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ANALYSIS OF THE CONSTRAINTS OF TRANSPORTING LIVESTOCK FROM MAI'ADUA MARKET, KATSINA STATE, NIGERIA

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ABSTRACT
This paper examines the constraints of transporting livestock from the Mai'adua market. Both primary and secondary data were utilised for this study. The primary data was obtained via a structured questionnaire, while the secondary data was obtained from the Katsina State Ministry of Industry and Commerce and the State Ministry of Agriculture. Purposive sampling was used to select the study market, and snowball and quota sampling were employed to administer the questionnaire. The data were analysed using both descriptive statistics (simple percentages) and inferential statistics (correlation analysis). The finding reveals that males aged 35 to 54 are the primary actors in the livestock business and transportation. The results further indicate that poor roads, high taxes, unreceipted fees, and traffic congestion were the most significant challenges affecting livestock handling, trading, and transportation in the study market. Similarly, the correlation analysis shows both positive and negative associations among the variables. Based on the findings of the study, it is recommended that the government improve the state of roads and construct railways from the sources to the various destinations to ensure smooth and relatively cheaper livestock transport.

Keywords: In-flow, Out-flow, Livestock, Transportation, Challenges

INTRODUCTION

Transportation plays a vital role in livestock production by facilitating the essential movement of animals between locations. This process demands precise coordination among multiple individuals (Aradom et al., 2012; Harris, 2001). Livestock typically travel at least once in their lives for various imperative reasons, such as feeding, breeding, seeking markets, accessing butchers, and participating in animal shows (Minka & Ayo, 2006). Economic factors, particularly favourable pricing in various contexts, play a crucial role in driving such voyages (Keeling, 2005; Marahrens et al., 2011). There has been a significant surge in the transportation of livestock to various locations, mainly due to impressive advancements in livestock production and increasing meat demand, as well as improvements in road infrastructure and the technological innovations of modern vehicles (Dalmau & Velarde, 2013; Hultgren, Schiffer, Babol & Berg, 2022).

Transporting livestock involves a series of actions that significantly impact the animals' well-being. It is crucial to plan each journey carefully, considering the specific needs of the animals, expected weather conditions, and overall transportation circumstances. Additionally, the transporter's experience and the physiological condition of the animals must be factored into the planning process (Nielsen et al., 2022).

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The Food and Agriculture Organisation (2002) emphasises that transporting livestock is the most stressful and harmful phase in the value chain from farm to market. This stress can lead to a significant decline in livestock output and sales. Therefore, a livestock transport plan should provide drivers with the necessary information to effectively manage low-risk yet predictable situations, such as delays, severe weather, and animal diseases (Federal Ministry of Agriculture and Rural Development, 2022).

The complete transport process comprises crucial phases: loading, transit time, and unloading. Several key factors significantly impact both positive and negative welfare and meat quality outcomes throughout this process. These factors include driver experience and training, handling quality, transport duration and rest stops, trailer design and ventilation, livestock behaviour, temperature, road conditions, weather, and overall fitness for travel. Moreover, the transport process operates under stringent regulations and industry-specific guidelines in each country (Nielsen et al., 2022). It is essential to prioritise these elements to ensure optimal animal welfare and meat quality.

One of the main concerns regarding animal transport is the lack of clear protocols and agreements on when animals are fit for travel. When animals, regardless of their age, are unfit for transport, their ability to endure the stresses of transportation diminishes, further jeopardising their health and welfare. Additionally, withdrawing feed before transport can negatively affect animal welfare by causing hunger and metabolic stress. Previous clinical conditions that cause calf pain can be exacerbated during transport, leading to increased suffering. In young animals, changes in immune function present further potential impacts due to transport. Therefore, assessing fitness for transport should be addressed at the farm of origin. It is also important to note that unweaned animals are more challenging to move than older animals because they do not exhibit natural herding behaviour. This increases the risk of poor handling and injury, consequently resulting in discomfort and pain (Mary, 2024).

The escalating cost of acquiring livestock, coupled with inadequate road infrastructure and persistent fees for livestock transportation and handling, directly undermines the availability of cattle in the market. Transportation expenses represent a substantial portion of the overall costs borne by consumers. Consequently, it is imperative to conduct a thorough analysis of the dynamics and structural patterns involved in cattle handling and transportation from production sites to their final destinations.

Jibril and Abdullahi (2012) unequivocally identify inadequate transport networks as the foremost challenge confronting livestock transportation in Nigeria. Their study of cattle marketing at the Mai'adua International Border Market in Katsina State reveals that transportation costs are perceived as the primary concern by most marketers, underscoring the critical economic importance of cattle marketing in this region. Oni (2006) emphasises that beef cattle marketing has been neglected by individuals, groups, and governments, despite its undeniable significance for national development. However, few studies have investigated the dynamics of livestock inflow and outflow in the Mai'adua market.

