

Impact of Agricultural Financing on Livestock Production in Nigeria (1986-2024)

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Abstract

Livestock production is essential for food security and rural livelihoods in Nigeria. However, insufficient agricultural financing, which includes a lack of credit guarantees, limited loans from banks, low government spending, and poor infrastructure, has led to stagnant productivity and a 12% decrease in per capita meat availability. To explain these dynamics, the paper examined the impacts of the agricultural financing on livestock production in Nigeria for the period between 1986 and 2024 with special reference given to the contributing roles of the Agricultural Credit Guarantee Scheme Fund (ACGSF), the credit provided by the deposit money banks to the agricultural industry, government spending on agriculture and infrastructure expenditure. Using an Autoregressive Distributed Lag (ARDL) model on annual time-series data obtained using Central Bank of Nigeria Statistical Bulletin, the study has investigated the long-run and short-run relationships among the following variables. The empirical evidence proved that the credit provided by the deposit money banks had a very strong and statistically significant effect on livestock production in the long-run, but the Agricultural Credit Guarantee Scheme Fund produced a negative yet statistically insignificant effect. The government spending on agriculture had a positive, but marginally important, impact as opposed to infrastructure spending, which had a statistically significant negative impact with the livestock output. These results highlight the efficiency of the private banking credit on overcoming the capital constraint, but it also shows that the system lacks efficiency and undermines the effectiveness of the public and guaranteed financing sources. The paper recommends that the delivery of credit by the private sector should be strengthened to enhance risk-sharing practices and incentives, to reform the ACGSF in order to increase its reach and simplify management, to redistribute government agricultural funding towards capital-intensive investments that would support livestock systems, and ultimately, to redirect infrastructure expenditure towards rural livestock value-generating chains to reduce its counter-productive effect.

Keywords: *Agricultural Credit Guarantee Scheme Fund (ACGSF), Agricultural financing, ARDL model, Deposit money banks' credit, Government expenditure on agriculture, Infrastructure expenditure, Livestock production, Nigeria*

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Background to the Study

Agricultural financing is a crucial component of global agricultural economies, offering vital resources such as credit, subsidies, insurance, and infrastructure investments to improve farming efficiency and sustainability (World Bank, 2021). Indicators like commercial bank loans to agriculture, government funding for rural development, and microfinance support for agribusinesses have consistently fueled growth in the sector worldwide (Food and Agriculture Organisation, 2020). According to the World Bank (2021), these financial mechanisms contributed to a 15% rise in global agricultural output from 2000 to 2020, enhancing food security for over 8 billion individuals. Additionally, organizations like the Food and Agriculture Organisation (FAO) point out that effective financing is linked to better use of inputs, such as fertilizers and high-yield seeds, which can increase average crop yields by up to 20% in funded areas (FAO, 2020). Therefore, agricultural financing not only reduces risks from climate variability but also promotes value chain integration, from production to market access, highlighting its critical role in achieving Sustainable Development Goal 2, which aims for zero hunger (World Bank, 2021).

In Sub-Saharan Africa, agricultural financing is significantly lacking, even though the sector employs more than 60% of the workforce and accounts for nearly 25% of the regional GDP (African Development Bank, 2022). Formal credit for agriculture averages less than 10% of total lending, hindering mechanization and technology adoption across the continent (African Development Bank, 2022). The African Development Bank (2022) notes that this lack of funding leads to a low annual growth rate of just 4%, which falls short of the 6% needed to achieve the goals set out in Agenda 2063. Although rural microfinance initiatives are growing, they only reach 15% of smallholder farmers, forcing many to rely on informal lenders with high-interest rates exceeding 30% (International Fund for Agricultural Development, 2021). These challenges increase vulnerability to issues like droughts and pests, highlighting the urgent need for increased and targeted financial support to unlock the agricultural potential of the region (African Development Bank, 2022).

In Nigeria, which is Africa's most populous country, agricultural financing is severely inadequate, with credit to the sector making up less than 5% of total bank lending as of 2023 (Central Bank of Nigeria, 2023). The Agricultural Credit Guarantee Scheme Fund (ACGSF) provided only NGN 120 billion from 2015 to 2022, resulting in stagnant growth of just 1.8% annually, despite agriculture contributing 24% to the GDP (Central Bank of Nigeria, 2023). Other financial sources, such as loans from the Bank of Agriculture and commercial banks, show persistent gaps, with smallholders receiving less than 20% of the funds available due to collateral requirements (Ogunbiyi & Oladele, 2020). Data from the Central Bank of Nigeria (2023) also indicates that inflation has diminished real lending rates, discouraging investment, while inconsistent policies undermine programs like the Anchor Borrowers' Programme. These shortcomings not only hinder access to necessary inputs but also perpetuate rural poverty, impacting over 80 million farming households (Ogunbiyi & Oladele, 2020).

Livestock production is a crucial part of Nigeria's agriculture, supporting over 20 million pastoralists and contributing around 5% to the national GDP, according to the Federal

Ministry of Agriculture and Rural Development (2017). The country is home to approximately 18.4 million cattle, 76 million goats, 43.4 million sheep, and 180 million poultry, making Nigeria a leader in livestock in Africa. However, productivity remains low due to extensive free-range systems, with cows producing only 0.5 liters of milk daily compared to the global average of 2.5 liters (International Livestock Institute, 2022). Issues such as disease, feed shortages, and land disputes further hinder production, leading to stagnant meat output of 1.2 million tonnes each year, despite increasing demand. These inefficiencies contribute to food insecurity, as per capita meat availability has decreased amid urbanization (National Bureau of Statistics, 2024).

The relationship between agricultural financing and livestock production in Nigeria reveals a significant gap, as financing options do not adequately support livestock value chains, even with initiatives like the National Livestock Transformation Plan in place. This lack of funding has resulted in a 12% decline in per capita meat availability from 2010 to 2023, worsening conflicts between farmers and herders and causing distress in rural areas (NBS, 2024). Insufficient financial support limits the adoption of better breeds, veterinary care, and feed technologies, weakening the resilience of the sector. Research indicates that improved access to credit could boost livestock production by 25%, but bureaucratic challenges and lenders' risk aversion continue to be obstacles (Ogunbiyi & Oladele, 2020).

