



**ASSESSMENT OF THE GEOSPATIAL DISTRIBUTION OF LIVESTOCK RESOURCES  
AND INFRASTRUCTURES IN NIGERIA**

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**ABSTRACT**

This paper employs data from the Livestock Productivity and Resilience Support (L-PRES) baseline survey (October, 2024– February, 2025), which combined household-level information with geospatial mapping, to examine the spatial allocation of resources and its impact on production outcomes. A total of 7,020 households from 156 Local Government Areas were surveyed, while infrastructure facilities were georeferenced and analyzed using ArcGIS and QGIS tools. The results show highly uneven distributions: grazing reserves (81.6%) and water points (73.1%) are concentrated in the north, while feed mills (68.4%) and veterinary clinics (49.8%) are predominantly in the south. Livestock markets, though denser in the north, are undermined by insecurity and poor infrastructure. Chi-square tests confirmed strong statistical associations between region and resource distribution ( $\chi^2 = 740.39$ ,  $p < 0.001$ ), validating that disparities are systemic rather than random. Productivity assessments reveal that northern zones, despite having larger herds, face gaps of 18–32% compared to southern systems, largely due to limited veterinary services and weak feed supply. Conversely, southern poultry and small ruminant systems thrive under better service coverage and commercialization. While access to veterinary services showed only marginal statistical significance ( $\chi^2 = 5.39$ ,  $p = 0.067$ ), trends consistently demonstrate its role in boosting productivity. The paper concludes that addressing regional imbalances through targeted investments, especially in northern states, is essential for improving national livestock productivity and resilience.

**Keywords:** Geospatial, Distribution, Livestock, Resources, Productivity, Resilience

**INTRODUCTION**

The productivity and resilience of livestock farming are closely linked to access to infrastructure such as veterinary services, grazing reserves, feed mills, water points, and markets (FAO, 2013; IFAD, 2017). In Nigeria, however, these resources are highly uneven, leading to marked regional disparities. While northern states such as Kano and Katsina record some of the highest livestock densities, they face severe gaps in veterinary coverage and feed infrastructure, in contrast to southern states such as Osun and Edo where veterinary clinics and markets are more accessible (GIBKAM, 2025). The Livestock Productivity and Resilience Support (L-PRES) Project Survey in Nigeria provided a comprehensive national dataset by integrating geospatial mapping with field data to assess the distribution of livestock resources. This integration offers an unprecedented opportunity to analyze how infrastructure disparities shape productivity and resilience.

The problem lies in the absence of spatially explicit evidence to guide resource allocation and policy planning. This paper relies on the L-PRES survey to answer critical questions on the distribution of livestock resources, the nature of regional disparities, and the ways in which infrastructure access influences livestock density and productivity. The survey's combination of geospatial tools and household-level data provides a robust methodological foundation for these analyses.

The justification stems from the urgent need to close infrastructural gaps that undermine livestock development. By applying the insights of the L-PRES survey, this study demonstrates how spatial intelligence can guide targeted investment, improve veterinary and market systems, and support



inclusive growth. In doing so, it contributes to the national goal of building a more resilient livestock economy supported by data-driven planning.

## METHODOLOGY

The data for this study were obtained from the Livestock Productivity and Resilience Support (L-PRES) Project Baseline Survey in Nigeria, implemented between October, 2024 and February, 2025. The survey integrated household-level data with geospatial mapping of livestock resources and infrastructure, providing a rare national dataset on resource distribution and access. The sampling framework was based on a multi-stage stratified design. At the first stage, Local Government Areas (LGAs) were selected across all 36 states and the FCT, with probability proportional to livestock density and diversity of production systems. Enumeration areas or villages were then randomly chosen, and livestock farming households were selected for interviews. In total, 7,020 households in 156 LGAs participated, providing quantitative data on access to veterinary services, markets, water points, grazing land, and feed supply.

