EFFECT OF GRADED LEVELS OF GREWIA MOLLIS STEM BARK POWDER (GSBP) ON THE PERFORMANCE OF GROWING RABBITS

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ABSTRACT
Twenty-four rabbits of mixed sexes of Chinchilla breed were used to determine the effect of Grewia mollis stem bark powder (GSBP) on the growth of rabbits. The rabbits were randomly assigned to four experimental treatments of six replicates each in a completely randomized design. The feeding trial lasted for five weeks. GSBP was incorporated in the diets of rabbits at 0%, 2%, 4%, and 6% for groups T1, T2, T3, and T4, respectively. Rabbits were housed in individual cages and water and feed were administered ad libitum. Proximate analysis of GSBP was conducted and data on weekly body weight were collected. Data were subjected to analysis of variance and means separated using Least Significant Difference. Results showed that incorporation of GSBP in rabbit diets significantly increased ($p<0.05$) final body weight and weight gain at the end of the study. However, GSBP inclusion depresses the body weight of rabbits beyond 4% inclusion. The result also showed that the incorporation of GSBP reduced production cost of feed. The findings of this study showed that GSBP could be included in the feed of growing rabbits up to 4% without any negative effect on their body weights.
Keywords: **Grewia mollis, rabbits, incorporation, feed, trial**

INTRODUCTION

A big shortfall between the amount of food produced today and the amount needed to feed everyone in 2050 has been reported to exist due to the increase in human population (Ranganathan *et al.,* 2018). This monumental population growth also comes with increasing incomes and changing diets, especially for animal-based foods. This represents a major opportunity for smallholders, agribusiness, and job creators throughout the livestock supply chain (World Bank, 2022). One major impediment to livestock production is the increased cost of feed ingredients as feed alone constitutes 60- 70% of production cost (Thirumalaisamy *et al.,* 2016). This high cost is exacerbated by the competition for conventional feedstuff between human and animals (Schader *et al*., 2015). Therefore, a viable strategy for sustainable increased efficiency in production is to utilize feed components that do not compete with direct human food consumption. This will reduce the feed cost which ultimately may lead to a significant reduction in the total cost of production (Thirumalaisamy *et al.,* 2016; Abdulrahman *et al.,* 2022).

Another strategy to reduce feed costs is using non-conventional feedstuff (NCF). Non-conventional feedstuffs refer to all those feeds that have not been traditionally used in animal feeding, new sources of feedstuffs, single-cell proteins, and feed material derived from agro-industrial by-products of plant and animal origin (Singh, 2016). An example of such NCF is *Grewia mollis. Grewia mollis* (Tiliaceae) or just Grewia is a shrub or tree widely distributed in northern Nigeria and some African countries. Various parts of the plant are used in food and medicine. In Nigeria, the stem bark powder is used as a thickener in "Kosai" and "Punkasau" in Hausa (Nigeria), respectively (Obidah *et al.,* 2010). It is used as soup among the Mwaghavul people in Plateau state (Kosshak, unpublished). Its leaves possess anti-inflammatory properties (Adamu *et al.,* 2020) and its stem bark powder serves as a good binder in paracetamol formulations (Nep *et al.,* 2013). Apart from the study of Obidah *et al.* (2010), there is no documented study on using Grewia stem bark powder (GSBP) in feed formulation. This study therefore seeks to assess the possibility of the use of GSBP in animal feed.

Materials and method

i. Proximate composition

Ground stem bark powder of Grewia was purchased from several sellers in the Mangu market in the Mangu Local Government Area of Plateau State Nigeria. They were then mixed properly to obtain a

composite sample. Four samples were collected and taken to four different laboratories in Jos Plateau State for proximate analysis.

Table 1: Composition of Treatment Diets

	T1(%)	T2(%)	T3(%)	T4(%)
Maize	39.08	36.36	33.86	30.99
Palm kernel cake	17.58	14.88	14.11	11.92
Groundnut cake	15.63	16.53	16.93	16.69
Soyabean cake	8.60	9.59	10.16	11.68
Rice offal	7.82	6.61	5.64	7.15
Grewia	0.00	6.48	10.86	13.49
Wheat offal	5.86	4.96	4.51	4.77
Bonemeal	3.91	3.31	2.82	2.38
Limestone	1.06	0.89	0.76	0.64
Premix	0.35	0.30	0.25	0.21
Lysine	0.04	0.03	0.03	0.02
Methionine	0.04	0.03	0.03	0.02
Common salt	0.04	0.03	0.03	0.02
	100.00	100.00	100.00	100.00
Calculated Analysis				
CP	17.03	17.03	17.03	17.03
CF	4.63	4.33	4.21	4.03
Fat	3.52	3.2	3.02	2.88
PC N/kg	312.78	298.92	287.34	277.29

