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Growth performance and cost-benefits of feeding West African dwarf goats groundnut haulms and cowpea husk supplemented with brewers' dried grains

Abstract

The objective of this work was to evaluate the growth performance and cost-benefits of feeding West African Dwarf goats' groundnut haulms and cowpea husk supplemented with brewers' dried grains. Twelve West African Dwarf bucks were assigned to four diets (treatments) consisting of groundnut haulms fed at 10, 30, 70 and 90% combined with cowpea husk at 90, 70, 30 and 10% respectively designated as treatments T_1, T_2, T_3 and T_4 with Brewers dried grain (BDG) fed at 150g across treatments as supplement. Parameters measured were daily feed consumption, daily weight changes, daily running costs in form of man hour labor charges, drugs, revenue, transportation and other charges. Data obtained were subjected to analysis of variance (ANOVA) and net farm income (NFI) to carry out the cost-benefit analysis. Results of the research showed average daily dry matter intake (DMI) varying from T_3 (377.71g) to T_2 (417.08g) the highest with significant difference ($P<0.05$) across treatments. While dry matter intake as percentage of live weight (DMI%LVW) obtained were T_2 (3.23) the highest followed by T_4 (3.17), T_1 (3.03) and T_3 (2.91), mean average daily weight gains (ADG) of 62.5g for T_2 being highest, followed by T_3 (61.42g), T_4 (60.17g) and T_1 (60.0g) were obtained respectively with significant difference ($P<0.05$) across treatments. Apparent digestibility results obtained were T_4 (69.22%) being the highest, followed by T_3 (68.9%), T_2 (67.82%) and T_1 (67.75%) the lowest. There was no significant ($P>0.05$) difference across treatments. Costs-benefits analysis showed that T_1 had the highest revenue (N7110.00) followed by T_2 (N7040.00), T_3 (N6560.00) and T_4 (N6436.67) in that order. Gross margin obtained were T_3 (N1090.00) the highest followed by T_1 (N1086.67), T_2 (N1073.33) and T_4 (N1070.00). With profits per Naira invested of N0.18 for $T_1$and T_2 and N0.20 for T_3 and T_4, cost per kilogram weight gained were N1795.60, N1704.76, N1592.48 and N1590.12 for treatments T_1, T_2, T_3 and T_4 respectively. It is concluded that higher inclusion of groundnut haulms in combination with cowpea husk brings more efficient nutrients utilization, higher rate of weight gain and hence higher profit in goat fattening.

Keywords: growth performance, cost-benefits, goats, cowpea husk, groundnut haulms

Volume 5 Issue 6 - 2018

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Received: October 29, 2018 | **Published:** November 27, 2018

Introduction

Nigeria is faced with perennial problem of inadequate quality and quantity of ruminant feed resources. This has resulted in the low productivity of these animals. The natural vegetation which forms the bulk of the primary feed resources is of low nutritive value especially during the dry season. Heavy losses are usually recorded among ruminant animals that depend on natural vegetation for their sustenance during this period.[1] The use of conventional feedstuffs which can salvage the situation is rather unsustainable due to their high costs. Okoruwa, et al.[2] reported that contemporary ruminant feeding development in Nigeria is now geared towards searching for inexpensive and readily available feed resources which can partially or wholly substitute the scarce expensive feedstuffs and inadequate forages.

In Nigeria, large quantities of crop residues are generated at the end of each harvest annually. These residues are of no utilizable or consumable value for man.[1] These crop residues if properly harnessed can meet the nutritional needs of these animals as well as eliminate environmental nuisance associated when left unattended to. It is further reported that most of these crop residues are highly fibrous, tough textured, of low digestibility and deficient in nutrients.[1] The use of forage legumes in livestock production systems in the tropics as alternative to highly expensive oil seed cakes has increased in recent years.

Cowpea (*Vigna unguiculata*) husk is a potential supplementary feed for ruminants in the dry season. About 82,000 tones of Cowpea husk and straws are produced in Nigeria annually.[3] It has been found to have a depressing effect on feed intake in goats but readily accepted by the animals.[4] Nigeria is the leading producer of groundnuts in Africa with an annual estimated output of 2 million metric tones.[5] Thus vast quantities of groundnut haulms are available annually for livestock feeding. The availability of this crop residue and variation in results obtained from ruminants fed on it underscore the need for more studies on how best its potential as animal feed can be exploited. Brewers' dried grains are the solid residues left after the processing or extraction of local beer from grains. Once the sugar content of the grains is extracted, the remaining product is a concentrate of protein and fiber that is suitable for animal feeding particularly ruminants.[6] This residue has a long history in animal feeding.[7]

