POVERTY REDUCING EFFECTS OF PROCESSED BEEF MARKETERS: EVIDENCE FROM KADUNA, KANO AND KATSINA STATES OF NIGERIA

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ABSTRACT

The objective of this study was to provide empirical information on the poverty reducing effects of processed marketers in Kaduna, Kano and Kastina States of Nigeria. The study made use of primary data, which were obtained through the use of a computer-aided personal interview (CAPI) software on tablets. Analysis of the data was done using Foster-Greer-Thorbecke's (FGT) Weighted poverty index and Tobit regression model. The results of the poverty profile of raw and processed beef cattle marketers in the study area showed that 40% and 38% of the raw and processed beef marketers respectively constituted the share of the population that cannot afford to buy a basic basket of goods (food and non-food) equivalent to the poverty line of ₦75, 600. The depth of poverty (poverty gap index) of poor raw beef marketers (0.10) was lower than that of the poor processed beef marketers (0.14). The degree of poverty among the poor raw beef marketers given by the estimated severity of poverty (0.04) was equally lower than that of the poor processed beef marketers (0.07). The results on poverty reducing effects of processed beef marketing activities on poverty revealed that raw beef and processed beef marketing activities significantly reduce poverty incidence by 1.7% and 3.3% for the beef cattle farmers and traders respectively. In the light of the decreasing unemployment, it is recommended that it is recommended that beef marketers should be supported with easy access to credit such as the collateral-free and interest-free loans under the MARKETMONI and TRADERMONI loan schemes of the Government Enterprise and Empowerment Programme (GEEP).

Key words: Raw beef marketers, Processed beef marketers, poverty status, Tobit regression

INTRODUCTION

Agriculture provides livelihoods to more than one billion people worldwide and remains the back bone of many low-income countries, accounting for 60.4 percent of employment and contributing up to two-thirds of gross domestic product in some of those countries (East African Business Council (EABC, 2020). The Nigeria agricultural sector holds the key to the country's drive for economic diversification. Agricultural sector remains the largest employer of labour in the country, providing jobs for more than one third (36.4%) of the Nigerian labour force (Princewaterhouse Coopers (PWC), 2020).

Livestock production accounted for 1.8% of the GDP and 6.9% to the agricultural GDP of Nigeria in 2018 (Central Bank of Nigeria (CBN), 2018). Nigeria is one of the leading livestock producers in Central and West Africa and the country's cattle population is estimated at over 16 million heads, far ahead of Niger (8.7 million), Mali (8.2 million) and Chad (7 million), (Bernard, Bonnet and Guibert, 2010). However, a more recent data puts the number of cattle heads as 19.5 million heads (Food and Agricultural Organization of the United Nation (FAOSTAT), 2017). Livestock production systems and marketing represent a potential pathway out of poverty for many smallholders' livestock farmers and tend to serve poor consumers, creating an even tighter focus on the poor (Ari *et al*., 2016).

of cattle products especially beef and milk to meet animal protein requirement falls short of the demand. The demand-supply gap is further threatened by the reoccurring cattle rustling especially in north-west zone of Nigeria and farmers-herders conflicts across different parts of Nigeria (Shehu *et al.,* 2017; Ajibo *et al.,* 2018).

The outcome of enhanced production and marketing of cattle and its products especially beef can potentially lead to better income and nutritional status of households thus positively impinging their living standard (Mafimisebi *et al*., 2014). In contrast to development approaches that focus narrowly on improving the capacities of smallholders to increase their productivity or better manage natural resources, proponents of value chain development challenges development organizations to work with diverse stakeholders to understand the performance of the value chain and identify mutually beneficial options for improving chain performance.

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In order to examine these issues raised, the specific objective are to:

i.   determine the poverty status of raw and processed beef marketers and
ii.   determine the effects of marketing activities on the poverty status of raw and processed beef marketers.