Government efforts have been made in the last 10 years to counter such setbacks in an effort to improve performance in livestock production in Nigeria. The Bank of Agriculture, which was founded in 2001, as well as directives of Central Bank of Nigeria regarding specific credit channelling in the sectors, can be pointed out as the examples. These focus on improvement of the value chain, cost effective infrastructure, and increased advisory services. Financial viability and efficiency is addressed by additional schemes including Agricultural Credit Guarantee Scheme Fund, Commercial Agriculture Credit Scheme, and Livestock Productivity and Resilience Support Project as of 2022 (Central Bank of Nigeria, 2022). Nonetheless, the livestock sub-sector in Nigeria is not financially stable and efficient as compared to other economies. This is evident in the sub-sector's contribution of between 5-10 percent to agricultural GDP in Nigeria as compared to Kenya and 12 percent and Ethiopia's 19 percent (The Global Economy, n.d., Kenya Investment Authority, 2025). This shows that the livestock sub-sector in Nigeria is not performing to its expectation despite having a large number of livestock as well as ample production capacity. This demands an examination of the role that agricultural financing can play in enhancing livestock production in Nigeria for the period 1986 to 2024.

Based on this background, the paper seeks to answer the following research questions: What is the impact of the Agricultural Credit Guarantee Scheme on livestock production in Nigeria? What is the impact of deposit money banks' credit on livestock production in Nigeria? What is the impact of agricultural government expenditure on livestock production in Nigeria? What is the impact of infrastructure on livestock production in Nigeria? The specific objectives are; examine the impact of agricultural credit guarantee scheme on livestock production in Nigeria; investigate the impact of credit of the deposit money banks on the livestock

production in Nigeria; analyse the impact of agricultural government expenditure on livestock production in Nigeria; and evaluate the impact of infrastructure and livestock production in Nigeria. Hypotheses that led to the research were as follows: there is no significant impact of agricultural credit guarantee scheme on livestock production; there is no significant impact of deposit money banks credit on the livestock production in Nigeria; there is no significant impact of agricultural government expenditure on the livestock production in Nigeria, and there is no significant impact of infrastructure on livestock production in Nigeria.

Literature Review

Conceptual Review

Livestock Production

Various scholars have defined livestock production in different ways. Sikiruet *et al.* (2024) consider it through the prism of total output and productivity, which is usually quantified by GDP contribution and herd sizes without paying much attention to how the economy operates in the developing setting like in Nigeria. According to Makun (2018), livestock production is defined as a balance between the input factors (feed, labour), and the output factors, including milk yield and meat production, in the long-term sustainability without having one source of financing. The performance of livestock production, which is often understood as the rearing of animals as a source of meat, milk, and other products depends on the effective use of resources that should be properly developed (Federal Ministry of Agriculture and Rural Development, 2017). This school of thought seeks to achieve economic growth but presupposes a favourable result. According to Corral *et al.* (2019), institutions need to have an enabling role in the economic development of a country in terms of livestock production as it helps to stabilise production and avert economic vulnerability. This definition views performance as equity but there are normative issues. Consequently, the paper defines livestock production as the sectoral ability to generate various financiers to maintain operations, which will result in increased production.

Agricultural Financing

Agricultural financing is a crucial component of economic development, particularly in agrarian economies like Nigeria, where access to finance significantly impacts productivity and rural development. Various scholars have conceptualized this term differently, underlining its role in financial resource mobilization, investment, and sustainability within the agricultural sector. Dominic *et al.* (2023) defined agricultural financing as the provision of financial resources, including credit facilities, government expenditure, and loan guarantees, to enhance agricultural productivity. While comprehensive, this definition lacks specificity regarding financial instruments and barriers to access, such as high interest rates and collateral requirements. Marafa (2022) broadened the scope by considering agricultural financing as encompassing short, medium and long-term loans covering the entire agricultural value chain, from input supply to marketing. This definition highlights both on-farm and off farm activities but is somewhat technical and omits the role of government policies and institutional frameworks in facilitating agricultural financing. This paper defines agricultural financing as the provision of financial resources including agricultural credit guarantee scheme fund, government expenditure, commercial bank credit to the agricultural sector and infrastructure aimed at enhancing livestock productivity in Nigeria.

Agricultural financing in Nigeria includes important components such as the Agricultural Credit Guarantee Scheme (ACGSF), loans from deposit money banks, government spending on agriculture, and infrastructure development. Each of these elements plays a unique but interconnected role in supporting livestock production. The ACGSF is a government-supported program designed to reduce lending risks for banks, encouraging them to provide loans to farmers by offering guarantees, sharing risks, and relaxing collateral requirements for small-scale farmers. However, challenges such as delays in implementation and economic instability have been noted by researchers like Abu (2017), Eyo *et al.* (2020), and Okunlola and Ayetigbo (2024).

Loans from deposit money banks involve providing financial support to those in need, focusing on managing risks and improving agricultural productivity, as discussed by Ogar and Charles (2018), Balana and Oyeyemi (2022), and Ogunmuyiwa *et al.* (2017), although they face limitations due to regulatory constraints and limited resources. Government spending on agriculture includes investments in farm inputs, veterinary services, breeding programs, and support for various agricultural sectors, aimed at increasing food production despite issues related to fiscal inefficiencies and corruption, according to Nuhu *et al.* (2022), Onuoha (2025), and Erhuotor and Kigbu (2024). Infrastructure refers to essential physical and institutional resources such as roads, irrigation systems, storage facilities, and utilities that support livestock operations and improve market access. These efforts help overcome production challenges, even though there are concerns about maintenance and funding, as highlighted by Agbana and Ebisine (2022), Sogahet *et al.* (2024), and Mgbenka *et al.* (2016). These factors contribute to strengthening financial support for livestock production in Nigeria by addressing credit shortages, improving access to inputs, and enhancing the efficiency of the agricultural value chain.

