

Review

Cattle Rearing and its Contribution to the Nigerian Economy: *An Econometric Analysis*

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ABSTRACT

Scholars in their quest to study the fortunes or otherwise of the agricultural sector has dwell so much on crop farming to the neglect of livestock production. By the early 1970s, as the general standard of living improved, the demand for meat in Nigeria exceeded the domestic supply. Thus, 30 to 40 percent of the beef consumed in Nigeria was imported from Niger, Chad, and other neighboring countries. In the mid-1970s, Nigeria began importing frozen beef in response to export restrictions initiated by its neighbors. This study therefore is targeted at empirically examining the impact of cattle rearing and its contribution to the Nigerian economy. Using various econometric tools of analysis, the variables for study were tested for stationarity and all variables became stationary at first difference. In the same vein, evidence reveals that series in the model (GDP, Cattle-Prod and Agric-Exp) exhibit long-run equilibrium relationship judging from the Johansen cointegration result. Major findings from the OLS regression output reveals that cattle rearing have no significant contribution to the Nigerian economy during the period under reference. The study therefore recommends that in view of the importance of cattle rearing to the Nigerian economy, the government should first and foremost bring the age-long clashes between herdsman and farmers to a peaceful end for improve output in the livestock sub-sector. Ranching – a method of raising livestock under range conditions – has been suggested as the best solution to the incessant Fulani herdsman / farmers crises. Secondly, the Federal Government must as a matter of urgent importance do all that is within its reach to contain the menace of cattle rustling prevalent in the country. Finally, government should create well-equipped special reserves across the country with irrigation, dams, educational, health and recreational facilities where these herdsman can be stationed with their cows to avoid the incessant farmers-herdsman clashes. We must come to terms with the reality that these herdsman also need decent living and care from government.

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INTRODUCTION

Nigeria is one of the largest countries in Africa, with an estimated population of about 180 million (World Bank, 2015). The country has highly diversified agro-ecological conditions, which makes it possible to produce variety of agricultural products (both crop farming and livestock production). Furthermore, agriculture constitutes one of the most significant sectors of the economy (Manyong et. al., 2005). Agriculture in Nigeria employs about 70% of the working population and contributes with about 60% to the national income (Oluwasanmi, 1966). Its contribution

to Gross Domestic Product (GDP) accounted for about 40% in 2010 (CBN, 2011). During the early days of independence, Nigeria was and still is relatively self-sufficient in food and livestock production, and foreign exchange earnings from agricultural exports have been used over the years to support in financing imports needed for economic growth and development (Anderson, 1970). It is however lamentable that over the years, little attention has been given to the livestock sub-sector of the agricultural industry. Reliable statistics on

livestock holdings did not exist, but careful estimates suggested a total of 10 to 11 million cattle in the early 1970s and, after the severe drought, 8.5 million in the late 1970s.

The UN Food and Agriculture Organization estimated that in 1987 there were 12.2 million cattle, 13.2 million sheep, 26.0 million goats, 1.3 million pigs, 700,000 donkeys, 250,000 horses, 18,000 camels found mostly in the Sahel savanna around Lake Chad, and 175 million poultry nationally, owned mostly by villages rather than by commercial operators. The livestock subsector accounted for about 2 percent of GDP in the 1980s (The Library of Congress Country Studies and the CIA World Factbook, 1991). Scant literature exists on the activity of livestock production in Nigeria. Scholars in their quest to study the fortunes or otherwise of the agricultural sector has dwell so much on crop farming to the neglect of livestock production. This is the reason for this study, designed to empirically analyse cattle rearing and its contribution to the Nigerian economy, using econometric techniques of analysis. Emphasis shall be on cattle rearing which dominates livestock production in Nigeria. The study covers the period 1986 to 2015. The study shall test the null hypothesis "Cattle Rearing has no Significant Contribution to the Nigerian Economy between 1986 to 2016".

The remaining section of this is arranged as follows: Section two is devoted to literature review, section three is methodology. In section four, results are presented and discussed. In section five, conclusions and recommendations are outlined.

LITERATURE REVIEW

Among all the livestock that makes up the farm animals in Nigeria, ruminants, comprising sheep, goats and cattle, constitute the farm animals largely reared by farmers in the country's agricultural system. Nigeria has population of about 34.5 million goats, 22.1 million sheep and 13.9 million cattle (Lawal-Adebowale, 2012a). Livestock production is also an instrument of socio-economic change to improved income and quality of life. Thus, larger proportion of these animals' population are however concentrated in the Northern region of the country than the Southern region. Specifically, about 90% of the country's cattle population and 70% of the sheep and goat populations are concentrated in the Northern part of the country (Girei et al., 2013).

A significant portion of the agricultural sector in Nigeria involves cattle herding, fishing, poultry, and lumbering, which contributed more than 2 percent to the GDP in the 1980s. Per the UN Food and Agriculture Organization 1987 estimate, there were 12.2 million cattle, 13.2 million sheep, 26.0 million goats, 1.3 million pigs, 700,000 donkeys, 250,000 horses, and 18,000 camels, mostly in northern Nigeria, and owned mostly by rural dwellers rather than by commercial companies. Fisheries output ranged from 600,000 to 700,000 tons annually in the 1970s. Estimates indicate that the output had fallen to 120,000 tons of fish per year by 1990. This was partly due to environmental degradation and water

pollution in Ogoni land and the Delta region in general by the oil companies.