Growth is a complex biological process that is induced by differential development rates of body tissues. In practice, external measurements of the body have been used to estimate the development of the skeleton and/or soft tissues of the body.[8] In Nigeria most recently, in response to consumer demands, more goat meat is being produced. This is beneficial to the farmer in that there is quick turnover on investment and production of desirable carcass.[9] Goats can be successfully fed a variety of feed stuffs and can be marketed at various weights, ages and body conditions.[10] Profitability is influenced by season, year, genetics and management. Ram fattening for instance, is a profit motivated farming business aimed at maximizing profit.[11] Kemo[12] reported that feeding is the most important part of commercial goat production and maximum profit is mostly dependent on feeding high quality fresh and nutritious feed. Farming for profit requires that a farmer grows crops or livestock that can be sold on market. Farmer must understand market. He/she should know what leads to profit and what leads to loss. The goals of the farmer should among other things be profit maximization, risk reduction, food security and education for children. Costs-benefits analysis provides ways of analyzing and comparing the profitability of crop or livestock under different circumstances. Therefore economic analysis is a valuable tool in the planning and management of animal production enterprise. Livestock enterprise entails resource allocation (money, land and labour (etc.) which are scarce with the aim of making profit. Most of these economic benefits can be expressed in monetary terms. Information on growth performance and cost-benefits of feeding West African dwarf goats' groundnut haulms and cowpea husk supplemented with brewers' dried grains in this region is scanty. The experiment was therefore carried out to among other things determine the effects of the diets on growth performance and costs-benefits of fattening West African Dwarf goats.

Materials and methods

Experimental site

The research was carried out in the small ruminants' unit of Adamawa State University Livestock Teaching and Research farm, Mubi, Adamawa State, Nigeria. Mubi region lies on Latitude 90°11[1] north of the equator and Longitude 13°45[1] east of the Greenwich Meridian at an altitude of 696m above sea level. It is bounded in the South and East by Republic of Cameroun. With land area of 4,728.77m^2 and population of 245,460,[13] it is situated in the Sudan Savanna zone of Nigeria. The vegetation type is best described as *Combretacious* woodland savanna[14] which consists of grasses or weeds and shrubs collectively making 70% of the entire vegetation. Some of these grasses, weeds and shrubs are used as animal feeds. The area has two distinct seasons. Rainy season lasts for four (4) months and dry season that lasts for eight (8) months. Annual rainfall ranges from 700-900mm with peak in August. The area has minimum temperature of 12.7°C in January and maximum of 37°C in April.[15]

Sources of the feeds

The feeds were obtained from three sources. Groundnut haulms and cowpea husk were obtained from the farms after harvest. Some were bought from local farmers while brewers' dried grain was obtained from the local beer brewers.

Animals and management

Twelve male West African Dwarf goats of about one year old and 12Kg initial weights were individually housed in wooden pens. The pens were randomly divided into four groups (treatments) of 3 pens each in a randomized complete block design (RCBD). The treatments were T_1, T_2, T_3 and T_4 that received groundnut haulms at 10, 30, 70 and 90 % combined with cowpea husks at 90, 70, 30 and 10% basal diet which was supplemented with 150grammes of brewers' dried grains in treatments 1, 2, 3 and 4 respectively. The basal diets were fed *ad libitum* throughout the experimental period of 70 days. Clean drinking water was provided *ad libitum* in all these pens.

Parameters determined

Parameters measured were daily feed consumption, daily weight changes, daily running costs in form of man hour labor charges, drugs, revenue, transportation and other charges. Other parameters determined were revenues generated from the sales of fattened animals, used equipment and manure. Proximate composition of the experimental diets was determined by using the method of analysis as described by Association of Official Analytical Chemists.[16] Nutrients determined were dry matter (DM), crude protein (CP), crude fiber (CF), Ether extract (EE), nitrogen free extract (NFE) and total ash.

Data analysis

Data obtained were subjected to analysis of variance (ANOVA) and net farm income (NFI) analysis as described by Jabo et al.[17] and Mohammed to carry out the cost-benefit analysis which is specified by Aderinola & Akinrinola[18] as cited by Mohammed as follows.

NI=TR-(TVC+TFC)

Where NI, Net Income (Profit of the product in Naira/Kg; TR, Total Revenue of the ith product in Naira/Kg; TVC, Total Variable Costs of the ith product in Naira/Kg; TFC, Total Fixed Costs of the ith product in Naira/Kg.

