



## UTILIZATION OF CROP RESIDUES FOR LIVESTOCK FEEDS AMONG RURAL DWELLERS IN OSUN STATE, NIGERIA

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### ABSTRACT

This study examined the utilization of crop residues for livestock feeds among rural dwellers in Osun State, Nigeria. A multi-stage sampling technique was used in selecting 200 respondents. Data were collected using interview schedule and analyzed using descriptive statistics and multiple regression. The results revealed that the average age of the respondents was 58.1 years. Also, the crop residue mostly used by respondents was cassava peel (98.5%) and yam peels (96.0%). All (100.0%) of the respondents had knowledge that crop residues could be used for livestock feeds, while majority (64.0%) of the respondents were grouped as having low utilization. Barriers that hindered utilization of crop residues for livestock feeds were difficulty in processing crop residues ( $\bar{x}=1.86$ ) and inability to collect and transport ( $\bar{x}=1.77$ ). The results of the regression analysis revealed that gender ( $\beta=-2.73$ ), household size ( $\beta=0.73$ ), level of education ( $\beta=1.79$ ) and income ( $\beta=5.00$ ) were significant in influencing the utilization of crop residues for livestock feeds among respondents in the study area. The study concluded that utilization of crop residues for livestock feeds was influenced by gender, household size, level of education, income of the rural dwellers in the study area. The study recommends the need for extension organizations to organize workshops on crop residue management, focusing on nutritional value, processing and storage techniques among rural dwellers raising livestock in the study area.

**Keywords:** Crop, Residues, Livestock, Feeds, Utilization, Rural-dwellers

### INTRODUCTION

Livestock farming is an essential component of agriculture, providing meat, milk, hides, and draught power. However, a major challenge faced by rural livestock farmers is the availability and affordability of quality feed. Feeding livestock remains a critical factor in ensuring high productivity and profitability in rural communities (Adesogan *et al.*, 2020). Despite its importance, rural livestock production is fraught with challenges, chief among them being the cost and availability of feed. Feed often constitutes 60–70% of total livestock production expenses, making it a critical factor influencing the sustainability and profitability of livestock farming (Shah *et al.*, 2025). Seasonal feed shortages, particularly during dry months, further exacerbate the problem, leaving farmers struggling to sustain their herds. Livestock feed can be sourced commercially or through natural by-products like crop residues. Crop residues are the leftover plant materials after the harvest of grains, such as maize stover, rice straw, and groundnut haulms. These residues are abundant in rural areas and can serve as a cheap alternative to conventional livestock feed (Ademosun, 2021). Livestock feed plays a major role in ensuring health, growth, and animal productivity. It provides the necessary nutrients required for maintenance, reproduction, and optimal production of meat, milk, and other livestock products. Feeds are broadly categorized into two groups: concentrates, which are rich in energy or protein (e.g., grains and oilseed meals), and roughages, which include pasture grasses, forages, and crop residues (Ponnampalam, 2025).

Crop residues, the plant materials left after harvesting crops such as rice, maize, and wheat, present a viable solution to this challenge. These residues are abundant in most rural farming communities and can serve as a cost-effective and sustainable livestock feed resource. When managed correctly, they provide a way to enhance livestock nutrition while addressing feed scarcity. However, despite their availability and potential, use of crop residues as livestock feed remains sub-optimal due



to various socio-economic, technical, and cultural barriers (Gatkal *et al.*, 2024; Rao *et al.*, 2024). It holds significant potential as a cost-effective and sustainable alternative for livestock feed. Despite their availability, their utilization remains low among rural dwellers. Key barriers include limited knowledge about their nutritional benefits, lack of processing and storage facilities, and competing uses of residues for purposes like fuel or mulching (Topa *et al.*, 2025). Furthermore, traditional practices such as residue burning not only waste valuable feed resources but also contribute to environmental pollution and climate change (Polipalli, 2025). While Governments and agricultural extension services have introduced various programs to promote sustainable agricultural practices, the adoption of crop residue utilization remains inconsistent and poorly understood. Existing research has not fully explored the extent of rural farmers' knowledge, practices, and challenges regarding the use of crop residues for livestock feeding. This knowledge gap limits the development of targeted interventions that could address the problem effectively (Orounladji *et al.*, 2025). It is against this background that this study examined the utilization of crop residues for livestock feeds among rural dwellers in Osun State, Nigeria. Specifically, described respondents' socio-economic characteristics, identified crop residues used for livestock feeds, determined respondents' knowledge on crop residues for livestock feeds, determined respondents' frequency of usage of crop residues for livestock feeds, and, examined barriers to utilization of crop residues for livestock feeds.