In parallel, geospatial data collection was conducted to map livestock-related infrastructure. GPS-enabled tablets captured coordinates of grazing reserves, abattoirs, feed mills, veterinary clinics, livestock markets, and water facilities. Remote sensing data, including Landsat 8 imagery, were used to complement field mapping, particularly for identifying grazing and land-use patterns. Data validation included cross-checking household reports of resource access with geospatially recorded facilities.

Survey responses were analyzed using SPSS 28 to compute frequencies, averages, and regional variations in resource access. Spatial data were processed in ArcGIS 10.8 and QGIS 3.28 to generate thematic maps of infrastructure distribution. Spatial analysis techniques, including kernel density estimation and hotspot analysis, were employed to identify clusters of high livestock density and areas with severe resource gaps. Overlay analysis was used to compare livestock population data with infrastructure distribution, highlighting mismatches between demand and service provision. This methodological approach leverages the unique combination of survey and geospatial data produced by the L-PRES project. By integrating household perspectives with mapped infrastructure, the study provides a spatially explicit assessment of disparities in the distribution of livestock resources across Nigeria's regions.

## RESULTS AND DISCUSSION

### Livestock Resources and Infrastructure Across Nigeria

The findings illustrate the distribution of livestock resources and infrastructure across Nigeria, as presented in Table 1. This highlights stark regional disparities that influence both productivity outcomes and the resilience of production systems. Grazing reserves, which are essential for extensive pastoral systems, are overwhelmingly concentrated in the northern states, accounting for 81.6 percent of the national total compared to only 14.9 percent in the south and 3.5 percent in the Federal Capital Territory (FCT). This reflects the predominance of pastoral cattle production in the north but also illustrates the vulnerability of the system, as many reserves face encroachment, poor maintenance, and limited infrastructure to support sustainable grazing (FAO, 2022). These infrastructural limitations, coupled with the under-utilization of allocated grazing lands, where only 2.82% of the designated 9.8 million acres have been effectively acquired, further exacerbate conflicts over natural resource use between arable and pastoral farming systems, as reported by Amusan *et al.* (2017) and supported by more recent analyses of farmer–herder conflicts in Nigeria (Adelakun *et al.*, 2022).

Veterinary clinics recorded in this study are more evenly distributed, with 49.8 percent in the south and 46.3 percent in the north. The stronger coverage in the south enhances disease prevention and treatment in intensive poultry, piggery, and small ruminant systems. In contrast, the north's pastoral herds often face inadequate veterinary support, contributing to high disease prevalence, productivity losses, and livestock mortality (Umeh & Odoemelam, 2021). This imbalance underlines the need for improved veterinary outreach services in northern zones where herd sizes are largest. Livestock markets are denser in the north, holding 58.2 percent of the national total compared to 39.7 percent in the south. This pattern aligns with the north's role as the main supplier of cattle and small ruminants to the entire



country. However, the efficiency of these markets is undermined by poor infrastructure, weak price regulation, and insecurity along trade corridors, which increase transaction costs and reduce farmer incomes as supported by Liverpool-Tasie *et al.*, (2021). Feed mills are predominantly southern-based, with 68.4 percent located in the south, compared to only 28.7 percent in the north. This reflects the concentration of commercial poultry and pig production in the south. However, the feed gap in the north restricts the growth of semi-intensive and intensive systems, limiting opportunities to modernize livestock farming beyond extensive pastoralism (FAO, 2022; Adeniyi *et al.*, 2022).

The Chi-square test for the table shows a statistic of 559.79 with 8 degrees of freedom and a p-value approximately equal to  $1.03 \times 10^{-115}$ . This extremely low p-value indicates that the association between the type of resource or infrastructure and its regional distribution (North, South, FCT) is highly statistically significant, meaning the distribution is not random. As recorded, grazing reserves and water points are predominantly located in the North, while feed mills and veterinary clinics are more common in the South, and the FCT consistently accounts for the smallest proportion of all resources. These results suggest a clear regional pattern in the allocation of livestock-related resources and infrastructure, reflecting the varying priorities and needs of each region. This is in tandem with the reports of FAO (2022) & World Bank (2023).

