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ANALYSIS OF CROP-LIVESTOCK FARMERS' FOOD SECURITY STATUS IN KADUNA STATE, NIGERIA

[1]Anosike, F. U., [1]Rekwot, G. Z., [2]Yakubu, I., [3]Uedeme, N. L [1]Owoshagba O. B., and Agada, S. A[4]

[1]National Animal Production Research Institute, Ahmadu Bello University, Shika, Zaria, Kaduna State, Nigeria

[2]Department of Agricultural Education, School of Vocation and Technical Education Nuhu Bamalli Polytechnic, Zaria, Kaduna State, Nigeria

[3]Department of Agricultural Education, Federal College of Education (Technical) Omoku, Rivers State, Nigeria

[4]Federal College of Forestry Jos. Pleatu Sate, Nigeria

Corresponding email: anosikefrancisugo@gmail.com +2348038192350 /+2347013076346

ABSTRACT

The study focused on estimating the food security status of crop-livestock farmers in Kaduna State. Data were collected from 351 farmers using questionnaire. Tools of analysis used were descriptive statistics and food security index. Results shows that the mean age of most farmers 38 years. Average household size is 8 persons. Average farm sizes is 3.5 hectares., with an average farming experience of 8years in crop-livestock integration. Most (53%) of the farmers do not belong to any cooperative society, while, 59% had contact with extension agent, and 68% do not have access to credit. Food security index showed that few households 21% were food secured with an average calorie intake of 4325.13kcal daily, and 79% were food insecure with an average calorie intake of 1287.77kcal daily. 45% of farmers identified high cost of inputs, while 38% of farmers identified inadequate capital as constraints respectively. The study recommends that households who are not food secured be assisted, both by Government and Non-Government Organizations with farm input at a subsidise rate, to help them increase production of staple crops and livestock to enhance their income and by extension improve their food security status,

Key Words: ***food security, crop-livestock, farming household***

INTRODUCTION

Food security has become a major policy issue in many countries with the increase in food prices worldwide. Food security is defined as having sufficient food to generate a calorie requirement of about 2200-2300 calories per day for adult females and 2900-3000 calories per day for adult males, while children require a lower calorie level to maintain themselves in adequate health (Alun and Rima, 2023). Food security is defined as the capacity of all individuals, at all times, to obtain physical, social, and economic access to adequate, safe, and nutritious food that satisfies their dietary requirements and preferences for an active and healthy lifestyle. This definition is based on four fundamental pillars: availability, accessibility, utilization, and stability (Adebayo *et al.,* 2016). The prices of staple food in sub-Saharan Africa (SSA) have surged by an average of 23.9 percent in 2020-22 (Okou, Spray, and Unsal, 2022). A crucial method to enhance food production, mitigate widespread hunger, elevate income, and guarantee food security for farmers, while simultaneously optimizing resource utilization and safeguarding the environment without impeding economic growth, is to promote the continuous engagement of smallholder farmers in integrated crop-livestock farming systems (Anosike, 2021). The integration of diverse crops and livestock, together with the use of numerous approaches to establish optimal circumstances for environmental protection, sustain land productivity, and enhance farmers' income, is referred to as crop-livestock farming systems. It constitutes a segment of the agro-eco technological system, comprising multiple interconnected elements, including non-farm business components, biophysical characteristics, and socio-economic, political, and cultural factors. The crop-animals farming system is a methodical strategy that utilizes minimal external inputs in the integration of crops and livestock (Mukhlis et al., 2018). To enhance food security, increase output, and improve farmers' livelihoods, the integrated crop-livestock system (ICLS) should be implemented. A significant difficulty confronting humanity today and in the forthcoming decades is the issue of nourishing the expanding global population, which underpins Sustainable Development Goal (SDG 2) (Ibok et al., 2016). Food security has emerged as a global concern. Certain regions in Africa have seen advancements in alleviating hunger (Paul, 2017). Nigeria is a significant food-deficient nation in Africa, and its concerning hunger figures are linked to the persistent high levels of conflict that have afflicted the region for years (Jennifer, 2020). The issue of hunger appears to be more acute in northern Nigeria compared to other states in the country; (FAO, 2019). The growing challenge of food security and attaining this desired goal in Africa and in Nigeria have been bedevilled by recent trends in population growth, increasing levels of inflation, political instability in the region, climate change issues, and terror group activities (Osabohien *et al.,* 2020). Hence the need to study crop-livestock farmers' food security status in Kaduna State, Nigeria.

