestock feed production, is a major constraint to livestock farmers in Nigeria. This is due to several factors such as limited supply, high transportation costs, and import restrictions. As a result, farmers are forced to either reduce the quality and quantity of feed given to their animals or incur significant costs in procuring these feeds, which negatively affects their profitability.

The problems of feed scarcity and high cost of conventional feeds have significant impacts on livestock production in Nigeria. According to Ojo *et al*. (2020), these challenges lead to low productivity, high mortality rates, and reduced profitability. The low productivity of animals due to inadequate and poor quality feeds leads to reduced meat, milk, and egg production, which translates to

lower incomes for farmers. Additionally, high mortality rates result from malnutrition and inadequate feeding, which leads to increased healthcare costs for farmers. Finally, the high cost of feeds reduces farmers' profitability and hinders their ability to invest in their farms, leading to low production and decreased competitiveness in the market (Ojo *et al*., 2020).

MATERIALS AND METHODS

Study Area

The experiments was conducted at Professor Lawal Abdu Saulawa Teaching and Research Farm, in the Small Ruminant Unit of the Federal University Dutsinma, Katsina State. Dutsinma Local Government Area lies on latitude 12^0 27'16.128'N and longitude $07^0$29'5544E. It has a land area of about 527, km^2 (203sq miles). It has an elevation of about 605m (1,985 ft.), with a population of 167,671. The Departmental Livestock Teaching and Research Farm, according to field survey (2018) using GPS was reported as 6.46 hectares (64,616M^2), on Latitude: 12°25'39.3" N, Longitude: 7°27'63.6" E and Altitude: 505m.

Sources of Experimental Animals and their Management

Twelve Red Sokoto bucks with an average initial weight of 5.00±2.00 kg were procured for the study. Three (3) Red Sokoto bucks were randomly allocated to four (4) diets, in individual face – in cubicles of 2 by 2 metres, housed in the same pen with slanted concreted floors, under a common roof. The house was fully illuminated, well ventilated and was sanitized periodically. Prior to the arrival of the bucks, the cubicles were cleaned and disinfected with Diskol-ES (Tiscol) at the rate of 10mls/4litres of water. Also 10% formalin was used as a fumigant.

On their arrival, the bucks were quarantined and adapted for three (3) weeks during which their bodies were sprayed with acaricide, using Amitraz® 1ml/litre against external parasites. They were dewormed with Albendazole at 12.5mg/kg^1 body weight against internal parasites. Antibiotic, i.e Oxytetracycline L. A. (Kepro®) 20%, at 1ml per 10kg body weight was injected intramuscularly. Groundnut haulms and maize offal were offered to the bucks during the quarantine period and adaptation period of three (3) weeks before the commencement of the experiment.

EXPERIMENTAL DIETS AND ANIMAL FEEDING

Two experimental diets were used for the study: basal and supplemental diets.

The basal diets were free range grazing. The basal diets were fed to the bucks, *ad libitum* some of the spieces of grasses and legumes usually fund in the grazing area were: *Pennisetum purpureum, Panicum maximum, Andropogon gayanus, Ipomoea eriocapa, Centrosema pubscences, Chloris gayana Commelina benglensis, Chlorise gayana, Senna tora, Cassia occidentalis, Bauhinia thonningii, Triumfetta rhomboidea.*

Four supplemental diets containing 12% crude protein with varying inclusion level of soybean hulls were formulated. The supplements designated as T1, T2, T3 and T4 contained cottonseed cake, *Piliostigma reticulatum* pod meal, maize offal, wheat offal, cowpea husk, rice offal, bonemeal and salt as presented in Table 1. Diet 1, is a control as such does not contain soybean hulls while 2, 3 and 4 contain varying levels of soybean hulls. Each buck was offered its respective supplementary diet at 400g per head per day (200g each in the morning and in the evening) at about 8:00 am; they were allowed to consume the feed for one hour (8:00 am to 9:00 am) and thereafter allowed to graze the available forages at the University Teaching and Research grazing area for about 7 – 8 hours (9:00 am to 4:00 pm) in order to obtain their basal diets. Feed left-overs were collected and weighed immediately after the bucks were released for grazing. On their returns from grazing, they were kept in their individual cubicles. Clean drinking water and saltlick were provided *ad-libitum* for the duration of the experiment. Water and salt lick were provided *ad libitum.* The experiment lasted for 6 weeks after two weeks of adjustment to the experimental diets.