Finally, water points for livestock are concentrated in the north (73.1 percent), a response to arid and semi-arid conditions. While this supports pastoral systems, uneven access and poor maintenance constrain effectiveness. Overall, these patterns indicate that while the north holds most of the natural resource base and markets, the south benefits from better infrastructure for modernization. Bridging these regional disparities—by expanding veterinary services and feed infrastructure in the north while protecting grazing reserves—will be critical for improving livestock productivity in Nigeria.

**Table 1:** Livestock Resources and Infrastructure across Nigeria

Resource/Infrastructure	Total Count	North (%)	South (%)	FCT (%)	Remarks
Grazing reserves	423	81.6	14.9	3.5	Concentrated in the north
Veterinary clinics	1154	46.3	49.8	3.9	Better coverage in the south
Livestock markets	2015	58.2	39.7	2.1	Higher density in the north
Feed mills	576	28.7	68.4	2.9	Mostly southern-based
Water points (for livestock)	1832	73.1	24.6	2.3	Predominantly northern states
Chi-square statistic ( $\chi^2$ ):				559.79	
Chi-square statistic ( $\chi^2$ ):				8	
p-value:				0.000	

### Effects of Spatial Distribution of Livestock Resources and Infrastructures

The spatial distribution of livestock resources and infrastructure across Nigeria highlights profound regional imbalances that directly affect productivity, commercialization, and resilience of the sector. Grazing reserves, which are central to pastoral cattle production, are overwhelmingly concentrated in the North West (159) and North East (121), together accounting for nearly two-thirds of the national total of 423, as shown in Table 2. This reflects the historical dominance of extensive pastoral systems in these regions (FAO, 2022). However, the concentration of reserves in fragile, arid ecosystems increases pressure on land resources, leading to overgrazing, degradation, and escalating farmer–herder conflicts (Amusan *et al.*, 2017). By contrast, the South East and South South have very limited grazing reserves (13 and 9, respectively), consistent with their more crop-based and intensive livestock systems.

Veterinary clinics, numbering 1,154 nationally, are more evenly spread but are most concentrated in the South West (250) and South South (180). This reflects the strong presence of



intensive poultry and piggery enterprises, which require regular veterinary input (OIE, 2023). The relatively lower coverage in the North East (144) and North West (211), despite their large ruminant populations, highlights a service delivery gap that contributes to high disease incidence, low productivity, and preventable livestock deaths (Umeh & Odoemelam, 2021).

Livestock markets are most clustered in the North West (532) and North East (397), confirming the north's role as the national supplier of cattle and small ruminants (FAO, 2022). These markets connect rural herds to southern consumers but face challenges such as poor infrastructure, insecurity, and price volatility, which increase transaction costs and reduce farmer incomes (Liverpool-Tasie *et al.*, 2021; World Bank, 2023). The South West and South South also maintain significant markets (310 and 274), reflecting strong urban demand, but these largely depend on northern supply chains. Feed mills are predominantly concentrated in the southern zones, with the South West (164) and South South (130) leading. This distribution aligns with the south's dominance in commercial poultry production and underscores a critical feed gap in the northern zones, where only 74 feed mills exist across the North West and North East. The absence of feed processing capacity in the north limits the growth of semi-intensive systems and reinforces reliance on low-productivity grazing (NAERLS, 2023). Water points for livestock are most abundant in the North West (571) and North East (506), providing crucial support for pastoral systems in arid climates. However, challenges of maintenance, seasonal variability, and conflicts around water access undermine their effectiveness (Nori *et al.*, 2021).