The concentration of Nigeria's livestock-base in the Northern region is most likely to have been influenced by the ecological condition of the region which is characterized by low rainfall duration, lighter sandy soils and longer dry season (Lawal-Adebowale, 2012). All types of cattle interbreed and can therefore be regarded as a single species, Blench, (1998). Breeds of locally available cattle in Nigeria are basically indigenous and are grouped as the Zebu and Taurine. The Zebus are locally recognized by the cattle rearers in Northern part of Nigeria include Bunaji, Rahaji, Sokoto Gudali, Adamawa Gudali, Azawak and Wadara. Lombin (2011) in Nasiru, (2012) reported that Nigeria has a livestock population of about 16.3 million cattle, 40.8 million goats and 27 million sheep, 151 million poultry, 3.7 million pigs, 900,000 donkeys and 90,000 camels. FAO (2003) reported that cattle contribute over 50% of the national meat supply while the remaining 40-50% is contributed by other classes of livestock and other domesticated animals. Despite the large population of livestock in Nigeria, the protein intake is still below the minimum requirement (FAO, 2001). This may be attributed to the low number of cattle production in the country as a result of regionalized suitability to humid areas.

The introduction of the Structural Adjustment Programme (SAP), a government policy of the 80s in Nigeria, tremendously affected livestock production not only in the Northern part but the entire country. There was a decrease in the amount of meat consumed by households between the pre-SAP and the post-SAP period (NISER/CBN 1991). The number of cattle produced per sampled farmer also decreased by 44% between pre-SAP and the post-SAP period, *Ibid*. Apart from the Federal Government policies, the problems of livestock production in developing countries are becoming more critical as the production systems still remain constrained by socio-economic and biological factors (West, 1990). Cattle in specific are a major protein supplier to Nigerian populace and the world as a whole; hence, markets and marketing activities are very essential for the distribution of the cattle to the final consumers and for the wellbeing of the farmers and the marketers. Marketing of cattle just like in any other market in the State, is a crucial human invention. It is a function of so many factors among which are: pricing, transportation, financing and risk bearing. Agricultural marketing in the tropics is one of the most important sectors of the economy and as such, has substantial impact on the economy where it operates.

The importance of agricultural marketing cannot be over emphasized since it brings about specialized production for better skill and efficiency; thereby providing opportunities for exchange of goods and services (Olukosi et al., 1990). Cattle's marketing is an important part of agricultural and economic activities. The ability of the cattle marketer to generate more income from its marketing activities depends largely on the effective utilization of improved practices that lead to increase in suitable marketing conditions. The extent of usage of these practices by the cattle marketers could be

influenced by a set of factors including, socio-economic characteristics of the marketers (animal accessibility, education status of the marketers, experience in cattle marketing, information and its source utilization, etc.) and lack of knowledge regarding current marketing practices.

By the early 1970s, as the general standard of living improved, the demand for meat in Nigeria exceeded the domestic supply. Thus, 30 to 40 percent of the beef consumed in Nigeria was imported from Niger, Chad, and other neighboring countries. In the mid-1970s, Nigeria began importing frozen beef in response to export restrictions initiated by its neighbors. The National Livestock Production Company established domestic commercial cattle ranches in the late 1970s, but with poor results.

Most of Nigeria's sheep and goats are in the north, where the Fulani maintained an approximate ratio of 30 percent sheep and goats to 70 percent cattle. About 40 percent of northern non-Fulani farming households are estimated to keep sheep and goats. Most pigs are raised in the south, where the Muslim proscription against eating pork is not a significant factor.

Challenges Facing Livestock Production in Nigeria

According to a report by Food and Agricultural Organisation (FAO) (2014), Nigeria, with a population of over 180 million people is grossly underprovided with essential food components like protein which is important for the realization and development of human potentials both mentally and physically as well as infinitesimal contribution to the gross domestic product of the country. Data from the National Bureau for Statistics (NBS), Central Bank of Nigeria (CBN), and Food and Agricultural Organisation (FAO) indicates that from cattle, less than 2kg of beef is available to an average Nigerian per year and just mere 4kg of eggs per annum is available to each Nigerian. In fact, milk production has been nose diving or at best has remained constant since 1994. Livestock production is a source of employment and livelihood to many Nigerians. The livestock population comprises cattle, goats, sheep, pigs, poultry etc. The livestock system employed by the farmers is characterized by traditional system of production.

The two major challenges facing cattle production in Nigeria are basically Farmers and Herdsmen Crises over Grazing.

