Effects of Small-holder Livestock Production in Reducing Rural Poverty in the Central Agricultural Zone of Delta State, Nigeria

O.E. Inoni

Department of Agricultural Economics and Extension,
Delta State University, Asaba Campus, Asaba. Delta State, Nigeria

Abstract: The study was conducted to examine the effect of small-holder livestock production in reducing poverty among rural dwellers in the Central Agricultural Zone of Delta State, Nigeria. In order to achieve the objectives of the study, structured questionnaire were administered randomly to 218 small-scale farmers in 20 communities in five local government councils in the study area, using multistage sampling procedure. Data collected included socio-economic characteristics of households, flock size, livestock income, annual income of households, index of food insecurity, improved nutrition, ownership of residential accommodation, educational level, as well as gender of household head. Descriptive and inferential statistics were used to analyze the data. The results showed that socio-economic variables such as household size, annual income and gender of household head had statistically significant influence on value of flock size in small-holder livestock production, in consonance with economic theory. Livestock income was also found to exert a positive and statistically significant ($p < 0.01$) effect on improved nutrition, household food security and consequently, rural poverty alleviation. Mean household annual income from small-holder livestock production was ₦21, 916.29 and this accounted for 45.69% of the mean annual income of ₦47,972. 08.

Key words: Small-holder livestock production, food security, Livestock income, Rural poverty alleviation

INTRODUCTION

The problem of hunger and undernourishment and strategies to reduce food insecurity particularly in the developing world has been a daunting task since the 1990s. Hunger reduction is necessary for accelerating development and poverty reduction. Hunger is, at the same time, a consequence and a cause of poverty. Hunger negatively affects health, labour productivity and investment choices, thereby perpetuating a vicious circle of poverty. Therefore, targeted interventions to ensure access to food are needed. Growth in food production is indeed a key to hunger reduction and alleviation of rural poverty in Nigeria. Since combating hunger requires an expanded commitment to agriculture and rural development, policy initiatives to explore opportunities in the livestock sector must be implemented in order to realize the MDG goal of halving the proportion of undernourished people by 2015 [1].

The World Development Report 1990 estimated that about one billion people in the developing world live in absolute poverty, surviving on US$1.00 per day. The poor are people who are unable to obtain adequate income to maintain healthy living conditions. According to Olayemi [2], the poor have no access to the basic necessities of life such as food, clothing and a decent shelter; unable to social and economic obligations; they lack skills and gainful employment; have few, if any economic assets and also lack self-esteem. In most cases, the poor lack the capacity to liberate themselves from the shackles of poverty; and this situation causes the condition of extreme poverty to persist and to be transmitted from generation to generation [3]. Although the incidence of poverty is widespread in Nigeria, it is much higher in the rural areas where a greater proportion of the population live. The World Bank [4] put the total population of the poor in Nigeria at 34.7 million, with the incidence, depth and severity higher in the rural areas than urban centres.

The role of agriculture in alleviating poverty has been well reported in the literature. According to d'Silva and Bysouth [5], agricultural projects constitute one of the major avenues available to governments to alleviate

Corresponding Author: O.E. Inoni, Department of Agricultural Economics and Extension,
Delta State University, Asaba Campus, Asaba. Delta State, Nigeria.

poverty due to the abundant natural resources that the poor can exploit to their advantage. The land, water, fishery and forest resources are capable of improving the well-being of the poor if optimally and sustainably exploited. Furthermore, productivity-driven increases in food production have been shown to have a strong positive impact on the rural economy, leading to increased food availability and a reduction of food prices in local markets. Moreover, the enhanced incomes of small-scale farmers will provide a stimulus to rural economic activity by generating increased demand for the products of other sectors that are either linked to agriculture or supply consumption goods to farmers. Increasing the demand and therefore the price for those factors of production that the poor own, such as labour, as well as transferring physical assets such as land to them through appropriate land reform policies will improve their income and guarantee better living conditions for the rural poor [6].

Although the role of agriculture in mitigating the effects hunger and poverty in developing countries is very well known, the role of small-holder livestock production has not been the focus of such studies. The objective of this study therefore, was to determine the effect of small-holder livestock production in reducing rural poverty in the central agricultural zone of Delta State, Nigeria. Specifically, the study will investigate the contribution of small-holder livestock production to household food security and improved nutrition; determine the income shares of livestock in household annual income; and identify the factors that influence flock size in small-holder livestock production.

