International Journal of Livestock Research, Vol. 13 (12) Dec' 2023
http://www.ijlr.org
eISSN: 2277-1964

Original Research

Mini–Livestock Production as a Strategy for Food Security among Households in Benue State

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How to cite this paper
Alani, E. A., Olaniyi, A. M., & Onkpo, M. (2023). Mini – Livestock Production as a Strategy for Food Security among Households in Benue State. *International Journal of Livestock Research*, 13 (12), 6-13.

Received : Jan 27, 2023
Accepted : Oct 27, 2023
Published : Dec 31, 2023

Abstract

Food security is fast becoming a problem for human beings because of rising populations. Increase in consumption growth and a possible decline in food availability. This study assessed Mini-livestock production as a strategy for food security in Benue State. The study examined the food security status of the farmers, the relationship between income from the sale of mini-livestock and their food security status, determinants of food security status, and the constraints encountered in mini-livestock production in the study area were examined, analyzed, and identified. The study utilized a random sampling technique to select a sample of 150 mini-livestock farming households from the list of farmers obtained from the Benue State Agricultural and Rural Development Programme. Data collected were analyzed using Descriptive statistics, Food security index, correlation, logistic regression, and Likert - scale. Using the food security index approach, the results revealed that 75% of the respondents were food secure while 25% were food insecure. The result of the correlation analysis shows that there's a positive, strong, and significant relationship between the income of mini-livestock farmers and their food security status ($r= 0.593$; $P \leq 0.001$). The result of the logistic regression revealed that household size and income from the sale of mini-livestock are significant determinants of food security in the study area. The coefficient of income realized from sales of mini-livestock (0.107) was positive and significant at 5%, implying that as the income realized from sales of mini-livestock by the respondents increases, more money is earned resulting in increased food security status of the respondents. The major constraint encountered by Mini-livestock farmers in the study area is inadequate credit. Conclusion: In conclusion, mini-livestock production contributes to the food security status of farmers in the study area. Hence, it is recommended that people who have an interest in mini-livestock production should be encouraged through the provision of incentives and necessary production facilities.

Keywords: Food Security, Households Mini – Livestock, Production; Strategy.

Introduction

The world population is continuously increasing with a growing requirement for food. Food is a basic necessity of life. It is regarded as the basic means of sustenance, and an adequate food intake in terms of quantity and quality is key to a healthy and productive life (Food and Agricultural Organisation [FAO], 2005). Food accounts for a substantial part of a typical Nigerian household budget. Various foods serve as important vehicles for taking nutrients into the body and bringing about a healthy state, hence the need for food to be taken in the right quality and quantity. To measure the quality of any food taken, there are classes of essential nutrients, which must be combined in appropriate proportion to ensure an adequate food intake. These include carbohydrates, proteins, fats and oils, vitamins, and minerals (Omonona, Agoi, and Adetokunbo, 2007). Mini-livestock is a sustainable form of animal production that has significant potential for alleviating malnutrition and food insecurity (Assan, 2014). Mini-livestock (micro livestock) refers to the rearing of small body size animals that require moderate nutrition and management. They encompass all small indigenous vertebrates and invertebrates that can be produced on a sustainable basis for food, animal feed, and as a source of income. Many small animals, such as rodents and giants' snails, are threatened by extinction in Nigeria and African countries as a whole. Rearing these types of animals in captivity not only helps to protect and preserve them from going into extinction but also serves as a source of protein and income for farmers. These include snails, bush-rodents, grass cutters, rabbits, guinea pigs, honey bees, worms, insects, and many other small species. Mini-livestock is very much associated with increased food security as it lends itself to small-scale family production (Assan, 2014). It contributes to food security and meeting up the recommended dietary animal protein (Hardouin *et. al.*, 2003). The small size of mini-livestock animals means a small amount of input per unit, which in turn means more flexible production. Backyard food production such as mini-livestock can be a major contributor to a more balanced diet for both rural and urban people (Ogunniyi et al., 2015). Mini-livestock such as snails, rabbits, grass-cutters, and quail are animal protein intake which is quite low in developing countries than in developed countries and the level of meat and animal protein consumed by Nigerians is estimated at 6 g per caput per day which is about 29g less than the minimum of 35 g daily requirement recommended by the food and agriculture organization (Abu *et al*., 2008; FAO, 2004). As part of measures to improve the level of food insecurity and reduce undernourishment among the populace, there is an urgent need to encourage Mini-livestock production. Thus, this study intends to assess mini-livestock production as a strategy for food security among households in Benue state, Nigeria. The specific objectives are to: determine the food security status of mini-livestock farming households in the study area; examine the relationship between income from the sale of mini-livestock and the food security status of the farmers; analyze the determinants of food security status among mini-livestock farmers; and identify constraints associated with mini-livestock production.

