Does Livestock Keeping Reduce Poverty Among Farm Households In Nigeria?

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Abstract: The study was conducted to analyze the impact of keeping livestock on poverty among farm households in Nigeria as a contribution towards finding a panacea to the poverty plague in the agricultural sector. The study used secondary data obtained from the Nigeria living Standard Survey data conducted in 2009/2010. Data were analyzed using descriptive statistics, Forster-Greer-Thorbeck property measures and Propensity score matching. Results showed that 90% of the households were headed by males, 54% had household sizes of 1-4 and 79% were within the active productive age of less than 60 years while 62% had no formal education. About 96% were married whereas only 18.83% of the married household heads engaged in polygamous marriage. As high as 95.6% of the respondents had less than ₦99,999 in livestock value. 1.5% owned between ₦100,000-₦199,999 while 2.9% owned ₦200,000 and above worth in value. The incidence, gap and severity of poverty were least among respondents with between ₦100,000 and ₦200,000 worth of livestock. The impact of owning agricultural equipment, land and livestock increased incomes of such households by ₦3,677.44. Hence, the impact of keeping livestock reduced poverty incidence by 33%. The study recommends a reorganization of the existing farming systems being practiced in Nigeria. This will be aimed at encouraging the farm households to incorporate some livestock enterprises into their farm business organizations since the ownership of livestock significantly minimized the chances of the farmer being poor.

Keywords: Poverty, Farm households, Livestock, Propensity score matching, Average Treatment effect.

1. Introduction

High poverty incidence in Nigeria in the past three decades has been a topical issue for policy makers. National Bureau of Statistics, NBS (2005) recorded that the incidence of poverty in Nigeria increased sharply between 1980 (28.1%) and 1985 (46.3%) and although there was a slight decrease in poverty between 1985 and 1992 (42.7%), poverty incidence increased to 65.6% in 1996. Poverty incidence in Nigeria stood at 70%; 2007 estimate according to CIA (2011). Unfortunately, these numbers are getting worse.

A worrisome dimension is the fact that poverty is disproportionately concentrated among households whose primary livelihood depends on agricultural activities. Besides the fact that there have been some level of agricultural growth of 6.5% between 2002-2006 in Nigeria and then 40.84% of GDP in 2010(NBS, 2011), the problem of poverty among farm households still persists (WDI, 2007).

Notwithstanding the increasing rate of poverty among farm households, the Nigeria agricultural policy focus of food self-sufficiency is still couched mainly in terms of increasing physical output of domestically produced commodities, neglecting the issue of income of farm households, thus making the agricultural policy, commodity centered instead of people centered (Idachaba, 2006).

Physical assets help to increase opportunities to be more productive or to obtain credit facilities and even to serve as safety nets. Diversity in asset choice is important in order to allow households to manage risks in any one period. In fact any household that lacks access to physical assets and other productive resources is unlikely to survive any negative shock and as a survival strategy will adapt risk averse production strategies (Aryeetey, 2004). Moreover, the distribution of assets will also affect the rate of returns to investments, thus reinforcing the tendency towards income inequality (Van de Walle and Gunewardena, 2001).

This study considers livestock as the most important productive assets of the farm household being that most households in Nigeria possess them. More so, because it contributes 40% of the global value of agricultural outputs and supports the livelihood of 700 million poor farmers (Spore,2011).

Poverty in this study was based on household per capita expenditure instead on income. The purpose of doing this is because of some reasons. First respondents may find it more difficult to recall all their income as many income sources may be informal or transient; this is less likely to be a problem with expenditure, the bulk of which may be more frequent and regular. Secondly, respondents may have an incentive to understate or not declare certain sources of income if they fear that the information may be used for taxation purposes. Thirdly, respondents may have difficulty in calculating profits from household enterprises for which no formal accounts exist, and may simply not record them. Above all, the poverty indices in Nigeria are calculated based on household expenditure per capita.
Since possession of livestock (assets) are commonly seen as major determinants of rural households’ poverty in developing countries (Reardon and Vosti 1995; Freeman et al., 2004; Carter and Barrett 2006; Spore, 2011). Investments into livestock enterprises have been believed to raise households out of poverty through participating in an upward spiral of capital accumulation and rising welfare levels. Despite these perceived importance of keeping livestock in enhancing income of farm households, the mechanism through which they affect poverty is not well known in Nigeria, neither has there been notable studies done in that direction. This yawning knowledge gap has continued to persist, notwithstanding the deepening poverty especially among farm households in Nigeria.