## **MATERIALS AND METHODS**

### **Study Area**

The study was carried out in Osun State, located in southwestern Nigeria, lies between latitude 7°30'N and 8°45'N and longitude 4°00'E and 5°05'E. It shares boundaries with Kwara State to the North, Oyo State to the West, Ogun and Ondo States to the South, and Ekiti State to the East. The state is characterized by a tropical climate, with forested regions in the south and savannah vegetation in the north, making it suitable for both crop farming and livestock production (Adeyemi *et al.*, 2022). Osun State has a total of 30 Local Government Areas (LGAs). The dominant language in Osun State is Yoruba, with variations such as Oyo, Ijesa, and Ife dialects commonly spoken in different parts of the state. English is also widely used as an official language in schools, businesses, and administrative settings. Language plays an integral role in preserving cultural identity, as reflected in traditional festivals, storytelling, and local interactions (Ogunniyi *et al.*, 2023). The population of this study all the rural dwellers engaged in crop and livestock farming activities in Osun State, Nigeria.

### **Sampling Procedure and Sample Size**

A multi-stage sampling procedure was used in selecting respondents for this study. The first stage involved a proportionate random selection of 17% of the 30 Local Government Areas (LGAs), giving a total of 5 Local Government Areas (LGAs), namely Oriade, Obokun, Ilesa West, Atakunmosa West, and Boripe. The second stage involved a random selection of two communities in each of the selected LGAs, making a total of 10 communities. The communities were Itegun, Ijeda, Esa-odo, Ilare, Itakogun, Ikoyi, Kajola, Oke-ibode, Ororuwo, and Ada. The third stage involved a purposive sampling of 20 rural dwellers rearing livestock from the 10 selected communities, making a total of 200 respondents.

### **Data Collection and Analysis**

Data were collected using interview schedule to obtain information on the socio-economic characteristics of rural livestock farmers, crop residues used for livestock feeds, knowledge on crop residues for livestock feeds, frequency of usage, and barriers to accessing crop residues for livestock feeds. Frequency counts, percentages, means, standard deviation and ranks were used to summarize responses on crop residues used for livestock feeds and knowledge on crop residues for livestock feeds. The frequency of utilization was measured on scale of: Very often (5), Often (4), Sometimes (3), Rarely (2), Very rarely (1). A total of 9 utilization questions were presented to respondents. Barriers to utilization of crop residues for livestock feeds were measured using a 4-point Likert scale of Very severe (4), Severe (3), Less severe (2), and Not Severe (1). Multiple regression was used to show socioeconomic determinants of crop residue utilization for livestock feeds.

Mathematical expression for multiple regression:



$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon \dots\dots\dots (1)$$

- Y – Dependent variable
- x – Independent (explanatory) variables - socio-economic characteristics
- α – Intercept
- β – Slope
- ε – Residual (error)
- Where; Y= frequency of utilization of crop residues for livestock feeds
- X<sub>1</sub>= age (years)
- X<sub>2</sub>= gender
- X<sub>3</sub>= marital status
- X<sub>4</sub>= household size (persons)
- X<sub>5</sub>= Educational level (formal education 1 otherwise 0)
- X<sub>6</sub>= farming experience (year)
- X<sub>5</sub>= income (#)
- X<sub>5</sub>= farm size (ha)
- e<sub>i</sub> = error term

**RESULTS AND DISCUSSIONS**

**Socio-Economic Characteristics of Respondents**

The results presented in Table 1 showed that more than half (56.0%) of the respondents were male, while the remaining 44.0% were female. This implies that livestock rearing in Osun state is dominated by male folks. This finding agrees with a report by Akintade & Oyeboode (2025) that a higher percentage of livestock farmers in Osun State were males. The average age of the respondents was 58.1 years, as the majority were above 50 years of age. This shows that livestock farmers in the study area are getting old. This may negatively influence their ability to source crop residue for their livestock. The finding agrees with the report by Odu *et al.* (2018) that the pool of livestock farmers in Osun State was found to be between 40-59 years old. Also, most (81.5%) of the respondents were married. Regarding the education status of the respondents, 34.0% had secondary education, while 13.5% had no formal education. Literacy and this level of education could positively affect the adoption of innovations such as crop residues by the farmers. Oli *et al.* (2025) reported that education enhances farmers’ ability to understand, evaluate, and adopt new production techniques. On religion, most (75.5%) of the respondents were Christians and others (24.5%) practiced Islam. More results on socioeconomic characteristics presented in Table 1 revealed that the average farming experience was 31.5years and the average household size of the respondents was approximately 6 persons. This range of family size between 5-8 members in Northwestern, Nigeria was reported by Yakubu. (2023). The average annual income of the respondents was N636,750.00, indicating that almost half (48.5%) of the respondents earned 1million naira and below. The findings further showed that goats (85.0%), sheep (30.5%) and poultry birds (26.5%) were the most common livestock raised by the respondents and their common sources of information on livestock production were radio (95.0%) and mobile phone (48.0%).