MATERIALS AND METHOD
Description of the Study Area
The study was conducted in Kaduna, Kano and Katsina states of north-west zone, Nigeria. The north-west comprises of Jigawa, Kano, Katsina, Kaduna, Zamfara, Sokoto and Kebbi states. According to the 2006 population census, the total population of the zone is estimated at 35.7 million with an average density of 103 persons per square kilometer (National Population Commission (NPC), 2006). The projected population of the zone in 2018 is about 48.3 million, based on an annual growth rate of 3.2%. The north-west zone is known for livestock production activities such as cattle, goat, sheep, poultry etc. The zone produced over half of the entire cattle in the country in the national agriculture sample survey with 9,892,240 cattle heads representing 52.4% of cattle in Nigeria (NBS/FMARD, 2012). Kaduna, Katsina and Kano States had 655,382, 2,008,592 and 546,303 cattle heads respectively (NBS/FMARD, 2012).

Sampling procedure

Two categories of respondents were used for the study. These are raw (wholesalers, retailers) and processed beef marketers (*suya* producers, *kilishi*

producers, *danbun nama* producers). Multi-stage sampling technique was employed in the selection of the value chain actors. The selection of the sample for each actor was carried out in the following manner.
Raw beef marketers: In the selection of raw beef marketers, 10 raw beef marketers (wholesalers and retailers) were randomly selected in each of the 6 LGAs to give a sample size of 60 raw beef marketers (wholesalers and retailers)
Processed beef marketers: In the selection of processed beef marketers 10 processed beef marketers (*suya* producers, *kilishi* producers and *danbun nama* producers) to give a sample size of 60 processed beef marketers (suya producers kilishi producers, danbun nama producers) derived from a list of raw and processed beef marketers compiled with the assistance of extension agents and the beef marketers associations. The major limitation of the study is that the sample size of raw and processed beef marketers was not proportionately sampled, due to lack of information on the population of the actors in their respective market segments. The total sample size was 120. The study made use of primary data, which were obtained through the use of a computer-aided personal interview (CAPI) version of survey instrument rather than a paper-based questionnaire to improve the quality of data. The survey was administered using trained enumerators under the supervision of the researcher. Two different sets of CAPI version of questionnaire were used; raw beef marketers and processed beef marketers.

Table 1 Summary of the sampling of processed beef marketers in the study area

Actors	States	LGAs	Markets	Raw/Processed Beef Marketers	Sample frame	Sample size
Raw Beef marketers	Kano	Rimin gado, Gwarzo,	Rimi gado market, Getso market	Wholesale 15 Retailers 5	114	20
	Kaduna	Kubau, Soba,	Anchau martket, Tudun Saibu market	Wholesalers 9 Retailers 11	121	20
	Katsina	Faskari, Kafur	Sheme market, Kafur market	Wholesalers 14 Retailers 6	112	20
Processed Beef marketers	Kano	Rimin gado, Gwarzo	Rimi gado market, Getso market	Suya 9 Dambun nama 1 Kilishi 10	72	20
	Kaduna	Kubau, Soba,	Anchau martket, Tudun Saibu market	Suya 15 Dambun nama 1 Kilishi 4	59	20
	Katsina	Faskari, Kafur	Sheme market, Kafur market	Suya 15 Dambun nama 4 Kilishi 1	64	20
Total					542	120

Source: Reconnaissance survey, 2018

Analytical Technique

Foster-Greer-Thorbecke's (FGT) Weighted Poverty Index

The Foster, Greer and Thorbecke (FGT) measures of poverty are widely used because they are consistent and additively decomposable (Foster *et al.,* 1984). This was used to achieve part of the objective of this study. Poverty head count index, poverty gap index and squared poverty gap index was computed to measure the incidence, depth and severity of poverty among the raw beef and processed beef marketers. A relative poverty line was constructed based on the Mean Per Adult-equivalent Household Expenditure (MPAHE) of the raw beef and processed beef marketers. To account for intra-household composition in estimating household expenditure, the modified OEDC equivalence scale was used to calculate the adult-equivalent household size (Organisation for Economic Co-operation and Development (OEDC), 2008). The scale assigns a value of 1 to the first adult household member, 0.5 to each additional adult member and 0.3 to each child in calculating adult-equivalent household size (OEDC, 2008). The general Foster, Greer and Thorbecke (FGT) poverty index ($P_{\alpha i}$) can be expressed as:

$$P_{ai} = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - y_i}{z}\right)^a \dots\dots\dots\dots\dots\dots\ 1$$