It is generally observed that the north holds most of the grazing land, water points, and markets, while the south benefits from stronger veterinary and feed infrastructure. Bridging these structural imbalances by expanding feed and veterinary services in the north and securing grazing reserves will be vital for boosting livestock productivity and ensuring sustainable growth of Nigeria's livestock sector.

The chi-square test of independence for the distribution of livestock resources and infrastructure across Nigeria's geopolitical zones produced a chi-square statistic of 740.39 with 24 degrees of freedom and a p-value of 0.000. This extremely low probability value confirms that the distribution of infrastructure is not random but strongly associated with regional location. In practical terms, the allocation of grazing reserves, veterinary clinics, livestock markets, feed mills, and water points varies systematically between zones. Grazing reserves and livestock markets are concentrated in the North West and North East, which historically serve as pastoralist strongholds (Nori *et al.*, 2021). In contrast, veterinary clinics and feed mills are heavily present in the South West and South South, reflecting their roles as poultry and commercial livestock production hubs (NAERLS, 2023). Water points are disproportionately established in the North West and North East, consistent with the arid and semi-arid conditions that necessitate greater investments in water infrastructure (World Bank, 2023).

The statistical outcome therefore provides strong empirical support for the observation that livestock resources are unequally distributed across Nigeria. The regional clustering reflects historical patterns of livestock rearing, government planning biases, and ecological conditions, which collectively shape the infrastructure landscape. The evidence underscores the need for more balanced policy interventions to address under-resourced regions while consolidating strengths in zones already endowed with infrastructure.



**Table 2:** Livestock Resource and Infrastructure Availability by Zone

<b>Resource Infrastructure</b>	<b>North West</b>	<b>North East</b>	<b>North Central</b>	<b>South East</b>	<b>South West</b>	<b>South South</b>	<b>FCT</b>	<b>Total</b>	<b>Remarks</b>
Grazing reserves	159	121	66	13	20	9	35	423	Concentrated in North West & North East
Veterinary clinics	211	144	179	132	250	180	58	1,154	Strongest presence in South West & South South
Livestock markets	532	397	244	179	310	274	79	2,015	Highly clustered in North West & North East
Feed mills	44	30	92	94	164	130	22	576	Mostly in South West & South South (poultry hubs)
Water points	571	506	262	123	172	106	92	1,832	Majority in arid/semi-arid North West & North East
Chi-square statistic ( $\chi^2$ ):									740.39
Degrees of freedom (df):									24
p-value:									0.000



**Effects of Spatial Distribution on Livestock Productivity**

Table 3 shows the spatial distribution of livestock types across Nigeria. It reveals a paradoxical relationship between herd size and productivity, underscoring the uneven development of production systems. Cattle herds are significantly larger in the north, averaging 185 animals compared to 46 in the south. Despite this scale advantage, the north experiences a 24.5 percent productivity gap, driven by inadequate veterinary services, poor access to quality feed, and reliance on extensive grazing systems (NAERLS, 2023; World Bank, 2023). Larger herds in the north often suffer from low milk yields, high mortality, and recurrent disease outbreaks due to weak animal health service delivery and poor access to improved production technologies (NAERLS, 2024; Umeh & Odoemelum, 2021). By contrast, smaller herds in the south are supported by better veterinary coverage, feed availability, and semi-intensive practices, leading to higher per-animal productivity.

For small ruminants, average flock sizes are also larger in the north (62 goats/sheep) compared to the south (38). Yet the reported productivity gap of 18.2 percent reflects persistent management and health constraints that continue to affect small-ruminant production systems across northern Nigeria (NAERLS, 2023; FMARD, 2022). In the north, these animals are typically raised under extensive conditions with limited supplementation, whereas in the south, small ruminant production is more commercialized, with growing demand in peri-urban markets supporting improved management practices. The commercialization trend in the south enables better market integration and higher returns per animal.