To comprehensively fight poverty and enhance the incomes of farm households in Nigeria, there is need to focus on their livestock assets portfolios of farm households through which the income is generated. Hence the questions are: how do livestock asset holdings differ among farm households? To what extent do livestock assets contribute to poverty reduction? It is expected that households that have more livestock assets are unlikely to be poor. They will have access to productive resources more than those that do not have. Also they will be less risk averse in their production activities and can easily cope with sudden shocks and hence be less poor.

Hence, the specific objectives of this study describe the human capital assets of the farm households; ascertain the size of livestock asset holdings of farm households in Nigeria; determine the poverty incidence, gap and severity of farm households according to their livestock asset holdings; and estimate the impact of livestock asset holdings on farm household poverty in Nigeria.

II. Theoretical Framework for livestock asset holdings and Poverty.

We modeled this theoretical framework following Jalan and Ravallion (2003). Consider the impact on poverty of an exogenous increase in, allowing for household responses in the fulfillment of other determinants of household poverty. The increase in livestock holding could arise from a decision to increase livestock holding of the farm household. We show that once a household owns or increases his livestock and assuming that households care about more than just acquiring or increasing their stock, that the direction of the effect on their poverty situation is hypothetically ambiguous, and becomes an empirical question.

Let the Poverty status \( (h) \) of a household depend on its possession of livestock \( (w) \), household characteristics \( (s) \) on regional and community characteristics \( (x) \). The latter could include the availability of infrastructure (roads, water, electricity) and services (health, education), proximity to markets, household size, age structure, dependency ratio, gender of head of household which could well enter non-separably with \( w \); The wealth production function is

\[
h = h(s; w; x): \---------------------------1
\]

The function \( h \) is assumed to be strictly increasing and twice differentiable in both \( s \) and \( w \) and to be at least weakly concave in \( s \) (ruled out increasing returns to \( s \)). While \( w \) is likely to be a discrete variable. In choosing the level of household spending on acquiring livestock, the household takes account of its lost opportunity for consumption of other private goods, treated as a composite.

We assume that spending on livestock acquisition has no intrinsic value to households beyond its contribution to welfare. However, possession increasing value of livestock also raises welfare. For example, having these productive assets (livestock) serve as a form of insurance for the households particularly in times of uncertainty and a means for preparing for future consumption. Exogenous income is \( y \) of which \( y - s \) is left for households’ consumption after deducting purchased inputs to household welfare. This gives households utility \( u(y - s; w; x) \) in which the function \( u \) is strictly increasing and concave in \( y - s \) and strictly increasing in \( w \). Household welfare matters directly to household head’s welfare, but separably to their utility from consumption. Thus, the level of \( s \) is chosen by household heads to maximize

\[
u(y - s; w; x) + h(s; w; x) \---------------------------2
\]

The solution equates the marginal impact of spending on acquiring livestock with the marginal utility of own consumption,

\[
U_y (y - s; w; x) = hs(s; w; x) \] (using subscripts to denote partial derivatives), which we re-write in the explicit form

\[
s = s(w; y; x): \---------------------------3
\]

This yields a maximum utility to households of

\[
v(w; y; x) = h(w; y; x) + u[y - s(w; y; x); w; x] \] \---------------------------4
\]

where household welfare when their inputs are optimal is

\[
h(w; y; x) = h(s(w; y; x); w; x) \] \---------------------------5
By the envelope theorem, \( v(w; y; x) \) must be increasing in \( w \). However, this need not hold for both components of household utility. The effect of \( w \) on household poverty in a neighborhood of the equilibrium in which private inputs are optimal is given by

\[
hw = hs SW + hW
\]

Where

\[
S_w = \frac{u_{yw} - h_{yw}}{h_{yw} - u_{yw}} \quad \text{...............................................7}
\]

It can be seen that \( SW \) has the same sign as \( hSW - Uyw \) which could be positive, negative or zero. Since the direct welfare effect is positive \( (hw > 0) \), it can be seen from (6) that \( hSW - Uyw \geq 0 \) is sufficient for livestock assets to improve household poverty/welfare.

Now consider the income effect on the welfare gain from livestock assets. This is given

\[
H_{wy} = S_y (h_{yw} + S_y h_{yw}) + h_y S_{wy} \quad \text{...............................................8}
\]

Where

\[
0 < S_y = \frac{u_{yy}}{h_{yw} + u_{yy}} \leq 1 \quad \text{...............................................9}
\]

In the special case in which there are no interaction effects in household utility between livestock assets and income or spending on household welfare/poverty \( (hsw = Uyw = 0) \), we find that \( hwy = 0 \).

The poverty/welfare gains from livestock assets are independent of household income. More generally, however, the direction of the income effect could go either way. Consider the case in which household direct utility is additively separable between consumption and livestock holding \( (Uyw = 0) \) and the livestock holding does not alter the marginal propensity to spend on household inputs to household welfare \( (Syw = 0) \).