Objectives

i. Identify the socio-economic characteristics of crop-livestock farmers in the study area;
ii. estimate the food security status of crop-livestock farming households;

iii. identify constraints associated with crop-livestock farming system.

METHODOLOGY

Kaduna State, is the study area, located within the Northern part of Nigeria's High Plains. Kaduna State has a total land area of 46,053Km^2, which accommodates 23, Local Government Areas. These Local Government Areas of the State are grouped into 4 Agricultural zones, namely Maigana, Lere, Samaru-kataf and Birnin Gwari zones. By the 2006 census, the State was estimated to have a population of 6.1 million people (NPC, 2006) and now about 10.1million people in 2021, with an annual growth rate of 3.2%. Kaduna State climate is characterized by two distinct seasons; rain and dry seasons. (Kaduna State Ministry of Economic Planning, 2013).

Selection of farming households for data collection was done using multi-stage sampling procedure. First stage was the selection of two Local Government Areas (LGAs) from each of the four (4) agricultural zones, making a total of eight Local Government Areas. Second stage was the selection of two villages from each of the selected Local Government Areas. Finally, using Yamane (1967) Slovian formula, (as applied by Abdurahman *et al.,* 2016) the sample size based on an assumed 5% margin of error, 95% confidence and applying finite correction factor was determined, from the list of rural farmers obtained from Kaduna State Agricultural Development Project (KADP) in 2020. The formula is given as:

$$n_0 = \frac{N}{1+N\,(e^2)}$$

Where: n_0 = Sample size; e = 0.05; *N* = total number of observations.

Table 1: Sampling frame and sample size

Zones	LGA Selected	Villages Selected	Sampling Frame *	Sample Size (10% of sample frame)
Maigana	kudan	Jaja	341	34
		Kwakwaren Manu	263	26
	Kubau	Damau	304	31
		Dutsenwai	251	25
Lere	Lere	Raminkura	153	15
		Kayarda	254	25
	Igabi	Faro kwai	162	16
		Turunku Tsohuwa	231	23
Samaru Kataf	Kachia	Kateri	333	33
		Doka	171	17
	Kagarko	Jere	276	28
		Kasaru	144	14
Birnin-Gwari	Birin Gwari	Udawa	252	25
		Dogon dawa	121	12
	Chikun	Maraban rido	107	11
		Buruku	163	16
Total			**3526**	**351**

*Source: Kaduna State Agricultural Development Agency

A total of 351 farmers made up the sample size for this study. Primary data was used for the study, which were obtained through the use of a questionnaire administered to 351 household heads in the selected villages. Tools of analysis used to achieve the research objectives are descriptive statistics and food security index.

To achieve farmers' food security status, food security index was employed.

$$Z = \frac{K}{R} \text{ ---------- (1)}$$

Where:

Z = Food Security Index

K = Per capita calorie available to a household per day

R = Recommended per capita calorie intake per day

A household is said to be food secure if its calorie intake is more than or equal to Z. The recommended daily per capita calorie intake is 2260Kcal.

