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The Potential of Oyo and Kwara States of Nigeria as sources of groundnut (*Arachis hypogaea* L.) haulm for livestock feeding

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Abstract

Groundnut (Arachis hypogaea L.) haulm is an important supplement in ruminant feeding in Nigeria especially during the dry season. However, the cost of transportation from Sudan Savannah States of Nigeria where it is mostly produced to other parts of the country is very high. This study therefore was aimed at investigating the potential of Oyo and Kwara States to supply groundnut haulm (GH) for feeding livestock. A three-stage sampling technique was used for this study. The first stage was purposive selection of Oyo and Kwara States for their relative high groundnut production activities. In the second stage, Ogbomoso Local Government Area (LGA) and Morro LGA of Oyo and Kwara States, respectively were purposively selected because of the preponderance of groundnut farmers in these areas. The third stage involved the use of snowball sampling method for the selection of groundnut producing communities and groundnut farmers where Focus Group Discussions (FGD) were conducted and structured questionnaire were used to elicit information from interviewed respondents. Three villages each were purposively selected from Morro LGA and Ogbomoso LGA making a total of six villages. Data were collected from 60 purposively selected groundnut farmers from the six communities. The data obtained were analyzed using descriptive statistics of frequency counts, average ranking and matrix scoring. The results indicated that all the respondents (100%) planted groundnut only during the raining season and majority (56.65%) had potential to generate between 2- 4 tonnes of haulm per hectare. Inadequate finance had the highest score (5) as the most limiting constraint facing groundnut production. Almost all the farmers (98.35%) were not aware that GH could serve as livestock feed thus majority of them (81.70%) left it in the field to decay to increase soil fertility. Based on this study, the GH generated in Oyo and Kwara States may significantly contribute to livestock feeding in Nigeria. The government should assist the groundnut farmers with funds and sensitize them about importance of GH in livestock feeding for increased production and income

Key words: Groundnut haulm, groundnut farmers, Oyo and Kwara States, ruminant feeding

Running title: GH from Bode Saadu and Ogbomoso for livestock

Le Potentiel des États d'Oyo et de Kwara au Nigéria en tant que sources de paille de cacahuète (*Arachis hypogaea L.*) pour l'alimentation du bétail

Résumé

La paille de cacahuète (Arachis hypogaea L.) est un complément alimentaire important pour les ruminants au Nigéria, surtout pendant la saison sèche. Cependant, le coût du transport depuis les États du Soudan Savane du Nigéria, où elle est principalement produite, vers d'autres régions du pays est très élevé. Cette étude visait donc à examiner le potentiel des États d'Oyo et de Kwara pour fournir de la paille de cacahuète (GH) destinée à l'alimentation du bétail. Une technique d'échantillonnage en trois étapes a été utilisée pour cette étude. La première étape a consisté à sélectionner les États d'Oyo et de Kwara en raison de leur activité élevée en production de cacahuètes. Lors de la deuxième étape, la zone de gouvernement local (LGA) d'Ogbomoso et la LGA de Morro d'Oyo et de Kwara, respectivement, ont été choisies en raison de

la prépondérance des producteurs de cacahuètes dans ces zones. La troisième étape a impliqué l'utilisation de la méthode d'échantillonnage en boule de neige pour la sélection des communautés productrices de cacahuètes et des producteurs de cacahuètes, où des discussions en groupes (FGD) ont été menées et un questionnaire structuré a été utilisé pour recueillir des informations auprès des répondants interviewés. Trois villages ont été sélectionnés de manière ciblée dans la LGA de Morro et dans la LGA d'Ogbomoso, pour un total de six villages. Des données ont été collectées auprès de 60 producteurs de cacahuètes sélectionnés de manière ciblée dans les six communautés. Les données obtenues ont été analysées à l'aide de statistiques descriptives telles que les comptes de fréquence, le classement moyen et la notation matricielle. Les résultats ont indiqué que tous les répondants (100 %) cultivaient des cacahuètes uniquement pendant la saison des pluies et que la majorité (56,65 %) avait le potentiel de produire entre 2 et 4 tonnes de paille par hectare. Le manque de financement a obtenu le score le plus élevé (5) en tant que contrainte la plus limitante à la production de cacahuètes. Presque tous les agriculteurs (98,35 %) n'étaient pas conscients que la GH pouvait servir de nourriture pour le bétail, la majorité d'entre eux (81,70 %) la laissant donc sur le terrain pour se décomposer et augmenter la fertilité du sol. Selon cette étude, la GH produite dans les États d'Oyo et de Kwara pourrait contribuer de manière significative à l'alimentation du bétail au Nigéria. Le gouvernement devrait aider les producteurs de cacahuètes en fournissant des fonds et les sensibiliser à l'importance de la GH dans l'alimentation du bétail pour accroître la production et les revenus.

