Journal of Agriculture and Environment Vol. 16 No. 2, 2020: 13-23
ISSN: 1595-465X (Print) 2695-236X (Online)

LEGUMINOUS CROP RESIDUES UTILIZATION FOR LIVESTOCK PRODUCTION IN SELECTED AREAS OF ZAMFARA STATE, NIGERIA

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ABSTRACT

This study assessed the problem associated with proper processing and non utilization of leguminous crop residues for livestock production in the study area. Multi-stage sampling technique was employed to arrive at the sample size of 120 respondents. Data were collected through the administration of structured questionnaire and were analysed using descriptive and inferential statistics. Findings of the study indicated that majority of the respondents were male (91.7%), married (81.7%) with a mean age of 41.5 years. The study further revealed that 99.2% of the respondents had access to crop residues. Majority (78.2%) of the respondents obtained the residues through farming and 97.5% of them utilized it in feeding their livestock. The common leguminous residues utilized in the study area were groundnut haulm (76.5%), cowpea husk (20.45%) and cowpea vine (3.0%). Results of the regression analysis indicated a significant relationship between flock size and utilization of leguminous crop residues. The study concludes that legume crop residues were available and were mostly utilized in raising livestock and it is recommended that farmers should be trained on how to properly process the leguminous crops residue for feeding animals.

Keywords: Analysis; availability and utilization; legume crop residues; animal feed

INTRODUCTION

Leguminosae or Fabaceae is the family of flowering plants that assume to be the third most populous plant among the plant species behind *Asteraceae* and *Orchidaceae* with 670 to 750 genera and 18,000 to 19,000 species. These include important grains, pasture and agro-forestry species. Leguminous crops are best used as crops for human and animal consumption as well as in the production of paper as pulp, fuel-woods, timber, oil production, sources of chemicals and medicines, and are also cultivated as ornamentals, used as living fences and firebreaks among others (Lewis *et al*., 2005).

Basically, there are two types of crop residues namely: cereals (millet, sorghum, maize, etc.) residues and those of the legume (cowpea, groundnut, soybean, etc.) crops. The major crop residues which are grazed or stockpiled for ruminants' feeding are millet and sorghum stalks, cowpea vines, cowpea husks, maize stover, maize husks, and groundnut haulms. Legume crop residues, such as groundnut haulms, cowpea vines, and cowpea husks

have higher crude protein content and are generally used as supplements in addition to grazing of ranges and cereal crop residues (Singh *et al.,* 2003). The potential of legume crop residues as animal feed is enormous if all the different types of legume crops residues are considered and appropriate methods of improving their nutritional value are employed (Lal, 2008). Others (Latham, 1997; Erenstein and Thorpe, 2010) have identified two major uses of crop residues: used as feed for livestock or used as mulch. Moritz (2010) opined that residues use as livestock feed exerts a competitive pressure on residue used as soil mulch. The leguminous crop residues are therefore, good supplements to improve the feeding value of cereal straw. Cowpea and groundnuts are the major legumes and maize, millet and sorghum are the major cereals in West Africa and their residues constitute a major source of livestock feed (Singh *et al*., 2003).

Crop and livestock agriculture is important to the lives of most Nigerians. Fifty to eighty percent of Nigeria farmers are involved in crop, livestock, or crop-livestock agriculture who are increasingly turning into agro-pastoralists (Agyemang *et al.,* 1993). This change is largely spontaneous and is based on perceived reciprocal benefits that such a system offers.

The importance of leguminous crop residues in Talata Mafara Agricultural Development Project Zone of Zamfara State cannot be over emphasized in the sense that it plays a pivotal role in enriching the nutrient requirement of the animals in the study area. As a result, majority of the people in the study area use leguminous crop residues to fatten their animals.

The usage of leguminous crop residues could be seen as adaption of crop residue either as an intensification technology that enhance the availability of biomass and the consequent addition of nutriments to soil or a technology used for the purpose of enhancement of livestock feed (Aregheore, 2011). The non usage of leguminous crop residues in livestock production is among the major reasons why livestock management is not standard throughout Nigeria; this has resulted to lack of available legume crops and orientation about the positive impact of crop residues (proteins and fibre) on animal production. Leguminous crop residue provides ruminant livestock with feed that is rich in protein and energy as well as enhancing high level of intake of such feed by the animals and its antecedent digestibility and growth performances of ruminants fed on the diet. Among the supplements that have been used as protein supplement in ruminants' nutrition is legume forage which has been used as protein supplement for ruminants' livestock (Savon, 2005). Therefore, there is need for providing rich legume residues such as cowpea vines, husk, groundnut haulm, as well as the improve method of utilizing the residue to the livestock farmers. As such this research need to focus on the positive impact of leguminous crop residues in the livestock production in the study area.