In Nigeria, grazing lands have barely been demarcated, and this large sector of agriculture always suffers compared to crop farming or fruit plantation (FAO, 1985). The latter two are mostly demarcated favourably for the fact that most people are sedentary and areas needed are small. The establishment of demarcated rangelands and passageways (cattle corridors) allow the livestock to access water points and pastures without causing damage to cropland (FAO, 2011). Pastoralists usually graze over areas outside farm lands, and these have been accepted to be the norm from time immemorial. Their movements are opportunistic and follow pasture and water resources in a pattern that varies seasonally or year-to-year according to availability of resources (FAO, 2011). The patterns of movement

may be controlled by seasonal climate variations. However, increase in population, drying of waterholes, shifting in rainfall pattern leading to drought as a result of the changing climate affects both sectors of agriculture. At the same time, smaller and local agricultural production systems are becoming more and more integrated into the global economy, pushing up land values. These, coupled with the absence of good governance and the increase in level of poverty creates avenue for conflicts. Both customary and statutory land management systems are often not responding adequately to the tenure insecurity these changes bring (Djire et al., 2014).

Extensive livestock production in the form of pastoral livestock keeping is among the most suitable means of land use in arid areas of Africa because of its adaptability to highly variable environmental conditions (McCarthy et al., 2000). Livestock here signifies cattle, sheep and goats. In Nigeria, most pastoralists do not own land but graze their livestock in host communities (Awogbade, 1987). While a few have adopted the more sedentary type of animal husbandry, the increasing crises between farmers and pastoralist presupposes that grazing is a major means of animal rearing in Nigeria. The sedentary type of animal husbandry also proves to be more expensive, difficult to manage and inefficient for the rapid growing market of an ever increasing population like Nigeria.

Causes and Consequences of Farmer-Pastoralist Conflict

Past conflicts were solely due to overlap of farmlands with cattle routes, where farmers grow crops on the routes. But recently, this conflict has escalated, taking another dimension of ethnic and religious differences with little effort from government or community leaders aimed at addressing them. John (2014) studied the predicaments of the pastoralists and farmers and the true stories behind their conflicts and how these can be resolved. His results show the existence of one-sided reporting by the media, research articles and interested parties. Majority of those reports tend to highlight and report cases in which the pastoralist faulted farmers and tend to ignore the other side of the stories or even their losses (John, 2014). This appears to aggravate the situation and adds to the speculation and allegations of the pastoralist. Other studies show farmers encroachment on cattle routes is the real cause (Nfomi et al., 2014). These mystify who is wrong and how these conflicts can be addressed. Ethnic jingoists and politicians have been benefitting in these strifes and without doubt have succeeded in creating a divide between the farmers and pastoralist, especially in communities that are less educated. Leaders at the Federal, State, Local Governments and even at community levels become perplexed and wondered on how these issues can be resolved.

Farmers and pastoralist in many localities and different countries make their livelihood within the same geographical, political, and socio-cultural conditions which may be characterized by resource scarcity

(Braukämper, 2000) or political inequality (Bassett, 1988). Farmer-pastoralist conflicts have been associated with the conflict of land resource use exacerbated by dwindling resources (Blench, 2004). Some researchers have linked this crisis to the theory of eco-violence (Okoli and Atelhe, 2014), where environmental factors and exploitation of scarce resources leads to conflict and violence. This may explain the dwindling grazing resources (land, pasture etc) and poor management of existing grazing reserves (Adisa, 2012) as culpable. In addition, the population is dynamic and ever increasing compared to land that is relatively static. The population growth rate of Nigeria per year is 3.2% (National Population Commission, 2012). Therefore, more and more people will continue to compete over land. Other researchers (Okoli et al., 2014; Odoh and Chigozie, 2012; Abbass, 2012) relate the causes of conflict to the global climate change and the contending desertification and aridity that has reduced arable and grazing lands, forcing pastoralist to move southwards in search of pasture for their livestock. Climate change-induced rainfall shifting patterns/amount and desertification reduces crop lands, and farmers have to follow these patterns, leading to overlap on grazing lands. The Fulbe herders in Nigeria, for example are faced with rapidly vanishing grass, forcing them to switch from the Bunaji cattle breed, which depends on grass, to the Sokoto Gudali, which readily browses (FAO, 2001).

The pastoralists are also competing with large-scale agricultural schemes that narrow the grazing lands. The use of tractors, herbicides and fertilizers have revolutionised agriculture in the country leading to more and more grazing lands being farmed extensively (Iro, 2010). As farmlands increase to the detriment of grazing lands, animals can easily veer into farmlands and destroy crops. Land acquisition by capitalist farmers exacerbates the upsurge of conflict as pastoralist can no longer find where to pass let alone where to stay (Abbass, 2012). Changing access rights as traditional communal property are being replaced by private ownership (Adisa, 2012). It is common to see that Burtalis (cattle pathways) close to cities do not exist anymore as houses and filling (petrol/gas) stations have taken over their places. Cattle now have to compete with motorist to the only path that is tarred road. There are many other predominant causes. Blockage of waterholes by farmers and fishermen, crop damage by pastoralist livestock and reprisal attacks on pastoralist by sedentary farmers when ethnic or religious disputes occur somewhere else (Umar, 2002; Abbass, 2012; Audu, 2014). Also, allocation of grazing lands as government layouts without compensating the pastoralist, breakdown of law and order and taking side by local rulers or Judges responsible for dispute resolution (Rasak, 2011; Fabusoro and Oyegbami, 2009). Others are gradual decline of social cohesion, ethnocentric and religious intolerance of leaders who are themselves sedentary farmers and conflict of cultures (Abbass, 2012; Bello, 2013).