Mots-clés : Paille de cacahuète, producteurs de cacahuètes, États d'Oyo et de Kwara, alimentation des ruminants

Introduction

In order for livestock farmers to mitigate the consequences of pasture shortage, they resorted to using alternative feed stuffs such as crop residues and agro-industrial by-products (Sosina, 2017). Also, Olafadehan and Adebayo (2016) reported that crop residues serve as an alternative feed resource for the period of the prolonged dry season. Crop residues are described as the plant materials that are left in the field after the target crops have been harvested for example GH.

In time past, groundnut was grown primarily for oil and nut; the vegetative parts are left in the field to decay and improve soil fertility. As the search for alternative feed resources progresses, the vegetative part of groundnut, mainly the leaves and vines with leftover pods collectively referred to as haulm, has become a popular feed resource in the livestock industry (Adewuyi, 2021). The haulm is known to be acceptable by livestock. Liao and Holbrook (2007) added that GHs are more palatable than many other fodders. GH can serve as a supplement or be fed alone to the animals (Etela *et al*., 2011). It can as well be given to livestock fresh, dry, or in ensiled form (Hill, 2002). GHs are relished by animals due to their relatively high protein value (Liao and Holbrook, 2007). According to Singh and Diwakar (1993), the protein and cell wall carbohydrate contents of GH ranged from 5-15 % and 38-45%, respectively. GH can be included up to 500 – 800 g/kg in the diet of sheep for optimum weight gain and efficient nutrient utilisation during the dry season (Ososanya, 2012). The protein value of GH is higher than maize stover but possesses similar energy content. Groundnut is the largest crop produced in The Gambia and the haulm obtained is the most available feed resource for the small ruminants during the nine months of dry period in the urban and peri-urban areas (Asaolu *et al*., 2010). Groundnut hay is extensively used for livestock in India (NDDB, 2012). Etela and Dung (2011) found that West African Dwarf (WAD) sheep can be fed sole groundnut haulm from 6 dual purpose varieties without compromising nutrient intake and growth. When groundnut haulms were fed as a supplement to lambs feeding on different non-leguminous residues as a basal diet, there were significant improvements in their live weight gain (Abdou et al., 2011).

Despite the high potential of GH as a livestock feed resource, its production is mainly in the States within Sudan savannah agro-ecological zone of Nigeria, resulting in high cost of transportation to different parts of the country where and when it may be needed. There is still scarcity of information on abundance of GH in other parts of the country. This study was therefore conducted to assess the potential of Oyo and Kwara States of Nigeria as sources of GH for livestock.

Methodology

Study location

The study was conducted in Ogbomoso and Morro LGAs of Oyo and Kwara States, respectively. Both Ogbomoso North and South LGAs belongs to the same Ogbomoso Agricultural Extension Zone of Oyo State agricultural development programme, therefore the study combined the two LGAs. Ogbomoso LGAs fall within longitude 4º14'E and 4 º22'E and latitude 8 º07'N and 8º8'N. Morro LGA is in zone C of agricultural development programme of Kwara State and falls within longitude 4º47'E and 4 º70'E and latitude 9º04'N and 9 º5'N (Figure 1). The selected locations are suitable for groundnut production due to their relatively high temperature and the well-drained sandy nature of their soil (ICRISAT, 2015).