The objective of this study is to analyse the availability and utilization of leguminous crop residues for livestock production in the study area.

MATERIALS AND METHODS

The Study Area

Zamfara State is located in the north-western Nigeria. The State is located on longitude 6° 5' and 7' 5' E and latitude 11° 00' and 12° 00' N within the Sudan Savannah agro-ecological zone of Nigeria. The State has an area of 39,768 km^2 with projected population of about 3,278,873 people (NPC, 2011).

The area is characterized by two climatic seasons, dry season (November – April) and rainy season (May – October). The annual rainfall of the state is 1000mm. The annual minimum temperature is 22 ºC and maximum temperature is 33°C with mean temperature of 23°C.

There is a significant variation in the quality of soil in Zamfara State and the land is broadly divided into Fadama (low land) and *Tudu* (upland). Most of the farmers use organic manure to maintain the level of soil fertility. Majority of the inhabitants of the area are peasant farmers who are predominantly Hausa and Fulani by tribe and reside in rural areas. Farming is generally at the subsistent level and mostly done through traditional methods. Crops grown in the area include sorghum, maize, beans and millet which are mostly arable. The major occupations of the people are farming and rearing of livestock.

Sampling Procedure and Sample Size

A four stage sampling technique was used to arrive at the sample size of the study. In the first stage, one Agricultural Development Project Zone out of the zones was purposively selected for the study due to the high number of crop residues user farmers in the Zone. In the second stage two Local Government Areas (Talata Mafara and Bakura) were randomly selected. In the third stage, two districts each from the selected Local Government Areas were randomly selected. In the fourth stage, three villages were randomly selected from each of the selected districts and finally, 20 farmers were randomly selected from the villages, giving a sample size of 120 respondents for the study.

Table 1: Sampling procedure and sample size of the study

ADP Zones	Selected Zone	LGAs	LGAs selected	No. of Districts	Districts Selected	Selected villages	Selected farmers
Zone A		T/ Mafara	T/ Mafara	2	Morai	Gidanbuzu	20
					Garbadu	Unwala	20
						Dalam	20
Zone B	Zone C	Bakura	Bakura	2	Rini	Makusawa	20
					Yarkofoji	Yarduna	20
						Dankado	20
Zone C		Maradun Anka Gummi Bukkuyum					
Total							120

Source: Field Survey, 2018

Data Collection and Analysis

Primary data were collected through the administration of structured questionnaire, while secondary information was obtained from related literature and published and unpublished materials. Data collected were analysed using descriptive (frequency counts, percentage and mean) and inferential statistics (regression analysis). All the research objectives were analysed using descriptive statistics, while regression model was used to test the study hypothesis.

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Respondents

Sex: Table 2 depicted that majority (91.7%) of the respondents were males while their female counterpart constitutes the minority with only 8.3%. This comes into being as a result of cultural and religious restrictions of the farmers that male control over 91.7% of the farming business in the study area. This finding is line with Oseni *et al.* (2013) who reported that women constitute small share of agricultural labour force in Nigeria, and little is known about their activities, roles and constraints in the sector. In the same vein, Bandiera and Rasul (2006) reported that sex of the household had a negative influence on the intensity of farming activities. They added that, female headed household are likely to contribute more in farming activities than their male counterpart.

Table 2: Socio-economic characteristics of the respondents (n = 120)

Variables	Frequency	Percentage	Mean
Sex			
Male	110	91.70	
Female	10	8.30	
Age (years)			
20-30	30	25	41.48
31-40	20	25.83	
41 and above	59	49.17	
Marital status			
Married	98	81.70	
Single	20	16.70	
Divorced	1	0.80	
Widowed	1	0.80	
Educational Attainment			
Primary School Education	4	3.17	
Secondary School Education	33	26.19	
Tertiary	22	17.46	
Qur'anic education	16	12.69	
Adult education	51	40.47	
	*126		
Flock size			
1-10	84	70.0	
11-20	36	30.0	10.7
21 and above	0	0.0	

Source, Field survey, 2018: *Multiple responses

Age: Results of the study in Table 2 further showed that 59% of the farmers were within the age range of 40 years and above, 31% of them were within 31-40 years and 25% were within 20-30 years. The mean age was 41.48 years, implying that majority of the farmers were in their active and youthful age and hence expected to be energetic and productive in the utilization of legume crop residues. This finding is in line with Feder *et al.*

(1985) and Alene *et al*. (2000) who reported that the use of leguminous crop residues was positively and statistically influenced by the age of the user.

Marital status: Majority (81.70%) of the respondents were married, 16.70 % were single, and few (0.80 %) of them were widowed and divorced respectively (Table 2). The findings indicate that majority of the farmers were married and have family responsibilities to cater for and as such can utilize legume crop residues in feeding their animals in order to generate more income for family upkeep through livestock business.