MATERIALS AND METHODS

Area of Study: Delta State, which is one of the nine states in the Niger Delta region of Nigeria, is the location of the study (Fig. 1). Delta State is located approximately between longitude 5° 00′ and 6° 45′ east and latitude 5° 00′ and 6° 30′ north of the equator. The State is comprised of 25 local government councils with Asaba as its capital. It occupies a total land area of 17,698 square kilometres with a population of 2,570,181 people [7]. The natural vegetation in the State varies from the mangrove swamp forests in the south, to the freshwater swamp forests and rainforests in the central agro-ecological zone and the derived savannah belt in the northern part of the State. The prevailing climatic conditions thus favour a thriving agricultural economy. This study however was restricted to the Central agricultural zone of the State which comprised eight local government areas (LGAs); Udu, Uvwie, Okpe, Sapele, Ethiope West, Ethiope East, Ughelli North and Ughelli South.

Sampling Procedure and Data Collection: In order to examine the effects of small-holder livestock production in reducing rural poverty in Delta State, copies of questionnaires were administered to 218 households in 20 communities drawn from five local government areas (LGAs) out of the eight LGAs that comprised the Delta Central agricultural zone. Questionnaire administration was supplemented by interview schedule in some cases. Multi-stage sampling procedure was adopted in the study.
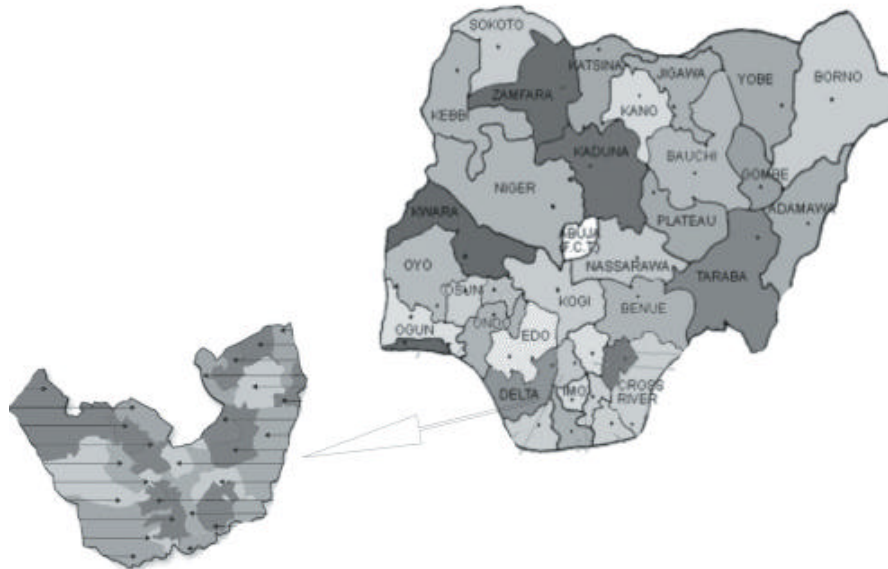

Fig. 2: Map of Nigeria, showing Delta State, the location of the study

Firstly, 5 Local Government Areas (LGAs) were chosen randomly out of the eight that comprised the central agricultural zone. At the second stage, 4 communities were selected at random from each of the 5 LGAs earlier chosen to give a total of 20 communities covered in the survey. The final stage involved the selection of 12 respondents each from the 20 communities giving a total sample size of 240 respondents. The survey was conducted between June and August, 2008. However, data analysis was based on information from 218 respondents as 22 questionnaires were discarded due to incomplete information and non-response.

Data collected include socio-economic characteristics of households, flock size of livestock kept, the value of flock size, livestock income, annual income of household, index of food security and improved nutrition, ownership of residential accommodation, educational as well as the gender of household head.

Model Specification and Estimation: The following econometric model was postulated to investigate the effects of specified explanatory variables on value of flock size, a proxy for the poverty-reducing potential of small-holder livestock production:

$$VFLz = f(Y_N, HH_z, GEN_{HD}, OWN_{RD}, EDU_L, u) \qquad (1)$$

Where VFLz is the monetary value of flock size of a particular household,

Y_N is the annual income of household,

HHz is household size,

GEN_{HD} is gender of household head (Male =1, Female = 2),

OWN_{RD} is the ownership of residential accommodation (Owner-occupier =1, Tenant = 2),

EDU_L is the level of education attained (no formal education =1, primary school = 2, secondary school = 3, tertiary education=4) and u is error term.