Theoretical Underpinning

The paper is anchored on the Finance-Led Growth Hypothesis advanced by Schumpeter (1911) and later operationalised by the works of King and Levine (1993). This hypothesis argues that in order to have all sectors of an economy healthy and dynamic, financial development must be efficient. Effective financial development, in its turn, requires the presence of strong financial institutions which are able to mobilise savings, release capital productively and encourage innovation by providing credits. The hypothesis assumes that financial development is a prerequisite to growth; as a result, it needs persistent returns in the form of increased productivity, technological advancement, and general economic growth. The allocation promise of the hypothesis entails the distribution of resources to high potential areas, correcting inefficiencies in capital markets and promotion of development through banking reforms and priority lending, especially in the Nigerian livestock industry, in order to reduce reliance on subsistence activities.

The hypothesis is an effective analytical instrument that one can use to understand why agricultural financing, particularly banks and governmental programmes play a critical role in shaping the performance and outputs of the livestock sector in Nigeria due to the financial fluctuations that are hampering sectoral expansion in the Nigerian economy. The measures

implemented by Central Bank of Nigeria to widen the availability of credit as well as to enhance financial inclusion are consistent with the propositions of Finance-Led Growth Hypothesis. In addition, the Credit Constraint Theory as formulated by Stiglitz and Weiss (1981) complemented in the paper as it is also relevant to this scenario; it is said that the asymmetric information and high monitoring costs in the credit markets create rationing thus limiting the access of borrowers to formal finance. The Finance-Led Growth Hypothesis recognises the role of alleviating such restrictions through the use of effective techniques of intermediation- generalised mechanisms that leverage economies of scale, and more specific-purpose mechanisms, like collateral substitutes of rural livestock producers. Based on this, the paper will be based largely on the Finance-Led Growth Hypothesis, but reinforced by the Credit Constraint Theory because they are relevant to the livestock industry in Nigeria.

Empirical Review

Fitawek and Kalaba (2017) conducted an empirical paper to examine the effects of rural financial services on livestock production in Ethiopia. Multiple regression models were adopted. Outcome unveiled that access to credit was found to have a significant positive impact on livestock ownership and productivity. Participation in savings schemes also positively influenced livestock production outcomes. The paper identified that the type and source of financial services significantly impacted livestock production. The paper found that socio-economic factors, such as household income and education level, moderated the impact of financial services on livestock production.

Obrimah *et al.* (2017) examined how agricultural financing influences Nigerian farmers' choices between crop diversification and livestock adoption, focusing on credit accessibility, interest rates, and regional disparities as key variables. Using regression and probit techniques of analysis, the paper found agricultural credit significantly influenced crop diversification decisions but showed no statistically significant impact on livestock adoption. Regional analysis revealed credit accessibility had stronger effects in northern zones compared to southern regions attributed to differential loan utilization efficiency and extension service quality. While interest rate reductions correlated with increased credit uptake the paper critically noted systemic inefficiencies: loans were diverted to non-agricultural uses due to weak monitoring, and 41% of farmers faced exclusion from formal credit channels despite policy provisions. Ensung (2018) determined the effect of agricultural financing on the agricultural productivity in Kenya using data from 1985 and 2015. The paper adopted regression technique for the analysis. The paper found that water development financing was significant and had a positive effect on agricultural productivity, agricultural asset financing had a negative but significant effect on the agricultural productivity whereas livestock financing had a positive but insignificant effect on the agricultural productivity in Kenya.

Okunlola *et al.* (2019) analyzed the effect of guaranteed agricultural financing to oil palm, cocoa, groundnuts, fisheries, poultry, cattle, roots, and tubers on Nigeria's economic growth. Utilizing time series data spanning 37 years (1981–2017), the paper employed the Autoregressive Distributed Lag (ARDL) model for analysis. Findings from both the short-run and long-run models indicated that none of the guaranteed agricultural finance variables

exhibit a statistically significant impact on real GDP. Uzomba *et al.* (2020) examined the relationship between agricultural funding-based contributions and performance of the Nigerian agricultural sector from 1986 to 2018. The paper utilized Fully Modified Ordinary Least Square (FMOLS) and Engle-Granger Single Equation Co-Integration Tests. From the analyses, the results discovered that total government expenditure and agricultural credits are significantly and positively related to crop production, livestock production and fishing production while foreign direct investment maintained a negative relationship with them.

Danladi *et al.* (2021) analyzed the impact of agricultural finance on productivity in Nigeria, utilizing the ARDL Test, Bounds Test, and Granger causality test on time series data spanning 1981 to 2019. The findings indicated that while both public and private financing had a positive yet insignificant influence in the short run, private financing proved to be significantly effective in enhancing agricultural productivity in the long run, whereas public financing remained insignificant. The paper identified a negative long-run relationship between interest rates and the production of both crop and livestock production. While, Kolade *et al.* (2021) analyzed the impact of agricultural financing on Nigeria's economic growth from 1986 to 2019, the paper employed both descriptive and inferential statistical methods, utilizing the Vector Error Correction Mechanism (VECM) for analysis. The findings indicated that agricultural financing significantly influenced economic growth in Nigeria. Additionally, exchange rate, government size, and inflation had notable effects on economic growth, while trade openness and investment exhibited a positive and significant impact. Furthermore, the paper established the existence of a significant long-run relationship between agricultural financing and economic growth in Nigeria.

Mbelu and Ifionu (2022) investigated the impact of agricultural financing on Nigeria's economic growth from 1981 to 2019, utilizing the error correction model and the Granger-causality model. The paper found that, in the long run, the Agricultural Credit Guarantee Scheme Fund had a positive and significant effect on the country's gross domestic product (GDP). Additionally, both commercial bank loans and community/microfinance bank loans exhibited a significant positive influence on GDP within the paper period. Moreover, the Granger causality analysis indicated a demand-following relationship rather than a supply-leading one, suggesting that an increase in production levels in Nigeria substantially supports and promotes the adoption of agricultural financial instruments. While, Dimgba *et al.* (2023) examined the impact of agricultural financing on livestock production in Nigeria over the period 1981 to 2021 deploying parsimonious error correction model (ECM) for data analysis, the paper found that the Agricultural Credit Guarantee Scheme Fund had a positive and significant influence on livestock production. However, the findings also indicated that bank loans, advances, and foreign aid to agriculture had a significant negative effect on livestock production.