RELATED LITERATURE AND THEORETICAL FRAMEWORK

Musa, Iheanacho, and Nyiatagher (2018) did a study analysing the channels and structures of cattle marketing intermediaries in the Mubi Local Government Area of Adamawa State, Nigeria. The

study's findings suggested that insurgency, insufficient market knowledge, limited access to credit facilities, transportation costs, and double charges by market officials were significant constraints. The report advised that efficient highways and affordable transportation methods should be made available to marketers via their cooperatives. The studies of Minka and Ayo (2009) and Broom (2003), as well as Javis Cockram, Ayo, and Oladele (1996), have focused on the utilisation and stresses during transportation of livestock using vehicles and other means. However, they placed great emphasis on the effects of transport on livestock. At the same time, this study considered the challenges of transporting livestock and compared them across different markets. Road transport conditions are recognised to affect animals' physiological responses due to psychological stress or physical weariness (Lambooij et al., 1985; Brandshaw et al., 1996). The factors contributing to road transport stress are categorized into pre-transport factors (including insufficient preparation prior to transportation), transport factors (which encompass distance and duration of travel, climatic conditions, alterations in established daily routines, road quality, and vehicle speed), and post-transport factors (such as rough unloading of animals from the transport vehicle, inadequate unloading ramps, insufficient food, water, and rest in lairage following transportation, and absence of post-transport medication) (Hartung, 2003; Warriss, 2003; Minka & Ayo, 2007).

One of the most influential theories for understanding livestock transport was developed by Niko Tinbergen (1951), Richard Dawkins (1976), and Konrad Lorenz (1981). The theory, known as animal behaviour and handling theory, emphasises understanding animal behaviour and developing appropriate handling techniques to reduce stress and improve safety. Alterations in behaviour are clear evidence that an animal is struggling to manage handling or transportation. Some of these elucidate which component of the circumstance is disagreeable. The animal may cease forward movement, become immobile, retreat, flee, or vocalise. The frequency of each can be measured by comparing responses across various races and loading ramps, among others.

MATERIALS AND METHODS

Study Area

The research area is the Mai'dua Local Government Area, one of the thirty-four (34) Local Government Areas in Katsina State. The Mai'Adua Local Government Area of Katsina State, Nigeria, is located between Latitudes 13°14′ 62″ N and Longitudes 8° 22′ 61″ E. Mai'Adua shares its northern border with the Republic of Niger, the eastern border with Zango, the southern border with Daura, and the western border with Mashi and Dutsi. It has an area of 528 km².

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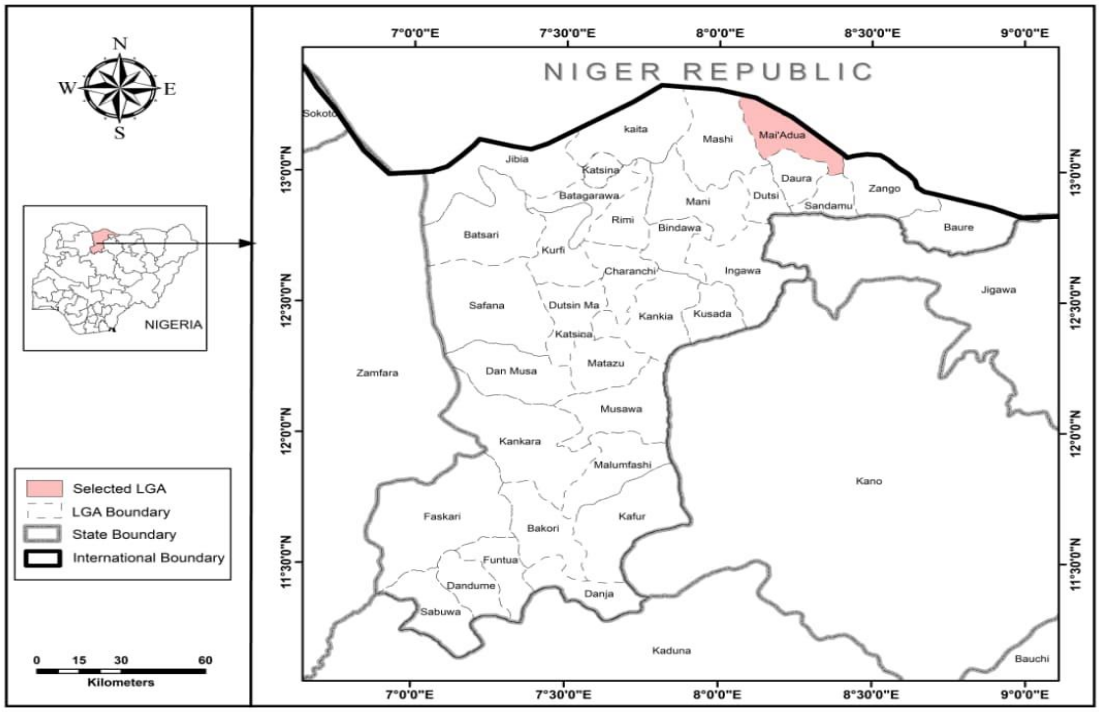