Educational attainment: Results in Table 2 also indicated that 40.47% of the respondents had Qur'anic education only, 26.19% attained secondary school education, 22% obtained tertiary education and 12.69% had adult education, indicating that most the farmers had one form of formal education or the other. This finding is in line with Gerda and Nachoem (2000) who reported that farmers use their educational attainment to utilize the available leguminous crop residues for livestock production.

Flock size: Majority (70%) of the respondents had flock size of 1-10 animals and 30% of them had a flock size of 11 -20 animals. The mean flock size was 11 animals, revealing that majority of the farmers had moderate flock size to be fed with legume crop residues.

Table 3: Socio-economic characteristics of the respondents Cont… (n = 120)

Variables	Frequency	Percentage	Mean
Farm size (ha)			
0.5-5	117	97.50	2.83
5.5 ha and above	3	2.50	
Secondary occupation			
Civil servant	16	12.5	
Farming	57	44.5	
Trading	34	26.5	
Hand working	21	16.4	
	128*		
Land acquisition			
Inheritance	116	80.55	
Purchased	15	10.4	
Rent	11	7.63	
Borrowing	2	1.38	
	*144		
Cooperative Membership			
None	60	48.00	
Farmers Club	32	25.6	
Fadama Users Association	13	10.4	
Water Users	14	11.2	
Miyetti Allah Cattle	3	2.4	
IFAD/CBARDP	27	21.6	
	*122		

Source: Field survey, 2018; 8 *Multiple response

Farm Size: Table 3 further revealed that majority (97.5%) of the respondents had between 0.5-5 hectares of the farmland, while few (2.5%) had 5.5 hectares and above. The mean farm size was 2.83 hectares indicating that majority of the farmers owned small farm

size and hence are referred to as small scale farmers with low input and hence, having small outputs.

Land Acquisition: As indicated in Table 3, majority (80.55%) of the respondents acquired their land through inheritance while few (10.4%) of them acquired their farmlands through purchase, 7.63% of them through rent and few through borrowing (1.38%). According to these findings, most of the farmers possessed their land through inheritance.

Cooperative Membership: Table 4 further indicated that 48.0% of the respondents were not registered into any cooperative society, 25.6% of the respondents were members of farmer's club while few (13.6%) were members of *Miyetti Allah* Cattle Breeders Association. The cooperative association was mainly designed by the farmers to have access to credit facilities, agricultural inputs and aids from government and nongovernmental organizations. These findings are in line with Badiru *et al.* (2016) who reported that the impetus for the organization of cooperatives in Nigeria came from agriculture or more precisely from the marketing of cash crops.

Availability of Crop Residues

Table 4 showed the available crop residue in the study area and majority of the respondents (99.2%) had access to the legume crop residues while few (0.80%) reported to have no access to the legume crop residues in the study area. These findings are in line with Owen (1994) who reported that crop residues constitute a major source of feed for livestock in rural areas of Africa.

Table 4: Availability of crop residues in the study area (n=120)

Crop Residues	Frequency	Percentage
Yes	119	99.2
No	1	0.80

Source, Field survey, 2018

Types and Availability of Leguminous Crop Residues

Findings revealed that majority (78.6%) of the respondents reported groundnut haulm as the common leguminous crop residue in the study area followed by few (16.8%) of the respondents who considered cowpea husk as the most available legume crop residue in the area (Table 5). This finding is in contrast with Anele *et al.* (2010) who posited that cowpea haulm constitutes the common leguminous crop residue and can provide adequate protein and energy to sustain ruminant production during an extended dry season.

Table 5: Types of legume crop residue available in the study area (n=120)

Variable	Frequency	Percentage
G/nut haulm	103	78.6
Cowpea husk	22	16.8
Cowpea vines	6	4.5
	* 131	

Source, Field survey, 2018, *Multiple responses

Means of Obtaining Legume Crop Residues

Results in Table 6 indicated that 78.2% of the respondents obtained legume residues through farming while few (19.1%) of them obtained the residues by purchasing from market or from neighbours. The study therefore revealed that majority of the farmers' source of legume crop residues was their farms.

Table 1: Means of getting legume crop residues (n=120)

Variable	Frequency	Percentage
Farming	111	78.2
Purchasing	27	19.1
Both	3	2.1
	*141	

Source, field survey, 2018; *Multiple responses

Utilization of Legume Crop Residues

Table 7 showed that 97.5% of the respondents utilized legume crop residues in the study area while very few of the respondents 2.5% did not utilize the legume crop residues for animal production. Findings of the study imply that the farmers considered the importance of the residue and as a result majority utilized it for feeding their animals.