Nnachi *et al.* (2023) examined the influence of agricultural financing on Nigeria's agricultural sector production between 1981 and 2021, utilizing the Autoregressive Distributed Lag (ARDL) model for time series analysis. The findings indicated that financing for cattle rearing, grains, and roots and tubers had a significant positive impact on agricultural production,

whereas funding allocated to cocoa, poultry, and oil palm did not exhibit a statistically significant effect. While, Abuzaid *et al.* (2023) investigated the current and future role and volume of agricultural financing in livestock production, focusing on the development of agricultural loans (specifically for animal production) and their impact on agricultural development in Qena Governorate, Egypt. Spearman rank correlation and comparative analysis was conducted. The results revealed that at Dershna Center, there is a significant annual increase in loan values. Conversely, other centers such as Abousht, NagHammadi, Qift, and Qus experienced annual decreases in loan values. The paper further noted that changes in loan volumes during the second period (2018/2020) did not align consistently with their relative importance in the first period (2005/2007). Also, the comparative analysis ranks the centers by the relative importance of loans, with DishnaCenter leading, followed by Naqada, Al-Waqf, Qena, and Nag Hammadi, while Abousht, Qus, and Farshout share the lowest rank.

Greco *et al.* (2025) conducted a bibliometric analysis on the evolution of agricultural financing research from 1975 to 2025, utilizing the Web of Science and VOSviewer 1.6.18 platforms. The findings revealed a substantial increase in scholarly interest, positioning agricultural financing as a fundamental component of sector sustainability. The paper identified key themes, including climate change, food security, financial accessibility, and resource diversification. Additionally, it highlighted that while countries with strong agricultural traditions have played a central role in this evolution, others with limited resources have achieved notable progress through strategic financial approaches.

Akintunde *et al.* (2025) examined the relationship between agricultural financing and economic growth in Nigeria, emphasizing its role in promoting sustainable agricultural development using data from 1981 to 2020. The paper employed the error correction model for analysis, and the findings indicated that agricultural credit, export financing, and capital expenditure exert a positive and significant impact on Nigeria's Gross Domestic Product (GDP). While, Aigbovo (2025) evaluated the effects of agricultural funding on agricultural production in Nigeria based on data from 2009 to 2023. The research used the Autoregressive Distributed Lag (ARDL) method for analysis. The results showed that commercial loans in banking had a significant and positive impact on agricultural production. On the contrary, Agricultural Credit Guarantee Scheme Fund (ACGSF) had a negative but insignificant impact, as well as a positive but insignificant impact on agricultural production in Nigeria.

Ezuem *et al.* (2025) conducted a study on the impact of agricultural financing on the economic performance of Nigeria from 1998-2023. The study employed regression methods. The findings indicated that funding agriculture was significant and positively related to economic performance. Agricultural loans portrayed a positive and significant influence on agriculture, while credits portrayed a positive but uncertain influence on the economic aspects of livestock within Nigeria. Despite the body of empirical literature on agricultural financing, existing studies have revealed significant gaps that this research attempts to fill. For instance, Dimgba *et al.* (2023) find that the agricultural credit guarantee fund has a mixed effect on the output of the Nigerian livestock sector, while bank credit impacts negative effects. However, the paper does

not discuss the role of deposit money banks credit and infrastructure. Internationally, studies (Danladi *et al.*, 2021; Nnachi *et al.*, 2023) confirmed that private financing of agriculture is sustainable in the long run, but they are silent on the livestock sector, specific dynamics from 1986 to 2023. This paper fills these gaps by incorporating deposit money banks credit and infrastructure as key financing supportive platforms that enhances livestock production within the Nigerian settings.

Methodology

To determine the impact of agricultural financing on livestock production in Nigeria, the paper adopted ex-post facto research design. This design proves apt for establishing causal relationships among historical economic variables without manipulation. The paper sourced its data from Central Bank Statistical Bulletin (2024). The time-series data utilized for the paper spanned from 1986 to 2024. Having considered the time-variant of the paper, the paper adopted autoregressive distributed lag model in analyzing the impact of agricultural financing on livestock production in Nigeria. The model of the paper was adopted from the studies of Dimgba *et al.* (2023) and Nnachi *et al.* (2023). The functional form adopted from these studies is expressed as:

$$LP = f(ACGS, BL, FA) \quad (1)$$

Where, LP signifies livestock production; Agricultural Credit Guarantee Scheme Fund disbursements (ACGSF), bank loans (BL), and foreign aid (FA). However, this paper modifies the functional form as stated thus:

$$LP = f(ACGS, DMBC, GEA, INF) \quad (2)$$

The modified empirical form is expressed in a log form as:

$$\ln LP_t = \beta_0 + \beta_1 \ln ACGS_t + \beta_2 \ln DMBC_t + \beta_3 \ln GEA_t + \beta_4 \ln INF_t + \varepsilon_t \quad (3)$$

Where; LP denotes livestock production (real GDP share, N'billion); ACGS, Agricultural Credit Guarantee Scheme Fund disbursements to livestock (N'billion); DMBC, deposit money banks' credit to agriculture (N'billion); GEA, agricultural government expenditure (N'billion); INF, infrastructure expenditure (N'billion); β_0 - β_4 , parameters; ε_t , stochastic error; and t, time subscript. Since the paper deployed autoregressive distributed Lag (ARDL) which is suitable for mixed-order integration of variables, both the short and long run dynamics were estimated. Pre- estimation diagnostics add unit root Test (Augmented Dickey- Fuller), by intermittent selection Akaike Information Criterion in determining the long- run relationships. Post- estimation confirms stability through the CUSUM and Breusch- Godfrey serial correlation test and Breusch- Pagan Test. The variables were logged to linearise the model, reduce heteroskedasticity, normalize scale differences, and interpret the estimated coefficients as elasticities. The ARDL long-run equation is stated as:

$$LnLP_t = \beta_0 + \beta_1 LnLP_t + \beta_2 LnACGS_t + \beta_3 LnDMBC_t + \beta_4 LnGEA_t + \beta_5 LnINF_t + \varepsilon_t \quad (4)$$