The poultry subsector demonstrates the clearest spatial divide. The average flock size in the south (254 birds) is more than double that of the north (123 birds), reflecting the dominance of intensive poultry production in the South West and South South. The productivity gap of 31.8 percent underscores the north’s disadvantage, as poor feed access, weak veterinary services, and limited market structures constrain expansion (FAO, 2022). Southern poultry systems benefit from concentrated feed mills, veterinary infrastructure, and stronger demand from urban consumers, enabling rapid turnover and commercialization (NAERLS, 2024; Adeniyi *et al.*, 2022).

The chi-square test of independence ( $\chi^2 = 133.75$ ;  $df = 2$ ;  $p = 0.000$ ) confirms a statistically significant difference in livestock distribution between the North and South. This indicates that observed variations are not due to chance but reflect structural differences in production systems. The North is characterized by large cattle herds under extensive management, while the South dominates poultry production and maintains smaller but more commercially oriented small ruminant systems (FAO, 2022; Nori *et al.*, 2021).

Generally, these findings demonstrate that larger herd sizes in the north do not translate into higher productivity. Instead, infrastructure, market access, and input availability in the south enable more efficient systems. Addressing service delivery gaps in the north, particularly veterinary support, feed supply, and market infrastructure, is critical for reducing productivity disparities and enhancing national food security (World Bank, 2023).

**Table 3:** Effects of Spatial Distribution on Productivity

Livestock Type	Average Herd Size North	Average Herd Size South	Reported Productivity Gap (%)	Remarks
Cattle	185	46	24.5	Larger herds but lower productivity in north due to poor services
Goats/Sheep	62	38	18.2	More commercialized in south
Poultry	123	254	31.8	Intensive poultry production thrives in south
Chi-square statistic ( $\chi^2$ ):			133.75	
Degrees of freedom (df):			2	
p-value:			0.000	



**Distribution of Veterinary Services by State Density**

The distribution of veterinary services across Nigeria as indicated in Table 4 reveals significant regional disparities with direct implications for livestock health and productivity. The North West and North East, despite holding the largest livestock populations, are the most underserved, with an average of only 3.4 and 2.9 clinics per LGA, respectively, and less than one veterinarian per 1,000 farmers (0.7 and 0.6). This limited access constrains vaccination coverage, disease surveillance, and treatment, contributing to outbreaks of diseases such as contagious bovine pleuropneumonia (CBPP), peste des petits ruminants (PPR), and Newcastle disease (NCD) (FMLD, 2024; NAERLS, 2024; OIE, 2023).

These constraints reduce productivity, increase mortality, and weaken household resilience, particularly among pastoral communities (Umeh & Odoemelam, 2021). In contrast, the southern zones show higher service density, with the South West (6.1 clinics; 1.9 vets) per 1,000 farmers, South East (5.7; 1.8), and South South (5.3; 1.6) demonstrating stronger veterinary coverage. This reflects the prevalence of intensive livestock systems that require regular veterinary interventions (OIE, 2023).

The North Central zone occupies an intermediate position, suggesting transitional production systems. However, the chi-square test ( $\chi^2 = 1.49$ ;  $df = 5$ ;  $p = 0.915$ ) indicates no statistically significant association between zone and veterinary service distribution. This suggests that while apparent differences exist, they may not be systematically structured.

Despite this statistical outcome, practical realities indicate that inadequate veterinary services in northern regions remain a critical constraint to livestock productivity. Strengthening veterinary delivery systems through mobile clinics, community-based animal health workers, and public-private partnerships is essential to improve disease control, enhance productivity, and support national livestock development (FMLD, 2024; NAERLS, 2024).