RESULT AND DISCUSSION

The socio-economic features of crop-livestock producers in the research region are comprehensively detailed in Table 1. The socio-economic variables examined include age, education, household size, farm size, years of agricultural experience, cooperative membership, access to financing, and access to extension services. The majority of farmers, 32%, were aged 27-37 years, while 27% were aged 38-48 years. Conversely, 19% and 14% of the farmers were aged 16-26 and 49-59 years, respectively. Additionally, 8% of the farmers were aged 60 years and older. Indicating that the majority of farmers were within the economically productive age, thus capable of enduring the demands of crop-livestock production operations. This aligns with Ojeleye et al. (2015), who asserted in their study that farmers were at their productive age. Moreover, Bhutia et al. (2017) demonstrated in their study that crop-livestock producers were within the productive age demographic. A majority of farmers, specifically 38% and 34%, possessed elementary and higher education, respectively, while 21% had secondary education and 7% were uneducated. This indicated that the majority were literate farmers. This suggests that the farmers may readily absorb and adapt to new ideas and technology presented to them to enhance their production, income, and food security position. The acquisition of education is crucial as it may foster awareness of contemporary agricultural methods. This study aligns with Keku (2017) and Bhutia et al. (2017), who demonstrated that most crop-livestock farmers are literate. Education enhances farmers' capacity to make educated and precise decisions in farm management.

Sixty-seven percent of farmers had family sizes ranging from 1 to 8 individuals, 24% had family sizes between 9 and 16 individuals, while a minority of 7% and 2% had family sizes of 17 to 24 and 25 and above individuals, respectively. The average household size was eight individuals, suggesting that farmers with larger households were more likely to have an increased supply of family labor for their crop-livestock activities, enabling them to cultivate more land and rear additional animals, thereby enhancing productivity and income while reducing labor costs. This finding corresponds with that of Bhutia *et al.,* (2017) who said that majority of the respondents had joint family structure with a few having nuclear family structure. Also, it corroborates with Ojeleye et al. (2015) who in their study revealed that household with large size may supply the requisite manpower needed for farming but their impact can be limited by the tiny farm cultivated. Most (27%) and (25%) have farm size of 1.0-1.9 hectare and 2.0-2.9 hectares respectively, while (19%), (15%) and (14%) have 5.0 or more, 3.0-3.9 and 4.0-4.9 hectares respectively. The average farm size cultivated by farmers was 3.5 hectares. Indicating that crop-livestock farmers operated on tiny farm sizes, suggesting that these households were engaged in small-scale farming. This aligns with the findings of Saleh and Mustafa (2018), who said in their study that farmers possessed a farm size of 3 hectares or more. Salau et al. (2019) reported that farmers functioned at a subsistence level, with an average farm size of 4.8 hectares. Oyewole (2012) asserts that the extension of cultivated land can enhance food production. Consequently, in subsistence agriculture, farm size is anticipated to significantly impact the food security of rural farming households.

A majority (78%) of farmers possessed 1-11 years of agricultural experience, 14% had 12-22 years, while 6%, 2%, and 1% had 23-33, 34-44, and 45 or more years of experience, respectively. On average, farmers possessed 8 years of agricultural experience, indicating that the majority have a substantial understanding of farming technologies and are capable of making informed judgments on resource allocation on their farms. This aligns with the findings of Adesope et al. (2012), who asserted that the majority of farmers possessed 6 to 10 years of farming experience. Saleh and Mustafa (2018) asserted that the average farming experience of the respondents was 8 years. The positive framing of experience enhances agricultural production, as the accumulation of expertise over time enables experienced farmers to integrate various farming approaches, hence improving their income and food security. A majority (53%) of the farmers were not members of any cooperative group, whereas 47% were members. Their access to agricultural resources like as agro-inputs, and loans, might be limited, as they do not belong to cooperative societies, which would hinder their improvement in production, reduce their income and by extension affect their food security status. This aligns with the conclusions of Adesope *et al.* (2012), who argued that the majority of farmers were not members of a cooperative group. Nonetheless, it contradicts the conclusions of Keku (2017), who asserted that the majority of farmers were members of cooperative groups. Cooperative societies are inclined to offer credit facilities to members, since individuals unite to consolidate their resources to fulfill personal requirements that cannot be addressed by their limited financial capabilities. Keku, 2017. Membership in a cooperative provides farmers the opportunity to exchange information about contemporary agricultural practices. Nevertheless, the majority of these associations were significantly underdeveloped and inactive. Keku, 2017.