Methods

This study was conducted in Benue State. Benue State was created on February 3, 1976. It has twenty (23) local government areas. Its geographic coordinates are longitude 7° 47' and 10° 0' East. Latitude 6° 25' and 8° 8' North; and shares boundaries with five other states namely: Nasarawa to the north, Taraba to the east, Cross-River to the south, Enugu to the south-west, and Kogi to the west. The state also shares a common boundary with the Republic of Cameroun on the south-east. Benue has a population of 4,780,389 (2006 census) and occupies a landmass of 32,518 square kilometers Agriculture is the mainstay of the economy, engaging over 75% of the state farming population. The State also boasts of one of the longest stretches of river systems in the country with great potential for a viable fishing industry, dry season farming through irrigation, and an inland water highway.

Sampling and Data Collection Techniques

The population of the study consists of households who engaged in mini-livestock production species such as rabbits, grass cutters, and snails in Benue State. One hundred and twenty (120) respondents were randomly selected from the list of registered Mini-livestock farmers from Benue State Agricultural and Rural Development (BNARDA).

The study used both primary and secondary data. Primary data was obtained through personal interviews using a structured questionnaire. Secondary information was obtained through the Internet, reports, and relevant publications.

Method of Data Analysis

Data collected were analysed with descriptive statistics, food security index, correlation, logistic regression and Likert scale. Descriptive statistics such as frequency counts, percentages, and mean scores were used to examine the socioeconomic characteristics and respondent's production characteristics of the respondents.

The food security index was used to determine the food security status of the respondents. This was estimated using the food security index and classifying households into food secured and food insecure. Any household whose per capita monthly food expenditure falls above or is equal to the food security line is food-secured. On the other hand, a food-insecure household is one whose per capita food expenditure falls below the food security line. The index is given by:

$$F= \frac{\text{per capita food expenditure for the ith household}}{{}^{2}/_{3}\ \text{mean per capita food expenditure of all households}}$$

Where F = food security index.
$F \geq 1$ = food-secured household.
$F \leq 1$ = food insecure household. (Ogunniyi *et al*., 2015).

The Correlation was used to examine the relationship between income from the sale of mini-livestock and the food security status of the respondents. Correlation is a bivariate analysis that measures the strength of the association between two variables and the direction of the relationship. In terms of the strength of the relationship, the value of the correlation coefficient varies between +1 and -1. A value of ± 1 indicates a perfect degree of association between the two variables. As the correlation coefficient value goes towards 0, the relationship between the two variables will be weaker. The direction of the relationship is indicated by the sign of the coefficient; a + sign indicates a positive relationship and a – sign indicates a negative relationship.

Based on the food security index (Fi), logistic regression was used to identify determinants of food security among the respondents.

The logistic prediction equation used is:

$Z = b_o + b_1X_1 + b_2X_2 + \ldots + b_kX_k + u$
Where Z = Logit for food security = Logit (p)
b_o= Constant
$b_1, b_2,\ldots,b_k$ = the regression coefficients which interpret the effect of X on Z
X = independent variables
K = number of independent variables
P = probability of presence of characteristic of interest
u = error term

In the logistic regression analysis, the independent variables are as follows;

X1 = Age of respondent (Number of years) continuous
X2 = Gender (male 1, female 0) Dummy
X3 = Marital status (Married = 1, otherwise = 0) Dummy
X4 = Education (Number of Years) continuous
X5 = Household Size (number of household members) continuous
X6 =Access to credit (Yes =1, No =0)
X7 = income from the sale of Mini-livestock

To highlight constraints encountered in Mini-livestock production, a 4-point Likert-scale type was used. Respondents were required to indicate their opinions by checking any of the four options namely: Extremely severe = 4, Very severe =3, Severe =2, and Not severe =1.

These values were added to obtain 10, which were further divided by 4 to obtain 2.5, which was regarded as the

mean. The values of the mean score were then used to rank the constraints faced by Mini-livestock farmers.