When:

$$a = 0, \qquad P_0 = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - yi}{z}\right)^0 = \frac{q}{n}\dots\dots\dots\ 2$$

i.e poverty incidence or head count

$$a = 1, \qquad P_1 = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - yi}{z}\right)^1 \dots\dots\dots\dots. 3$$

i.e poverty gap or depth

$$a = 2, \qquad P_2 = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - yi}{z}\right)^2 \dots..\dots\dots\ 4$$

i.e poverty severity

Where,

n = number of households in a group
q = the number of poor households
z = poverty line (2/3 Mean Per Adult-equivalent Household Expenditure (MPAHE) of the beef raw and processed beef marketers)
y = the per adult-equivalent expenditure (PAE) of the ith household,
α = degree of poverty aversion (0, 1 and 2)

Tobit regression model

Tobit regression model was employed to achieve part of objective v. (Effects of beef cattle activities on the poverty status of raw and processed beef marketers). The Tobit model is an extension of Probit model, and it is one of the approaches dealing with the problem of censored data (Johnston and Dandiro, 1997). This is a hybrid of the discrete and continuous models. The use of Tobit model is conceptually preferable to convectional linear regression models because parameter estimates from the former overcome most weaknesses of linear probability model namely: providing estimates which are asymptotically consistent and efficient (Mcdonald and Moffit, 1980).

The Tobit model is expressed based on Tobin (1958) as follows:

$$y_i = y_i^* = X_i\beta_i + e_i \dots\dots\dots\dots\dots\dots\dots\dots 5$$

$$y_i = 0 \qquad if\ y_i^* \dots\dots\dots.\dots\dots\dots\dots\dots.\dots\ 6$$

$$y_i = y_i^* \quad if\ y_i^* > 0 \dots\dots\dots\dots\dots\dots\dots\dots 7$$

$$i = 1, 2, 3, \dots\dots., n$$

where,

y_i = observed dependent variable measuring both the probability of being poor and poverty intensity of the raw and processed beef marketers (It is discrete, when the value chain actors are not poor and continuous, when they are poor).

y_i^* = latent variable indicating that poverty may or may not be directly observable. Hence, poverty is observed if $y_i^* > 0$ and unobservable if $y_i^* \leq 0$

X_i = the key interest is on causality between raw and processed beef marketing activities and poverty. In addition to the primary variable of interest given by returns on beef cattle value chain activities, other variables that affect poverty based on theory and empirical findings were included in the model to avoid model mis-specification which will result in biased estimates. Therefore, inclusion of a large vector of control variables reduces potential omitted variable bias (Wooldridge, 2016; Verhofstadt and Maertens, 2014).

Following McDonald and Moffit (1980), the Tobit model can be further disaggregated to determine the effect of a change in the value of the ith variable on a change in the probability of a household being in poverty and the expected intensity of the poverty. The expected change in the intensity of poverty with respect to a change in an explanatory variable is given by a rescaled estimate which is the marginal effect of an explanatory variable on the expected value of the intensity of the poverty calculated at the mean values of the explanatory variables:

$$\frac{\delta E(y_i)}{\delta X_i} = F(z)b_i = \frac{b_i X_i}{\sigma}b_i \dots\dots\dots\dots\dots\dots 8)$$

Where,

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$F(z)$ = cumulative normal distribution of z (adjustment factor)

z = z-score for the area under normal curve

σ = standard deviation of the error term

The explicit form of the regression model is as follows:

Model for raw and process beef marketers

$$Y_i = b_{i0} + b_1X_1 + b_2X_2 + b_3X_3 + \cdots + b_{10}X_{10} + e_i \ldots 9$$

Where,

Y_i = dependent variable (intensity of poverty among raw beef marketers and processed beef marketers with non-poor beef marketers having a value of zero and the farther away the value is from zero, the higher the intensity of poverty)

X_1 = returns on raw and processed beef marketing (₦ per 100 kg of raw meat and processed beef sold)

X_2 = age (years)

X_3 = educational level (years)

X_4 = household size (number)

X_5 = dependency ratio (ratio of the number of non-working household members to working household members)

X_6 = crop income (₦)

X_7 = access to credit (₦)

X_8 = membership of association (number of years of spent as a member of association)

X_9 = non-agricultural income (₦)

X_{10} = participation in other beef cattle value chain activities (Dummy: 1 yes, 0 otherwise)

Log transformed monetary variables were used in the estimated OLS and Tobit regression models. The log transformation of monetary amounts is necessary to make such variable more normally distributed (less skewed or heteroskedastic) and reduce the influence of outliers (makes estimates less sensitive to outlying observations) to ensure more reliable estimates (Wooldridge, 2016).

Results and Discussion
Effects of raw and processed beef marketing Activities on Poverty Status of the marketers

Based on the food and non-food consumption expenditure of the raw and processed beef marketers as presented in table 2, the relative poverty line was estimated to be ₦75, 600. Using the relative poverty line of ₦75, 600 in the study area, the poverty headcount index which is the share of the beef value chain actors whose per-adult equivalent consumption expenditure per annum is below the poverty line is 0.40 and 0.38 for raw beef marketers and processed beef marketers respectively. This implies that 40% and 38% of the raw beef marketers and processed beef marketers respectively constituted the share of the population that cannot afford to buy a basic basket of goods (food and non-food) equivalent to the poverty line.

The depth of poverty (poverty gap index) of poor raw beef marketers (0.10) was lower than that of the poor processed beef marketers (0.14). This indicates that the poor raw beef marketers are farther away from the poverty line than the poor processed beef marketers and the implication is that it is easier for raw beef marketers to move above the poverty line or move out of the poverty trap than the poor processed beef marketers. The degree of inequality (squared poverty gap index or poverty severity) among the poor raw beef marketers given by the estimated severity of poverty (0.04) was equally lower than that of the processed beef marketers (0.07). This shows that poverty tends to be less severe among raw beef marketers than the processed beef marketers. From the poverty profile of raw and processed beef marketers based on the three poverty indices, it can be deduced that the processed beef marketers were worst off in terms of poverty in comparison with the processed beef marketers.

Table 2 Distribution of poverty indices of raw and processed beef

Actors	Poverty headcount	Poverty gap	Poverty severity
Raw beef marketers	0.40	0.10	0.04
Processed beef marketers	0.38	0.14	0.07

Effect of raw beef marketing activities on poverty status of the marketers

The maximum likelihood estimates of the Tobit regression in Table 3 show the determinants of poverty status of raw beef marketers with particular interest on the effect of returns on beef value chain activities (BCA). Other explanatory variables are included in the model to avoid omitted variable bias.

The log-likelihood ratio of 124.08 was significant at 1% probability level and this indicates the joint significance of the independent variables included in the model. The estimated coefficient of returns on BCA was negative and significant at 5% probability level which indicates that raw beef marketers returns on BCA significantly decreases the intensity of poverty among raw beef marketers by 1.7% *ceteris paribus*. This implies that an increase in returns

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realized from beef cattle value chain activities will decrease the likelihood and intensity of poverty among the raw beef marketers. This corroborates Ari *et al*. (2016) who noted that livestock production systems and marketing represent a potential pathway out of poverty for many smallholders' livestock value chain actors.