Sampling procedure

A three-stage sampling technique was used for this study. The first stage was purposive selection of Oyo and Kwara States for their relative high groundnut production. In the second stage, Ogbomoso Local Government Area (LGA) and Morro (LGA) of Oyo and Kwara States, respectively were purposively selected because of their preponderance of groundnut farmers. The third stage involved the use of snowball sampling method with the help of the agricultural extension officers in charge of the two respective agricultural zones studied as the key informants for the selection of groundnut producing communities and groundnut farmers The three villages from Morro LGAs were Awesu, Sharanga, and Bode Saadu while the villages from Ogbomoso LGAs consisted of Abogunde, Iwofin and Agriculture Farm Settlement making a total of six communities

Research instruments, population and Sample size

The instruments used for data collection were FGD, structured questionnaire and secondary data of the registered groundnut farmers. From the secondary data in the zonal Agricultural office and FGDs, it was observed that groundnut production pattern in the study locations followed similar pattern therefore, 60 groundnut farmers were purposively selected for the study from six villages, three communities each from Ogbomoso and Morro LGAs as identified by the key informants, the extension officers in charge of the study locations. Information collected include socio-economic characteristics, farm size, groundnut yield, small ruminant kept, haulm uses, sources of capital and labour, constraints and solutions. Groundnut (SAMNUT-21) haulm yield cultivated in the study areas was estimated as twice the quantity of pods (ICRISAT, 2015). Data obtained were analyzed using descriptive statistics of frequency counts, average ranking and matrix scoring, pair-wise ranking and matrix scoring.

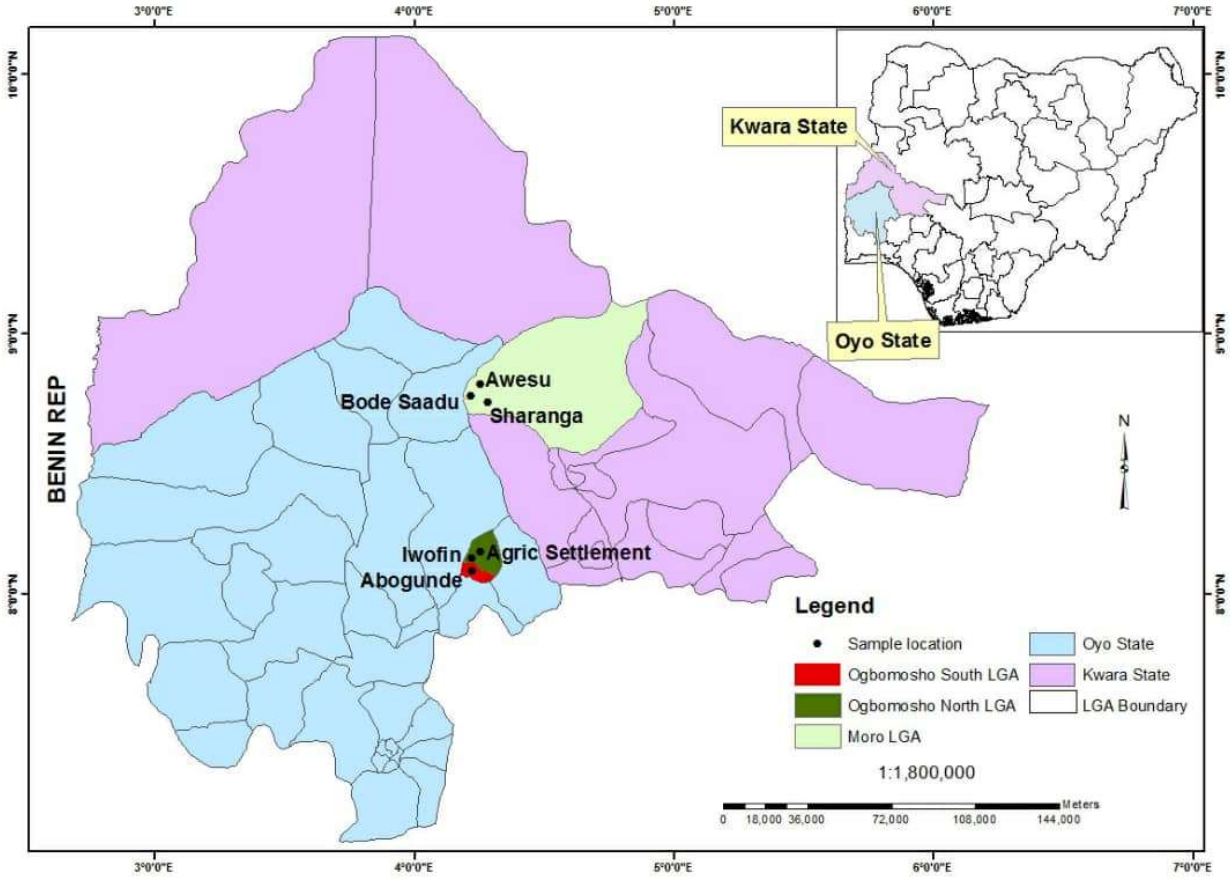

Figure 1: Map of study locations- Morro and Ogbomoso Local Government Areas (North and South belonging to one Agriculture extension zone) of Kwara and Oyo States, respectively.

