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Establishing A Resilient Meat Value Chain In Northern Nigeria For Sustainable Economic Growth

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Abstract
Nigeria's projected 200 million people and expanding middle class are driving up the country's demand for beef. For well-managed meat processing businesses, this dramatic increase in demand offers several opportunities. This study aims to investigate how the long-standing practice of transporting cattle from northern Nigeria to the southern region of the country can be converted into a sustainable meat processing and marketing enterprise through an efficient meat value chain.The paper adopts qualitative research design through field observations and selective content analysis of empirical materials in books, journals, periodicals, and internet source. Findings from the analysis reveal that marketing fresh and processed beef is both superior and more economical than selling live cattle. This is due to the fact that it improves the value chain and generates employment in industries like animal husbandry, veterinary medicine, animal feed, building public and private abattoirs, and the promotion and export of beef. In a similar vein, an enhanced beef value chain may spur the expansion of small businesses in the area and increase farmer incomes, thereby promoting inclusive development in business and entrepreneurship among value chain actors sustainably. Consequently, it is recommended that government should vigorously promote private sector investment in meat value chain by increasing market access and marketing efficacy, building and upgrading existing slaughterhouses and abattoirs as well as creating meat processing clusters with integrated cold chains, testing facilities, effluent management, and auxiliary units, to produce high quality meat for both domestic consumption and exports.

Keywords: Value Chain, Beef, Meat Processing, Livestock, and Cattle Trading

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INTRODUCTION

Nigeria has a large number of animals, including about 20 million cattle, 40 million sheep, and 60 million goats, however, nearly 30% of those slaughtered are imported, mostly from nearby countries like Cameroon, Chad, Mali, and the Niger Republic [1]. Traditional production techniques are used to manage 99 percent of Nigeria's cattle population in smallholder and pastoral systems [2], which has an impact on the country's limited supply and rising cattle prices. Unfortunately, it appears that there are no workable domestic alternatives to meet the raising demand [3].

In the same vein, the market size and supply dynamics present several opportunities for well-run meat processing enterprises as integrated meat processing facilities can boost value by producing more products. The main goal is to achieve sustainable inclusive development in business and entrepreneurship among producers, marketers and other service providers of value-added products in the value chain.Therefore, Northern Nigerian states may revolutionize their meat value chain to provide mass employment, export money, and food self-sufficiency with proper planning and implementation, hence the need for the study.

Problem Statement

Nigeria's burgeoning middle class and population of over 200 million are driving an increase in meat consumption. The rapid increase in demand poses challenges for Nigeria's developing meat industry. Historically, Nigeria has faced problems such as nomadic farming, long transportation times, low productivity, and insufficient technology, preventing it from becoming a major meat producer. According to Ogbeide (4), the main impediment to the growth of the meat industry in Nigeria is lack of sufficient products to meet consumer demand, as well as poor product quality to capitalize on in expanding its food industry. Obstacles to developing an organised meat industry include outdated processing and packaging technologies, poor meat quality for export markets, lack of integrated infrastructure for large-scale production, and insufficient modern abattoirs/slaughterhouses [4].The perilous condition is exacerbated by a lack of knowledge, frequent regulatory changes, little or no value addition, and

unstable power sources that hinder effective utilization of the cold chain.

In addition, recent challenges for herders threaten their way of life in the long run.The main sources of these difficulties are the *Boko Haram* insurgency, land encroachment, and growing urbanization. Over the last 20 years, Nigeria has experienced rising confrontations between sedentary farmers and herders over water and land access resulting in over 7,000 death of people in the last five years. Mercy Corps projected in May that the annual cost to Nigeria's economy is close to $13 billion (11.57 billion euros) [1].

Another significant challenge is that merchants in the meat value chain face a considerable obstacle in transferring livestock from northern Nigeria to the southern region. Traditional trading practices should be replaced with a modern, creative, and value-added marketing system for processed beef, as it offers numerous benefits.Transporters and merchants encounter numerous challenges during transportation, including theft, accidents, and arson by ethnic militias, resulting in animal and human losses.