Some economic indicators were also applied to ascertain the economic viability of the study. Hence Operating ratio, gross ratio and fixed ratios were calculated following Olukosi & Erhabor[19] as below;

OR=TOC/GI

Where OR, operating ratio; TOC, Total operating cost; GI, Gross income; GR, TFC/GI

GR = TFC/GI

Where GR, Gross ratio; TFC, Total fixed expenses; GI, Gross income

FR=TFC/GI

Where FR, Fixed ratio; TFC, Total fixed cost; GI, Gross income

Feed conversion ratio, being total feed intake per unit weight gain was also calculated for each goat in each treatment.

Results and discussion

In Table 1, are presented the experimental diets with groundnut haulms and cowpea husk combined at different levels. The efficiency is measured by the dry matter intakes, dry matter intake as percentage of live weight, daily weight changes, feed efficiencies, cost per weight gain, net return on investment and return per Naira investment. Results of the experiment on growth performance and costs-benefits are presented in Table 2 & 3.

Results of the research showed average daily dry matter intake (DMI) varying from T_3 (377.71g) to T_2 (417.08g) the highest with

significant difference (P<0.05) across treatments. This is lower than that (668.4g) of Mohammad & Ramli[20] when they fed goats Napier grass and oil palm frond supplemented with Soy waste. However, Mtenga et al.[6] had earlier obtained dry matter intake of 794g which is similar to that of Mohammad & Ramli[20] when they fed Saanen goats high energy diets. They concluded that goats fed high energy diets grow faster and utilize feed more efficiently than those on low energy diets. While dry matter intake as percentage of live weight (DMI%LVW) obtained were T_2 (3.23) the highest followed by T_4 (3.17), T_1 (3.03) and T_3 (2.91), they were lower than 3.7% obtained by Mohammad & Ramli.[20] Mean average daily weight gains (ADG) of 62.5g for T_2 being highest, followed by T_3 (61.42g), T_4 (60.17g) and T_1 (60.0g) were obtained respectively with significant difference (P<0.05) across treatments. This was lower than 185g of Mtenga et al.[6] but similar to 66.07g obtained by Nyako.[21] Apparent digestibility results obtained were T_4 (69.22%) being the highest, followed by T_3 (68.9%), T_2 (67.82%) and T_1 (67.75%) the lowest. There was no significant (P>0.05) difference across treatments. Result obtained was similar to 68% reported by Mtenga et al.[6]

Feed Conversion efficiency varied from 0.147 (T_4) to 0.163 (T_3) as against 0.065[20] and 0.08.[22] with feed conversion ratios of 6.12 (T_3) to 6.81 (T_4) obtained. Feed conversion efficiency is a function of feed intake and weight gain. Nutrients intake in a feed is a function of amount of feed eaten and the nutrients levels in the diet. Growth rate (weight gain) requires extra feed intake above what is required for maintenance. Faster growth rate means better feed conversion efficiency, because it makes more use of feed available for production (NRC, 1994).

Babale et al.[23] on feeding West African Dwarf goats varying levels of maize bran with groundnuts haulms basal diets obtained 664g DMI, 3.4% DMI%LVW, 75.70g average daily gain, 75% digestibility with feed efficiency of 9.78. The authors concluded that ground nut haulms being a legume forage rich in crude protein and maize bran rich in energy, could be economically used in formulating diets for dry season feeding of small ruminants. Costs-benefits analysis (Table 3), showed that T_1 had the highest revenue (N7110.00) followed by T_2 (N7040.00), T_3 (N6560.00) and T_4 (N6436.67) in that order. Gross margin obtained were T_3 (N1090.00) the highest followed by T_1 (N1086.67), T_2 (N1073.33) and T_4 (N1070.00). With profits per Naira invested of N0.18 for T_1 and T_2 and N0.20 for T_3 and T_4, cost per kilogram weight gained were N1795.60, N1704.76, N1592.48 and N1590.12 for treatments T_1, T_2, T_3 and T_4 respectively. The economic analysis of the research showed a gross farm income of N1080.00 per head of the animals which implies that the experiment was a profitable venture. The highest turnover of N1090.00 was obtained with treatment T_3 (70% groundnut haulms and 30% cowpea husk) diet. However, economic efficiency of production was found to decrease with increase in the level of cowpea husk inclusion in the diet. This is because groundnut haulms is of higher nutritive value than cowpea husk.[24]

Conclusion and recommendation

It is concluded that higher inclusion of groundnut haulms in combination with cowpea husk brings more efficient nutrients utilization, higher rate of weight gain and hence higher profit in goat fattening. It is recommended that farmers could combine 70% groundnut haulms with 30% cowpea husk supplemented with 150g of brewers' dried grain to get higher rate of gain and profit.

Acknowledgments

None.

Conflicts of interest

Author declares that there is none of the conflicts.