Because economic theory does no indicate the precise mathematical form of the relationship among the variables, different functional forms of the above model including the linear, semi-logarithm, logarithm and exponential functions were fitted. However, the logarithmic function was chosen as the lead equation on the basis of economic and statistical theory, as well as econometric criteria. The logarithmic form of the model is specified as follows:

$$InVFL_Z = In\beta_0 + \beta_1 InY_N + \beta_2 OWN_{RD} + \beta_3 In\,EDU_L$$
$$+ \beta_4 lnHH_Z + \beta_{July\ 21,\ 2009_5} GEN_{HD} + u \qquad (2)$$

and the variables are as defined in equation (1).

Small-holder livestock keeping plays a crucial role in food security of the rural poor. They make a significant contribution to food production through the provision of high value protein-rich animal products; and being a major source of income and store of wealth for small-holders provide access to food. In order to examine the effect of livestock keeping in household food security, the following econometric method were specified and estimated:

$$In\,HFD_{SEC} = In\,\alpha_0 + \alpha_1 ln\,ACS_{FD} + u \qquad (3)$$
$$In\,IMP_{NT} = F_0 + F_1 ACS_{FD} + In\,u \qquad (4)$$

Where HFD_{SEC} is an index of household food security, ACS_{FD} is an index of access to food measured by the ratio of livestock income to annual household income and IMP_{NT} is an index of improved nutrition due to livestock keeping.

The Ordinary Least Squares (OLS) technique was used to estimate the relevant parameters.

RESULTS AND DISCUSSION

The socio-economic characteristics of small-holders livestock producers in northern Delta State are presented in Table 1. It shows that about 37% of the household studied are headed by females while 63% are male. However, the distribution of respondents with respect to educational status reveals that 55% of them attained different levels of formal education. A relatively small household size was found in the study with a mean size of 7 persons per household; though about 34% of the households have a family size ranging between 9-13 persons. The findings do not support the preponderance of large family sizes among the poor in the rural areas reported by Eboh [8].

The income level of respondents as well as its disparity is another economic variable of interest in the study. As shown in Table 1, small-holder livestock producers in Delta State are mainly small-scale farmers who earn low incomes, with an average annual income of about ×47, 972.08. In fact, 75% of the farmers studied earned an annual income ranging between ×12, 000.00- ×37, 000.00. Apart from generating income to the farmer, livestock keeping is a means of accumulating capital for investment in the rural economy. Being highly mobile capital goods, livestock can be liquidated easily if economic incentives are unattractive or during period of crisis for the farm-family [9]. The average annual income from livestock was ×21,916.29 per rural household. However, the proportion of livestock income in annual household income was quite high. As shown in Table 1,

Table 1: Distribution of Socio-Economic Characteristics of Respondents (n = 218)

Parameter	Frequency	Mean (Mode)
Gender		
Female	81(37.2)*	
Male	137(62.8)	(Male)
Educational status		
No formal education (1)	98(445)	
Primary school (2)	68(31.2)	1.83
Secondary school (3)	43(19.7)	
Tertiary education (4)	9(4.1)	
Household size		
3-5	70(32.1)	
6-8	75(34.4)	7 persons
9-11	65(29.8)	
12-14	8(3.7)	
Ownership of residence		
Tenants	105(48.2)	
Owners-occupiers	113(51.8)	(Owner-occupier)
Annual income (✗)		
12000-24000	73(33.5)	47,972.08
25000-37000	91(41.7)	
38000-50000	44(20.2)	
51000-63000	10(4.6)	
Livestock income(✗)		
5000-10000	105(48.2)	
11000-16000	74(33.5)	21,916.29
17000-22000	31(14.2)	
23000-28000	7(3.2)	
29000-34000	1(0.5)	
Livestock income (% of Annual income)		
13-26	30(13.8)	
27-40	77(35.3)	
41-54	63(28.9)	45.69
55-68	32(14.7)	
69-82	16(7.3)	

* Figures in parentheses (✗) are percentages.

Source: Computed from Survey Data, 2008.

income from livestock keeping constituted 45.61% of the total annual income of all households. Small farmers keep a higher proportion of livestock and they generate an equally greater percentage of income thereby. Similar findings were reported by Sastry *et al.* [10] in Southern India.