In fact, the Lagos State Government's decision to use cattle feedlots to carry out the red meat transformation agenda has apparently posed a bigger challenge to cattle movement from the north to the south. Feedlots are intensive production systems where cattle are raised and fattened until ready for slaughter. The program aims to prevent food crises in the state by bridging the gap.Therefore, the study seeks to highlights the need for northern state governments to establish integrated meat processing businesses to turn live cattle into fresh or processed beef.

RESEARCH OBJECTIVES

The primary goal of this research is to investigate how the cattle trade can be transformed into sustainable meat processing and marketing via an efficient meat value chain. The study aims to:

i. Understand the notion of meat value chain.
ii. Recognize the market potential for beef in Nigeria and Africa.
iii. Identify critical prerequisites for building a standard beef processing abattoir.
Iv. Explain the benefits of meat processing and marketing over the hazardous animal transportation across long distances.

LITERATURE REVIEW

Meat is defined by Food and Agricultural Organizations (FAO) as the animal flesh that is used for human consumption [5]. The edible part of animal tissues and any manufactured or processed products made from them are commonly referred to as meat [6]. Meats are frequently classified according to the kind of animal they come from; beef from cattle, veal from calves, lamb from young sheep, and mutton from sheep older than two years are all considered forms of meat. The processing and marketing of beef is the primary focus of this essay. Meat is widely used in Middle Eastern, European, North American, African, and Asian cuisines. It can be roasted or cut into steak. Moreover, it is prepared as fried meat, barbecue, dried-roasted meet (*Kilishi*), or shredded-fried meat (*Dambun nama*) in Kano State, Nigeria, or used in stews and pepper soup [7].

Market Potential of Beef in Nigeria and Africa

In general, there are two types of meat that are sold in markets: fresh meat and processed meat. The former includes fresh, chilled, or frozen meat from domestic and wild animals, while the latter includes any kind of meat that has been salted, dried, roasted, fried, cooked, or smoked. Fresh (non-refrigerated) red meat is sold practically the same day it is processed, especially in Nigeria, and most consumers eat it that same day. Since meat is sold under generic brand names and in plain packaging, there is little product differentiation based on carcass or cut quality. Furthermore, weighing scales are rarely used, and prices are negotiable. Nigeria is home to over 50,000 meat wholesale and retail companies, with an average yearly revenue of N25 million ($160,000 USD) [8]. The end-user market is primarily divided into retailers, food service industry, household consumers, and others.

Nigeria's meat market is expected to grow from $4.07 billion in 2018 to $6.08 billion by 2025 [9]. With 700,000 tons of meat imported each year, Saudi Arabia offers a sizable market and export potential for meat exports [10]. Accordingly, only 15% of beef is industrially processed into value-added products, while over 80% of it is sold fresh or minimally processed. This suggests that the processing of beef has enormous unrealized potential [4]. Therefore, the meat industry can grow rapidly to become a significant pillar of the Nigerian economy and a well-known African meat brand worldwide with modernization, private investments, and forward-thinking public policies. The consumption of agro-processed goods is therefore anticipated to rise in tandem with the growing rural-urban migration and the increase in disposable income [11].

According to the Food and Agriculture Organisation (FAO), the top ten producers of beef in Africa are South Africa (15%), Tanzania (7%), Kenya (7%), Chad (6%), Ethiopia (5%), Sudan (5%), Egypt (5.72%), Nigeria (5.03%), Morocco (4.32%), and South Sudan (3.53%) [10]. These ten countries produce around 67–

68% of Africa's beef. Ethiopia has the largest cattle herds in Africa (more than twice as large as Tanzania's) and is the continent's fifth-largest producer of beef. Therefore, there is no correlation between cattle size and beef exports. Despite this, the country's meat production is just 38% of that of South Africa, which ranks first on the list.

Another market that Nigerian beef marketers can access is the global halal meat market, which is expected to reach a value of approximately USD 723billion by 2032 [12]. However, it is pertinent to note that the demand for Halal products is not limited to Muslims alone, as non-Muslim customers of various racial and religious backgrounds also purchase goods with the Halal logo. According to Hussain,et al. (13), non-Muslim nations in both the West and the East account for over 80% of the global halal trade. The amount spent domestically on halal goods and services in Nigeria reached US$107 billion in 2022 and is projected to reach US$180 billion by 2027, making it the eighth largest domestic halal food market in the world [14]. However, only 5.7% of Africa's $4.2-billion exports of halal products to OIC nations are currently from Nigeria. Therefore, Nigeria's GDP and foreign exchange earnings can be greatly increased if it continuously improves its beef exports to the OIC in the years to come.