Having expressed the long run equation, the short run equation is expressed as:

$$LnLP_t = \beta_0 + \sum_{i=1}^p \beta_1 \delta LnLP_{t-i} + \sum_{i=0}^{q1} \beta_2 \delta LnACGS_{t-i} + \sum_{i=0}^{q2} \beta_3 \delta LnDMBC_{t-i} + \sum_{i=0}^{q3} \beta_4 \delta LnGEA_{t-i} + \sum_{i=0}^{q4} \beta_5 \delta LnINF_{t-i} + \alpha_1 LnLP_{t-i} + \alpha_2 LnACGS_{t-i} + \alpha_3 LnDMBC_{t-i} + \alpha_4 LnGEA_{t-i} + \alpha_5 LnINF_{t-i} \quad (5)$$

The first-difference operator δ used is the short-run dynamics, in this case, the contemporaneous variables are lagged with a lagged term included. Conversely, the level variables express the long-run relationship which is represented by their lagged coefficients (α). The error correction model used, therefore, in this analysis is:

$$LnLP_t = \beta_0 + \sum_{i=1}^p \beta_1 \delta LnLP_{t-i} + \sum_{i=0}^{q1} \beta_2 \delta LnACGS_{t-i} + \sum_{i=0}^{q2} \beta_3 \delta LnDMBC_{t-i} + \sum_{i=0}^{q3} \beta_4 \delta LnGEA_{t-i} + \sum_{i=0}^{q4} \beta_5 \delta LnINF_{t-i} + \phi ECT_{t-i} + \varepsilon_t \quad (6)$$

The short-run effect is operationalised in this specification through the $\Delta LnLP_t$ which is the immediate impact of changes in agricultural financing on livestock production. The error-correcting term (ECT_{t-1}), is used to ensure that any non-equilibrium with the long-run concordance is brought to align gradually with time. This adjustment coefficient, ϕ , then, must be statistically significantly negative so that the system will approach the long-run equilibrium.

Presentation and Interpretation of Results

Following the specific objectives of this paper, data analysed was presented in this section of the paper. The presentations of the analysis follow a chronological analytical procedure beginning with the outcomes obtained from descriptive analysis. The findings of the descriptive analysis are presented in Table 1.

Table 1: Descriptive Statistics

	LP	ACGS	DMBC	GEA	INF
Mean	805.9276	594039.8	314.7451	2781806.	185.3846
Median	412.1115	271895.6	60.97625	509511.2	83.38836
Maximum	2620.293	2342247.	2255.357	9800907.	600.9884
Minimum	7.389413	4446.900	1.830300	72.27226	0.278946
Std. Dev.	839.3344	691611.4	524.2339	3411335.	199.9210
Skewness	0.698374	0.930195	2.314753	0.812588	0.716973
Kurtosis	1.976381	2.685064	7.873030	2.046490	2.109469
Jarque-Bera	4.747946	5.637036	71.53302	5.621432	4.511307
Probability	0.093110	0.059694	0.000000	0.060162	0.104805
Observations	39	39	39	39	39

Source: Author's Computation (2025)

The average of livestock production, payment of Agricultural Credit Guarantee Scheme Fund on livestock and deposit-money banks credit on livestock and in government expenditure on livestock and infrastructure expenditure are 805.92, 594039.8, 314.74, 2781806 and 185.38 respectively the comparatively small size of LP compared to financing programmes implies a lack of sector performance amid resource distributions. Its largest values are 2620.293, 2342247, 2255.357, 9800907 and 600.9884 and the smallest are 7.389413, 4446.900, 1.830300, 72.27226, and 0.278946.

This variation in LP ranges is an indication of being exposed to shocks, unlike much more solid financing flows. The highest variability of GEA is pointed out in the standard deviations (839.3344, 691611.4, 524.2339, 3411335 and 199.9210). This fact suggests that the inconsistency of policies compromises the stability of spending in comparison to a constant flow of credit. Also, the skew of all variables is positive and the kurtosis values as well. Jarque-Bra tests only reject normality in DMBC ($p = 0.00000$), but the rest of series meet the conditions of normality with a number of observations of 39. DMBC has a big sample size though and the effect of this non-normality is offset, since central limit theory applies. A stationarity test was then made after the descriptive analysis as shown in Table 2.

Table 2: Results of Unit Root Tests

Variable	ADF @ Level	ADF @ First Difference	Order of Integration
LOG(LP)	-3.602006 {0.0105}		I(0)
LOG(ACGS)	-0.684043 {0.8385}	-4.996039 {0.0002}*	I(1)
LOG(DMBC)	-0.690978 {0.8367}	-6.921787 {0.0000}*	I(1)
LOG(GEA)	-0.725540 {0.8278}	-5.772127 {0.0000}*	I(1)
LOG(INF)	-2.101323 {0.2453}	-7.439930 {0.0000}*	I(1)

Source: Author's Computation (2025)

ADF test statistics and p-values are given at each variable at the level and the first difference. In the case of livestock production (LOG(LP)) the ADF value is significant at the 5 percent ($p = 0.0105$) level, which means that LOG(LP) is stationary at level and integrated of order zero, I(0). In terms of the rest of the variables, which are Agricultural Credit Guarantee Scheme Fund disbursements to livestock (LOG(ACGS)), deposit money banks credit to agriculture (LOG(DMBC)), government expenditure on agriculture (LOG(GEA)) and infrastructure expenditure (LOG(INF)) the level ADF statistics is not significant at the 5-percentage level ($p > 0.24$) indicating the lack of level non-stationarity. These variables are stationary at the order one, I(1) after first differencing, and the p-values of the first-difference are significant on the 1% level. Table 3 presents the estimation of the lag length structure results. This result was used to decide the optimum lag for estimation, which is reported in Table 3.