**Table 4:** Distribution of Veterinary Services by State Density

<b>Zone</b>	<b>Average Clinics per LGA</b>	<b>Average Vets per 1,000 Farmers</b>	<b>Remarks</b>
North West	3.4	0.7	Severe shortages
North East	2.9	0.6	Underserved
North Central	4.2	1.1	Moderate
South West	6.1	1.9	Better coverage
South East	5.7	1.8	Higher service access
South South	5.3	1.6	Relatively balanced
Chi-square statistic ( $\chi^2$ ):			1.49
Degrees of freedom (df):			5
p-value:			0.915

**Infrastructure-to-population Ratios**

The infrastructure-to-population ratios presented in Table 5 highlight significant structural imbalances that directly shape livestock productivity across Nigeria. Feed mills, at only 0.4 per 1,000 farmers in the north compared to 1.9 in the south, illustrate the most critical gap in feed supply systems. This shortage constrains access to formulated feed, particularly for semi-intensive and intensive systems, reinforcing dependence on low-quality natural pastures (NAERLS, 2024). As a result, livestock in the north often exhibit slower growth rates, lower milk yields, and reduced reproductive performance (FAO, 2022). In contrast, the south benefits from concentrated feed infrastructure that supports thriving poultry and piggery enterprises, enabling higher productivity and market integration (Adeniyi *et al.*, 2022).

Livestock markets, with a ratio of 1.6 per 1,000 farmers in the north versus 1.2 in the south, are more concentrated in northern regions, reflecting the area’s role as the primary supplier of cattle and small ruminants in Nigeria (NAERLS, 2023; FMARD, 2022). However, inefficiencies such as poor infrastructure, insecurity, and weak value chain linkages limit their efficiency, reducing producer margins (World Bank, 2023). Water points follow a similar pattern, with higher ratios in the north (1.3) compared to the south (0.7), reflecting pastoral production needs in arid and semi-arid areas. While



critical for mobility, these systems are undermined by poor maintenance and seasonal variability, reducing their effectiveness (FLMD, 2024).

**Table 5:** Infrastructure-to-population Ratios

Infrastructure Type	North Ratio (per 1,000 farmers)	South Ratio (per 1,000 farmers)	Remarks
Feed mills	0.4	1.9	Feed gap drives low productivity in the north
Markets	1.6	1.2	More clustered in the north
Water points	1.3	0.7	Reflects pastoral needs in arid zones

The spatial distribution of livestock infrastructure across Nigeria underscores the structural inequalities shaping production outcomes between the north and south. It is recorded in Table 6 that feed mills are heavily concentrated in the southern zones, particularly in the South West (2.3 per 1,000 farmers), South East (1.6 per 1,000 farmers), and South South (1.8 per 1,000 farmers), which serve as major poultry production hubs requiring consistent feed supply (NAERLS, 2024). In contrast, the North West (0.3) and North East (0.2) exhibit extremely low availability, constraining intensification and modernization of livestock systems.

Livestock markets show the opposite trend, with the highest density in the North West (1.9) and North East (1.7), reinforcing the north's dominance in cattle production and trade (FAO, 2022). However, persistent infrastructure deficits and security challenges continue to undermine market efficiency (World Bank, 2023).

Water points are also more prevalent in northern regions, particularly the North West (1.5) and North East (1.4), reflecting the ecological requirements for pastoral systems (Nori *et al.*, 2021). Nevertheless, limited maintenance and seasonal shortages constrain their effectiveness. Overall, the distribution pattern reveals that while the north is endowed with natural resource-based infrastructure, the south benefits from better access to modern inputs and services essential for productivity growth (FMARD, 2022; NAERLS, 2024).

The chi-square test of independence ( $\chi^2 = 42.74$ ;  $df = 10$ ;  $p = 0.000$ ) confirms a statistically significant association between infrastructure type and regional distribution. This indicates that infrastructure allocation is structurally determined rather than random, reflecting ecological conditions, production systems, and policy priorities (FAO, 2022; World Bank, 2023). Feed mills are concentrated in southern regions to support intensive poultry systems, while livestock markets and water points are more prevalent in the north to sustain pastoral production systems.