**Table 1: Socio-economic Characteristics of Respondents (n=200)**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Mean±SD</b>
<b>Sex</b>			
Male	112	56.0	
Female	88	44.0	
<b>Age (years)</b>			
≤ 30	7	3.5	58.1±11.6
31 – 40	27	13.5	
41 – 50	57	28.5	
51 and above	109	54.5	
<b>Marital status</b>			
Single	27	13.5	
Married	163	81.5	
Separated	2	1.0	
Widow	8	4.0	
<b>Level of Education</b>			
No Formal Education	27	13.5	
Primary School	59	29.5	
Secondary School	68	34.0	
Tertiary education	46	23.0	
<b>Religion</b>			
Christianity	151	75.5	
Islam	49	24.5	
Traditional	0	0	
<b>Farming Experience (years)</b>			
≤ 10	18	9.0	31.5±14.8
11 – 20	55	27.5	
21 – 30	40	20.0	
31 and above	87	43.5	
<b>Farm size (hectares)</b>			
≤ 3.0	10	5.0	1.169±0.1
3.1 – 6.0	118	59.0	
6.1 and above	72	36.0	
<b>Household size (persons)</b>			
≤ 4	10	5.0	5.9±1.7
5 – 8	118	59.0	
9 and above	72	36.0	
<b>Annual income (Naira)</b>			
≤ 500,000	93	46.5	636750.00±
500,001 – 1,000,000	97	48.5	387508.38
Above 1,000,000	10	5.0	
<b>Types of livestock owned</b>			
Goat	170	85.0	
Sheep	61	30.5	
Cow	15	7.5	
Pig	30	15.0	
Poultry birds	53	26.5	
<b>Sources of information</b>			
Mobile phone	96	48.0	
Newspaper	3	1.5	
Radio	190	95.0	
Television	15	7.5	
Others	0	0	

**Source:** Field Survey, 2025



**Types of Crop Residues Used for Livestock Feeds**

Results in Table 2 revealed that most of the respondents mainly utilized yam peels (96.0%), vegetable leaves (92.5%), cassava peels (98.5%), cowpea husk and vines (91.0%). A few others used millet straw (4.5%) and pawpaw leaves (4.5%). This implies that yams and cassava peels, vegetables and cowpea husk and vines were the preferred crop residues utilized for feed in the study area, as found in similar studies by Hossain *et al.* (2025).

**Table 2:** Distribution of Respondents by Types of Crop Residues Used for Livestock Feeds

<b>Crop Residues</b>	<b>Yes Frequency (%)</b>
Maize stover	93(46.5)
Rice straw	84(42.0)
Yam peel	192(96.0)
Vegetable leaves	185(92.5)
Wheat straw	13(6.5)
Sugarcane bagasse	31(15.5)
Cassava peel	197(98.5)
Beans husk	182(91.0)
Soybean hull	51(25.5)
Maize straw	50(25.0)
Millet straw	9(4.5)
Banana peel and leaf	84(42.0)
Corn shaft	35(17.5)
Pawpaw leaf	9(4.5)

**Source:** Field Survey, 2025

**Knowledge of Crop Residues for Livestock Feed**

Findings in Table 3 showed that majority of the respondents had the knowledge that crop residues could be used for livestock feeds (100%), had knowledge about different methods of harvesting crop residues (98.0%), and had the knowledge of how to properly prepare crop residues to make them safe and palatable for livestock (91.0%), while only some (13.0%) knew challenges associated with using crop residues for livestock feeds. This implies that livestock farmers in the study area were highly knowledgeable in the use of crop residues for livestock feeds, properly prepared crop residues to make them safe and palatable for livestock, and used different methods of harvesting crop residues for feed production. This finding confirmed a report about high knowledge and use of crop residues for livestock feed in Kebbi State, Nigeria. (Abdulkadir & Abdullahi, 2023).