Table 3: Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-222.1729	NA	0.437715	13.36311	13.58758	13.43966
1	-68.97785	252.3213	0.000237	5.822227	7.169015*	6.281520
2	-40.63318	38.34868	0.000215	5.625481	8.094594	6.467519
3	-14.67536	27.48475*	0.000270*	5.569139*	9.160575	6.793922*
4	35.57532	38.42699	0.000115	4.083805	8.797565	5.691332

Source: Author's Computation (2025)

The lag length of 3 is suggested by Table 3. This result is supported by most of the information criteria: sequential modified LR test, the Final Prediction Error (FPE), Akaike Information Criterion (AIC) and the Hannan-Quinn Information Criterion (HQ), denoted by an asterisk at lag 3. Therefore, lag order of 3 is adequate to interpret the short-run relationship of the effect of the agricultural financing on livestock in Nigeria. Since all the series are established as I(0) and I(1), the bound cointegration test is revealed in Table 4.

Table 4: Bound Test Result

ADRL Bound Test	Value	Critical		
<i>F</i> -statistics	10.91865			
K	4	Value		
		Significance level	Lower bounds	Upper bounds
			<i>I</i> (0)	<i>I</i> (1)
		10%	2.2	3.09
		5%	2.56	3.49
	2.5%	2.88	3.87	
	1%	3.29	4.37	

Note: *K* = Number of Variables

Source: Author's Computation (2025)

The results of ARDL bounds test presented in Table 4 are 10.91865 with F -statistic that is greater than the upper critical values at the Thresholds of 1, 2.5, 3.49 and 3.09 (k= 4). This shows that there was a long-run relationship between the variables in the model. Based on this, the null hypothesis of no co-integration is rejected and it proves the existence of the long-run equilibrium between livestock production (LOG(LP)) and the variables of credit disbursements (LOG(ACGS), LOG(DMBC)) and the government spending on agriculture (LOG(GEA)) and infrastructure spending (LOG(INF)) in Nigeria. The long-run and the short-run model are then subsequently estimated as Tables 5 and 6 respectively.

Table 5: Short-run Estimates of the ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(ACGSFLIV)	0.093629	0.022866	4.094647	0.0015
DLOG(ACGS(-1))	0.213247	0.024359	8.754292	0.0000
DLOG(ACGS(-2))	0.184096	0.028884	6.373708	0.0000
DLOG(ACGS(-3))	0.129698	0.024382	5.319387	0.0002
DLOG(DMBC)	0.238614	0.033117	7.205116	0.0000
DLOG(DMBC(-1))	-0.096946	0.045936	-2.110450	0.0565
DLOG(DMBC(-2))	-0.148197	0.041103	-3.605531	0.0036
DLOG(DMBC(-3))	-0.105437	0.039393	-2.676515	0.0202
DLOG(GEA)	0.020020	0.004447	4.501859	0.0007
DLOG(GEA(-1))	-0.153160	0.017905	-8.554269	0.0000
DLOG(GEA(-2))	-0.156116	0.017311	-9.018192	0.0000
DLOG(GEA(-3))	-0.121602	0.017499	-6.949230	0.0000
DLOG(INF)	0.031247	0.015704	1.989774	0.0699
DLOG(INF(-1))	0.084400	0.017710	4.765591	0.0005
DLOG(INF(-2))	0.075422	0.019252	3.917534	0.0020
DLOG(INF(-3))	0.074145	0.016556	4.478434	0.0008
CointEq(-1)*	-0.454351	0.047163	-9.633716	0.0000
R-squared	0.952371			
Adjusted R-squared	0.907544			

Source: Author's Computation (2025)

The short-run estimation indicates that the coefficient of D(LOG(ACGS)) is 0.093629 with a p-value of 0.0015 which is a positive and statistically significant effect at the 1 00 per cent level. Therefore, an increase of one percent in the disbursements of the Agricultural Credit Guarantee Scheme Fund on livestock would be linked to a corresponding 0.094 percentage point increase in the short run production of livestock. D(LOG(DMBC)) has a coefficient of 0.238614 (p = 0.0000) which is also a statistically significant positive effect: an increase in the credit issued by deposit-money banks to agriculture by one percent produces an increase in livestock production by 0.239 percent. In the case of D(LOG(GEA)) the coefficient of 0.020020 (p = 0.0007) is proof that there is a positive and statistically significant short run relationship. CointEq(-1) of the cointegration equation is equal to the lagged coefficient of the dependent variable, equal to -0.454351 with a very significant p -value of 0.0000; this negative coefficient suggests a correction mechanism that causes the system to approach equilibrium at the rate of 45.44%. An R² of 0.952371 supports the explanatory power of the model.

Table 6: Long-run Estimates of the ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(ACGS)	-0.077546	0.156583	-0.495243	0.6294
LOG(DMBC)	0.909217	0.072311	12.57363	0.0000
LOG(GEA)	0.387807	0.181024	2.142297	0.0534
LOG(INF)	-0.258460	0.098609	-2.621072	0.0223
C	-1.357471	0.732287	-1.853740	0.0885

Source: Author's Computation (2025)

Long-run estimation of the coefficient shows that coefficient of Log (ACGS) = -0.077546 (p=0.6294) is not statistically significant at traditional level. On the other hand, LOG(DMBC) has a very important coefficient of 0.909217 (p=0.0000) which implies that an increase in the credit of deposit-money banks to agriculture by one percent of the long-term result in an increase in the livestock production by 0.909 percent. LOG(GEA) has a coefficient of 0.387807 (p = 0.0534), which is slightly significant at the 10 percent confidence level, whereas LOG(INF) has a coefficient of -0.258460 (p = 0.0223), and this is statistically significant at the 5 percent confidence level. The constant value is -1.357471 (p= 0.0885), which is just significant at the 10% level, implying that there are other factors that are not observed that affect livestock production in Nigeria. Diagnostic testing was further done to confirm the estimated model and the results are provided in Table 7.