Then \( hwy = S2hSW \) (using (7) and (9)). So in this special case, the household welfare benefit from livestock holdings will increase (decrease) with income if the stocks are complements (substitutes) for other household inputs.

So far we have taken livestock possession to be exogenous. In the empirical work we allowed placement to be a function of a wide range of observable characteristics at household level. Here, we can think (quite generally) of the placement as maximizing some weighted sum of \( v(wi, xi, yi) \) over all \( i \), with weights determined by a vector of characteristics of the household and their socioeconomic environment. This might also include any other variable affecting the household poverty. The solutions will take the form \( wi = w (xi, \lambda) \) where \( \lambda \) denotes one or more multipliers on the constraints, including resources available for providing other inputs. The task of the empirical work is then to measure the welfare gains from higher \( w \), recognizing that the observed levels of \( w \) in the cross-sectional data reflect purposive placement, assuming that the relevant \( x \)'s are observable.

III. Methodology

The Nigeria Living Standard Survey (NLSS) conducted by the National Bureau of Statistics in 2009/2010 was the source of data for this study. The NLSS data was collected on some indicators which include demography, education, health, employment and time use, migration, housing, social capital, agriculture, household expenditure, non-farm enterprise, credit, assets and saving, income transfer and household income schedule.

The poverty incidence, gap and severity of farm households according to their livestock asset holdings was realized using Foster Greer Thorbecke indicators while the impact of livestock asset holdings on farm household poverty was realized using propensity score matching.

IV. Model Specification

Poverty measure:

The Foster, Greer, Thorbecke, FGT (1984) weighted poverty index for quantitative poverty assessment was used for this study due to its additive decomposability into sub-groups. This means that it can be used to decompose poverty into contributions from different subgroups under study. The detail of FGT is as shown below

\[
P_{\alpha} = \frac{1}{n} \sum_{i=1}^{q} \left( \frac{z - y_i}{z} \right)^{\alpha}
\]

where \( \alpha = 0, p_0 = \frac{1}{n} \sum_{i=1}^{q} \left( \frac{z - y_i}{z} \right)^{0} = \frac{q}{n} \rightarrow \text{Poverty incidence or head count} \)

\[
\alpha = 1, p_1 = \frac{1}{n} \sum_{i=1}^{q} \left( \frac{z - y_i}{z} \right)^{1} \rightarrow \text{Poverty gap or depth}
\]
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\[ \alpha = 2, P_2 = \frac{1}{n} \sum_{i=1}^{q} \left[ \frac{z - y_i}{z} \right]^2 \rightarrow \text{Poverty severity} \]

Where

\[ n = \text{Number of Households in a group} \]
\[ q = \text{The number of poor Households} \]
\[ z = \text{Poverty line} \]
\[ y = \text{The Per Capita Expenditure (PCE) of the } i^{th} \text{ household} \]
\[ \alpha = \text{Degree of Poverty aversion.} \]

The Propensity score Model.

Here we describe the methodology following Esquivel and Huerta-Pineda, (2007) to estimate the impact of livestock assets on poverty. The idea here is to assume that possession of assets is similar to “Treatment”, so that we may estimate an average treatment effect on the probability of being in poverty. Through this procedure, we intend to compare the probability of being in poverty for households who possess livestock versus those households who did not possess livestock. Expectedly, the difference will then be attributed to the possession of the assets. The assumption being made in using this methodology is that the decision to receive “treatment” (that is possessing livestock), although not random is heavily dependent upon observable characteristics.

Estimation of Average Treatment Effect based on the Propensity score.

The estimation of an average treatment effect on observational studies can produce biased results when non experimental estimators are used (Esquivel and Huerta-Pineda, 2007). The fundamental problem in this type of analysis is that the assignment of subjects to the treatment and control groups is not random and therefore the estimation of the average treatment effect is usually biased as a result of the existence of confounding factors. Thus the matching between treated and control subjects becomes difficult when there is n-dimensional vector characteristics.

An important method of addressing this problem is by using the propensity score matching technique which summarizes the pre-treatment characteristics of each household into a single index variable known as the propensity score, which is then used to match similar households. The basic idea behind the propensity score matching technique is that we may reduce the bias if we compare outcomes of treated and control groups which are as similar as possible.