T= Treatment, %= Percentage, PKC= Palm Kernel Cake, GNC = Groundnut Cake, SBC= Soyabean cake, CF=Crude Fibre, CP= Crude Protein. Premix contents; Vit A, 10,000,000 I.U; Vit D3, 2,000,000 I.U; Vit E, 20,000 mg; Vit K3, 2,000 mg; B1, 3000 mg; B2, 5000mg; niacin, 45,000 mg; calcium pantothenate, 10,000 mg; vitamin B6, 4,000 mg; B12, 20 mg; choline chloride, 300,000 mg; folic acid, 1,000 mg; biotin, 50 mg; manganese, 300,000 mg; iron, 120,000 mg; zinc, 80,000 mg; copper, 8,500 mg; iodine, 1,500 mg; cobalt, 300 mg; selenium, 120 mg; antioxidants, 120,000 mg

Feed trial

This study was conducted in the Rabbitry Unit of the Federal College of Land Resources Technology Teaching and Research Farm, Kuru, located on latitude 9.7183° N, 8.8359° E. The experiment lasted for five weeks. Twenty-four mixed sex Chinchilla grower rabbits were used in the study. The animals were administered a branded drug containing 10% ivermectin/ml against ecto and endo-parasites according to manufacturer's specifications. The rabbits were randomly distributed into four treatments groups (designated T1, T2, T3 and T4) with six replicates in a completely randomized design. The GSBP were incorporated into the formulated diet at different levels (T1=0%, T2=2%, T3=4%, and T4=6%). The composition of the various treatments is presented in Table 1. Feed and water were offered *ad libitum*. Daily weight of feed consumed was obtained by subtracting quantity of daily feed leftover from that offered to rabbits. The weekly feed intake was calculated as the cumulative daily feed consumed for the week. The rabbits were weighed at the start of the study and then weekly. The total weight gain for each rabbit was determined at the end of the study by subtracting the initial body weight from the final body weight. Data were subjected to the analysis of variance (ANOVA) using Statistical Package for Social Sciences (IBM® SPSS version 25, 2017), and means were separated using least significant difference (LSD) at $P<0.05$.

RESULTS AND DISCUSSION

The proximate composition is presented in Table 2. The results showed that GSBP has high proportion of crude fibre (17.00%) and nitrogen free extracts (64.92%). The moisture content (7.40%) was considerably low and could be stored appreciably without microbial contamination. The results obtained compared favourable with to those documented for crude fibre (19.70%), nitrogen free extracts (66.16%) and moisture (9.65%) by Gambo *et al.* (2017).

Table 2: Proximate composition of *Grewia mollis* stem powder

Component	Mean ± SEM
Moisture	7.40 ± 0.17
Crude Protein	4.80 ± 0.04
Crude fibre	17.00 ± 0.06
Ether extract	0.80 ± 0.02
Ash	5.00 ± 0.12
NFE	64.92 ± 0.02
Calcium	0.82 ± 0.01
Phosphorus	0.05 ± 0.01

SEM = Standard Error of Mean, NFE = Nitrogen Free Extract

Table 3: Performance of Rabbits feed GSBP

Parameters	T1(%)	T2(%)	T3(%)	T4(%)
Ave. Initial Wt (g)	1077.00±90.61	1162.00±124.13	1317.67±34.35	1036.33±74.26
Ave. Final Weight (g)	2008.33±56.87^{c}	2218.33±69.84^{b}	2450.00±28.29^{a}	2040.01±70.59^{b}
Ave. Weight gain (g)	931.33±98.42^{c}	1056.33±63.39^{b}	1132.32±6.06^{a}	1003.68±33.41^{b}
PC (₦/kg)	312.28	298.91	287.33	277.29
PC (₦/25kg)	7806.96	7472.91	7183.43	6932.22

T= Treatment, %= Percentage, Ave = Average, Wt = Weight, PC = Production Cost, a, b, c = means in the same row with different superscript are significantly different ($p<0.05$)

There were significant ($p<0.05$) differences in average final weight and average weight gain with treatment 3 showing superior performance when compared with the rest of the treatments. The inclusion of GSBP beyond 4% appears to depress the weight gain of the rabbits. This better performance with inclusion of GSBP could be attributed to the presence of a variety of biologically active compounds that may serve as growth and health promoting substances (Gambo *et al.,* 2017; Emmanuel and Ochefu, 2020; Anyanwu *et al.,* 2021). In addition, there was a reduction in the cost of production with increasing inclusion of GSBP.

CONCLUSION

This study showed that GSBP inclusion significantly improved growth performance of growing rabbits up to 4% without deleterious effect on performance and higher profit margin as the production cost is reduced. Therefore, it is recommended that inclusion of GSBP should not exceed 4%.

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