Table 7: Diagnostics Test Results

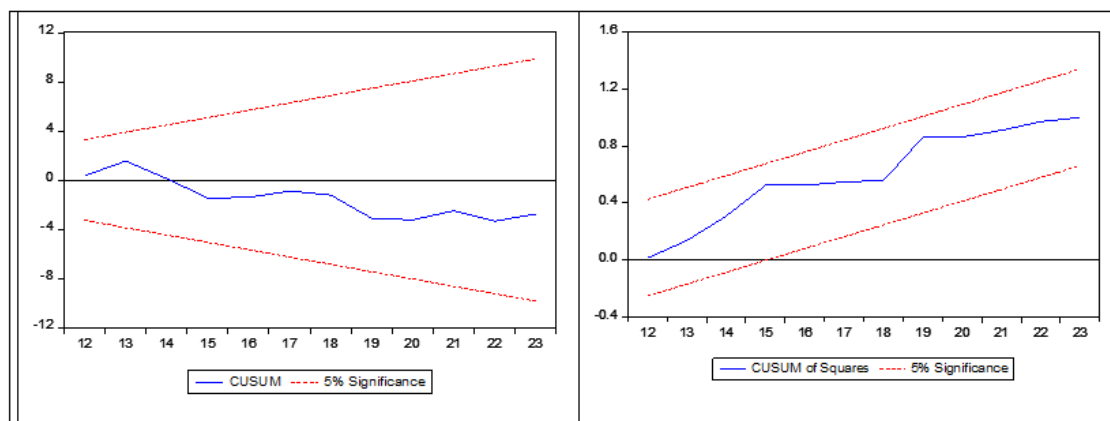
Diagnostic Tests		
Test	F-statistics	Probability
Jarque-Bera	0.664991	0.7171
Breusch-Godfrey Serial Correlation LM Test	3.240463	0.0737
Heteroskedasticity Test: Breusch-Pagan-Godfrey	0.307686	0.9912
Ramsey RESET Test	2.007725	0.1863

Source: Author's Computation (2025)

Table 7 offers diagnostic leads that prove the strength of ARDL specification that was used to examine the influence of agricultural financing on livestock production in Nigeria. The Jarque-Braun test, which tests whether the residuals are normally distributed has a Jarque-Bera statistic of 0.664991 (p=0.7171), indicating that the autocorrelation is not statistically significant at the standard 5% level. The Breusch-Godfrey LM test, which tests the same value, has a value of 3.240463 (p=0.0737) indicating that there is no significant serially correlated value in the autocorrelation at the conventional Equally, the F-test of heteroskedasticity of the Breusch-Pagan-Godfrey test is 0.307686 (p=0.9912) which is more than sufficient to reject the null hypothesis, and the Ramsey RESET test value of 2.007725 (p=0.1863) has supported the sufficiency of the model specification. These diagnostics provide support to the approximate

short-run and long-run coefficients hence making it possible to infer impartially on the central role of the credit provisioning of deposit-money banks in the production of livestock. Further outcomes from the CUSUM test and CUSUM squares tests were presented in Figure 1.

Figure 1: Stability Test Results



Source: Author's Computation (2025)

The plots also support the stability of the parameters; the blue cumulative-sum line does not leave the 5 percent significance bounds as set by the red line boundaries over the time period which means that there are no structural breaks or instability of the estimated coefficients. Similarly, the CUSUM of squares plot indicates that the blue line is satisfying the red boundaries all along that it is not the case that the residual variance changes with neither time nor does the time-varying parameter interactions. These findings support the beliefs about the short and long-run estimates, namely, the high importance of the elasticity of credit provided by deposit-money banks on livestock output (0.909) and, therefore, policy implications, including enhancing private credit flows, are well-founded on the basis of the empirical reality in Nigeria.

Discussion of Findings

The empirical evidence shows that the fund agricultural credit guarantee scheme has a negative but insignificant effect on the livestock production in Nigeria. This means that, though the scheme might have the inadvertent consequence of holding output back, perhaps due to the inefficiency of the administration or the inefficient allocation of resources, the impact of the policy does not reach the required level of statistical soundness between the years 1986 and 2023. This leads to the null hypothesis of the lack of any significant effect to be accepted. This insignificance can be explained by the presence of deep-rooted barriers like bureaucracies in disbursing funds, high levels of defaults due to poor screening of borrowers and the low reach to the smallholder livestock farmers who lead the industry. These obstacles water down the ability of the scheme to achieve productivity gains, such as animal health and breed improvement.

The findings are in line with those of Okunlola *et al.* (2019), who found no statistically significant short- or long-run effects of guaranteed agricultural finance on real GDP in Nigeria and explained the null result as a result of systemic inefficiencies. Likewise, Dimgba *et al.* (2023) found evidence of the agricultural credit guarantee scheme on livestock production to have a mixed effect with positive impacts in the short run with insignificance in the long run due to structural barriers. However, the results are contrary to those of Uzomba *et al.* (2020), who found a large positive correlation between agricultural credits and livestock production, and Mbelu and Ifionu (2022), who found that the scheme would have positive and significant impacts on the GDP in the long run, which, however, can be attributed to the aggregation of the sector instead of livestock-specific interactions.