Modern Abattoir and its Operation

Abattoirs in developing countries are classified into three types: small to medium-sized government slaughter slabs, large abattoirs in major cities built during colonial times, and new, well-equipped, and sanitary abattoirs producing high-quality meat for domestic and international markets. The majority of meat in Nigerian cities and rural regions comes from traditional slaughterhouses, where workers utilize knives and axes on bare floors or cemented slabs. Joseph's (15) investigation on post-mortem processes and cattle slaughtering in Nigerian cities revealed a dearth of sufficient meat processing facilities.

A conventional abattoir requires some major sections or divisions. These sectors include receiving and holding, stunning and slaughter, bleeding and evisceration, carcass cleaning, and meat inspection. Other areas include cutting and deboning, packing and labelling, refrigeration and freezing, waste management, and laboratory and administrative units [16]; [17]; [18]; [19]; [20]. Standard abattoirs should have qualified workers, cutting-edge machinery, lairage, appropriate and potable water supply, decent drainage, and an efficient sanitation system [21].

Animals are received, checked, and held in the receiving area before slaughter. After being slaughtered, the animals are transferred to the bleeding and evisceration room. They are cleaned and prepared for meat inspection to ensure it is free of contamination or disease. Halal slaughter requires strict adherence to Islamic rules. Islamic dhabihah, also known as zabiha, is a rapid and deep cut to the throat made with a sharp knife. According to Usmani (22), butchers must mention Allah's name (Bismillah Allahu Akbar) before slaughtering any animal. However, Islamic scholars uniformly concluded that beef that dies during or after stunning is not halal and thus banned from consumption [23]. After inspection, the meat is sliced and deboned to remove the beef from bones, third quarters, heads, and legs. The fresh meat will be properly wrapped and labelled for retail sale. After processing and packaging, meat is stored in the freezer or cold stores to prevent spoilage or damage. Furthermore, to enhance the value chain effect, trash is collected, processed, and disposed of in the waste management area, resulting in rich manure for farmers. The administrative sector includes staff offices and laboratory buildings for veterinary testing, ensuring healthy and safe meat production and a clean environment.The beef value chain includes post-slaughter animal treatment, which begins at the abattoir and extends to meat processors, markets, and consumers [24].

Similarly, traditional cattle butchers are essential for slaughtering livestock in abattoirs. According to Nwanta, et al. (25), Nigeria has around 30 abattoirs, 132 slaughterhouses, and 1077 slaughter slabs, killing 14,127,868 animals annually. An assessment of contemporary abattoirs in Nigeria's states of Sokoto, Niger, Nasarawa, Lagos, Oyo, Kaduna, Kano, and Bauchi revealed that butchers' resistance was a major factor for their failure [26]. They were only able to utilize a small portion of their installed capacity (2-8%). The failure can be attributed to poor planning, cattle acquisition issues, inadequate product marketing, and bad perceptions of modern abattoirs among local butchers. This is because local butchers fear that modernizing slaughtering methods would erode their traditional practices. As a result, they typically oppose the building of contemporary slaughterhouses.They prefer traditional slaughterhouses that are outdated, unsanitary, with inadequate refrigeration.

Meat Preservation and Storage

Meat preservation reduces deterioration by slowing enzyme activity, inhibiting microbial development, and preventing rancidity from fatty acid oxidation [27]. Meat can be preserved using several processes, such as smoking, canning, drying, curing, or cold storage. Refrigeration is the most commonly used method for preserving fresh meat for 5–7 days [27].An integrated cold chain manages perishable food products from their origin in the field, ranch or body of water to their final

consumption. Drying meat effectively removes moisture and prevents microbial growth, making it a fantastic way to preserve it. Kilishi, or roasted dried meat, and dry sausages are examples of dried meats that can be stored at room temperature for extended periods without spoiling.

THEORETICAL FRAMEWORK

The Porter's value chain model is the theoretical basis for this investigation. Porter's (28) value chain concept is based on the process view of organisations, which considers a manufacturing or service organisation to be a system with inputs, transformation processes, and outputs.Beef value chain activities include input supply, production, processing, marketing, and consumption. Rekwot, et al. (29) define product delivery as the process of transporting live animals' meat, milk, eggs, leather, fibre, and dung to consumers. Figure 1 below depicts the many stages of the value chain.