Figure 1: Map of Katsina State showing the study area
Source: Ministry of Land Survey, Katsina

A purposive sampling technique was used to select the Mai'adua market for this research. This is because the Mai'adua market is among the primary livestock markets in Katsina State that distribute livestock to all six geopolitical zones of Nigeria. Quota sampling was used to assign a quota of samples to each of the purposively selected actors. These are the owners of transport means, Handlers, dealers, drivers, and agents, and different types of livestock sold and transported in and out of the two markets, such as sheep and goats, camels, donkeys, cattle, and horses. Lastly, a snowball sampling technique was used to recruit participants for the survey.

The data collection instrument was primarily a structured questionnaire (Table 1). The structured questionnaire was designed to cater for the socio-economic characteristics of the respondents and the objectives of the research. The sample size for this study was 249 completed questionnaires. The 249 copies of the questionnaire were administered via snowball sampling of respondents, as this study focuses on a selected group of people involved in livestock marketing and transportation.

Table 1: Distribution of the Respondents in Mai'adua Market

S/N	Types of Livestock	Owners	Dealers	Operators	Driver	Agent	Total	Sample Size
1	Sheep and Goat	1025	80	350	109	611	2175	158
2	Cattle	510	67	75	85	353	1090	79
3	Donkey	35	05	10	10	17	77	6
4	Camel	30	05	10	10	07	62	4
5	Horse	15	05	05	04	05	34	2
	Total						**3433**	**249**

Source: Authors' computation (2023)

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The T-test and Correlation matrix were used to analyse the data obtained during the field exercise. A T-test and a correlation matrix are statistical analyses that compare the relationship between two or more variables from the same sample or between two related groups on the same continuous independent sample. Consequently, it was used in this study to compare the means of livestock flow data into and out of the two markets under different transport regimes to determine whether their means are substantially different. The analysis was carried out using SPSS version 23.

RESULTS AND DISCUSSION

Demographic and Socio-Economic Characteristics of the Respondents

The importance of socio-economic characteristics of the respondents in the inflow and outflow of livestock cannot be overemphasised, as it examines the sex, age, marital status, level of education, and tribe of the respondents involved in the marketing and handling of livestock.

Sex of the Respondents

The sex distribution of respondents shows that the Mai'adua market had a different sex ratio: 92.4% were male, while 7.6% were female. This suggests that the majority of individuals engaged in livestock handling, marketing, and transportation in the Mai'adua market are also male, with only a small number of females participating. Cultural and religious beliefs in the area often confine females to their homes, as it is prescribed that women should remain at home. These outcomes align with Mamman's (2005) research on livestock transportation at the Achida Sokoto Kara market, which found that all participants were male. Similarly, a study conducted by Emmanuel et al. (2023) on cattle marketing and associated hazards among traders in North Central Nigeria revealed that nearly all participants involved in the marketing, handling, and transportation of animals were male.

The predominance of males in livestock trading is not surprising given the demanding nature of the work, which involves managing the influx and outflux of cattle and coping with the associated stress of market activities. Additionally, the local culture and religious beliefs may further inhibit female participation in these activities. Despite being confined at home due to these beliefs, women still play a crucial role in raising animals and ultimately selling them in the market. Therefore, there is a notable relationship between the two markets concerning gender roles in livestock trading.

Age Distribution of the Respondents

The age distribution of respondents indicates that in the Mai'adua market, the highest age bracket involved in handling, marketing, and transporting livestock is 50-54, comprising 40.5% of respondents. This is followed by the 35-39 age bracket, which constitutes 31.6% of those surveyed. The 50-54 age group is notable for its experience in livestock handling, marketing, and transportation. These results align with the findings of Mamman (2005), who noted that individuals aged 50 constitute a high percentage of those engaged in these activities. However, these findings differ from the observations made by Abdullahi (2012), which indicated that the majority of livestock handlers were within the 40-50 age range.