**Table 3:** Distribution of Respondents by Knowledge of Crop Residues for Livestock Feed

<b>Knowledge questions</b>	<b>Yes Frequency (%)</b>
Are you aware that crop residues can be used for livestock feeds?	200(100.0)
Do you know how to process your crop residues for livestock feeds?	105(52.5)
Do you use any method to improve the nutritional benefits of crop residues before feeding them to the livestock?	30(15.0)
Do you know how to properly prepare crop residues to make them safe and palatable for livestock?	182(91.0)
Are you aware of any challenges associated with using crop residues for livestock feeds?	26(13.0)
Do you have access to any resources or information that can help you learn more about crop residue utilization?	66(33.0)
Are you aware of the potential benefits of using crop residues for livestock feeds?	151(75.5)
Are you aware of different methods of harvesting crop residues?	196(98.0)
Are you aware of how crop residues can be stored to minimize nutrient loss?	64(32.0)

**Source:** Field Survey, 2025



**Utilization of Crop Residues for Livestock Feeds**

The study showed that the frequency of use of crop residues for livestock feeds ( $\bar{x}=4.83$ ), drying crop residues for livestock feeds ( $\bar{x}=4.17$ ), and chopping into small pieces for livestock ( $\bar{x}=2.57$ ) were ranked 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup>, respectively, while fermenting crop residues for livestock feeds ( $\bar{x}=1.41$ ) was ranked ninth position as the least indicated utilization of crop residues for livestock by respondents. This implies that the livestock farmers in the study area mainly utilized crop residues for livestock feeds, dried crop residues for livestock feeds, and chopped residues into small pieces for livestock. This finding confirmed a report by Yohannes *et al.* (2025) on high awareness and utilization of crop residues as alternative animal feed for small-scale farmers.

**Table 4:** Distribution of Respondents by Utilization of Crop Residues for Livestock Feeds

Utilization questions	VO	O	R	VR	N	Mean	Rank
How often do you use crop residues for livestock feeds?	173(86.5)	22(11.0)	3(1.5)	1(0.5)	1(0.5)	4.83±0.52	1 <sup>st</sup>
How often do you dry crop residues for livestock feeds?	57(28.5)	126(63.0)	11(5.5)	5(2.5)	1(0.5)	4.17±0.68	2 <sup>nd</sup>
How often do you chop into small pieces for livestock?	39(19.5)	9(4.5)	26(13.0)	78(39.0)	48(24.0)	2.57±1.41	3 <sup>rd</sup>
How often do you mix crop residues with other feeds?	6(3.0)	17(8.5)	38(19.0)	38(19.0)	101(50.5)	1.95±1.14	4 <sup>th</sup>
How often do you ensile crop residues for livestock feed?	0	11(5.5)	41(20.5)	51(25.5)	97(48.5)	1.83±0.94	5 <sup>th</sup>
How often do you grind crop residues for livestock feeds?	5(2.5)	28(14.0)	14(7.0)	22(11.0)	131(65.5)	1.77±1.21	6 <sup>th</sup>
How often do you use as supplements?	1(0.5)	8(4.0)	20(10.0)	40(20.0)	131(65.5)	1.54±0.87	7 <sup>th</sup>
How often do you compress crop residues into pellets for livestock feeds?	0	2(1.0)	30(15.0)	24(12.0)	144(72.0)	1.45±0.78	8 <sup>th</sup>
How often do you ferment crop residues for livestock feeds?	1(0.5)	2(1.0)	16(8.0)	40(20.0)	141(70.5)	1.41±0.72	9 <sup>th</sup>

**Source:** Field Survey, 2025; Keys: (VO) Very Often, (O) Often, (R) Rarely, (VR) Very Rarely, (N) Never



**Level of Utilization of Crop Residues for Livestock Feeds**

Respondents were further grouped by their aggregate utilization score to assess the level of utilization of crop residues for livestock feed. Results in Table 5 revealed that the majority (64.0%) of the respondents were grouped as having low utilization of crop residues for livestock feeds, while very few (1.5%) practiced high utilization of crop residues for livestock feeds. This shows that the utilization of crop residues as livestock feed is low among rural farmers in the study area. This finding negates the report of very high utilization of crop residues for livestock feed among livestock farmers (Kazemi, 2025).