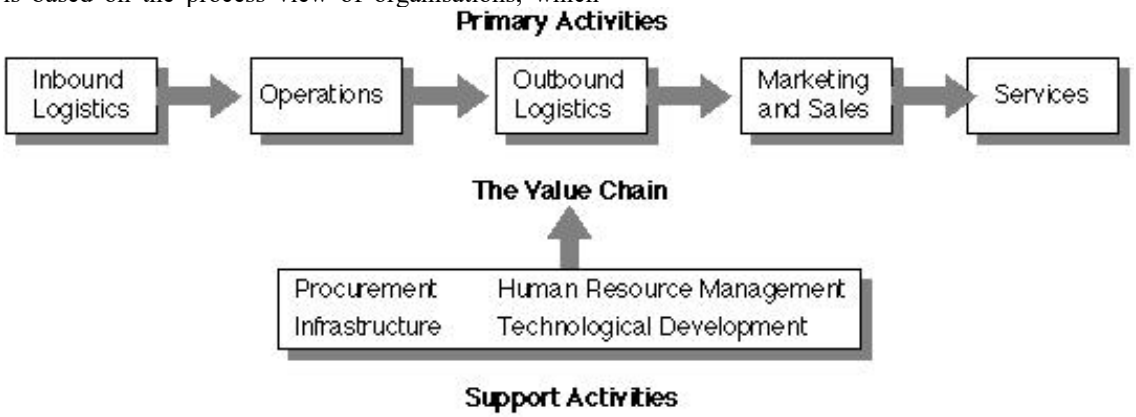

Figure 1: Porters Value Chain.
Source: **Porter, M. E.,** ***Competitive Advantage,*** **1985. The Free Press. New York**

Businesses can categorize their activities along the value chain as primary or support, as shown above. Porter (28) defines the primary activities as marketing, sales, outbound logistics, operations, and inbound activities (receiving, storing, and distributing inputs). Secondary activities encompass procurement, human resource management (hiring, training, developing, compensating, and laying off employees), technological expertise, and organizational structure to achieve organizational goals.

METHODOLOGY

This paper relies mostly on current literature. The work used a qualitative research design, which does not require previous hypotheses and involves selected content analysis of empirical materials and field observations [30]. Examination and discussion of relevant books, journals, periodicals, and internet sources were carried out, after which analysis was made before arriving at relevant conclusion that provide practical insights into the beef value chain system.

Beef Value Chain Analysis

Value chain analysis enhances logistics management and supplier coordination by identifying how each step adds value to the final product or service. According to government estimates, Nigeria eats 360,000 tonnes of beef annually, accounting for half of total West African consumption [1]. Premiumtimesng (31) reports that 98% of the N328 billion worth of cow meat consumed in Lagos state comes from the northern region or over the border. In addition, in Nigerian cities, consumers chose locally farmed beef slices over frozen imports [32; [33]. Therefore, the livestock value chain involves collaboration among producers and marketers of value-added products. Delgado (34) notes that delivering high-quality products to end customers requires numerous jobs including input suppliers, producers, traders, butchers, marketers, and consumers. There are also facilitating organisations in the meat value chain such as financial institutions, extension services, veterinary services, transportation, market links, and cold storage facilities [35]; [36]. Aboah et al. (32) used system dynamics (SD) modelling to identify the key feedback loops influencing Nigeria's cattle value chain. The model consists of eight modules: producers, live cattle marketers, butchers, abattoirs, supermarkets/cold stores, livestock wholesalers (assemblers), and consumers (households).

Figure 2 illustrates the transfer of price information between modules and the interaction of materials. Producers can sell live cattle to households directly or through marketplaces, butchers, abattoirs, wholesalers, and supermarkets/cold stores. Abattoirs purchase live cattle, slaughter them, then sell the carcasses and leftovers to butchers and supermarkets. After preparing the carcass, the butcher sells fresh beef and its byproducts to homes, food sellers, and restaurants. According Aboah et al. (32), the butchery sells 80% of its meat directly to families and the remaining to food sellers and eateries. Efficient information

communication among players in agricultural value chains is vital for promoting direct and indirect product flows, improving decision-making, and ensuring overall chain smoothness 37]. Figure 2 displays a system dynamic model of Nigeria's cattle value chain.