Cattle Rustling

In cattle rustling, the gap between minor violence and full-scale war is very narrow as herdsmen face mounting insecurity. Who are the rustlers, and how have they become so powerful that security forces can't tackle them? In the last few years, crimes related to cattle rustling have increased across many states. Gunmen with automatic weapons storm settlements, with a misplaced sense of military fraternity, killing them and taking cattle away. In 2013, armed gunmen stormed the commercial farm owed by then Vice President Namadi Sambo, along Birnin Gwari road in Kaduna State and took away over 1,000 cattle worth more than N100 million. In a similar incident, another group of rustlers invaded the farm of the Emir of Zazzau, Alhaji Shehu Idris, in Zaria and made away with over 200 cattle worth millions of naira (Daily Trust, May 2015).

Per Daily Trust Newspapers (2015) asserted that robberies in high-profile farms, along with constant reports of ruthless killing of cattle owners, left the herdsmen between the devil and the deep blue sea: between the farmers and the diabolic rustlers. The situation has left many herdsmen without cattle. Prompted by incessant cattle robbery cases, the former Inspector General of police, Suleiman Abba, constituted a "Task Force on Cattle Rustling and Associated Crimes" to checkmate the rising crime in all the six geopolitical zones of the country. The task force is saddled with pre-emptive intelligence gathering, anti-cattle rustling and allied crimes patrols and the operations, as well as the investigation and possible prosecution of the reported incidents of cattle rustling. But not much has been heard since then as the attacks continue to mount. Benue, Plateau, Kwara, Nasarawa, Taraba and the federal capital territory (FCT) are fast becoming safe havens for crime warlords hell bent in wiping out the age long traditional occupation of the Fulani. Daily reports of cattle rustling in these states raise many questions seeking answers: if all the cattle are rustled, what next? Who are these rustlers? Who are the buyers of these stolen cattle? And why have they become powerful? Are the robbers more tactical in the crime than security forces fighting them? Or are there untouchable masked men behind them?

METHODOLOGY

Variables and Data Source

Variables for this study are Gross Domestic Product (proxy for economic growth) used as dependent variable while the independent variables are cattle production (proxied by GDP ratio for livestock production) and government expenditure on agriculture used as control variable. To determine the contribution or impact of cattle rearing on the Nigerian economy, government expenditure on agriculture is an important variable which

Empirical Result and Analysis

Table 1. Data Presentation on Gross Domestic Product (GDP), Cattle Production (Cattle Prod) and Government Expenditure on Agriculture (Agric-Exp)

YEAR	GDP	CATTLE_PROD	AGRIC_EXP
1981	5.17E+10	2.525025	0.013028
1982	5.37E+10	3.962689	0.0148
1983	5.80E+10	5.193151	0.01277
1984	6.43E+10	6.619808	0.015664
1985	7.35E+10	7.162608	0.020365
1986	7.49E+10	7.389413	0.020689
1987	1.12E+11	8.373794	0.046145
1988	1.48E+11	8.889891	0.083
1989	2.28E+11	11.79099	0.1518
1990	2.82E+11	14.14587	0.258
1991	3.29E+11	15.57605	0.2087
1992	5.55E+11	23.02748	0.455975
1993	7.15E+11	36.57599	1.803806
1994	9.46E+11	54.30441	1.183291
1995	2.01E+12	97.20229	1.5104
1996	2.80E+12	130.4078	1.592562
1997	2.91E+12	145.0295	2.058885
1998	2.82E+12	158.3143	2.891705
1999	3.31E+12	164.3743	59.31617
2000	4.72E+12	172.1903	6.335779
2001	4.91E+12	228.5579	7.064546
2002	7.13E+12	271.0261	9.993554
2003	8.74E+12	299.2245	7.537355
2004	1.17E+13	360.803	11.25663
2005	1.47E+13	463.42	16.32596
2006	1.87E+13	560.2461	17.91903
2007	2.09E+13	642.2764	32.48423
2008	2.47E+13	758.8398	65.39901
2009	2.52E+13	863.4024	22.4352
2010	5.55E+13	979.5641	28.21795
2011	6.37E+13	1115.602	41.2
2012	7.26E+13	1251.931	33.3
2013	8.10E+13	1399.485	39.43101
2014	9.01E+13	1573.053	36.7
2015	9.52E+13	1748.025	41.27

Source: World Bank Development Indicators and Central Bank of Nigeria Statistical Bulletin (2015)

must not be neglected to avoid biased results. The data for the study were secondary in nature obtained from the World Bank Development Indicators and Central Bank of Nigeria (CBN) statistical bulletin, 2015 edition. The time series data cover a 34-years period ranging from 1981-2015.