**Table 5:** Level of Utilization of Crop Residues for Livestock Feeds

Score obtained	Level	Frequency	Percentage
9 – 21	Low	128	64.0
22 – 33	Moderate	69	34.5
34 – 45	High	3	1.5
Total		200	100.0

Possible score range = 9 – 45

**Barriers to Utilization of Crop Residues for Livestock Feeds**

The findings in Table 6 revealed that difficulty in processing crop residues (WMS =1.86), inability to collect and transport (WMS =1.77), and lack of knowledge about proper use (WMS =1.76) were the major barriers to utilization of crop residues for livestock feeds. Rural dwellers facing challenges in processing crop residues for animal feed may be due to limited resources and technology. This finding agrees with a study that indicated that the use of crop residue for feed faced several challenges, including knowledge of processing the residues into animal feed (Patil *et al.*, 2021). Other barriers were low nutritional value (WMS= 1.70), poor quality of crop residues (WMS = 1.59), and cost of crop residues (WMS =1.34).

**Table 6:** Distribution of Respondents by Barriers to Utilization of Crop Residues for Livestock Feeds

Barrier Statements	WMS	SD
Difficulty in processing crop residues	1.86	0.66
Inability to collect and transport	1.77	0.78
Lack of knowledge about proper use	1.76	0.63
Low nutritional value	1.70	0.49
Poor quality of crop residues	1.59	0.97
Competing uses like construction materials	1.56	0.52
Storage issue of crop residues	1.46	0.57
Market access to crop residues	1.40	0.58
Cost of crop residues	1.34	0.58
Seasonal availability	1.27	0.53

**Source:** Field Survey, 2025; Keys: Very Severe (VS), Severe (S), Less Severe (LS), Not Severe (NS)

**Socioeconomic Determinants of Crop Residue Utilization for Livestock Feeds**

Findings in Table 7 indicated that the socioeconomic characteristics were significant determinants of crop residue utilization for livestock feed (R square 0.564, F=6.518; Sig. =0.000), predicting 56.4% utilization of crop residues for livestock feeds by livestock farmers in the study area. The specific significant explanatory variables were income in naira ( $\beta=5.00$ ), household size ( $\beta=0.73$ ), and attainment of formal education ( $\beta=1.79$ ), which indicated a positive significant influence on crop residue utilization for livestock feed. This implies that an increase in income, household size, and formal education supported crop residue utilization for livestock feed, as also found in a study by Musa *et al.* (2024).

On the negative note, gender ( $\beta= -2.73$ ) indicated an inverse significant relationship with crop residue utilization for livestock feed. This indicates that older rural farmers may use less crop residue for feed. This finding is expected as rural farmers who are advanced in age may possess little or no



required strength for harvest and convey crop residues and process them into feed for their animals. Therefore, the null hypothesis is rejected while the alternative is accepted. The findings corroborate studies that revealed income, education, household size and age of farmers as determinants of utilization of crop residues for feed (Abulude, 2025).

**Table 7: Socioeconomic Determinants of Crop Residue Utilization for Livestock Feeds**

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	37.12	3.48		10.67	0.00
Age (year)	-0.10	0.06	-0.23	-1.61	0.11
Gender (male 1, female 2)	-2.73	0.71	-0.27	-3.84	0.00***
Marital status (married 1 otherwise 0)	0.84	0.69	0.09	1.21	0.23
Household size (persons)	0.73	0.26	0.25	2.77	0.01***
Level of Education (formal education 1 otherwise 0)	1.79	0.43	0.35	4.15	0.00***
Farming Experience(year)	0.01	0.05	0.02	0.11	0.91
Income (Naira)	5.00	0.50	0.14	2.19	0.03**
Farm size(Hectares)	-0.45	2.77	-0.01	-0.16	0.87

\* = P < 0.05 \*\*\* = P < 0.01

### CONCLUSION AND RECOMMENDATIONS

The study concludes that gender, household size, level of education, and income were the factors influencing the utilization of crop residues for livestock feed among rural dwellers in the study area. Also, the level of utilization of the crop residue for livestock feeds was low among the rural dwellers. In addition, the barrier to underutilization was their difficulty in processing crop residues, inability to collect and transport crop residues, and lack of knowledge about proper use of crop residues. Based on the findings, the study recommends that;

- i. There is a need for extension organizations in Osun State to organize workshops or training sessions on crop residue management, focusing on nutritional value, processing, and storage techniques among rural dwellers raising livestock in the study area.
- ii. Government institutions saddled with the responsibility of producing locally made agricultural equipment, like National Centre for Agricultural Mechanization (NCAM) should build affordable, locally suitable machinery, such as chaff cutters or grinders, which can improve the processing efficiency of rural dwellers in utilizing crop residues.

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