

Alleviating Rural Poverty: What Role for Small-Holder Livestock Production in Delta State, Nigeria

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Summary

In order to examine the role of small-holder livestock production in reducing rural poverty among small-scale farmers in Delta State, Nigeria, structured questionnaire were administered randomly to 264 small-scale farmers in 24 communities in six local government areas of the State, using multistage sampling technique. Data collected include 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 analyse the data. The results showed that annual income, household size and gender of household head are statistically significant determinants of the value of flock size in small-holder livestock production. Average annual household income from livestock keeping was ₦12,447.47 and this constituted 42.6% of the mean annual income of ₦31,262.95. The study also found that income from small-holder livestock operation have a positive and statistically significant ($p < 0.001$) effect on improved nutrition, household food security, and consequently, rural poverty reduction.

Key words

small-holder livestock production, rural poverty alleviation, livestock income, food security

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Introduction

The problems of poverty and strategies to alleviate its burden have been issues of great concern in the developing world since the 1980's. The poor are those people who are unable to obtain adequate income to maintain healthy living conditions. 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 have no access to the basic necessities of life such as food, clothing, and a decent shelter. They are unable to meet social and economic obligations; they lack skills and employment; have few, if any economic assets, and also lack self-esteem (Olayemi, 1995; Amaghionyeodiwe and Osinubi, 2004) In most cases, the poor lack the capacity to liberate themselves from the shackles of poverty. This situation causes the condition of extreme poverty to persist and to be transmitted from generation to generation. (Obadan, 1997; Kakwani and Pernia, 2000). While it is easy to recognise those who are absolutely poor, relative poverty refers to a situation in which some households are less rich than others in terms of income and other resources.

Several methods of measuring the absolute level of poverty have been developed over the years. They include the incidence of poverty, the poverty gap ratio (World Bank, 1993), the Sen index (Sen, 1976), and the FGT(a) class of poverty measures developed by Foster, Greer and Thorbecke (1984). Although the incidence of poverty is widespread in Nigeria, it is much higher in the rural areas where the population is higher. The World Bank (1996b) 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 in urban centres. Recent estimates by the National Bureau of Statistics (2005) put the incidence of poverty in Nigeria at 54.4 percent (Table 1); while the estimates by United

for Nigeria. This classifies Nigeria as a low human development nation. The rural poor comprise of two groups according to Aku, Ibrahim and Bulus (1997):

- those who do not own enough land to grow food for family consumption. They are poor because of unequal distribution of cultivable land; a situation that may be exacerbated by population pressure. Farmers who do not have a sufficient amount of land often also have additional problems because of their inadequate access to complementary inputs such as fertiliser and credit.
- landless agricultural and non-agricultural labourers who rely on employment opportunities in the countryside. According to Lipton (1983), the poverty of the landless is caused not only by low agricultural wages but also by the shortage of employment opportunities during the year.

The role of agriculture in alleviating poverty has been well reported in the literature (Lopez and Anriquez, 2004; Upton, 2002) The importance of agriculture in poverty reduction comes from the fact that the majority of the poor in most developing countries live in rural areas and that food prices are a major determinant of the real income of both the rural and the urban poor (Upton, 2004). According to d'Silva and Bysouth (1992), agricultural projects constitute one of the major possibilities available to governments to alleviate poverty due to the abundant natural resources that the poor can exploit to their advantage. In Nigeria, for example, about 75% of the total land area is cultivable and supports a thriving agricultural economy, coupled with abundant and well distributed rainfall throughout the year (Evbuomwan, 1997). The land, water, fishery and forest resources are capable of improving the well-being of the poor if optimally and sustainably exploited. Increasing the demand, and therefore the price of 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 (The World Development Report, 1990).

Although the poverty-reducing potentials of livestock production in developing countries are well known (Thorton et al., 2002; Brown, 2003; Upton, 2004; Leonard, 2004; Pica-Ciamarra, 2005), the role of small-holder livestock production in alleviating rural poverty has not been the focus of studies in Nigeria. The objective of this study, therefore, is to examine the effect of small-holder livestock production on rural poverty reduction in Delta State, Nigeria; specifically, the investigation of the contribution of small-holder livestock production to household food security and improved nutrition, determination of the income shares of livestock in household annual income, and identification of the factors that influence flock size in small-holder livestock production.

Table 1. Incidence of poverty in the Niger Delta Region of Nigeria, 1980 – 2004

	1980	1985	1992	1996	2004
Edo/Delta	19.8	52.4	33.9	56.1	Delta = 45.35 Edo = 33.09
Cross River	10.2	41.9	45.5	66.9	41.61
Imo/Abia	14.4	33.1	49.9	56.2	Imo = 27.39 Abia = 22.27
Ondo	24.9	47.3	46.6	71.6	42.15
Rivers/Bayelsa	7.2	44.4	43.4	44.3	Rivers = 29.09 Bayelsa = 19.98
Nigeria	28.1	46.3	42.7	65.5	54.4

Source: National Bureau of Statistics, 2005.