The propensity score is the probability of assignment conditional on pre-treatment characteristics:

\[ p(X) = Pr \{D = 1 | X \} \]

where:

\[ p(X) = F(h(Xi)) \]
\[ F(.) \text{ is logistic cumulative distribution.} \]
\[ D = 1 \text{ if the household has livestock and 0 otherwise.} \]

Logit model was used to identify the determinants of keeping livestock by the farm households. The logit model was adopted since the ordinary least square (OLS) procedure was not appropriate particularly when the dependent variable is dichotomous. The problem with the OLS estimate however is the non-fulfillment of \(0 \leq E(Yi/X) \leq 1\) since \(E(Yi/X)\) in the linear probability model measures the conditional probability of the event \(Y\) occurring given \(X\), and must necessarily lie between 0 and 1 (Gujarati, 1988). The logit model is based on the cumulative logistic probability function. To identify the factors influencing the ownership livestock by farm households, the household’s head responses of Yes (1) or No (0) to ownership of the asset were regressed on their socio-economic characteristics.

The logit regression model is specified as

Thus, the probability \((P_i)\) that a household will own livestock is a function of an index \(Z_i\), which is also the inverse of the standard logistic cumulative function of \(P_i\), that is,

\[ P_i (Y=1) = F^{-1}(P_i) \]

Then, \[ Z_i = F^{-1}(P_i) \]

The index is a set \((X_i, n = \text{farm households’ socioeconomic characteristics, while } b_i \text{ are regression coefficients which indicate the probability effect of farmers’ attributes})\) and is a linear function of the attributes, that is,

\[ Z = b_0 + b_1X_1 + b_2X_2 + \ldots + b_nX_n \]

The probability of owning livestock is given by

\[ (Y = 1) = \frac{1}{1 + e^{-Z}} \]
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While the probability of not owning livestock is given by

\[ 1 - P_i(Y = 1) = \frac{1}{1 + e^{zi}} \]

And

\[ e^{zi} = \frac{P_i(Y=1)}{1-P_i(Y=1)} \]

The dependent variable, \(Y_i\), which is whether the household possess livestock or not, takes the value 1 if the farm household does and 0 if he does not. We used maximum likelihood estimation since the dependent variable is binary thus making ordinary least squares estimation inappropriate (Pindyck and Rubinfield, 1981; Scolt, Smith and Rungeelling, 1997). The probability that a farm household possesses livestock can be estimated as the average value of \(Z_i\):

\[ Z_i = \ln \frac{P_i}{1-P_i} = b_0 + b_1X_1 + b_2X_2X_3 + b_4X_4 \cdot b_5X_5 + b_6X_6 + b_7X_7 \ldots + b_{13}X_{13} \]

\(B_0 = \) constant
\(B_1 \ldots B_{13} = \) coefficients of the explanatory variable \(X_1, \ldots X_{13}\)
\(X_1 = \) age (yrs.)
\(X_2 = \) sex, dummy variable (male=1, female=0)
\(X_3 = \) household size in number
\(X_4 = \) monogamous marriage, dummy variable (yes=1, no=0)
\(X_5 = \) polygamous marriage, dummy variable (yes=1, no=0)
\(X_6 = \) divorced, dummy variable (yes=1, no=0)
\(X_7 = \) separated, dummy variable (yes=1, no=0)
\(X_8 = \) widowed, dummy variable (yes=1, no=0)
\(X_9 = \) number of children under age 5
\(X_{10} = \) number of household members over age 15 with primary
\(X_{11} = \) number of household members over age 15 with junior secondary
\(X_{12} = \) number of household members over age 15 with senior secondary
\(X_{13} = \) number of household members over age 15 with tertiary/university

Rosenbaum and Rubin (1983) established the following condition in order to be able to estimate the Average Treatment effect on the Treated (ATT) based on the propensity score: Condition 1: The Balancing Hypothesis

\[ D \perp X | p(X) \]

This means that for observations with the same propensity score, the distribution of pre-treatment characteristics must be the same across households who did not possess livestock and those who have livestock. That is, conditional on the propensity score, each household has the same probability of assignment to treatment, as in a randomized experiment.

Condition 2: Unconfoundedness Given the Propensity Score

\[ Y_i Y_0 \perp D | X \Rightarrow Y_i, Y_0 \perp D | p(X) \]

If assignment to treatment is unconfounded conditional on the variables pre-treatment, then assignment to treatment is unconfounded given the propensity score. After computing the propensity score, the ATT (\(\gamma\)) was estimated as follows:

\[ \gamma = E\{Y_i - Y_0 | D_i = 1\} \]

\[ \gamma = E\{E\{Y_i - Y_0 | D_i = 1, p(X)\}\} \]

\[ \gamma = E\{E\{Y_i | D_i = 1, p(X)\} - E\{Y_0 | D_i = 0, p(X)\}\} | D_i = 1 \]

Where:

\(Y_i\) is the potential outcome if the household possess livestock
\(Y_0\) is the potential outcome if the household possesses no livestock. \(D_i\) is treated households, while \(D_0\) is untreated households.