Table 2: Utilization of legume crop residues (n=120)

Variables	Frequency	Percentage
Utilizes legume crop residues	117	97.5
Not utilizing the crop residue	3	2.5

Source, Field survey, 2018

Type of Legume Crop Residues Utilized

Result in Table 8 shows that majority (76.5%) of the respondents utilized groundnut haulm, followed by cowpea husk with 20.45% of the respondents while few (3.0%) of the respondents utilized cowpea vine for their animal feeding. This finding is in contrast with Soetan and Oyewole (2009) who reported that groundnut haulm had high crude protein and is mostly utilized by farmers for animal production.

Table 3: Types of legume residues utilized (n=120)

Variable	Frequency	Percentage
G/nut haulm	101	76.5
Cowpea husk	27	20.45
Cowpea vines	4	3.0
	* 131	

Sources, Field survey, 2018; *Multiple responses

Mode of Offering Legume Residues to Animals

Table 9 showed the different ways of offering residues to the animals by the respondents, the findings therefore, showed that majority (97.5%) of the respondents offered the crop residues to the animals in dry form while few (1.5%) reported that they offered their animals with the residues in green/wet form. These findings are in line with Aletor and Omodara (1994) who opined that dried feeds are kept well because the moisture content in it is low to such that spoilage by microorganisms is reduced to certain level and its mostly kept for feeding animals at any season of the year.

Table 4: Means of offering legume crop residues to animals (n=120)

Variable	Frequency	Percentage
Dry form	117	97.5
Wet form	3	1.5
Marshy form	0	0.00

Source: Field survey, 2018

Training Received on the Usage of Leguminous Crop Residues

Table10 indicated that majority (95.8%) of the respondents did not receive any sort of training on the usage of leguminous crop residues while very few (4.2%) of the respondents reported to have received training on the usage of leguminous crop residues in the study area.

Table 10: Training needs of the respondents based on usage of leguminous crop residues

Variable	Frequency	Percentage
Training received	5	4.2
No training received	115	95.8

Source, Field survey, 2018

Types of Training Provided

Table 11showed the various types of training provided on the usage of leguminous crop residues in the study area where the majority (95.8%) of the respondents did not received any sort of training on the usage of legume crop residues, 2.5% of them received training on improved methods of preserving legume crop residues while few (1.7%) of the respondents received training on improved residue storage method. These findings correspond with Daneji, (2011) who reported that extension teaching is out of school informal training given to the farmers in order to help them maximize their output.

Table 11: Types of training provided (n=120)

Variable	Frequency	Percentage
Received no training	115	95.8
Improved method of preservation	2	1.7
Improved storage method	3	2.5

Source: Field survey, 2018

Use of Training Received

Table12 shows that most (60%) of the respondents used the training provided on the usage of leguminous crop residues and some (40%) of them did not use the training provided on the usage of legume crop residues.

Table 12: Use of training received (n=120)

Variable	Frequency	Percentage
Used the training received	72	60.0
Did not use the training received.	48	40.0

Source: Field survey, 2018

Relationship between Socio-economic Characteristics and Utilization of Legume Crop Residues

Table 13 showed the relationship between socio-economic characteristics and utilization of legume crop residues among the respondents in the study area. Multiple regression analysis result indicated that among all the socio-economic variables, only flock size was significantly related ($P< 0.05$) with utilization of legume crop residues for animal feeding. This finding revealed that much usage of leguminous crop by the farmers depends on the number of flocks owned.

Table 13: The relationship between socio-economic characteristics and the utilization of legume crop residues for animal feeding

Variable	Unstandardized coefficient	Standard error	Standardized coefficient	t-ratio	p-value
Constant	1.129	0.084		13.509	0.000***
Sex	-0.027	0.056	-0.47	-0.472	0.638
Age	-0.001	0.002	-0.123	-0.971	0.334
Marital status	-0.013	0.040	-0.035	-3.313	0.755
Flock size	0.004*	0.004	0.148	1.032	0.304
Farm size	-0.10	0.013	-0.090	-0.750	0.454

Source: Field survey, 2018

CONCLUSION

Based on the objectives that guided this study and the findings, it is concluded that majority of the farmers were males and fall within age bracket of 41 years and above with Qur'anic education being the common educational attainment of the respondents and that respondents had access to legume crop residues and was duly utilized for feeding their animals. Findings of the study also revealed that leguminous crops were available in the study area but only few of the respondents received training on the utilization of the residues and majority of those that were trained used the training provided on the utilization of the legume crop residues for feeding animals.

Based on the findings of the study, the following recommendations were made: There is need to include all farmers in the study area in trainings on legume crop residues utilization irrespective of age and gender by the government and nongovernmental agencies; Farmers should endeavour to actively participate in any sort of trainings that have to do with any agricultural activity.

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