Marital Status of the Respondents

The marital status of the respondents in the Mai'adua market shows that an overwhelming 89.5% are married, with single respondents constituting only 10.5%. This result suggests that married individuals are significantly engaged in livestock handling, marketing, and transportation, providing a crucial source of livelihood for their families. This finding is consistent with a study conducted by Abu et al. (2012), which found that 85% of livestock marketers in the Mai'adua market are married.

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Level of Education

The level of education of the respondents is 23.2%. According to this finding, there is clear evidence of the involvement of more educated persons in livestock handling, marketing, and transportation, particularly in Charanchi than in Mai'adua. Unlike in the past, when livestock was handled mainly by uneducated persons, the majority of livestock traders have non-formal education.

Ethnicity of the Respondents

The ethnic group of the respondents. The finding reveals that in Mai'adua, Hausa is the most common language, with 65.4%, followed by Hausa at 32.2%. This is probably because the majority of the livestock in the Mai'adua market are from the Niger Republic, thus the majority of them are Fulani. The result indicates that the majority of respondents across the two major livestock markets in Katsina State are Hausa, who are well-known worldwide as major livestock producers and engage in such business.

Table 2: Demographic and Socio-Economic Characteristics of the Respondents

Sex	**Frequency**	**Frequency**
MALE	219	219
FEMALE	18	18
Total	**237**	**237**
15-19yrs	22	9.3
65-69yrs	11	4.6
35-39yrs	75	31.6
40-44yrs	1	.4
45-49yrs	32	13.5
50-54yrs	96	40.5
Total	**237**	**100.0**
Married	212	89.5
Single	25	10.5
Total	**237**	**100.0**
Primary School	117	49.4
Secondary School	13	5.5
Tertiary	55	23.2
Religious Education	52	21.9
Total	**237**	**100.0**
Hausa	74	31.2
Fulani	155	65.4
Yaruba	8	3.4
Total	**237**	**100**
Civil Servant	10	4.2
Trading	160	67.5
Farming	18	7.6
Livestock Transporters	49	20.7
Total	**237**	**100.0**

Source: Field Survey (2023)

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Occupation of Respondents

The result shows that the highest proportion of respondents in the Mai'adua market trading was 67%, followed by livestock transporters at 20.7%. The results clearly indicate that the primary occupation of the respondents at both livestock markets in Katsina state is livestock trading. This finding is in line with Mamman (2005), who reported that the transport aspect of livestock marketing at Achida and Sokoto Kara markets is dominated by traders, who account for the majority of respondents.

Challenges Confronting the In-flow of Livestock to Mai'adua Markets.

The data on the challenges facing livestock transportation, both in terms of inflow and outflow, were analysed descriptively using a T-test. The challenges identified in this study are as follows: X1: Inadequate loading equipment, X2: Untrained handlers, X3: High taxes and unreceipted fees, X4: Insecurity, X5: Poor roads, X6: Accidents, X7: Traffic congestion, X8: High cost of transportation, X9: Loss of animals en route to their destination, X10: Too many quarantine checkpoints. To assess the significance of these challenges, the mean values were calculated for the inflow and outflow of livestock from each market. The results indicate that in the Mai'adua market, the most significant challenge to livestock inflow is poor roads, with a mean value of 4.63, followed closely by traffic congestion, which has a mean value of 4.59. Additionally, the high number of taxes and unreceipted fees ranks third, with a mean value of 4.47. In summary, transportation presents significant challenges for the inflow of livestock to Mai'adua markets, primarily due to poor road conditions, high transportation costs, traffic congestion, and excessive taxes and fees, all of which can lead to insecurity.

Table 3: Challenges to Study Markets (Mai'adua)

	Mai'adua	
	Mean	**SD**
X1	3.85	1.01
X2	2.4	1.51
X3	4.47	.74
X4	4.14	1.14
X5	4.63	.55
X6	3.46	.70
X7	4.59	.55
X8	3.76	.91
X9	1.77	1.29
X10	3.08	1.00

Source: Field Survey, 2023

Challenges Confronting Out-flow of Livestock (Mai'adua markets)

The analysis reveals that the most significant challenge affecting the flow of livestock from the Mai'adua market is different challenges. The issue here is high taxes and unreceipted fees, with a mean value of 4.35. This is followed by insecurity, which also has a mean value of 4.34. The high cost of transportation ranks third, with a mean value of 4.25. In summary, the significant challenges affecting the outflow of livestock to both the Charanchi and Mai'adua markets include high taxes and unrecovered fees, high transportation costs, and widespread insecurity.