Calculating the ATT may not be immediately obvious at this point since the propensity score is a continuous variable. Becker and Ichino (2002) proposed different matching methods to solve the problem posed by the propensity score as a continuous variable. However, this study used nearest neighbor matching, matching five neighbors with replacement. The ATT in the nearest neighbor matching method was computed in the following way:

\[ \frac{\tau_{NN.M}}{N_T} = \frac{1}{N_T} \sum_{i \in T} \left[ Y_i^T - \sum_{j \in C(i)} W_{ij} Y_j^c \right] \]
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\[
= \frac{1}{N_T} \left[ \sum_{i \in T} Y_i^T - \sum_{i \in T} \sum_{j \in (c|i)} W_{ij} Y_j^c \right]
\]

\[
= \frac{1}{N_T} \sum_{i \in T} Y_i^T - \frac{1}{N_T} \sum_{j \in c} W_{ij} Y_j^c
\]

Where

\[
W_{ij} = \frac{1}{N_i^c} \text{if } j \in \text{and } W_{ij} = 0 \text{ otherwise}
\]

\[
W_j = \sum_i W_{ij}
\]

And

\[
C_{(i)} = \text{mim} \left| p_i - p_j \right| \text{ for the nearest neighbor matching method}
\]

\(N_c\) is the number of control observations, and \(N_T\) is the number of treated observations. \(Y_T\) is the outcome for the treated and \(Y_C\) is the outcome for the control.

In the propensity score analysis, we treated possession of livestock as dichotomous variables. Possession of livestock versus not having livestock. This manipulation helped to ascertain the effect of having livestock on household poverty.

The variables included in the propensity score matching included human capital as well as other household characteristics such as age of household head, education level, and household size, among others. These variables have been implicated in literature to determine poverty (Grootaert, et al., 2002; Ersado, 2006; Ahmed et al., 2009; Chaudhry, Malik and Hassan, 2009).

After matching and estimating the ATT, the ATT was then applied to households that did not have the livestock assets in order to find out the decrease/increase in poverty headcount, poverty gap, and poverty severity due to these attributes; that is, to find out what poverty will be assuming the households who do not have livestock assets are allowed to have access to size of income/expenditure equal to the ATT.

V. Results And Discussion

Size and composition of Human capital asset indicators of the respondents

This study made use of 24,492 farm households, headed by 21,925(89.52%) males and 2,567(10.48%) females.

Household size of the respondents

Table 1 shows the distribution of the sampled farm households in Nigeria according to size. Almost 20% of the households had four persons. The farm households can be said to have relatively smaller sizes since 53.86% of them had household sizes of between 1-4, while only 14.46% had sizes of 8 and above. This revelation seems to negate the common notion that farm households in developing countries have larger household sizes (Chaudhry, Malik and Hassan, 2009; Pablo and Jose Maria, 2009). Okunmadewa, Yusuf and Omonona (2007) observed that a unit increase in household size is associated with 3.1% increase in poverty. Thus, the smaller the household size, the lower the probability of that household falling into poverty.

<table>
<thead>
<tr>
<th>Household size</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1941</td>
<td>7.93</td>
</tr>
<tr>
<td>2</td>
<td>2956</td>
<td>12.07</td>
</tr>
<tr>
<td>3</td>
<td>3200</td>
<td>13.07</td>
</tr>
<tr>
<td>4</td>
<td>4848</td>
<td>19.79</td>
</tr>
<tr>
<td>5</td>
<td>3719</td>
<td>15.18</td>
</tr>
<tr>
<td>6</td>
<td>2675</td>
<td>10.92</td>
</tr>
<tr>
<td>7</td>
<td>1611</td>
<td>6.58</td>
</tr>
<tr>
<td>8 and above</td>
<td>3542</td>
<td>14.46</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24492</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Source: Computation from NLSS 2009/2010 survey data
Age of Household Heads
The age of the household head is a strong determinant of the probability of being poor (Aigbokhan, 2008). Table 2 shows the distribution of the household heads according to age. Majority of the farm household heads were within the active productive age of less than 60 years. Only 21.19% of the respondents fell within the old age of lower productivity. The age of the household head is negatively associated with the probability of being poor (Khalid et al., 2005). According to Etim and Ukoha (2010), poverty incidence is highest (69%) and lowest (31%) when households are headed by persons within the age of 61–80 and 21–40 years, respectively.

Table 2: Distribution of Household Heads according to age

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20</td>
<td>60</td>
<td>0.24</td>
</tr>
<tr>
<td>20-29</td>
<td>2625</td>
<td>10.72</td>
</tr>
<tr>
<td>30-39</td>
<td>6136</td>
<td>25.05</td>
</tr>
<tr>
<td>40-49</td>
<td>6014</td>
<td>24.55</td>
</tr>
<tr>
<td>50-59</td>
<td>4467</td>
<td>18.24</td>
</tr>
<tr>
<td>60 and above</td>
<td>5190</td>
<td>21.19</td>
</tr>
<tr>
<td>TOTAL</td>
<td>24,492</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Computation from NLSS 2009/2010 survey data.