References

1. Osuiji PO, Nsahii IV, Khalili H. Feed Evaluation. *ILCA Manual 5*. Ethiopia. 1995; 40. p.
2. Okorua MI, Adewumi MK, Njidda AA. Nutrients utilization and growth Performance of West African Dwarf goats fed with elephant grass or different proportions of plantain and mango peels. *World Journal of Agricultural Sciences*. 2013;1(6):194–202.
3. Oluokun JA. Intake, Digestion and Nitrogen balance of Diets blended with Urea treated and untreated cowpea husks by growing Rabbits. *African Journal of Biotechnology*. 2005;4(10):1203–1208.
4. Adeloye AA. The influence of varying ratio of Cowpea husk and maize milling waste on feed intake, protein and energy utilization by the goat. *Nigerian Journal of Animal Production*. 1994;21(1,2):23–25.
5. RMRDC. Raw Material Research and Development Council, Federal Ministry of Science and Technology. *Report on Survey of Agro-raw materials in Nigeria*. 2004.
6. Mtenga LA, Owen E, Muhikambele VRM, et al. Performance and feed Utilization in Saanen goats as influenced by castration and diets. *Tanzanian Journal of Agricultural Science*. 2005;6(2):55–61.
7. Charray J, Humbert J, Levif FJ. Manual of Sheep production in humid Tropical Africa. *CTA Publications*. 1992;43–54.
8. Atta M, Adamu AAG, Abuzaid ABI. Effects of two different feeding systems on body growth and measurements in Sudan Nilotic male kids. *Animal Science Journal*. 2011;2(1):01–06.
9. Ahamefule FO, Ibeawuchi JA, Ibe SN. Performance of West African Dwarf goat Fed Pigeon pea-cassava peal Based Diets. *Journal of Animal and Veterinary Advances*. 2005;4(12):1010–1015.
10. Schoenian S. Option for fattening (finishing) meat goats. *Review on Animal Production*. 2013;15(2):173–178.
11. Shiawoya EL. Sheep Fattening Enterprise as a strategy for poverty reduction: A case Study of some key Local Government Areas of Niger State. *Journal of Human Ecology*. 2006;20(1):11–14.
12. Kemo, M. Modern goats farming methods. 2017.
13. Saidu I, Gadiga BL. *Population: A write up in Mubi region, A Geographical synthesis*. In: Adebayo AA, editor. Paraclette Publishers; 2004;117–119.
14. Areola OO. *Soil and Vegetable Resources in Geography of Nigeria Dev.* Nigeria: 1983;26–40.
15. Adebayo AA. *Mubi Region: A geographical synthesis*. 2004.
16. AOAC (Association of Official Analytical Chemists). *Official Methods of Analysis*. 18th ed. USA: AOAC International, Maryland; 2005.
17. Jabo MSM, Buhari UA, Bashir SS. Profitability assessment of beef (suya) marketing in Sokoto metropolis. *Proceedings of the 24th Annual Conference of farm management Association of Nigeria, Nigeria*. 2010;304–305.
18. Aderinola EA, Akinrinola OO. Profitability, input elasticity and return to scale for yam production in Ondo State, Nigeria. Proceedings of the 39th Conference of the Agricultural society of Nigeria. 2005;300–303.

19. Olukosi JO, Erhabor PO. *Introduction to Farm Management Economics; Principles and Application*. Agitab Publishers ltd Zaria; 1980.

20. Mohammed MR, Ramli BA. Feed intake and growth performance of goats fed with Napier grass and oil palm fronds supplemented with Soy waste. *Journal of Applied Animal Research*. 2014;43(3):256–260.

21. Nyako HD. Effects of feeding different supplements on the performance of Yankasa Rams offered a basal diet of groundnut haulms. *Global Journal of Animal Scientific Research*. 2016;4(3):576–582.

22. Ferdous MR, Khan MJ, Rashid MA, et al. Effects of different Levels of concentrate supplementation on the performance of Black Bengal goats. *Bangladesh Journal of Animal Science*. 2011;40(1–2): 40–45.

23. Babale DM, Yahaya MS, Kibon A. Effects of feeding graded levels of Maize bran on the performance of West African Dwarf goats offered a basal diet of ground nuts haulms. *Adamawa State University Journal of Agricultural sciences.* 2011;1(1):64–67.

24. Federal University of Technology. Nigeria: Paraclette Publishers; 32–33.

Citation: Babale DM, Millam JJ, Abaya HY, et al. Growth performance and cost-benefits of feeding West African dwarf goats groundnut haulms and cowpea husk supplemented with brewers' dried grains. *MOJ Anat & Physiol.* 2018;5(6):386–389. DOI: 10.15406/mojap.2018.05.00231