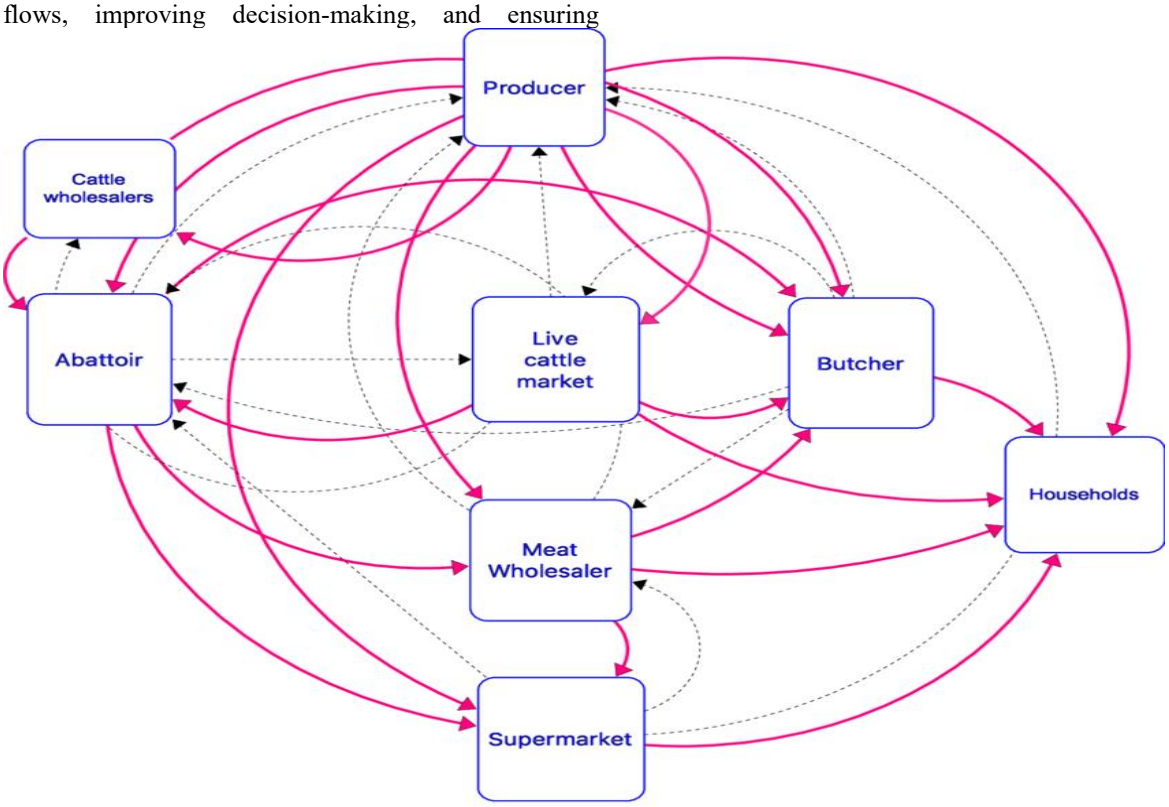

Figure 2: System dynamic module interactions and information flows in the cattle value chain.
Source: Aboah et al. (32). *The black dotted links represent the information flow*.

RESULTS AND DISCUSSION

According to the value chain study, northern Nigerian states can replace the traditional practice of shipping live cattle to southern Nigeria with a modern abattoir-based beef processing system. However, the study demonstrates that local butchers' actions are vital to the survival of contemporary abattoirs because they regard it as a substitute to their traditional methods of animal slaughter. Consequently, the study found that traditional butchers contributed significantly towards the decline of modern slaughterhouses, especially in northern Nigeria. This is empirically supported by the study of [26].

Moreover, it has been identified that developing nations rely heavily on the value chain of beef to improve their nutritional, social, and economic well-being. As such the meat business is crucial for economic growth, poverty reduction, and food security in emerging nations, providing revenue, jobs, and protein-rich food for locals [10]. As the Nigerian meat market is projected to earn US$40.74 billion in revenue by 2024, with a CAGR of 12.01% from 2024 to 2029 [38], the country has a large local market for both fresh and processed meat, making meat processing a better option than selling live animals.