The result of the analysis also shows that the credit of deposit-money banks to agriculture has a positive and significant effect on livestock production in Nigeria. In that regard an increase in credit is linked to increase in livestock production, which is why the formal banking intermediation is especially critical when it comes to mitigating capital constraints and enabling investments in feed, veterinary supplies, and the growth of livestock stocks. The null hypothesis is thus dismissed. This positive elasticity may be an indication of the ability of banks to conduct strict monitoring and increase in the loans that facilitate the shift in subsistence to commercial livestock activities that guarantees improvement in the output and in the integration in the market. The findings are consistent with Uzomba *et al.* (2020), who reported a strong positive relationship between ag credits and livestock production, and with Danladi *et al.* (2021), who established that the long-term effectiveness of private financing is effective in the enhancement of agricultural productivity, including livestock. Besides, the positive impact of agricultural credit on the growth of the economy was supported by Kolade *et al.* (2021) and Akintunde *et al.* (2025), where livestock was also one of the implications. Conversely, the results differ with Dimgba *et al.* (2023), who found that bank loans have a significant negative impact on livestock production, which could be related to high interest rate or misplacement in their sample.

In the case of agricultural government spending, the result showed that it has a positive but insignificant implication on livestock production in Nigeria. This statistical insignificance causes rejection of the null hypothesis at the traditional five-percent level of significance; however, the proximity to the same at the ten-percent level suggests that there may be latent benefits that are sabotaged by the implementation blemishes. This underperformance is probably due to chronic underinvestment below the Maputo Declaration ten-percent benchmark on capital expenditure and prioritisation of current over capital spending, fund disbursement delays, corruption, which weaken the effectiveness of the expenditure in the livestock infrastructure or extension services delivery. The findings are consistent with Okunlola *et al.* (2019) that did not see a significant effect of government agricultural finance on GDP and with those by Dimgba *et al.* (2023) who did not see a significant effect on livestock with fiscal inefficiencies. They also coincide with the findings of Uzomba *et al.* (2020), who found that there is a positive, yet not unconditionally significant relationship between government spending and livestock production. On the contrary, the findings do not conform to those offered by Kolade *et al.* (2021) and Akintunde *et al.* (2025), who found a large positive

nexus between government capital expenditure and economic growth, including agriculture, and Mbelu and Ifionu (2022), who also obtained significant long-run contributions to GDP which may be because their scope was wider and did not include livestock-specific nuances.

Infrastructure spending has a negative and significant effect on livestock production in Nigeria. The result indicates that an increment in expenditure is associated with a decline in output, which was rejected by the null hypothesis. The negative impact could be a mismatched investment, e.g. urban-biased development of roads at the cost of rural veterinary or storage facilities, or incompetence such as dropping out of projects or inadequate maintenance, which enhances post-harvest losses and disease outbreaks in livestock. This highlights the need to have special, livestock-based infrastructure to reduce the weaknesses in feed supply and animal health services. These findings also align with Ensung (2018), who discovered that the agricultural asset financing (including infrastructure) negatively yet significantly affected the productivity in Kenya that can be explained by the poor allocation. They also compare with Fitawek and Kalaba (2017) who reported that the influence of financial services on livestock is moderated by the infrastructural shortage. Nevertheless, the results are in contrast to Obrimah *et al.* (2017) who suggested positive infrastructural synergies in agriculture diversification, and Abuzaid *et al.* (2023) who indicated inconsistent yet potentially beneficial impacts of loans on animal production in Egypt, which suggests a discrepancy in the efficacy of implementation.

Conclusion and Recommendations

Following the outcome of the paper, it can be stated that agricultural financial has a complex effect on livestock production in Nigeria throughout the 1986 to 2024 period. The credit of the deposit money banks, especially, shows a strong, positive and statistically significant effect of the long-term, which highlights the essential role of the banking institution in the mitigation of capital limitations and the promotion of productivity increase in the sector. Conversely, the agricultural credit guarantee scheme fund has a negative although insignificant impact, government expenditure on agriculture has a positive although insignificant impact and infrastructure expenditure gives a negative impact, which is significant. These findings, combined, point to the fact that the efficacy of normal public and guaranteed financing systems relies upon overall inefficiencies in resource allocation, and on difficulties in implementation, that merely tends to convert resources into lasting growth in livestock output. The short-run results show that the agricultural credit guarantee scheme, the credit of the deposit money bank, and government expenditure have positive contributions to it with different lags and adjustments, whereas infrastructure presents mixed results, thus reflecting the needs of reforms to be narrowed down to address the vulnerabilities of the rural livestock system caused by the administrative delays, corruption, and urban-biased investments. Thus, it is suggested that:

- i. The Central Bank of Nigeria with the Federal Ministry of Agriculture and Rural Development, ought to carry out a total revamp of the Agricultural Credit Guarantee Scheme Fund, through simplification of the application procedures to no longer than 30 days, raising the guarantee coverage ratio of the current 75 to 90, namely in relation to livestock-specific loans, and incorporation of digital platforms that would enable it to monitor in real-time the repayment of the guarantees and verification of the

- collateral, thus, improving the accessibility of the scheme to smallholder herders.
- ii. The Central Bank of Nigeria ought to establish compulsory sectoral credit allocation percentage to the deposit money banks, to ensure that at least 10 per cent of the total credit portfolio is allocated to livestock production with subsidised interest rates of not more than 5 per cent per annum, and that banks that fail to meet this target are given tax incentives and risk capping guarantees, thereby encouraging increased credit flows and guaranteeing of a minimum of 20 per cent productivity increase in livestock production due to the annual performance audits.
 - iii. To ensure that corruption is checked and to ensure transparency in agricultural budgets, the Federal Ministry of Finance, Budget and National Planning should require a redistribution of agricultural budgets with at least 70 -percent of annual budgets focused on livestock infrastructure including veterinary clinics and feed stores, with a firm commitment to disbursing policies on a quarterly basis and having annual agricultural budgets independently audited by the Auditor General of the Federation to maximise the long-run effect on production efficiency.
 - iv. Federal Ministry of Works and Housing in collaboration with Federal Ministry of Agriculture and Rural Development should channel infrastructure investments on rural livestock corridors by investing at least N500 billion annually since 2026 in building 5000 kilometres of feeder roads, 1000 modern abattoirs and integrated cold -chain facilities with project implementation managed by a special inter-ministerial task force in order to mitigate the negative effects that have been experienced and promote a smooth market accessibility by producers.

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