Results (Source: Field survey, 2018)

Table 1: Socio-economic distribution of Respondents

Variable	Category	Frequency	Percentage
Age	31 – 60	66	55.0
	Above 60	54	45.0
	Mean Age: 42 years		
Gender	Male	88	73.3
	Female	32	26.7
Marital status	Single	2	1.7
	Married	90	75.0
	Divorced	10	8.3
	Separated	3	2.5
	Widow(er)	15	12.5
Educational Level	No Formal Education	6	5.0
	Primary Education	20	16.7
	Secondary Education	63	52.5
	Tertiary Education	31	25.8
Adjusted household size	2 – 4	48	40.0
	5 – 7	64	53.3
	8 – 10	8	6.7
	Mean: 5		
Primary occupation	Non-farming	36	30.0
	Farming	84	70.0
Years of experience	1- 2	20	16.6
	3- 4	63	52.5
	5- 6	32	26.7
	.>6	5	4.2
	Mean 4years		
Access to extension service	Yes	21	17.5
	No	99	82.5

Table 2: Mini-Livestock Production Characteristics of Respondents

Characteristics	Frequency	Percentage
Purpose of production		
Income generation	108	90
Consumption	12	10
Sources of stock inflow		
Market	90	75
Wild	18	15
Neighborhood	2	1.7
Research institute	10	8.3
Species of mini-livestock reared		
Rabbit	52	43.3
Grasscutter	38	31.7
Snail	25	23.3
Rabbit and grasscutter	5	4.2
Income generated from sale of mini-livestock (No income)		
10,000 - 25,000	12	10

25,100 - 50,000	7	5.8
50,100 - 75,000	40	33.3
Above 75,000	54	45
Mean N42,462.50	7	5.8
Expenditure		
1,000 - 10,000		
10,100 - 20,000	16	13.3
20,100 - 30,000	59	49.2
30,100 - 40,000	43	35.8
Mean N18,150	2	1.7

Table 3: Determination of Food Security Index

Items	Amount (₦/month)
TPCE	485450.2
Mean TPCE	4045.42
2/3MPCE (Food Security Line)	2696.95

Table 4: Food Security Status for the farm households

Items	Frequency	Percent
Food Insecure (%)	30	25
Food Secure (%)	90	75
Total	**120**	**100**

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Items	Frequency	Percent
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Total	**120**	**100**

Table 5: Relationship between Income from Mini-Livestock Production and the Food Security Status of the Farmers

Variables	R	p-value	Significant level
Income from mini-livestock production and Food Security Status	0.593	0.001	Significant

Table 6: Determinants of Food Security among Farmers

Variables	Coefficient	S.E.	Sig.
Age	0.052	0.059	0.375
Gender	-1.394	1.349	0.301
Marital Status	-1.582	1.364	0.246
Educational Qualification	1.356	1.466	0.355
Household Size	-2.138	0.597	0.000***
Access to Credit	-12.447	40192.970	1.000
Income from Sales	0.000	0.000	0.000***
Constant	0.047	3.197	0.988

****Significant at 0.05 level: Statistically significant*

a. *Variable(s) entered on step 1 = Age of respondent, Gender, Marital status, Education. Household Size, Access to credit and income from sales.*

b. *R Square: 0.54; Adjusted R Square: 0.47*

Table 7: Constraints Encountered by Mini-livestock Farmers

Constraints	Mean	Rank
Inadequate credit	2.62	1st
Inadequate information on production	2.20	2nd
Low extension contacts	2.10	3rd
Untimely Access to Credit	2.04	4th
Untimely supply of inputs	2.00	5th
Inadequate management skill	1.77	6th
Unavailability of market	1.57	7th
High cost of production materials	1.3	8th

Discussion

Table 1 shows the socio-economic characteristics of the respondents. Result of this study shows that most of the respondents are within the age range of 31 to 60 years with a mean age of 42 years. This implies that Mini-livestock production is largely dominated by Middle Ages and youth. Majority of the respondents are males (73.3%), while 26.7% of them are female. The finding corroborates that of Ogunjimi (2011) who reported that majority of farmers that are engaged in mini-livestock farming in South-Western Nigeria are male. About 75% of the respondents are married. This implies that majority of mini-livestock farmers are married. 52.5% of the respondents have secondary education, 25.8% had tertiary education, 16.7% had primary education and 5.0% had no formal education. Implying that there is high level of literacy among the respondents because most of the mini-livestock farmers were literate. According to Babatunde et al., (2007) education is a social capital, which could impact positively on a household's ability to take good and well–informed production and nutritional decision. More than half (70.0%) of the respondents are engaged in farming as primary occupation. The experience of farmers ranges between 3 – 4 years with a mean of 4years. This implies that these respondents have been practicing mini-livestock farming for a relatively long time. 25% of the farmers have access to extension while 75.0% have no contact with extension agents. The implication of low extension contact is that farmers may not be well exposed to requisite training on the management practices which may subsequently affect production of the mini-livestock in the study area. Records of household size also revealed that 53.3.0% of the respondents have more than five persons per family. Household size is an important variable that determines the total household food requirement and thus affect per capita food consumption and household food security. This result was similar to that of Odebode and Munsong (2001) and Bammeke (2003) who reported household size of between 2 to 6 people as the modal family size among households. Most of the respondents have fair household sizes. The larger the household size, the higher the expenditure of the family on food.