Furthermore, according to the Food and Agriculture Organisation (FAO), the cattle business provides a livelihood for over 11.3 billion people worldwide, primarily in developing countries [39]. For example, Mokoena and Smith (40) highlight the significant economic, agricultural, and GDP impact of the red meat value chain in South Africa. The table below displays South Africa's export value to the top ten countries.

Table 1: Top 10 Importers of South Africa's beef (HS: 0201) in value terms

Country	Exported value in 2023 (USD)
1. Kuwait	25,395
2. Jordan	25,364
3.United Arab Emirates	16,580
4. Qatar	10,308
5. Mozambique	8,328
6. Lesotho	3,396
7. Bahrain	2,088
8. Mauritius	2,075
9. Angola	1,607
10. Lebanon	1,361

Source: **Trade Map, (41), Own Calculations, &[40].**

South Africa is a net exporter of beef, with large export volumes to many countries globally. The Harmonized System (HS) number 0201 indicates fresh or chilled bovine flesh. It is a standardized numerical method for categorizing traded commodities worldwide that is typically overseen by the World Customs Organisation [42]. South Africa's top 5 destinations for beef exports are Kuwait, Jordan, the UAE, Qatar, and Mozambique, accounting for 89% of total exports in 2023. Northern Nigeria has the potential to gain from the lucrative export market if it can supply high-quality processed beef. Similarly, Nigeria can equally capitalize on the $7 trillion global halal market [43]. States in Northern Nigeria can exploit the potential opportunities of beef exports to the Middle East and Asia, resulting in significant foreign exchange revenues, as the country presently accounts for a meagre 5.7% of Africa's $4.2 billion halal product exports to the Organisation of Islamic Countries.

Nigeria's economy, therefore, requires diversification due to diminishing oil revenue [44]; [45]; 46]. The National Livestock Transformation Plan (NLTP) (2019-2028), adopted by the National Economic Council of Nigeria, intends to enhance the value chain of livestock, particularly undeveloped species such as beef, dairy, poultry, sheep, and goats [47]. Africa's export of live animals, particularly cattle, to West African coastal markets remains low [48] as only Botswana, Namibia, and Swaziland export a small amount of beef to high-value EU markets [49]. Therefore, the preceding discussion clearly demonstrates the importance of meat processing over live cattle trading due to the numerous benefits associated with meat processing, including job creation, industrial development, improved social security, increased incomes, improved rural and urban development, and increased revenue generation by state and federal governments. In the same vein, the value addition provided by the beef value chain creates a viable market not just for high-quality meat, but also for meat products and other byproducts. This, in turn, boosts the volume of business activity in a certain society/community or the economy as a whole.

SIGNIFICANCE OF THE STUDY

The significance of this study is multifaceted, as it aims to address some of the critical challenges and opportunities in the region. Specifically, it will promote economic development of northern Nigeria which has significant livestock resources. By improving efficiency and market access, the study aims to enhance the competitiveness of local producers. Similarly, a resilient meat value chain will contributes to food security by ensuring a stable supply of protein-rich food. And since the livestock sector is a major source of livelihood for many rural households, strengthening the value chain can help reduce poverty by increasing incomes and creating economic opportunities. Furthermore, it is generally believed that presently, northern Nigeria faces various challenges, including insecurity, climate change, and resource conflicts. Therefore, establishing a resilient meat value chain can help mitigate these challenges by promoting sustainable practices and economic stability. It can also help towards reducing the perennial conflict between herders and farmers, by modernizing herding techniques. In essence, such a study is crucial for fostering sustainable economic development, improving food security, and reducing poverty in Northern Nigeria by leveraging the region's livestock resources.

CONCLUSION

Northern Nigeria's beef value chain has the ability to drive sustainable economic growth and development through the cumulative effect of input suppliers, producers, traders, butchers, marketers, and consumers as well as the facilitating organisations in the meat value chain such as financial institutions, extension services, veterinary services, transportation and cold storage service providers. To this end, it clearly shows that the study will bring about inclusive sustainable development in agribusiness and management, thereby aptly aligning with the conference theme and focus.