Nations Development Programme (2005), based on the Human Development Index (HDI) and Human Poverty Index for developing countries (HPI-1), reported an HDI and HPI-1 of 0.439 points and 38.8 percent, respectively

Material and methods

In order to examine the effects of small-holder livestock production on alleviating rural poverty in Delta State, Nigeria, copies of structured questionnaire were administered to 264 households in 24 communities drawn from the three agricultural zones, namely Delta Central, Delta North, and Delta South that comprise the State. A multi-stage sampling technique was adopted in the study. Firstly, two Local Government Areas (LGAs) were selected from each of the three agricultural zones, making a total of six LGAs used for the study. Secondly, four communities were selected randomly from each of the six LGA which were earlier chosen, giving a total of 24 communities. From each of these communities 11 respondents were eventually selected.

Data on socio-economic characteristics of households, flock size of livestock, the value of flock size, livestock income, annual income of a household, index of food security and improved nutrition, ownership of residential accommodation, education, as well as the gender of the household head, were collected. The survey was conducted between August and December, 2005.

Model specification and estimation

The following econometric model was postulated to investigate the effects of predetermined variables on the value of flock size, a proxy for the poverty alleviating potential of small-holder livestock production:

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

where:

- VFLz is the monetary value of flock size of a particular household,
- Y_N is the annual income of household,
- HHz is the household size,
- GEN_{HD} is the gender of the 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 the error.

Economic theory does not indicate the precise mathematical form of the relationship between the variables, which is the reason for fitting the different functional forms of the above model (the linear, semi-logarithmic, logarithmic and exponential functions). 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:

$$\begin{aligned} \ln VFL_z &= \ln \xi_0 + \xi_1 \ln Y_N + \xi_2 \ln OWN_{RD} + \\ &+ \xi_3 \ln EDU_L + \xi_4 \ln HH_z + \xi_5 \ln GEN_{HD} + u \end{aligned} \quad (2)$$

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

Small-holder livestock keeping plays a crucial role in food security of the rural poor. It makes a significant contribution to food production through the provision of high value, protein-rich animal products. Small-holder livestock keeping is also a major source of income and store of wealth for small-holders because it provides access to food. In order to examine the effect of livestock keeping in household food security, the following econometric models were specified and estimated:

$$\ln HFD_{SEC} = \ln \psi_0 + \psi_1 \ln ACS_{FD} + u \quad (3)$$

$$\ln IMP_{NT} = \varphi_0 + \varphi_1 ACS_{FD} + \ln u \quad (4),$$

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. However, data analysis was based on information from 218 respondents because 46 questionnaires were discarded due to incomplete information and the fact that they did not respond.

Results and discussion

The socio-economic characteristics of small-holder livestock producers in Delta State are presented in Table 2. About 37% of the households studied are headed by females and 63% by male. However, the distribution of the educational status of the respondents reveals that 55% of them attained different levels of formal education.

A relatively small household with a mean size of seven people was found in the study per household; though about 34% of the households have a family size ranging between nine to thirteen persons. The findings do not support the preponderance of large family sizes among the poor in the rural areas reported by Eboh, (1995).

The income level of respondents as well as its disparity is another economic variable of interest in the study. As shown in Table 2, small-holder livestock producers in Delta State are mainly small-scale farmers who earn low incomes, with an average annual income of about ₦31,262.95 [US \$1.00 = ₦135.00 (Nigerian Naira)] It is ₦25,536.48 for females and ₦34,648.68 for males. In fact, 75% of the farmers studied earned an annual income ranging between ₦12,000.00 and ₦37,000.00. Apart from being source of income to the



Table 2. 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(44.5)	
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)	31,262.95
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)	12,447.47
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)	42.6
55-68	32(14.7)	
69-82	16(7.3)	

* Figures in parentheses () are percentages.

[‡]US \$1.00 = ₦135.00 (Nigerian Naira).

Source: Computed from Survey Data, 2005.

Table 3. Regression results of determinants of flock size in small-holder livestock production

Variable	Estimated coefficient	t-statistic	p-value
Annual income	0.1632	3.81	0.00*
Accommodation	0.0532	1.78	0.07
Educational level	-0.0132	-0.597	0.55
Household size	0.3595	7.85	0.00*
Gender of the household head	0.4258	12.15	0.00*
F-statistic =102.76			
D- W statistic =1.99			
Adjusted R-squared = 0.70			
n = 218			

*significant at the 1% level; Source: authors' calculation

farmer, livestock keeping is a mean 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 of the family-farm (Jarvis, 1993). The average annual income from livestock keeping was ₦12,447.47 per rural household.