Level of Education of Household Heads
The level of education of household heads is a strong variable in determining the probability of being poor. Onu and Abayomi (2009) in their study revealed that poverty was highest among illiterate household heads. Sikander and Ahmed (2008) also corroborated this submission. Okunmadewa, Yusuf and Omonona (2007), posited that one extra year of schooling is associated with 1.6% reduction in poverty. Regrettably, Table 3 shows that the bulk of the respondents, 62.10% had no formal education, 4.3% had primary education, and 33.13% had secondary education while only 0.47% had tertiary education.

Table 3: Distribution of the Households Heads according to Level of Education

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No formal education</td>
<td>15,209</td>
<td>62.10</td>
</tr>
<tr>
<td>Primary education</td>
<td>1053</td>
<td>4.30</td>
</tr>
<tr>
<td>Secondary education</td>
<td>8114</td>
<td>33.13</td>
</tr>
<tr>
<td>Tertiary education</td>
<td>116</td>
<td>0.47</td>
</tr>
<tr>
<td>TOTAL</td>
<td>24,492</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Computation from NLSS 2009/2010 survey data.

Marital Status of the Household Heads
A cursory look at Table 4 reveals that about 96% of the respondents were once married whereas only a meager 4.04% never got married. Only 18.83% of the married household heads were engaged in polygamous marriage. This revelation tends to negate the general belief that farmers in developing countries are usually polygamous with large household sizes.

Table 4: Distribution of the respondents according to Marital Status

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monogamous marriage</td>
<td>16,779</td>
<td>66.51</td>
</tr>
<tr>
<td>Polygamous marriage</td>
<td>3,893</td>
<td>15.89</td>
</tr>
<tr>
<td>Informal Union</td>
<td>46</td>
<td>0.19</td>
</tr>
<tr>
<td>Divorced</td>
<td>329</td>
<td>1.34</td>
</tr>
<tr>
<td>Separated</td>
<td>332</td>
<td>1.36</td>
</tr>
<tr>
<td>Widowed</td>
<td>2,123</td>
<td>8.67</td>
</tr>
<tr>
<td>Never married</td>
<td>990</td>
<td>4.04</td>
</tr>
<tr>
<td>TOTAL</td>
<td>24,492</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Computation from NLSS 2009/2010 survey data.
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Ownership of livestock by respondents

Ownership of livestock in the traditional Nigerian society has been recognized as a sign of wealth, a productive asset and a safety net in time of need. The livestock surveyed include draught animals, cattle, sheep, goats, pigs, rabbits, chicken and turkey. From the survey only 189 of the total respondents did not own livestock out of the 24,492 respondents. However, the picture becomes clearer in Table 5.

<table>
<thead>
<tr>
<th>Value of livestock in N</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than N100000</td>
<td>23,233</td>
<td>95.6</td>
</tr>
<tr>
<td>N100,000-NN199,999</td>
<td>365</td>
<td>1.5</td>
</tr>
<tr>
<td>N200,000 and above</td>
<td>705</td>
<td>2.9</td>
</tr>
<tr>
<td>Total</td>
<td>24,303</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Computation from NLSS 2009/2010 survey data.

Here the value of livestock owned within the last 12 months of the survey showed that 95.6% of the respondents had less than N99,999 in livestock value. 1.5% owned between N100,000-N199,999 while 2.9% owned N200,000 and above. These values seem unsatisfactory and meager considering the relatively large household sizes of the respondents. They will need larger stocks with higher monetary values to be able to sustain their households.

Decomposition of Poverty measurement according to value of livestock (₦) owned

One of the major tasks of poverty analysis is the construction of poverty lines. This study used the same poverty line of twenty thousand and seven hundred and thirty thousand (₦23,733) as used by the Nigeria’s National Bureau of Statistics (NBS) in calculating poverty indices in 2010. The poverty measures considered were poverty headcount incidence, poverty gap and poverty severity squared poverty gap.

The poverty situation among respondents with different categories of value of livestock is shown in Table 6.

<table>
<thead>
<tr>
<th>Value of livestoek in N</th>
<th>Poverty incidence</th>
<th>Poverty gap</th>
<th>Poverty severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than N100000</td>
<td>0.80</td>
<td>0.33</td>
<td>0.18</td>
</tr>
<tr>
<td>N100000-200000</td>
<td>0.48</td>
<td>0.18</td>
<td>0.08</td>
</tr>
<tr>
<td>More than 200000</td>
<td>0.75</td>
<td>0.32</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Source: Computation from data.