Model Specification

A multiple regression model is used with gross domestic product (GDP) as dependent variable with cattle production (Cattle Prod) and government expenditure on agriculture (Agric-Exp) were taken as independent

variables. The functional form of the model is thus specified. as:

$$GDP = f(\text{Cattle Prod}, \text{Agric-Exp}) \quad \dots \quad (\text{eq. 1})$$

For the purpose of estimation we shall restate the above functional form explicitly as:

$$GDP = \beta_0 + \beta_1(\text{Cattle Prod}) + \beta_2(\text{Agric-Exp}) + \mu_t \dots \dots \quad (\text{eq. 2})$$

The estimated models are further transformed into log-linear form. This is aimed at reducing the problem of

multi-collinearity among the variables in the models. Thus the log-linear models are specified as shown below:
 $\text{LnGDP} = \beta_0 + \beta_1(\text{LnCattle Prod}) + \beta_2(\text{LnAgric-Exp}) + \mu_t$
(eq. 3)

Our a priori expectations are:

β_1 and $\beta_2 > 0$.

Where:

GDP = Gross Domestic Product
 (expressed in Nigeria Naira)
 Cattle Prod = GDP ratio for Livestock
 Production (expressed in Nigeria Naira)
 Agric-Exp = Government expenditure on
 Agriculture (expressed in Nigeria Naira)
 μ_t = Error term
 Ln = Natural Logarithm
 β_0 = Intercept
 β_1 and β_2 = Slope of the regression equation

A priori Expectation

A priori expectation is a theoretical statement or criteria set by economic theory. It is hoped that parameters in this model have the correct signs and sizes that conform to economic theory. If they carry the expected signs, then the hypothesis is accepted otherwise it is rejected. From the model, the expected theoretical relationship between the explanatory and independent variables are:

- Gross Domestic Product vs Cattle Production (Cattle Prod): Here β_1 is expected to have a positive sign as increase in cattle production tends to bring an increase in the Gross Domestic Product (economic growth) of Nigeria, *ceteris paribus*.
- Gross Domestic Product vs Government expenditure on agriculture: In β_2 above, the relationship is expected to be positive since the more government expenditure (funding) received by the Federal Ministry of Agriculture, the more capital projects like dam, irrigation, importation of special breed of grasses for cattle consumption and creation of ranches to enhance cattle production thereby bringing increase to Gross Domestic Product.

Method of Data Analysis

The methods of data analysis include first and foremost descriptive statistic, then unit root test with Augmented Dickey-Fuller (ADF) and Philips-Perron unit root method, a test for long run relationship (cointegration) and then the ordinary least square (OLS) multiple regression method to determine the effect of the independent variables in the model on the dependent variable. The study made use of E-views 8.0, econometric software for the analysis (table 1).

Stationarity Test

The variables in the model, being time series data may be non-stationary, so regression models using these series, most likely will generate spurious result; and the outcome will be biased towards finding a significant relationships among variables. To overcome this undesirable outcome, the time-series aggregates were

subjected to test of stationarity by testing for the presence or absence of unit root using Johansen cointegration test.

This study therefore commences its investigation by first testing the properties of the time series used for analysis. The test is conducted using two different unit root models. That is, the Augmented Dickey Fuller (ADF) model and the Philips-Perron (PP) model. The essence of using the two tests is for confirmatory testing. The result of the estimation is thus summarized (table 2).

From the result presented in table 1 above, shows that ADF and PP unit root tests on the variables at their level and difference values has been conducted. The summary of the result reveals that gross domestic product, cattle production and government expenditure on agriculture are non-stationary in the level values. However, the stationarity property is found after taking the first difference of the series (gross domestic product, cattle production and government expenditure on agriculture) all 1 percent significance level. Economic theory holds that when variables that are known to be $I(1)$ produce a stationary series, then there is a possibility of a long run cointegration relationship among them.

Cointegration Test

Having established the root properties of the above variables, we move ahead to show whether there is a long-run co-integration relationship among the variables under consideration by applying Johansen Full Information Maximum Likelihood method.

The above (table 3) illustrate Johansen's co-integration test under both trace and maximum eigenvalue. Both trace and maximum eigenvalues test indicates two co-integrating relationship between GDP and other variables at the five percent level of significance, where the trace statistic values of 47.48511 and 19.49914 are greater than the 5% critical values of 29.79707 and 15.49471. Similarly, maximum Eigenvalue of 27.98598 and 18.08729 are greater than the critical values 21.13162 and 14.26460 respectively thus leading to the rejection of the null hypothesis of no cointegration and concluding otherwise. The conclusion that can be arrived at is that there exists a unique long run relationship between GDP and cattle production and government expenditure on agriculture i.e. they can both walk together for a long time without deviating from the established path during the period under reference.

Coefficient of Determination

The coefficient of determination (*r*-square and adjusted *r*-square) are useful for throwing light at the explanatory power of the regression model. The model with an adjusted *r*-squared of 0.72 is impressive. This indicates that 72 percent of variation in the gross domestic product (GDP) is explained by the independent variables cattle production and government expenditure on agriculture. The remaining 28 percent is explained by variables not included in this model. The Adjusted R^2 of 0.72 is close to the R^2 value of 0.73, meaning that the model is fit and useful for making valid conclusions on the topic of study.