Regression Results: The estimated results for equation (2) are shown in Table 2 with an Adjusted R-squared of 0.66. This implies that the fit of the model was good as the

Table 2: Regression Results of Determinants of Flock Size in Small-Holder Livestock Production

Variable	Estimated coefficient	t-statistic	p-value
Annual income	0.1182	2.21	0.02**
Accommodation	0.0402	1.59	0.07
Educational level	-0.0101	-0.674	0.61
Household size	0.2915	6.69	0.01*
Gender of household head	0.3538	12.15	0.00*
F-statistic =89.76			
D-W statistic =2.13			
Adjusted R-squared = 0.66			
n = 218			

*significant at the 1% level;   ** significant at the 5% level

Source: author's calculation

explanatory variables jointly explained 66% of the variation in the dependent variable (value of flock size). The Durbin-Watson statistic of 2.13 indicates mild presence of autocorrelation in the data. Generally, the result conforms with *a priori* expectations on the size and signs of the regression of the coefficients. Furthermore, it shows that income, household size and gender of household head exerted a positive and statistically significant influence on value of flock size in small-holder livestock production, in Delta State. Rural dwellers require a sizeable and stable stream of income for initial as well as subsequent investment in livestock keeping. Thus, a rise in household income will enable farmers expand the size of their holdings and consequently their value. However, the elasticity of flock size with respect to income is low. A 10% increase in income will raise the value of flock size by only 1.2%.

Unlike annual income, the response of flock size to household size and gender are quite large. Raising household size and male-headed families by 10% will respectively increase value of flock size by 2.9% and 3.5%. Small-holder livestock keeping depends heavily on labour input of the household for feeding and overall management. Therefore, larger household with more labour are better able to maintain larger flocks. Although, both male and female farmers keep livestock, the study shows that flock size is gender sensitive. This may be due to the differences in composition of flocks by male-and female-headed households. Male farmers kept a large number of goats, sheep and sometimes pigs, but females had mainly chickens ducks and a few goats in their flocks. Because of the relatively large initial investment in small ruminants, female-headed household had only a few of them in their flock composition, due to their relatively smaller average annual income.

Educational level had a negative effect on flock size. This is an indication that rural dwellers with a higher level of educational attainment do not participate actively in small livestock keeping. Highly educated people will rather engage themselves in intensive backyard poultry keeping than small-holder semi-intensive production that litter the surrounding with dung and droppings. Ownership of residential accommodation though had a positive influence on size of livestock holding, have no statistically significant effect. The economic implication of the result is that, implementing a policy that can enhance the income generating ability of the rural poor will alleviate the burden of poverty by stabilising food supply, improving the nutritional status of rural dwellers and contribute to the growth of the rural economy [11]. Coupled with an average household of 7 persons, improved rural income will stimulate investment in small-holder livestock production in Delta State.

The results of food security models are presented in equations (3a) and (4a) below. They imply that access to food, a proxy of ratio of livestock income to annual income is a

$$In\ HFD_{SEC} = 0.117 + 0.691\ In\ ACS_{FD} \qquad (3a)$$

t-ratio (21.16)*

$R^2 = 0.71; D\text{-}W = 2.21; F = 315.036; n = 218$

statistically significant determinant of household food security (p < 0.000). This is so because income from sale of livestock products provides purchasing power and thus guarantees access to food. The fit of model (3a) is high as access to food explains 71% of the variation in food security. However, the explanatory ability of model (4a) is comparatively low since only 65% of the variation in improved nutrition is accounted for by variation in access to food.

$$In\ IMP_{NT} = -0.420 + 0.397ACS_{FD} \qquad (4a)$$

t-ratio (20.74)*

$R^2 = 0.65; D\text{-}W = 1.95; F = 437.127; n = 218$

The implication of this finding is that a host of other factors influence household food security and these must be identified and addressed if rural poverty is to be alleviated. Nevertheless, access to food occasioned by increased income from small-holder livestock production, exerted a positive and statistically significant effect on improved nutrition (p < 0.001).

CONCLUSION

The paper has examined the role of small-holder livestock production as a tool for poverty reduction among farmers in the central agricultural zone of Delta State, Nigeria. The following

conclusions can be drawn from the study:

C Small-holder livestock sector holds great promise as a tool for improved nutrition and household food security for the rural poor.
C Small-holder livestock keeping is a major source of cash income to farmers as average annual income from livestock keeping (✗21,916.29) per farm family, accounted for about 45.69% of average annual income (✗47,972.08).
C Since value of flock size in small-holder livestock depends significantly on annual income, household size and gender of household head, policies to stimulate the income generating ability of small-holder farmers should be pursued with renewed vigour.
C Implementation of livestock subsidy programmes by government agencies and donor organisations should be encouraged as these will stimulate and sustain farmers' interest in small-scale livestock keeping in order to reduce rural poverty.

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