Results and discussion

Socio-economic characteristics of groundnut farmer

Table 1 shows the socio-economic characteristics of groundnut farmers in Ogbomoso and Morro LGAs of Oyo and Kwara States respectively. The majority of the groundnut farmers (80%) from the study areas were males. This result agrees with the findings of Olafadehan and Adewumi (2011) that reported male dominance in crop-livestock production systems in Derived savannah. This may be attributed to the predominance of the traditional system of crop production which is drudgery, stressful, and requires physical strength that may be difficult for the women to cope with. The dominance age range of 21-40 and 41-60 years obtained in the present study for Ogbomoso and Morro respectively contradicts the reports of Gebreegziabher *et al*. (2016) that reported the age bracket of 35 - 45 years category for the crop-livestock production system in derived guinea savannah. This may be due to different class intervals used or better awareness of prospect in groundnut production for both the youth and adults in the study areas, although fewer youths were involved in groundnut production in Morro Local Government compared to Ogbomoso probably because of 'Okada' (motorcycle) business which may be more lucrative in the area. It may also be as a result of the relatively higher literacy level of farmers in Ogbomoso which possibly prompted them to prefer a less 'life

risky' or more dignified profession, and their better understanding of benefits in agriculture compared to those from Morro. A large proportion of the groundnut farmers (96.7%) in the study locations were married. This may be due to the early income-generating nature of arable crops enterprise which probably encourages them to start a family life and settle down at early age as compared to professions that require a longer year of academic training to secure a job (Adewuyi, 2021). Most of the farmers (78.4%) in the study areas embraced farming as their major occupation. This may be attributed to the agrarian background of the people in the studied area and their awareness of a better future in agribusiness, as the nation expects a paradigm shift in the economy from petroleum or crude oil to agricultural production. Majority of the respondents from Morro LGAs (60.00%) had Arabic education while a large proportion of their counterparts from Ogbomoso (53.30%) received secondary education. This may be due to higher number of Muslim in Morro LGAs compared to Ogbomoso which are predominantly of Baptist denomination and embraced Western education. The results on educational level of the farmers from Ogbomoso contradicts the findings of Fakoya (2002) and Ayuk *et al*. (2011) that reported low literacy levels among farmers involved in the crop-livestock production system. The household size of 6-10 was the highest (40.00%) for farmers from Morro while majority (41.65%) of the respondents from Ogbomoso had household size of 1-5 which was comparatively lower. This may be attributed to larger size of farms been cultivated in Morro LGAs that requires more family labour since the production is still mainly traditional in the study areas.

Groundnut production in the study locations is presented in Table 2. The average yield of between 1-2 tonnes per hectare recorded by the farmers is slightly higher than 0.9 tonne/ha earlier reported by ICRISAT (2015) among the traditional groundnut farmers in Nigeria, this may be due to new cultivars available to farmers in recent times. However, the groundnut farmers from Morro had relatively higher productivity than Ogbomoso. This might be as a result of better environmental factors (soil, water, or temperature) in the Guinea savannah and management or cultural practices by the farmers. GH has been estimated to be based on the cultivars (ICRISAT, 2015). The dominat cultivar in the study areas was SAMNUT-21 with haulm potential of twice the pod (ICRISAT, 2015). Most of the farmers (66.70%) from Morro could generate more than 4 tonnes of GH per hectare and majority of their counterparts from Ogbomoso (80.00%) could turn in upto 2 tonnes of GH per hectare. This suggest an average of 4 tonnes of GH/ha per farmer and 8 tonnes in total since a farmer from each of the locations cultivated 2ha of groundnut on the average. Groundnut production is more abundant in the drier region of Nigeria (ICRISAT, 2015). All the respondents (100.00%) cultivated groundnut during the rainy season only. This may be due to a lack of irrigation facilities during the dry season for crop production. The study also reveals that farmers in the study locations depended more on friends and family (53.35%) followed by personal savings (33.35%) as the main source of finance for their farming. This may be the reason for the low farm size of an average of 1-2 ha by the majority of the farmers from the two locations. On average, the two major sources of labour available to the farmers were hired (55%) and family (45%), this may be probably due to medium-size production capacity that might not necessarily require the use of mechanization (Adewuyi, 2021)