The incidence, gap and severity of poverty were least among respondents with between N100,000 and N200,000 worth of livestock. Those with more than N200,000 have higher poverty incidence, gap and severity followed by respondents with less than N100,000.

Why the category with value of livestock between N100,000 and N200,000 should have the lowest poverty incidence remains surprising. However, the only explanation could be that these categories of households were more efficient in their production.

Specifically, farm households whose livestock were valued less than N100,000, between N100,000 and N200,000, and above N200,000, had 80%, 48% and 75% poverty incidence, respectively. The poverty gap is about 33%, 18% and 32%, respectively. This means that the percentages of the poverty lines are required by the household to escape poverty. The severity of poverty is estimated at 18%, 8% and 17% implying that there is 18%, 8% and 17% inequality, respectively, among the households within various categories of livestock value.

Put differently, a higher weight is placed on the household who are further away from the poverty line. This indicates how much of a gap is among the poor and the volume of resources is needed to bring the households closer to the poverty line above.

Impact of keeping livestock on household poverty

In the propensity score matching, we considered and matched household owning livestock versus those who did not. The matching score results indicated that the untreated and treated samples for the analysis were in the region of common support. The variables met the balancing tests. Normally, in balancing test, paired test examines whether the mean of each element of the dependent variables for the treatment group is equal to that for the untreated sample. Tables 7 show that the mean of the variables were equal for the nearest neighbour matching as the values were not significant.

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Table 7: Result of the balancing test for the nearest neighbor matches for livestock assets

<table>
<thead>
<tr>
<th>Variables</th>
<th>RaisedLivestock Vs doesnot</th>
<th>Ctrl</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>54.77</td>
<td>54.36</td>
<td>0.64</td>
</tr>
<tr>
<td>Sex</td>
<td>0.26</td>
<td>0.28</td>
<td>-0.14</td>
</tr>
<tr>
<td>Household Size</td>
<td>4.45</td>
<td>4.46</td>
<td>0.06</td>
</tr>
<tr>
<td>MonoMarriage</td>
<td>0.74</td>
<td>0.78</td>
<td>-0.31</td>
</tr>
<tr>
<td>PolyMarriage</td>
<td>0.74</td>
<td>0.73</td>
<td>0.06</td>
</tr>
<tr>
<td>Divorced</td>
<td>0.74</td>
<td>0.73</td>
<td>0.06</td>
</tr>
<tr>
<td>Separated</td>
<td>0.31</td>
<td>0.32</td>
<td>-0.36</td>
</tr>
<tr>
<td>Widowed</td>
<td>0.74</td>
<td>0.78</td>
<td>-0.31</td>
</tr>
<tr>
<td>Number of Children under Age5</td>
<td>0.26</td>
<td>0.28</td>
<td>-0.14</td>
</tr>
<tr>
<td>Number ofhold Members over age15 With Primary</td>
<td>0.41</td>
<td>0.43</td>
<td>-0.67</td>
</tr>
<tr>
<td>Number ofhold Members over age15 with jnrsecondary</td>
<td>0.74</td>
<td>0.78</td>
<td>-0.31</td>
</tr>
<tr>
<td>Number ofhold Over age15 with Secondary</td>
<td>0.31</td>
<td>0.32</td>
<td>-0.36</td>
</tr>
<tr>
<td>Number ofhold Over age15 with University</td>
<td>0.07</td>
<td>0.08</td>
<td>-0.21</td>
</tr>
</tbody>
</table>

Computation from data

Table 8: Logit estimates from propensity score matching of possession of livestock

| Variables                                   | Coefficient | Std error   | z   | P>|z| | [95% Conf. Interval] |
|---------------------------------------------|-------------|-------------|-----|-----|---------------------|
| Constant                                    | -2.132474   | .2273605    | -9.38| 0.000 | -2.578092-.1.686855 |
| Age                                         | -0.0042728  | .001421     | -3.01| 0.003 | -0.007058-.0014876  |
| Sex                                         | .5727807    | .1284768    | 4.46 | 0.000 | .3209708-8.245906   |
| Household size                              | .0227961    | .0058051    | 3.93 | 0.000 | .0114183-.034174    |
| Mono marriage                               | .4424651    | .1116       | 3.96 | 0.000 | .2273332-.6611971   |
| Poly marriage                               | .5034938    | .1202824    | 4.19 | 0.000 | .2677446-.739243    |
| Separated                                   | .1007145    | .2481725    | 0.41 | 0.685 | -.3856947-.5871237  |
| Widowed                                     | .4728828    | .1594775    | 2.97 | 0.003 | .1603127-.7854529   |
| No of children under age5                   | .011881     | .0742742    | 0.16 | 0.873 | -.1336938-.1574558  |
| Number ofhold Members over age15 With Primary | -.0161493   | .0029359    | -5.50| 0.000 | -.0219036-.010395   |
| Number ofhold Members over age15 with jnrsecondary | .0178283   | .0059305    | 3.01 | 0.003 | .0062048-.0294518   |
| Number ofhold Over age15 with Senior Secondary | -.0114819   | .0050246    | -2.29| 0.022 | -.0213298-.0016339  |
| Number ofhold Over age15 with University    | .0191039    | .008432     | 2.27 | 0.023 | .0025776-.0356303   |