Economy of Supplementation

Where total feed consumed per kilogram per diet will be calculated by using a procedure described by Yerima *et al.* (2020) where by total feed consumed will be divided by total cost of feed per diet. Total cost of feed will be calculated by adding all the prices of ingredients involved in making the supplements (Yerima *et al.*, 2020). Total cost of feed per kilogram per liveweight gain per Naira (₦) will be calculated as described by Muhammad *et al.* (2016) and Audu *et al.* (2019) where average total cost of feed per Naira

Table: 1 Ingredients and Chemical Composition of the Experimental Diets

Ingredients %	Treatments			
	T1	T2	T3	T4
Soybean hulls	0.00	15.00	22.50	30.00
Maize offal	30.00	15.00	7.50	0.00
Wheat offal	22.00	18.00	15.00	14.00
Rice offal	10.00	17.00	20.25	22.00
Cottonseed cake	10.00	8.00	10.00	9.00
Cowpea husk	11.00	10.00	11.00	12.00
P. reticulatum	14.00	14.00	11.00	10.00
Bone meal	2.50	2.50	2.50	2.50
Common Salt	0.50	0.50	0.50	0.50
Dry Matter	89.47	90.53	89.73	90.30
Organic Matter	81.89	82.11	80.64	78.35
Crude Protein	18.94	21.75	19.63	21.06
Ash	7.58	8.42	9.09	11.95
NDF	65.24	67.55	66.90	63.61
ADF	35.65	38.50	42.65	39.75
Hemicellulose	29.59	29.05	24.25	23.86

NDF = Neutral Detergent Fibre and ADF = Acid Detergent Fibre

(₦) per diet will be divided by average total weight gain in kilogram (Kg) per diet.

Experimental Design

The experiment was conducted in a Completely Randomized Design with four (4) treatments of three (3) animals each as a replicate.

Statistical Analysis

Data generated was analysed using SAS (2002) Difference among means were separated at ($p<0.05$) using Duncan Multiple Range Test (DMRT, 1955) of the same statistical package.

RESULTS AND DISCUSSION

Total feeds consumed were similar ($p>.05$) among the treatments with the highest value recorded in diet 1 and lowest in diet 3 (Table 2). The values were below range of values 0.90 – 1.76 kg reported by Mubi *et al.* (2013), 4.25 – 6.76 kg reported by Yerima *et al.* (2020), 18.14 – 19.93 kg and 1.00 – 7.80 reported by Muhammad *et al.* (2016). The total cost of feed was significantly ($p<0.05$) different among the treatment groups throughout the experimental period. Treatment 2 and 4 recorded lowest respectively. These were higher than ₦ 1290.14 – ₦1429.06 reported by Audu *et al.* (2019) but higher than 262.01 – 401.54 reported by Yerima *et al.* (2020), ₦ 79.20 – ₦ 109.35 reported by Mubi *et al.* (2013), higher than ₦ 9822.35 – ₦ 15522.59 and ₦ 12188.85 – ₦ 17229.40 reported by Muhammad *et al.* (2016) for growing and fattening Uda rams and ₦1520.00 - ₦2202.00 reported by Yusuf (2021) for Yankasa rams respectively. The differences could be as a result of costs of different diets used in different experiments.

However, cost of feed in naira per kilogram body weight gain were similar ($p>0.05$) across the dietary groups. Lowest value was recorded on treatment 4, while the highest value was recorded in treatment 1. The values were higher than ₦ 157.84 – ₦ 589.47 reported by Mubi *et al.* (2013), ₦ 215.55 – ₦ 239.45 reported by Audu *et al.* (2020), the values were also higher than ₦235.59 – 593.47 reported by Yusuf (2021) for Yankasa rams. Moreover, the values in this study were higher than ₦ 46.60 – ₦ 113.05 reported by Yerima *et al.* (2020). Maigandi and Owanikin. (2002) that cost of feed per kilogram liveweight gain is an important index of economics of sheep and goat production.

CONCLUSION AND RECOMMENDATION

It is therefore concluded that supplemental diet containing 30% inclusion level of soybean hulls had highest total weight gain, lower total cost of feed and least cost of feed per naira per kilogram weight gain, as such it is recommended for supplementation on bucks during early rainy season grazing.

Table 2: Economy of Supplementation of Growing Red Sokoto Bucks fed with the Experimental Diets

Parameters	Diets				SEM	LS
	T1	T2	T3	T4		
Total weight gain (Kg)	0.98	1.00	1.06	1.23	0.46	NS
Total feed intake (Kg)	0.25	0.22	0.18	0.19	0.24	NS
Total cost of feed (₦)	18210.00[a]	17032.50[d]	17469.00[b]	17190.00[c]	0.00	**
Cost of feed per (₦) per (Kg) weight gain	1858.16	17032.50	1648.10	1397.56	0.24	NS

a, b, c and d = Means within rows with different superscript are significantly ($p<0.05$) different SEM = Standard Error of Means; Difference, NS = Not Significant; = ($p>0.05$)

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