Table 1: Socio-economic characteristics of groundnut farmers in Morro and Ogbomoso LGAs of Kwara and Oyo States

	Groundnut farmers (%)		
Variables	Morro (n=30)	Ogbomoso (n=30)	Average %)
Sex			
Male	96.70	86.70	91.70
Female	3.30	13.30	8.30
Total	100.00	100.00	100.00
Age			
<20	10.00	0.00	5.00
21-40	26.70	57.00	41.85
41-60	53.30	43.00	48.15
>60	10.00	0.00	5.00
Total	100.00	100.00	100.00
Marital status			
Married	93.30	100.00	96.65
Single	6.70	0.00	3.5
Total	100.00	100.00	100.00
Household size			
1-5	33.30	50.00	41.65
6-10	40.00	30.00	35.00
>10	26.70	20.00	23.35
Total	100.00	100.00	100.00
Educational level			
Primary	23.30	33.30	28.30
Secondary	13.30	53.30	33.30
Tertiary	6.70	13.40	10.10
Arabic	53.30	0.00	26.65
None	3.40	0.00	1.65
Total	100.00	100.00	100.00
Occupation			
Trading	10.00	23.30	16.65
Civil Service	3.30	0.00	1.65
Farming	86.7	70.00	78.35
Artisan	0.00	6.70	3.35
TOTAL	100.00	100.00	100.00

n = Number of respondents in respective variable groups
Source: Field survey, 2017

Table 2: Groundnut production in Morro and Ogbomoso (LGAs) of Kwara and Oyo States respectively

Parameters	Groundnut production (%)		
	Morro (n= 30)	Ogbomoso (n= 30)	Average (%)
Farm Size (hectares)			
1-2 ha	70.00	90.00	80.00
>2 ha	30.00	10.00	20.00
Total	100.00	100.00	100.00
Yield in tonnes per ha			
1-2 tonnes	33.30	80.00	56.65
>2	66.70	20.00	43.35
Total	100.00	100.00	100.00
Potential haulm yield In tonnes/ hectare			
2-4	33.30	80.00	56.65
> 4	66.70	20.00	43.35
Total	100.00	100.0	100.00
Season(s) of production			
Rainy	100.00	100.00	100.00
Dry	0.00	0.00	0.00
Both	0.00	0.00	0.00
Total	100.00	100.00	100.00
Sources of fund			
Personal Saving	20.00	46.70	33.35
Friends and family	56.70	50.00	53.35
Banks	0.00	0.00	0.00
Cooperative	3.30	0.00	1.65
Buyer	20.00	3.30	11.65
Total	100.00	100.00	100.00
Sources of labour			
Family	46.70	43.30	45.00
Hired	53.30	56.70	55.00
Communal	0.00	0.00	0.00
Total	100.00	100.00	100.00

n= no of respondents in respective variable group, ha=hectare
Source: Field survey, 2017

The need of assessment groundnut production in the study locations

Table 3 shows the five major problems facing the farmers and suggested solutions from PRA exercise conducted at the study locations. The problems identified by the farmers were drought, pest/diseases, labour, animal invasion, and inadequate finance. The suggested solutions include the provision of irrigation facilities, chemicals to control diseases, modern farm implements, restriction of open grazing, and accessible funds like a loan for agribusiness.

The result of Focus Group Discussion (FGD) among the groundnut farmers in Morro and Ogbomoso using a pair-wise ranking technique of comparing two problems at a time with the farmers deciding which of the problem was more important is presented in Table 4. Constraint/ problem 5 which was inadequate finance had the highest frequency of four in both Morro and Ogbomoso followed by drought, constraint (1) with frequency of 3 in both locations. Animal invasion (4) was ranked higher in Ogbomoso with frequency of 4 than constraint 2 pest/diseases with frequency of 1 but the reverse was the case in Morro as pest/disease (2) had a frequency of (1) and zero for animal invasion. The five major problems identified by the farmers were drought, pest/diseases, labour availability, animal invasion, and inadequate finance. This is partially in agreement with the report by ICRISAT, (2015) that drought, edaphic, diseases, and seed were the major challenges facing groundnut production in Nigeria. The pair-wise comparison results revealed that inadequate finance is the most limiting constraint to groundnut production in the study areas. This is corroborated by the economics principle that capital is the most important factor of production because all other factors can be acquired through it. Followed by inadequate finance is the drought. This is in tandem with ICRISAT, (2015) report that drought stress at the beginning and end of groundnut season affects plant establishment, poor yield, crop failure, pod formation, and risk of aflatoxin infection.