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Table 4: Challenges Confronting Livestock Out-flow from the Market (Mai'adua)

	Mean	SD
X1	3.93	.77
X2	1.70	.93
X3	4.35	.64
X4	4.34	.55
X5	4.26	.44
X6	2.92	.72
X7	3.63	1.50
X8	4.25	1.19
X9	2.91	1.38
X10	2.04	1.18

Source: Field Survey, 2023

Challenges of the In-Flow of Livestock to Mai'adua Market

The results of the analysis indicate both positive and negative associations of the variables examined. There is a negative relationship between untrained handlers and high taxes and unreceipted fees in the process of moving livestock to Mai'adua market, with r = -433 and p = 0.05. This implies that as the number of untrained handlers increases, there is a tendency toward low taxes and unreceipted fees when moving livestock to the Mai'adua market. Similarly, the association of untrained handlers shows a negative association with numerous quarantine checkpoints, with r = -308 and p = 0.05. This finding implies that as the number of untrained individuals increases, the number of trained individuals increases.

Furthermore, the results revealed a positive relationship between high taxes and unreceipted fees, and the number of quarantine checkpoint officers (r = 0.349, p = 0.05). This result implies that as high taxes and unreceipted fees increase, there is a strong tendency for numerous checkpoints operated by quarantine officers.

Table 5: Correlation Matrix for the inflow of livestock at Mai'adua Market

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
X1	1.000	.011	-.227	-.152	-.112	-.069	-.118	-.059	.027	-.119
X2		1.000	-.433	.020	.029	.234	-.055	-.206	.187	-.308
X3			1.000	.105	.213	-.165	-.006	.131	-.122	.349
X4				1.000	.029	-.075	.022	.217	.037	.242
X5					1.000	.011	-.075	.021	-.209	.123
X6						1.000	.037	-.206	.272	-.162
X7							1.000	-.134	-.138	.033
X8								1.000	-.238	.133
X9									1.000	-.288
X10										1.000

Source: Field Survey, 2023

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Challenges of Outflow from Mai'adua Market

The results indicate both positive and negative relationships regarding the livestock from the Mai'adua market to their final destination. Specifically, there is a negative correlation between high taxes and unreceipted fees and the number of quarantine officer checkpoints, with a correlation coefficient of r = -0.227 and a significance level of p = 0.05. This suggests that as high taxes and unreceipted fees increase, the number of quarantine officer checkpoints tends to decrease. Additionally, there is also a negative relationship between inadequate loading equipment and traffic congestion, with a correlation coefficient of r = -0.228 and a significance level of p = 0.05. This implies that improvements in loading equipment are likely to reduce traffic congestion.

Furthermore, the results revealed a positive association between the number of untrained handlers and the number of quarantine checkpoints (r = 0.270, p = 0.05). This indicates that as the number of untrained handlers involved in livestock movement increases, the number of quarantine checkpoints tends to increase as well. Additionally, there is a positive association between poor road conditions and high transportation costs, with r = 0.127 and p = 0.05. This suggests that poorer road conditions lead to higher transportation costs.

Table 6: Correlation Matrix for Out-flow of Mai'adua Market

X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X1
X1	1.000	.070	-.136	-.174	-.007	-.019	-.252	-.005	-.083	-.048
X2		1.000	-.228	-.081	-.147	.023	-.002	-.077	.270	.077
X3			1.000	.063	.162	-.018	.108	.128	.001	-.277
X4				1.000	.031	-.077	-.028	.080	-.030	.068
X5					1.000	-.110	.127	.103	-.002	-.044
X6						1.000	-.047	.001	-.071	-.011
X7							1.000	.064	-.025	.129
X8								1.000	-.115	.101
X9									1.000	-.125
X10										1.000

Source: Field Survey, 2023

CONCLUSION AND RECOMMENDATIONS

The study reveals important insights into the significant challenges affecting the transportation of livestock from and to Charanchi market to their final destination. It reveals that the most significant challenges affecting the livestock transportation are poor roads, high taxes, and unreceipted fees, and traffic congestion are the significant challenges,

The study revealed that poor roads, high transport costs, and traffic congestion are significant challenges. It is recommended that the government improve the state of the roads and construct railways from the sources to the various destinations so that transporting livestock can be smoother and relatively cheaper.

Based on the results, the livestock population in the study area indicates a high weekly intake, especially of cattle, sheep, and goats. This research recommends expanding the kara space and constructing drainage within the market. The study also revealed that poor roads, high transport costs, and traffic congestion are significant challenges. It is recommended that the government should improve the state of the roads and construct railways from the sources to the various destinations so that transporting livestock can be smooth and relatively cheaper.

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