Computation from data

The result in Table 8 show that households whose head are separated with spouse and with number of children under age 5 were not significant while households with members over age 15 with senior secondary school, number of household members over age 15 with university education were significant at 5% while the remaining variables were significant at 1% in predicting the probability of owning livestock.
The result of the average treatment effect on the treated (ATT) that is average gain in expenditure per capita by households that raised livestock is shown in Table 9.

Table 9: Average Treatment effect on the Treated based on ownership of physical assets

<table>
<thead>
<tr>
<th>Asset</th>
<th>Treated</th>
<th>Control</th>
<th>Difference</th>
<th>Std error</th>
<th>T-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raised livestock vs does not</td>
<td>14046.23</td>
<td>10368.79</td>
<td>3677.44</td>
<td>1270.713</td>
<td>2.894</td>
</tr>
</tbody>
</table>

Source: Computation from data

The result shows that the ATT for households that own livestock versus those that did not own was ₦3677.44. The t value of 2.89 for test of difference between the treated and control groups was greater than the tabular value of 1.96 at a probability value of 0.05. This shows that the impact of owning livestock on per capita expenditure of farm households using nearest neighbor matching was significant. We can thus confidently reject the null hypothesis that there is no significant difference between households that have livestock and those who did not have them since there is a statistically significant differences existing between them.

This finding is in consonance with Ahmed et al, (2009) who reported a positive estimate of the impact of owning livestock on poverty. Ersado (2006) had earlier observed that poverty and vulnerability is strongly associated with asset ownership and access to markets to mobilize them in time of need. Families with higher value of assets were significantly less vulnerable.

The actual impact of the owning livestock on poverty was also determined by adding the ATT, from owning livestock to the per capita expenditure of those who do not own livestock. The aim was to ascertain the reduction or increase in poverty due to the possession of livestock. That is to ascertain what the poverty level would have been if the households without livestock are made to have income that is equal/equivalent to the ATT. The poverty ratios considered were poverty incidence (P0, which measures the percentage of people living below the poverty line), poverty gap (P1, which measures how far the average income/expenditure of the poor fall short of the poverty line, in order words, the percentage income that is required to bring a poor person to the poverty line) and the squared poverty gap (P2, which shows the severity of poverty). The result is presented in table 10.

Table 10: Distribution of poverty measure when ATT is added to per capita expenditure of households who did not keep livestock

<table>
<thead>
<tr>
<th>No livestock</th>
<th>PCEXPDR</th>
<th>PCEXPDR+ATT</th>
<th>DIFFERENCE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P0</td>
<td>P1</td>
<td>P2</td>
</tr>
<tr>
<td></td>
<td>75</td>
<td>31</td>
<td>17</td>
</tr>
</tbody>
</table>

The result shows that when the ATT (gain or impact due to possession of livestock) was added to the expenditure per capita of households with livestock, poverty incidence dropped by 33%. Thus, the gain from the nearest neighbor matches as a result of having livestock, when added to expenditure per capita of those who did not have livestock, reduced poverty incidence by 33%. Also, having livestock reduced poverty gap by 48% while squared poverty gap was reduced by 100%.

VI. Conclusion and Recommendation

Analyzing the impact of keeping livestock on poverty among farm households in Nigeria has brought into focus the power of this asset in helping to alleviate poverty, considering the fact that over the years, so much has been said and done by the Nigerian government, International and Non- governmental organizations to fight poverty which is preponderance among farm households who constitute more than 70% of the work force in Nigeria.

Much is still needed to be done to transform agriculture in Nigeria through boosting the income of the farm households by creating enabling environments that will make it possible for them to sustainably keep livestock.

The study recommends a reorganization of the existing farming systems being practiced in Nigeria. This will be aimed at encouraging the farmers to incorporate some livestock enterprises into their farm business organizations since the ownership of livestock significantly minimized the chances of the farmer being poor. Specifically, the government is advised to establish a sustainable framework that will enable farmers to access loans at more friendly interest rates. The provision of low- interest capital will boost the acquisition of productive resources that will enable the farm households to invest meaningfully in livestock production.
Does Livestock Keeping Reduce Poverty Among Farm Households In Nigeria?

References