Table 2. Augmented Dickey Fuller and Philip-Perron Unit Root Test with Intercept

Variable		P-value	1 st t-statistic value	Difference	5% Critical Value	Order of Integration
Log(GDP)	ADF	0.0001	-5.483705		-2.954021	I(1)
	P-P	0.0001	-5.478854		-2.954021	I(1)
Cattle_Prod	ADF	0.0213	-3.348838		-2.963972	I(1)
	P-P	0.0163	-3.444753		-2.954021	I(1)
Agric_Exp	ADF	0.0000	-8.088027		-2.954021	I(1)
	P-P	0.0000	-8.740760		-2.954021	I(1)

Source: Author's computation using E-views 8.0

Table 3. Extracted Johansen Cointegration Result
Series tested: GDP, Cattle_Prod, Agric_Exp

Trace Statistic	5% critical value	Prob. Value	Max- statistic	Eigen	5% critical value	Prob. Value
47.48511	29.79707	0.0002	27.98598		21.13162	0.0046
19.49914	15.49471	0.0118	18.08729		14.26460	0.0119
Trace test indicates 2 cointegrating eq.(s) at the 0.05 level				Series have long-run relationship		
Max-eigenvalue test indicates 2 cointegrating eq.(s) at the 0.05 level				Series have long-run relationship		

Source: Author's computation using E-views 8.0

Table 4. Extracted OLS Regression Output

Variable	Coefficient	Standard Error	T-statistic	Prob. value
Dependent Variable	26.75858	0.294142	90.97166	0.0000
Cattle Production	0.003342	0.000691	4.833942	0.0000
Agricultural Expend.	0.031261	0.018859	1.657582	0.1072
Post-Estimation / Robustness Test				
R-squared		0.733746		
Adjusted R-squared		0.717105		
F-statistic		44.09292		
Prob(F-statistic)		0.000000		
Jacque-Berra Probability:		0.258235		
Breusch-Godfrey Serial Correlation LM Test:		0.9073		
Heteroscedasticity Test: Breusch-Pagan-Godfrey:		0.6516		

Source: Author's computation using E-views 8.0

Joint Statistical Significance of the Model

The F-statistic of 44.09292 which is a measure of the joint significance of the explanatory variables is found to be statistically significant at 1 percent level as indicated by the corresponding probability value 0.00000.

Individual Statistical Significance of the Model:

The Student t-test otherwise known as individual statistical significance of the parameters is adopted to test how significant each variable is in contributing to the independent variable: In doing this we compare the estimated t-statistic with the tabulated t-value, which by rule of thumb should be greater than 2 and significant at

the 0.05 level of significance. In testing for the first independent variable (cattle production), we compare the t-statistic value of 4.833942 against the threshold figure of 2 and conclude that the variable shows a positive and statistically significant relationship with gross domestic product within the period studied. On the contrary, the variable (government expenditure on agriculture) fails this statistical test, since 1.657582 is less than the table value of 2. We thus conclude that government expenditure on agriculture is not significant in explaining the model (table 4).

The constant is statistically significant implying that GDP does not only depend on cattle production and government expenditure on agriculture but other variables not specified herein may affect GDP.

The coefficient of cattle production in conformity with economic a priori expectation is positively signed. The result above reveals that a naira increase in cattle production translates to 0.003342 billion naira increase in the gross domestic product of Nigeria between 1981 to 2015. This contribution is however insignificant and leaves much to be desired. It only goes to show that cattle production in Nigeria has not brought in much to the growth and development of Nigeria, and many factors are responsible for this abysmal performance. So many reasons are attributable to the near insignificant contribution of this very important sub-sector of the agricultural ministry to the nation's growth.

The coefficient of government expenditure on agriculture is also positive as expected by theory. The result reveals that a naira increase in government expenditure on agriculture leads to 0.031261 billion naira increase in gross domestic product of Nigeria within the same period. This impact is not quite significant and is a wakeup call for government to put in more efforts at reviving the ailing agriculture ministry. The sector has suffered long years of neglect probably because of the easy petro-dollar derivable from the oil industry.

To test the hypothesis "Cattle Rearing has no Significant Contribution to the Nigerian Economy between 1986 to 2016" earlier formulated, the t-statistic and probability values for the individual coefficient shall be used as yardstick for accepting or rejecting formulated hypothesis. Since the t-statistic value (1.657582) and probability value (0.1072) of the coefficient are less than the permissible threshold by theory, we accept the null hypothesis and conclude that Cattle Rearing has no significant contribution to the Nigerian Economy between 1981 to 2015.

Robustness Test

To buttress the empirical analysis above, it is also necessary to examine the statistical properties of the estimated model. Robustness checks are crucial in this analysis, because if there is a problem in the residuals from the estimation of a model, it is an indication that the model is not efficient, such that parameter estimates from such model may be biased. The model was tested for normality, serial correlation, heteroscedasticity and stability tests and the result is as shown in the appendix page.