The other variables that had significant effect on poverty status of the beef marketers are dependency ratio, access to credit, membership of association, non-agricultural income and other value chain activities. The coefficient of dependency ratio was positive and significant at 10% probability level, which indicates that a unit increase in the dependency ratio tends to increase the likelihood and intensity of poverty among the raw beef marketers. This is likely because most dependants particularly the aged and children contribute less to raw income generation through raw beef marketing and other income sources. This study is in line with the findings of Ezeh *et al*. (2019) who found that number of dependants had a positive influence on the likelihood of poverty among beekeepers in Kaduna state. Access to credit had a negative and significant relationship with poverty status of raw beef marketers at 1% probability level. This implies that with more credit obtained, the likelihood and intensity of poverty will tend to decrease among the raw beef marketers. This is plausible as access to credit can enable raw beef marketers to address cash constraints in beef marketing and ultimately increase their income generation. This finding is in line with that of Onwumere *et al*. (2017) who stated that access to credit by farm households had significant negative relationship with poverty status at 10% level of significance indicating that the probability of being poor reduces with an additional unit of credit acquired. The coefficient of membership of

association was positive and significant at 10% probability level, which is against a priori expectation of poverty reducing effect of social capital formation through membership of associations. This result implies that raw beef marketers who belong to an association are more vulnerable to poverty than raw beef marketers who do not belong to an association. A plausible explanation for this unexpected result is that raw beef marketers who are members of cooperative may be contributing their time and monetary resources with no commensurate benefits such as information, credit facilities, capacity building etc. from the association which results in their membership being counterproductive. This result is not in consonance with the finding of Ojo *et al.* (2020) who showed that membership of cooperative was negative and at 10% probability level. The coefficient of non-agricultural income was negative and significant at 5% probability level. This implies that the prevalence of poverty among raw beef marketers will be reduced as non-agricultural income increases. This likely arises as non-agricultural income complements the raw beef marketers' sources of income by availing the marketers' additional resources for investment and consumption purposes, which creates pathway out of poverty. The negative relationship between non-agricultural income earning and poverty was equally reported by Akpan *et al*. (2016). The estimated coefficient of other chain activities was negative and significant at 1% probability level. This implies that as the participation of raw beef marketers in other beef activities increases such as integrating forward into processed beef marketing, the likelihood and intensity of poverty among the raw beef marketers will tend to decrease. Explanatory variables such as age, education, household size and crop income were not significantly related to the poverty status of raw beef marketers in the study area.

Table 3: Effect of raw beef marketing activities on poverty status of the marketers

Variables	Coefficient	Std. error	t-value	M.E
Constant	0.087	0.042	2.071	
Returns on BCA	-0.034	0.017	-2.036**	-0.017
Age	0.023	0.031	0.753	0.011
Education	0.048	0.051	0.949	0.024
Household size	0.034	0.031	1.092	0.017
Dependency ratio	0.019	0.011	1.729*	0.009
Crop income	-0.013	0.009	-1.472	-0.006
Access to credit	-0.071	0.021	-3.408***	-0.035
Association	0.027	0.015	1.800*	0.013
Non-agricultural income	-0.078	0.034	-2.285**	-0.038
Other chain activities	-0.022	0.009	-2.339***	-0.011
Pseudo R-squared	0.40			
Likelihood ratio value	124.08***			

Note: *,** and *** indicates significance at 10, 5 and 1% probability levels respectively,
BCA = beef cattle value chain activities, M.E = marginal effect on the censored expected value (all observations)

Effect of processed beef marketing activities on the poverty status of the marketers

The maximum likelihood estimates of the Tobit regression in Table 4 show the determinants of poverty status of processed beef marketers with particular interest on the effect of returns on beef value chain activities (BCA). Other explanatory variables are included in the model to avoid omitted variable bias. The log-likelihood ratio of 95.22 was significant at 1% probability level and this indicates the joint significance of the independent variables included in the model. The estimated coefficient of returns on BCA was negative and significant at 5% probability level. This implies that opportunities to increase returns realized from beef cattle value chain activities will decrease the likelihood and intensity of poverty among the processed beef marketers by 3.3% *ceteris paribus*.