Table 3: The need assessment of groundnut production in Morro and Ogbomoso LGAs

Serial no	Constraint	Solution
1.	Drought	Provision of Irrigation
2.	Pest/Diseases	Rodenticides and disease resistant cultivars
3.	Labour	Farm implement should be provided
4.	Animal invasion	Open grazing should be prohibited
5.	Inadequate finance	Agricultural loan should be made available

Farmers' awareness of GH as livestock feed and its alternative uses

Table 5 shows the farmers' awareness of GH as livestock feed and its alternative uses in Morro and Ogbomoso LGA. All the respondents (100%) from Ogbomoso were not aware that GH is a feed resource for livestock. Similarly, 96.7% of farmers from Morro were not aware that it could be fed to livestock as feed. On average, 98.4% of the farmers were ignorant of GHs as a livestock feed resource. Most farmers (81.7%) left the haulm to decay in the field while some farmers (16.65%) allowed it to be grazed by cattle together with other weeds. The majority of the respondents in the study area were not aware of GH as a feed resource. This result agrees with Rehab *et al*. (2004) that reported a poor understanding of the nutritional and economic value of GH in ruminant diets by livestock farmers in Egypt. As a result of low awareness of

GH as livestock feed, the majority of the groundnut farmers both Morro and Ogbomoso allowed the haulms to decay in the field as an organic manure for improvement of soil fertility and few of them allow it to be grazed alongside other weeds by cattle. This is in agreement with the finding of Sansoury and Emery (1982) that crop residues as livestock feed is faced with challenges of alternative uses like fuel, composting, construction and pharmaceuticals.

Table 4. The pair-wise comparison of groundnut production problems in Ogbomoso and Morro LGAs

	Farmers ranking of the constraints	
	Morro	Ogbomoso
Comparison	More important	More important
Constraint 1 Vs Constraint 2	1	1
Constraint 1 Vs Constraint 3	1	1
Constraint 1 Vs Constraint 4	1	1
Constraint 1 Vs Constraint 5	5	5
Constraint 2 Vs Constraint 3	3	2
Constraint 2 Vs Constraint 4	2	4
Constraint 2 Vs Constraint 5	5	5
Constraint 3 Vs Constraint 4	3	4
Constraint 3 Vs Constraint 5	5	5
Constraint 4 Vs Constraint 5	5	5

Vs= Versus

Constraint 1=Drought, constraint 2 = pest/diseases, constraint 3 = labour, constraint 4 = animal invasion, constraint 5 = inadequate finance

Table 5: Farmers' awareness of GH as livestock feed and its alternative uses in Morro and Ogbomoso (LGAs) of Kwara and Oyo States respectively

	Farmers Awareness (%)		
Parameters	**Morro (n=30)**	**Ogbomoso (n= 30)**	**Average (%)**
Awareness of GH as a livestock feed			
Aware	3.30	0.00	1.65
Not aware	96.70	100.00	98.35
Total	100.00	100.00	100.00
Haulm use after groundnut Harvest			
As livestock Feed	3.30	0.00	1.65
Burnt it	0.00	0.00	0.00
Left to decay	63.40	100.00	81.70
Grazed with other weeds by cattle	33.30	0.00	16.65
Total	100.00	100.00	100.00

n = number of respondents in respective variable groups

Conclusion

The study revealed that a good number of the farmers in the study areas cultivated about 2 hectares of groundnut (SAMNUT-21) with average yield of up to 4 tonnes of GH per hectare aggregated to 8 tonnes of GH per farmer. With estimation of at least 1000 farmers in the study areas, 8000 tonnes of GH could be generated per season. Therefore, if the groundnut farmers in Ogbomoso and Morro LGA could be sensitized on the importance of GH as livestock feed instead of leaving them in the field to decay as observed in this investigation, the locations could significantly contribute to GH production for feeding livestock in the South West geopolitical regions of Nigeria.