From the Breusch-Godfrey Serial Correlation LM Test results, the hypothesis of zero autocorrelation in the residuals was not rejected. This was because the probability value of 0.9073 is greater than 5%. Therefore, the Breusch-Godfrey serial correlation LM test did not reveal serial correlation problems for the model. Also, Breusch-Pagan test was conducted to test for heteroscedasticity and the result reveals a probability of 0.6516 which is more than 0.05. This leads to the rejection of the presence of heteroscedasticity in the residuals thus concluding that the residuals are homoscedastic. It can therefore be deduced that the model is valid and useful for policy making. The result of Jarque-Bera test of normality also indicate the series as being normally distributed and valid for empirical analysis

judging from the insignificant probability value of 0.258235. The result of both the CUSUM and CUSUMQ stability test indicates that the model is stable. This is because both the CUSUM and CUSUMQ lines fall in-between the two 5% lines.

CONCLUSION / RECOMMENDATIONS

Cattle rearing is a business that has the potential of contributing significantly to the growth of the nation's economy. But the sub-sector has come under severe attacks and challenges over the years as herdsmen-farmer's clashes have remain a recurring decimal in our national life. It has threatened the livelihood of both farmers and herdsmen as well as the peaceful existence of Nigeria. It is in consideration of these facts that this study empirically examines cattle rearing and its contribution to the Nigerian economy between 1981 to 2015. The sources of data are statistical bulletins published by World Bank Development Indicators (WBDI) and Central Bank of Nigeria Statistical Bulletin 2015. To achieve the objectives specified in the study, Augmented Dickey Fuller and Philips-Perron unit root test, Johansen cointegration tests and Ordinary Least Square estimation techniques were employed, using E-views version 8 software. Results from the stationarity and cointegration test reveals that all the variables are first difference stationary, with evidence of a unique long run relationship among the variables in the model. Findings from the OLS regression output reveals that cattle rearing has no significant contribution to the Nigerian economy during the period under reference.

The following policy recommendations are suggested:

- First and foremost is the issue of herdsmen-farmers' persistent clashes over grasses to feed cattle. For our cattle to bring in maximum contribution to GDP growth the debate on whether to create ranches must be ended. Ranching – a method of raising livestock under range conditions – has been suggested as the best solution to the incessant Fulani herdsmen / farmers' crises. Nigerian cows are among the best species of cows in the world but lacked the capacity to produce quality milk because they wandered ceaselessly in search of greener pasture which often brings the herdsmen at logger heads with local farmers. The importance of ranching cannot be overemphasized if the government is desirous of getting the best from livestock production. Ranching is global best practice in cattle production. The largest ranch in the world, dairy farm in the world is in Saudi Arabia; 135,000 cows in one farm, but they are the most comfortable cows on planet earth, they live in air-conditioned tents. They eat and they produce milk; they give 40 litres of milk per day, the reverse is the case in Nigeria where our cows sometimes produce just half a litre of the milk. That is why Saudi milk is all over the gulf. For Saudi Arabia to have attained this feat is not by accident, they get their grass from the U.S.; import alfalfa grass from the U.S. and from Sudan. Our cows are wandering and the herdsmen are at war with farmers; a crisis

that must be ended as quickly as possible. And the solution is in growing grasses. Grass is not just grass. When grass does not contain 80 percent amino acid and nutrients, it is not good for even cow to eat. The food that cow eat passes to human being through meat that we eat. When these cows eat high quality grasses and water, we are eating good quality food, but if not, we are eating chaffs and the milk production as well will be low.

- In cattle rustling, the gap between minor violence and full-scale war is very narrow as herdsmen face mounting insecurity. Reports of robberies in high-profile cattle farms, along with constant reports of ruthless killing of cattle owners, leave the herdsmen between the devil and the deep blue sea. The situation has left many herdsmen without cattle and have made them criminals themselves due to frustration. The Federal Government must as a matter of urgent importance do all that is within its reach to contain this menace. It is important to note that on average it takes about seven years for a calf to be born. It equally involves a lot of work and patience to raise the calf to adulthood. It therefore becomes impossible and difficult for herdsmen who are robbed of their livelihood to sit and watch while these criminals go unchallenged. A task force must therefore be put in place to checkmate the excesses of cattle rustlers. This, if achieved has the potential of increasing output in the sector as well as GDP growth rate.
- The present nomadic lifestyle of herdsmen of always being in the bush and forest makes them animistic and ruthless, hence they show no compassion to other fellow humans once confronted with a crises. Government should therefore create well-equipped special reserves across the country with irrigation, dams, educational, health and recreational facilities where these herdsmen can be stationed with their cows to avoid the incessant farmers-herdsmen clashes. We must come to terms with the reality that these herdsmen also need decent living and care from government. Peaceful coexistence between these two important agricultural stakeholders will in no small measure collectively improve the fortunes of agriculture in the country.