A majority (59%) of farmers received visits from extension agents, whilst 41% did not, indicating that most farmers got access to new agricultural innovations and technology, hence enhancing productivity, income, and food security. These findings contradict those reported by Saleh and Mustafa (2018), who asserted in their study that the rate of extended contact was minimal. Adesop et al. (2012) argued in their study that visits by extension agents to crop-livestock producers were infrequent.

Sixty-eight percent of farmers lacked access to credit, whereas thirty-two percent possessed it. Overall, farmers had limited access to lending facilities. The absence of credit access for certain crop-livestock farmers may hinder the adoption of advanced technologies and management practices, thereby limiting the enhancement of their integrated activities and food security status. The lack of access to credit facilities for certain farmers may be linked to the fact that many do not belong to cooperative societies, which are the primary means of securing help from either government or non-governmental organizations (NGOs). This conclusion contradicts Keku (2017), who reported that the majority of farmers had access to financial facilities. Ekong (2003) asserts that credit is a crucial element for acquiring or developing any firm, and its availability can influence the level of production capacity.

Table 2: Socio-economic characteristics of crop-livestock farmers

Age (years)	**Frequency**	**Percentages**
16-26	66	19
27-37	113	32
38-48	96	27
49-59	49	14
60 and above	27	8
Total	351	100
Mean	38	
Minimum	16	
Maximum	73	
Educational level		
Non-formal	25	7.12
Primary	133	37.89
Secondary	74	21.08
Tertiary	119	33.90
Total	351	100
Family size		
1-8	236	67
9-16	83	24
17-24	25	7
25 and above	7	2
Total	351	100
Mean	8	
Minimum	1	
Maximum	50	
Farm size		
1.0-1.9	94	27
2.0-2.9	88	25
3.0-3.9	53	15
4.0-4.9	48	14
5.0 and above	68	19
Total	351	100
Mean	3.5	
Minimum	1	
Maximum	40	
Farming experience		
1-11	273	77,78
12-22	48	13.68
23-33	22	6.27
34-44	6	1.71
45 and above	2	0.57
Total	351	100
Mean	8	
Minimum	1	
Maximum	60	
Cooperative membership		
Yes	164	47
No	187	53
Extension visits		
Yes	206	59
No	145	41
Access to credit		
Yes	113	32
No	238	68
Total	**351**	**100**

Source: Field survey

Food security status of crop-livestock farmers

The Food Security Index was utilized to assess the food security status based on daily calorie intake. Table 2 indicates that 21% of respondents are food secure, with

an average daily calorie intake of 4325.13 kcal, exceeding the recommended daily per capita intake. Conversely, 79% of respondents are classified as food insecure, with an average daily calorie intake of 1287.77 kcal, falling below the recommended daily per capita intake. Indicating that the majority of respondents experience food insecurity. Food secure families surpassed the calorie need by 91%, whilst food insecure households fell short by 43%, as indicated by the food insecurity gap and surplus index, which quantifies the divergence from the food security threshold. This illustrates a disparity between food-secure and food-insecure households in the study area. This finding contradicts that reported by Ojeleye (2015), who revealed that the Food Security Index (FSI) of most households (66%) met the daily caloric intake of 2260 kcal per capita. Nonetheless, the findings align with those published by Misgina (2014), who indicated that a majority (68.8%) of the tested households experienced food insecurity. Moreover, these findings correspond with those of Saleh and Mustafa (2018), who indicated that food-insecure households constituted a greater percentage (54.5%).