The other variables that had significant effect on poverty status of the beef cattle farmers are education, dependency ratio, access to credit and other value chain activities. The coefficient of education was negative and significant at 1% probability level. This implies that a unit increase in the education of processed beef marketers tends to decrease the likelihood and intensity of of poverty among processed beef marketers. This likely arises because education enhances the human capital of the processed beef marketers, which improves their productivity and economic opportunities for income generation. The result is consistent with the poverty reducing effect of education reported in various empirical studies (Ojo *et al.*, 2020; Onwumere *et al.*, 2017). The coefficient of dependency ratio was significant at 1% probability level and had a positive relationship with

poverty. This implies that an increase in the dependency ratio tends to increase the likelihood and intensity of poverty among processed beef marketers. This could be attributed to an increase in food and non-food consumption expenditure associated with an increase in the number of dependants. This result is consistent with Ezeh *et al.* (2019) who reported poverty increasing effect of dependency ratio. The coefficient of access to credit was negative and significant at 5% probability level. This implies that an increase in credit at the disposal of the processed beef marketers tends to decrease their likelihood and intensity of poverty. The reason for this is that access to credit makes it possible for the processed beef marketers to meet the day-to-day financial needs of managing their business profitably towards increasing their returns on investment and improving their wellbeing. This finding agrees with that of Onwumere *et al.* (2017) who reported that amount of credit obtained had negative relationship with the intensity of poverty among artisanal fish farming households. The coefficient of other chain activities was negative and significant at 10% probability level. This implies that processed beef marketers participation in other beef cattle value chain activities will have the tendency of reducing their likelihood and intensity. This is plausible only when increased income generation results from integrating into other beef cattle activities and subsequently improving the processed beef marketers' ability to meet their food and non-food consumption needs. Explanatory variables such as age, household size, crop income, membership of association and non-agricultural income were not significantly related to the poverty status of processed beef marketers in the study area

Table 4: Effect of processed beef marketing activities on the poverty status of the marketers

Variables	Coefficient	Std. error	t-value	M.E
Constant	0.134	0.041	3.268	
Returns on BCA	-0.072	0.031	-2.323**	-0.033
Age	0.016	0.013	1.231	0.007
Education	-0.051	0.021	-2.429***	-0.023
Household size	0.042	0.110	0.382	0.019
Dependency ratio	0.021	0.008	2.625***	0.010
Crop income	0.024	0.021	1.143	0.011
Access to credit	-0.089	0.045	-1.978**	-0.041
Association	0.035	0.191	0.183	0.016
Non-agricultural income	-0.108	0.068	-1.588	-0.049
Other chain activities	-0.018	0.010	-1.800*	-0.008
Pseudo R-squared	0.38			
Likelihood ratio value	95.22***			

Note: *,** and *** indicates significance at 10, 5 and 1% probability levels respectively,
BCA = beef activities,
M.E = marginal effect on the censored expected value (all observations)

CONCLUSION AND RECOMMENDATION

Based on the findings of the study, it can be concluded that raw and processed beef marketing activities significantly reduces the poverty incidence of raw and processed beef marketers by 1.7% and 3.3% respectively. This implies that beef marketing activities is a potential pathway out of poverty for many raw and processed beef marketers. Arising from the access to credit for both raw and processed beef marketers, it is recommended that beef marketers should be supported with easy access to credit such as the collateral-free and interest-free loans under the MARKETMONI and TRADERMONI loan schemes of the Government Enterprise and Empowerment Programme (GEEP). This is necessary as better access to credit through the government loan schemes and other sources will help to enhance the activities of the raw and processed beef marketers and offer opportunities for increasing the scale of operation and vertical integration.

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