The result shown in Table 2 shows that most of the respondents raised mini-livestock purposely for income generation (90.0%). This corroborates with the findings of Odukoya *et. al.*, (2017). According to the study, many mini-livestock farmers in the study area are into rabbit rearing. The higher percentage of farmers rearing rabbits could be attributed to the fact that rabbit meat is socially accepted in many parts of Nigeria and has a short gestation period (28 to 35days), rapid growth rate, genetic diversity, large litter size, ability to utilize forage and agricultural by-products, and adaptation over a wide range of ecological environment. In addition, it is affordable and its management requirements are low cost. Rearing of rabbits, according to Abu et al., (2008), appears to be the most sustainable means of producing high-quality animal protein for the expanding populations of the lesser developing countries like Nigeria. It is small-bodied (2.5 – 5.4 kg), It is a monogastric- herbivore animal; it is a good food converter (Hemmer, 1992). They are considered a delicacy, and highly prized (Yeboah and Adamu, 1995). Going by the income generation through the sales of livestock, the result found that most of the respondents earned more from the sales of livestock and their product(s).

Table 3 shows the level of food security status among households. Households were profiled into food secure and food insecure groups based on their per capita food expenditure. The food insecurity line is defined as two-thirds of the mean per capita food expenditure of the total households studied. The result shows the household's monthly mean per capita expenditure, total per-capita expenditure and mean total per capita expenditure. Households whose per capita food expenditure falls below the food security line were said to be food insecure, while households whose per capita food expenditure equals or greater than food security were food secure. It was observed that 75% of the households were food secure while 25% were food insecure as shown in Table 4.

Results in Table 5 reveals that there's a positive, strong and significant relationship between the income of mini-livestock farmers and their food security status ($r= 0.593$; $P \leq 0.001$). This result proves that the higher the income from sale of mini-livestock, the more food secure the household is. The higher the income realized from sales of mini-livestock by the respondents, the more money is earned resulting to increased food security status of the respondents. The result of this study agreed with result of Ogunniyi et al., (2015) who reported that farmers who rear one and two mini-livestock species had better returns on their production, generate more streams of income and these make them to be food secured.

The determinants of food security among farmers was estimated using logit regression model. The result reveals that the household size has a negative coefficient and significant at 5% level, implying that a large household size may likely be food insecure, while a small household size could be food secure. The coefficient of income realized from sales of mini-livestock was positive and significant at 5%, implying that as the income realized from sales of mini-livestock by the respondents increases, more money is earned. While other factors analyzed were not statistically significant determinants of food security among farmers in the study area, but their contribution to food security cannot be overlooked. Finally, Table 7 discusses the major constraints encountered by Mini-livestock farmers in Benue State. It shows that inadequate credit ranked first among the constraints identified by the Mini-livestock farmers. Adequate access to credit will allow the farmers to purchase needed inputs in terms of improved breeds of stocks and feeds and meet immediate cash requirement which may improve their production, income and increase their food security status.

Conclusion

This study revealed that 75% of the respondents are food secured while 25% of them are food insecure. There is a significant and strong correlation between income from sale of mini-livestock and food security status of the households. Household size and income from sale of mini-livestock amongst all the variables were found to have significant effects on food security Based on the result of this study, it was concluded that majority of the mini-livestock farming households in the study area were food secured.

Based on these findings therefore, it is recommended that there is need to create awareness and sensitize households on the importance of Mini-livestock production. Young people that have interest in mini-livestock production should be encouraged through provision of incentive and other necessary production facilities. Mini-livestock expertise should organize training and educate those who are into production and intended individuals on the best mini-livestock management practices. Further studies should be conducted on the consumption and profitability of Mini-livestock marketing in the study area.

List of Abbreviations

BNARDA - Benue State Agricultural and Rural Development
FAO - Food and Agricultural Organisation

Availability of Data and Materials

https://data.mendeley.com/datasets/5bnb7pb5jn/1

Funding

Not applicable

Acknowledgments

The authors appreciate the effort of extension officers who help during the administration of questionnaires.

Contribution by Authors

Conceptualization, EAA., and AMO; Data Curation, EAA; Formal Analysis, EAA; Methodology, AMO; Writing-Original draft, EAA., and AMO.; Writing-Review & Editing, EAA. Publication of this article was in accordance with the agreement of all the authors.

Conflict of Interests

There is no conflict of interest.

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