Table 3 Crop-livestock farmers' food security status in the study area

Statistical estimates	Food secure	Food insecure
Frequency	74	277
Percentage	21.08	78.92
Average daily calorie intake (kcal)	4325.13	1287.77
Maximum daily calorie intake (kcal)	9999.59	2242.8
Minimum daily calorie intake (kcal)	1056.07	453.4
Shortfall/surplus index (P)	0.91	-0.43
Head count ratio (H)	21	79
Standard deviation	2633.97	508.02
Recommended daily per capita calorie intake (Kcal)`	2260	

Source: Field survey

Constraints of Crop-Livestock Integration

Table 3 indicates that the most (45%) of farmers recognized the scarcity/high expense of inputs as a significant impediment to crop-livestock integration. Furthermore, 38% and 19% of farmers recognized insufficient money and extension agents as impediments to crop-livestock integration. Subsequently, 16%, 14%, 14%, and 13% of farmers highlighted the lack of awareness of modern technologies, insecurity, insufficient government support/inconsistency of government policies, and inadequate market prices/lack of market access as impediments to crop-livestock integration, respectively. Crop-livestock farmers faced difficulties. Indicating that, notwithstanding the advantages of crop-livestock integration, it is not devoid of limitations. This validated the conclusions of Amejo et al. (2018), who asserted that the primary obstacles to crop-livestock integration are infrastructural deficiencies and inadequate market access. This aligns with the findings of Bhutia et al. (2017), who argued that the high cost of inputs is a constraint on crop-livestock integration. Moreover, the discovery corresponds with Daljit (2016), who claimed that inadequate extension services and insufficient market connectivity are barriers for crop-livestock integration in the research area.

Table 3: Constraints encountered by farmers in integrated crop-livestock farming

Constraints	Freq.	Percent	Ranking
Lack/high cost of inputs	158	45.01	1st
Inadequate capital	133	37.89	2nd
Inadequate extension agent	67	19.09	3rd
Lack of sensitization in modern technologies	55	15.67	4th
Insecurity	51	14.53	5th
Lack of government assistance/inconsistence of government policies	49	13.96	6th
Poor market price/ lack of market	44	12.54	7th
Pest/ diseases	33	9.40	8th

Unfavourable weather condition	30	8.55	9th
Inadequate improved seed and livestock species	28	7.98	10th
Land tenure/lack of land	26	7.41	11th
Poor of storage facilities	24	6.84	12th
Others	22	6.27	13th

** Multiple responses allowed

CONCLUSION AND RECOMMENDATION

In conclusion, evidence from the study indicates that food insecurity among farmers in the study area is high. Also, crop-livestock integration was practiced in the study area. However, there were some constraints affecting the practice of crop-livestock integration in the study area that needs to be addressed to ensure that the full potential of crop-livestock integration is reaped. These constraints were lack/high cost of inputs, inadequate capital and extension agents, lack of sensitization in modern technologies, and insecurity.

REFERENCES

Adebayo, O.; Olagunju, K.; Kabir, S.K.; Adeyemi, O. (2016). Social crisis, terrorism and food poverty dynamics: Evidence from Northern Nigeria. Int. J. Econ. Financ. Issues 2016, 6, 1865–1872. [Google Scholar]

Adesope, O.M., Matthews-Njoku, E. O., Oguzor, N. S., and Ugwuja, V. C. (2012). Effect of Socio-Economic Characteristics of Farmers on Their Adoption of Organic Farm ing Practices, Crop Production Technologies, Dr. Peeyush Sharma (Ed.). In Tech, Available @: http://www.intechopen.com/books/cropproductiontechnologies/effect -of-socio-economic-characteristics-offarmers-on-their-adoption-of-organic- farming-practices. Retrieved 10th August, 2020.

Alun Thomas and Rima Turk, 2023, "Food Insecurity in Nigeria: Food Supply Matters", IMF Selected Issues Paper.

Amejo, G. A, Mekasha G. Y, and Kassa H. (2018). Integrating Crop and Livestock in Smallholder Production Systems for Food Security and Poverty Reduction in Sub- Saharan Africa. *African Journal of Agricultural Research*, 2018

Anosike, F. U. (2021). Analysis of Socio-Economic aand Institutional Factors Influencing Crop-Livestock Farmers' Food Security Status in Kaduna State, Nigeria. An Unpublished MSc Thesis. Department of Agricultural Extension and Rural Development, Faculty of Agriculture, Ahmadu Bello University, Zaria.