However, the proportion of income attained by livestock keeping in annual household income was quite high. As shown in Table 2, income from livestock keeping constituted 42.6% 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.*, (1993) in Southern India.

Regression results

The estimated results of equation (2) are shown in Table 3. The regression fits the data well with an Adjusted R-squared of 0.70. This implies that the independent variables jointly explained 70% of the variation in the dependent variable (value of flock size). The Durbin-Watson statistic of 1.99 indicates the absence of autocorrelation in the data. Generally, the result conforms with *a priori* expectations of the size and signs of the regression coefficients. Furthermore, it shows that income, household size, and the gender of the household head have a positive and statistically significant influence on the value of flock size in small-holder livestock production, in the study area. 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 to expand the size of their holdings and consequently the value of their holdings. However, the income elasticity of flock size is low. A 10% increase in income will raise the value of flock size by only 1.6%.

Unlike the annual income, the response of flock size to household size and gender is quite large. Raising the household size and percentage of the male-headed families by 10% will respectively increase the value of flock size by 3.6% and 4.6%. Small-holder livestock keeping depends heavily on the input of labour of the household in feeding and overall management. Therefore, larger households are more capable of maintaining larger flocks. Although both male and female farmers keep livestock, the study shows that the flock size is gender sensitive. This may be due to the differences in composition of flocks owned by male-headed and by female-headed households. While male farmers kept a large number of goats, sheep, and sometimes pigs, females had mainly chickens, ducks, and a few goats in their flocks. Because of the relatively large initial investment in small ruminants, female-headed households had only a few of them in their flock, due to their relatively smaller average annual income. Furthermore, a number of households headed by females were tenants, a condition that limited their access to production space for livestock, unlike their owner-occupier counterparts. Since small-holder production activities were carried out around the home, land space was thus a major constraint to flock size, particularly amongst tenant households of

which female-headed households were a majority. Such a constraint to production space among the female producers may be responsible for the seemingly gender sensitivity of flock size in small-holder livestock production.

Educational level had a negative effect on flock size. This is an indication that rural dwellers with a higher level of education do not participate actively in small livestock keeping. Highly educated people will rather engage themselves in intensive backyard poultry keeping than in the small-holder, semi-intensive production that litters the surroundings with dung and droppings. Although ownership of residential accommodation (a proxy for land ownership), had a positive influence on size of livestock holding, it has no statistically significant effect. Nevertheless, land ownership is one critical input on which small-scale livestock production depends (Maltsoglou and Rapsomanikis, 2005). 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 (Birdsall, Ross and Sabot, 1995). Coupled with an average household size of 7 persons, improved rural income will stimulate investment in small-holder livestock production in Delta State, Nigeria.

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

$$\ln HFD_{SEC} = -0.0182 + 0.814 \ln ACS_{FD} \quad (3a)$$

t - ratio (26.74)*; $R^2 = 0.77$; *D*-*W* = 2.09;
F = 715.036; *n* = 218

significant determinant of household food security ($p < 0.001$). This is so because the income from sale of livestock products improve purchasing power, and thus guarantee access to food. The fit of model (3a) is high as access to food explains 77% of the variation in food security. However, the explanatory ability of model (4a) is rather low since only 55% of the variation in improved nutrition is accounted for by variation in access to food. The implication of this finding is that a

$$\ln IMP_{NT} = -0.249 + 0.277 ACS_{FD} \quad (4a)$$

t - ratio (16.403)*; $R^2 = 0.55$; *D*-*W* = 1.97;
F = 269.049; *n* = 218

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, have a positive and a statistically significant effect on improved nutrition ($p < 0.001$).

Conclusion

The paper examined the role of small-holder livestock production in poverty reduction among farmers in Delta State, Nigeria. The following conclusion can be drawn from the study:

- (i) The small-holder livestock sector holds great potential as a strategy for improved nutrition and household food security for the rural poor.
- (ii) Small -holder livestock keeping is a major source of cash income to farmers as the average annual income from livestock keeping (₦12,447.47) per farm family accounted for about 43% of average annual income (₦31,262.95).
- (iii) Since the value of the flock size in small-holder livestock depends significantly on the annual income, household size and the gender of the household head, policies to stimulate the income generating ability of small-holder farmers should be pursued. There may be a need to explore off-farm sources of income in order to accommodate the rural landless.
- (iv) Direct intervention through livestock subsidy programmes by government agencies and donor organisations will stimulate and sustain farmers interest in small- scale livestock keeping in order to reduce rural poverty.

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