**Table 6:** Infrastructure-to-population Ratios per Region

<b>Infrastructure Type</b>	<b>North West</b>	<b>North East</b>	<b>North Central</b>	<b>South East</b>	<b>South West</b>	<b>South South</b>	<b>Remarks</b>
Feed mills	0.3	0.2	0.5	1.6	2.3	1.8	Feed mills are concentrated in southern poultry hubs (SW, SE, SS)
Markets	1.9	1.7	1.2	0.9	1.3	1	Markets are denser in northern cattle-producing zones
Water points	1.5	1.4	1.1	0.6	0.8	0.7	Pastoral water infrastructure more available in arid/semi-arid north
Chi-square statistic ( $\chi^2$ ):						42.74	
Degrees of freedom (df):						10	
p-value:						0.000	



**Relationship between Infrastructure Access and Productivity**

Presented on Table 7 is the relationship between veterinary service access and productivity demonstrates the critical role of animal health infrastructure in improving production outcomes. In areas with high veterinary coverage ( $\geq 5$  veterinarians per 2,000 farmers), cattle productivity reaches an average of 198 kilograms of beef per animal per year, while poultry productivity averages 235 eggs per hen per year. These outcomes reflect regular access to vaccinations, disease diagnostics, and advisory services which reduces losses from endemic diseases such as contagious bovine pleuropneumonia, Newcastle disease, and avian influenza (NAERLS, 2024; OIE, 2023).

Under medium access levels (3 – 4 veterinarians per 2,000 farmers), productivity indicators decline to 174 kilograms of beef and 212 eggs for poultry. This reflects partial access to animal health services, where preventive care is inconsistent and treatment often occurs only after disease outbreaks. (Umeh & Odoemelam, 2021). At low access levels (< 3 veterinarians serve 2,000 farmers), productivity drops further to 153 kilograms for cattle and 189 eggs for poultry, highlighting the severe consequences of inadequate veterinary coverage, particularly in northern Nigeria (NAERLS, 2023; FMARD, 2022).

The chi-square test ( $\chi^2 = 5.39$ ;  $df = 2$ ;  $p = 0.067$ ) indicates that the association between veterinary service access and productivity is not statistically significant at the 5% level, although it approaches significance. Despite this, the consistent downward trend in productivity across access levels suggests a strong practical relationship between veterinary service availability and livestock performance (FAO, 2022). These findings align with national livestock development priorities emphasizing improved animal health service delivery as a key driver of productivity (FMLD, 2024).

In practical terms, the evidence indicates that enhancing veterinary service coverage—particularly in underserved northern regions, through mobile clinics, community animal health workers, and public–private partnerships will be essential for improving livestock productivity, strengthening resilience, and supporting national food security.

**Table 7:** Relationship between Infrastructure Access and Productivity

Access Level to Veterinary Services	Avg. Cattle Productivity (kg beef/animal/year)	Avg. Poultry Productivity (eggs/hen/year)	Remarks
High ( $\geq 5$ vet per 2,000 farmers)	198	235	Better productivity
Medium (3 –4 vet per 2,000)	174	212	Moderate
Low (<3 vets per 2000)	153	189	Lowest productivity
Chi-square statistic ( $\chi^2$ ):			5.39
Degrees of freedom (df):			2
p-value:			0.067

**CONCLUSION AND RECOMMENDATION**

The survey confirms that livestock resources and infrastructure in Nigeria are unevenly distributed, reinforcing productivity gaps between northern and southern regions.

1. Expand veterinary coverage in northern zones through mobile clinics and public-private partnerships.
2. Establish more feed mills in the north to support semi-intensive and intensive livestock systems.
3. Protect, rehabilitate, and properly manage grazing reserves to reduce conflicts and degradation.
4. Improve maintenance and distribution of water points to support pastoral mobility.
5. Strengthen market infrastructure and ensure security along trade corridors.
6. Utilize geospatial intelligence for targeted and equitable resource allocation.

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