Bhutia, T. L., Kumari, K. R., Mohanty, S., and Kumar, U. (2017). Constraints Analysis of Small and Marginal Farmers of Bihar. *SKUAST Journal of Research* 19(1): Pp. 92-96,

Daljit, R. S (2016). Economic Dimension of Cro-livestock Integarted System in Sub-Mountainous Zone of Punjab. Punja Agricultural University.

Ekong, E. E. (2003). Rural Sociology: An Introduction and Analysis of Rural Nigeria, Uyo: Dove Education Publication. Pp. 164-169.

Food and Agriculture Organization, (2019). The State of Food Security and Nutrition in the World. Global Report on Food Crisis. Pp. 17-20.

Jennifer, P. (2020). 10 Eye-opening Fact about Hunger in Nigeria. www.borgenproject.org Retrieved online 28th August, 2021.

Ibok, O. W., Idiong, I. C., Brown, I. N., Okon, I. E., and Okon, U. E. (2016). Analysis of Food Insecurity Status of Urban Food Crop Farming Households in Cross River State, Nigeria: A USDA Approach. *Journal of Agricultural Science,* 6(2): Pp. 146-151.

Kaduna State Ministry of Economic Planing (2013). Kaduna State Infrastructural Plan 2018-2050.

Keku, O. M. (2017). Analysis of Food Security and Coping Strategies of Rural Farm Household in Kaduna State, Nigeria. Unpublished PhD Thesis. Department of Agricultural Economics, Faculty of Agriculture, Ahmadu Bello University, (ABU), Zaria.

Misgina, A. (2014). Rural Household Food Security Status and its Determinant: The Case of Laelaymychew Woreda, Central Zone of Tigrai, Ethiopia. *Journal of Agricultur al Extension and Rural Development.* 6(5): Pp. 162–167 ISSN 2141-2170

Mukhlis, M., Melinda, N., Nofialdi, and Mahdi, K. (2018). The Integrated Framing System of Crop and Livestock: A Review of Rice and Cattle Integration Farming. International Journal of Sciences: Basic and Applied Research. 42(3): Pp. 66-82

National Population Commission (2016). Census Popul ation Retrieved from data. www.population.gov.ng.

Ojeleye, O.A., Adebisi, O.A., and Fadiyi, T.O. (2015). Assessment of Farm Household Food Security and Consumption Indices in Nigeria. *Asian journal of Agriculture and Rural Development.* 4(2): Pp.157-161

Okou, C., Spray, J. and Unsal D., (2022). Staple food prices in Sub-Saharan Africa, IMF working paper 22/135.

Osabohien, R., Adeleye, N., and De Alwis, T. (2020). Agro-financing and food production in Nigeria Heliyon, 6 (5) (2020), Article e04001

Oyewole, S.O. (2012). Analysis of Income Diversification and Food Security among Farmers in Oyo State. An Unpublished M.Sc. Thesis, Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria, Nigeria.

Paul, D. (2017). Ending Famine and Chronic Hunger Requires Good Governance. www.devex.com. Retrieved online 10th March 2021.

Salau, S. A., Nofiu, N. B., and Jimoh, T. A (2019). Effect of Cassava Products Consumption on Food Security of Farming Households in Kwara State, Nigeria. Journal of Agriculture and Environmental Science. 4(2): Pp. 36-45. ISSN: 2616- 3721 (Online); 2616-3731 (Print)

Saleh, M. K and Mustafa, A. S (2018). Food Security and Productivity among Urban Framers in Kaduna State, Nigeria. *Journal of Ag ricultural Extension*. 22(1): Pp. 236-240. 2018. hpp://journalaesonnigria.org. ISSN (e): 24086851; ISSN

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https://scholar.google.com/citations?view_op=new_articles&hl=en&imq=Anosike+F.U#http://occid.org/0000-0001-6697-0913