Furthermore, the beef industry can considerably increase the region's economic prosperity by increasing livestock productivity, improving processing and handling, expanding market access, attracting private sector investment, and strengthening legislative and regulatory frameworks. Thus, improving the cattle value chain can benefit local small businesses, create jobs, and increase farmer earnings. Nigeria's meat industry is predicted to expand rapidly due to increased demand, favourable demographics, and a better economic climate. This might position Nigeria as a leader in West Africa's meat processing especially with modernization, private investments, and innovative state policies that can propel Nigeria's meat sector to become a globally recognised African brand.

Consequently, marketing processed and fresh beef is, by far, a better option than selling live animals. This will benefit the value chain by creating jobs in industries such as animal husbandry, veterinary care, animal feeds, abattoir building, and beef marketing and export. It can also improve nutrition, increase food security, and strengthen Nigeria's reputation as a reliable supplier of premium beef to domestic and international markets. Therefore, by prioritizing sustainability and investing in the beef value chain, it can drive economic growth, reduce poverty, and improve socioeconomic security in Nigeria, thereby contributing to the country's economic transformation and sustainable development.

LIMITATIONS OF THE STUDY AND NEED FOR FURTHER RESEARCH

It is a well known fact that Northern Nigeria faces significant security challenges, including insurgency and banditry. These security concerns can disrupt the meat value chain itself, thereby affecting transportation, trade, and overall stability. The study's projections may also be affected by unpredictable climate patterns, making it very difficult and challenging to establish a long-term resilient meat value chain. Similarly, inadequate infrastructure, including roads, electricity, and cold storage facilities, can hinder the development of a robust meat value chain. These limitations can increase transportation costs, reduce product quality, and limit market access and competitiveness. In addition, the conservative nature of sociocultural factors of the people in northern Nigeria regarding traditional livestock practices and sociocultural norms can influence the adoption of new technologies and management practices, which in turn, affects the establishment of modern abattoir.

In the same vein, getting accurate and reliable data on livestock production, market dynamics, and other related factors may be limited in some areas, which affect the validity of the study's findings and recommendations. Moreover, the study's recommendations may require significant financial investment and coordinated implementation efforts which can be significantly hindered by limitations in funding or implementation capacity. To this end, further research is needed on how to address any or some of the identified limitations in order to establish a resilient meat value chain in Northern Nigeria.

RECOMMENDATIONS

To transform Northern Nigeria's beef value chain, a multidimensional strategy is needed to address many concerns, including the following.

1. Encouraging local butchers to recognize the benefits of modern abattoirs for their earnings, health, and financial success. Modern abattoir operations may enhance revenue, expand markets, create jobs, and boost the economy.
2. Improving livestock productivity: The newly constituted ministry of livestock program should focus on improving commercial feedlots, breeding programs, and animal health services to boost meat production and quality. Farm clusters can also facilitate the sharing of best practices and achieve economies of scale.
3. Training and certification programs in slaughterhouse management, slaughtering practices, meat processing, and quality control should be introduced to bridge skill shortages and support private and community-owned abattoirs.
4. Establishing meat processing clusters to scale up and promote meat production by integrating cold chains, testing facilities, effluent management and auxiliary units.
5. Accrediting and upgrading existing slaughterhouses and abattoirs to increase meat production and quality. Accredited abattoirs can increase standards throughout the value chain by following hygienic practices and investing in modern facilities, including meat processing, cold chain equipment, waste management, water, and energy services.
6. Improving market access and marketing efficiency: To assist smallholder farmers in reaching profitable markets, the government should establish strong market links and cold chains that seamlessly integrate meat transportation from farm to fork.A well-planned distribution system can reduce waste without sacrificing quality.To maintain price stability, meat prices should strike a compromise between producer profitability and consumer affordability.
7. Encouraging private sector investment in the meat value chain through business-friendly policies and incentives.Supporting local manufacture of cold chain and processing equipment is also essential as it creates ancillary enterprises and ensures affordable supplies for the meat sector.
8. Meat grading and standardization: Nigerian meat products must comply with local and export criteria, including quality, shelf life, Halal certification, and hygiene. Accessing international markets requires thorough study and investments that meet export regulations and standards.

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