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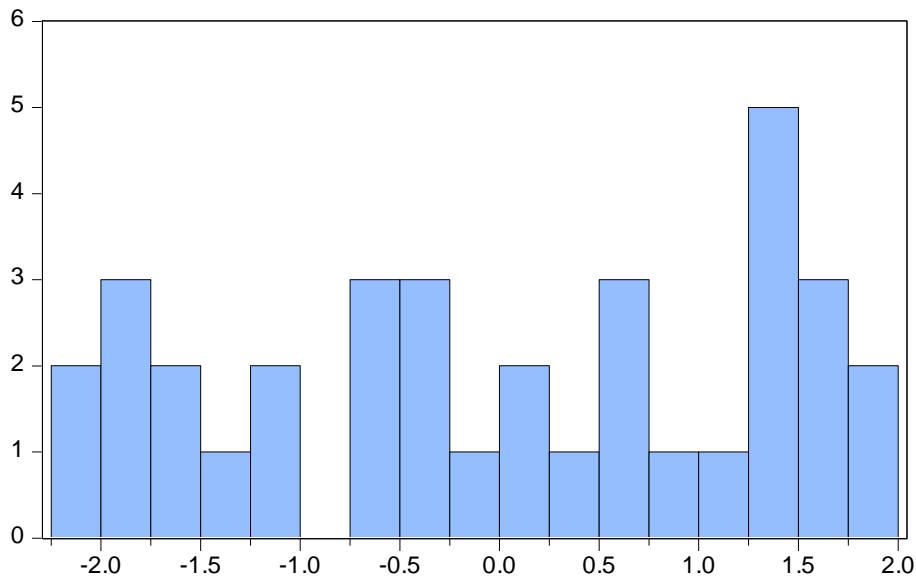
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APPENDICES

Log Data

Year	GDP	CATTLE_PROD	AGRIC_EXP
1981	24.66934	0.926251	-4.34068
1982	24.70591	1.376923	-4.21314
1983	24.78308	1.647341	-4.360665
1984	24.88724	1.890066	-4.15639
1985	25.02112	1.968874	-3.89394
1986	25.03953	2.000048	-3.878161
1987	25.44099	2.125107	-3.075963
1988	25.72008	2.184915	-2.488915
1989	26.15459	2.467336	-1.885191
1990	26.36358	2.649423	-1.354796
1991	26.51954	2.745734	-1.566857
1992	27.04304	3.136688	-0.785318
1993	27.29589	3.599392	0.589899
1994	27.57504	3.994605	0.168299
1995	28.32844	4.576794	0.412375
1996	28.6603	4.870667	0.465344
1997	28.69801	4.976937	0.722164
1998	28.66648	5.064582	1.061846
1999	28.82865	5.102146	4.082882
2000	29.18226	5.148601	1.846213
2001	29.2222	5.431789	1.955089
2002	29.59508	5.602215	2.30194
2003	29.79923	5.701194	2.019871
2004	30.08835	5.888332	2.420957
2005	30.32127	6.138634	2.792756
2006	30.56007	6.328376	2.885864
2007	30.67273	6.465019	3.480755
2008	30.83642	6.631791	4.180507
2009	30.85929	6.760881	3.110631
2010	31.64685	6.887108	3.339958
2011	31.78542	7.017149	3.718438
2012	31.91598	7.132443	3.505557
2013	32.02559	7.243859	3.674553
2014	32.13235	7.360773	3.602777
2015	32.18677	7.466242	3.720136



Series: Residuals	
Sample 1981 2015	
Observations 35	
Mean	-1.40e-16
Median	0.010899
Maximum	1.805114
Minimum	-2.098090
Std. Dev.	1.303669
Skewness	-0.189714
Kurtosis	1.691263
Jarque-Bera	2.707771
Probability	0.258235

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.097609	Prob. F(2,29)	0.9073
Obs*R-squared	0.227345	Prob. Chi-Square(2)	0.8926

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 04/13/17 Time: 12:55

Sample: 1982 2015

Included observations: 34

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001651	0.057543	-0.028686	0.9773
DLOG(CATTLE_PROD)	0.011759	0.246983	0.047612	0.9624
DLOG(AGRIC_EXP)	-0.000280	0.042641	-0.006569	0.9948
RESID(-1)	-0.063875	0.187572	-0.340538	0.7359
RESID(-2)	-0.057443	0.187776	-0.305910	0.7619

R-squared	0.006687	Mean dependent var	3.27E-17
Adjusted R-squared	-0.130322	S.D. dependent var	0.177585
S.E. of regression	0.188802	Akaike info criterion	-0.361181
Sum squared resid	1.033742	Schwarz criterion	-0.136716
Log likelihood	11.14007	Hannan-Quinn criter.	-0.284632
F-statistic	0.048804	Durbin-Watson stat	1.888605
Prob(F-statistic)	0.995269		

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.434319	Prob. F(2,31)	0.6516
Obs*R-squared	0.926732	Prob. Chi-Square(2)	0.6292
Scaled explained SS	1.651415	Prob. Chi-Square(2)	0.4379

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 04/13/17 Time: 12:56

Sample: 1982 2015

Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.018472	0.019908	0.927887	0.3606
DLOG(CATTLE_PROD)	0.071698	0.085132	0.842196	0.4061
DLOG(AGRIC_EXP)	-0.006979	0.014782	-0.472112	0.6402
R-squared	0.027257	Mean dependent var		0.030609
Adjusted R-squared	-0.035501	S.D. dependent var		0.064330
S.E. of regression	0.065462	Akaike info criterion		-2.530603
Sum squared resid	0.132843	Schwarz criterion		-2.395924
Log likelihood	46.02025	Hannan-Quinn criter.		-2.484673
F-statistic	0.434319	Durbin-Watson stat		2.079429
Prob(F-statistic)	0.651586			