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References

Abdou, N., Nsahlai, I.V., Chimonyo, M. 2011. Effects of groundnut haulms supplementation on millet stover intake, digestibility and growth performance of lambs *Anim Feed Sci Technol,* 169, pp. 176-184

Adewuyi, P. A. 2021. Nutritive value of processed groundnut (A*rachis hypogaea* L.) haulm-based diets for West African Dwarf rams. PhD thesis. Department of Animal Science, University of Ibadan, Pp 196

Asaolu, V. O., Odeyinka, S. M., Akinbamijo, O. O and Sodeinde, F. G. 2010. Effects of moringa and bamboo leaves on groundnut hay utilisation by West African Dwarf goats. Livest. *Res. Rural Dev*., 22 (1)

Ayuk, A. A., G. A. Kalio L.N. Agwunobi and B.I. Okon 2011. Agro By-product Feedstuffs and Livestock Management Systems for Rural Livelihoods in Cross River State *Journal of Agricultural Science* Vol. 3, No. 2; June 2011

Chah, J. M. I., Obi, U. P.1 and Ndofor-Foleng, H. M. 2013. Management practices and perceived training needs of small ruminant farmers in Anambra State, Nigeria *African Journal of Agricultural Research* Vol. 8 (22): pp 2713-2721

Gebreegziabher Z, Stage J, Mekonnen A, Alemu A 2016. Climatechange and the Ethiopian economy: a CGE analysis. *Environmentand Development Economics* 21(2):205–225.

GLSR. 2010. Gambia livestock sector review, FAO. pp 62

Etela, I. and Dung, D. D. 2011. Utilisation of stover from six improved dual-purpose groundnut (*Arachis hypogaea* L.) cultivars by West African Dwarf Sheep. *Afr. J. Food Agric., Nutr. Devel*., 11 (1): 4538-4545

Fakoya E. O. 2002. "Assessment of livestock production systems based on crop residues and legumes in humid zones of Nigeria." Proceeding of the Nigeria society for Animal Production 27th Annual NASP Conference Akure, Pp. 374 – 376.

ICRISAT. 2015. A Farmer's Guide to Profitable Groundnut Production in Nigeria pp36

Liao, B. and Holbrook, C. 2007. *Groundnut.* In: Genetic Resources, Chromosome engineering and Crop Improvement: Oilseed crops, Vol. 4.

Edited by R.J. Singh, CRC Press, Inc., Boca Raton, FL.: 51-87

NDDB, 2012. Nutritive value of commonly available feeds and fodders in India. National Dairy Development Board, Animal Nutrition Group, Anand, India

Olafadehan, O.A. and Adewumi, M. K. 2011. Livestock management and production system of agropastoralists in the derived savanna of South-west, Nigeria. *Tropical and Subtropical Agroecosystems,* 12: 685 – 691

Olafadehan, O. A. and Adebayo, O. F. 2016. Nutritional evaluation of ammoniated ensiled threshed sorghum top as a feed for goats. *Trop Anim Health Prod (48)2: pp*3 DOI 10.1007/s11250-016-1027-4

Ososanya, T. O 2012. Effects of GHs supplementation on ntake, digestibility and growth performance of rams. *Production Agriculture and Technology* 8 (1): 209 -215*; ISSN: 0794-5213. DOI: http://www.patnsukjournal.net/currentissue*

Rehab, A. M., Abdel-Azeem, F., Abdel-Fattah, S. A. and Yacout, M. H. M. 2008. Effect of using commercial enzymes to improve diets contained peanut hay on performance of growing rabbits. *J. Agric. Sci. Mansoura Univ*., 33 (7): 4911 - 4925

Singh, F. and Diwakar, B. 1993. Nutritive value and uses of pigeon pea and groundnut. Skills Development Series No. 14. International Crops Research Institute for Semi-arid Tropics (ICRISAT), Patancheru, Andhra Pradesh 502 324, India, 52pp

Sosina O. A. 2017. Assessment of crop residues as feed resources for crop-livestock production systems in Ibadan-Ibarapa area of Oyo State, Nigeria. A Ph.D thesis submitted to the University of Ibadan, Ibadan, Nigeria, pp 257

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