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ASSESSMENT OF CATTLE HERDERS' PERCEPTION ON EFFECTS OF LAND USE CHANGE ON THEIR LIVELIHOOD IN KATSINA STATE, NIGERIA

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ABSTRACT

This study aimed at assessing cattle herders' perception on effect of land use change on their livelihood in Katsina State, Nigeria. Multi-stage sampling technique was used to determine the sampled pastoralists from the State. The research centered on primary data acquired through questionnaire instrument, Focus Group Discussion and in depth Interview. Both descriptive (frequencies, percentages and mean) and inferential (Tobit regression model) statistics were used to analyze the data. Results indicate that herders are aware of the various issues associated with land use, the study also shows that perceived effect of land use change on herders' livelihood, whereby decrease in size of herd (RII=0.85), decreased animal productivity (RII=0.83), decrease in quantity of milk (RII=0.81), increased restriction to free grazing areas (RII=0.84), decrease in water quality and availability (RII=0.79) to greatly affect herders' livelihood. The common coping strategies adopted by cattle herders are, praying to God, Use of crop residues as animal feeds and moving long distances to find pasture having RII value of 0.83, Sales of natural resources such as medicine and Split herds have RII value of 0.76. It is concluded that land use change has greatly affected herders' livelihood activities in the study area. Hence, the study recommends among others that policy makers, planners, development agencies, individuals and donors should invest on proper planning during agricultural expansion, constructions and development of all sort, considering positive and negative impacts on herders' livelihood.

Keywords*: Land use, land use change, perception, livelihood, coping strategy*

INTRODUCTION

Man is significantly altering earth surface for his livelihood. In more recent times, population growth and increasing arable agricultural activities have put more pressure on land, resulting to observable change in the use of land. These changes in land use directly affect cattle herders' livelihood due to consistent conversion of grazing land to farmland. Currently, the situation is aggravated due to man's increased intervention on different grazing land, using it for either construction, building, farming or ranching. Hence, few grazing land on the earth's surface remain that have not been significantly altered by humans (Emenyonu, Orebiyi, Eze and Onyemauwa, 2015 and Mehdi, Miandad, Anwar, Rahman and Ashraf, 2021).

Despite modern grazing reserve and ranching are consistently springing up in Nigeria, available grazing land is still diminishing at an alarming rate and livestock pathways blocked as a result of constant increase in human activities. In Nigeria, the old grazing routes that support ease of movement and accessibility of pastureland and water by cattle herders that have existed for decades are almost gone due to poor maintenance of grazing land and water bodies along these paths usually cause by rapid land use change (Mohammed, Ismaila and Bibi, 2015 and Musa and Abubakar, 2024).

Consistent change of grazing land for agricultural purposes is the most prevalent and profound land use change (Akinluyi, Oyinloye and Aladekoyi, 2021). This change has effects on perception of herders on sustainable use of land in which their livelihood activities depends on, especially accessibility of vast land for movement of herds in search of pasture and water. Thus, enormous land is required for the ownership of large herds and suitability of cattle rearing. Therefore, constant change in the use of such vast land have effect on herders' livelihood and their perception on the use of land.

Cattle herding has long been a part of the pastoralists' economy and key source of livelihood. Changes in land use, increased agricultural activities, increasing population, climate change, and desertification have forced pastoralists to move for search of pasture as the savannahs become less suitable (Olanloye Adeokun, Oladoja, and Onasanya 2021). Conventionally, land is one of the most important and attractive resources for herders to settle, however, restrictions encountered by herders is access to safe land, has long been a policy problem in Nigeria causing a change in herders' perception on the sustainability of land use and its effect on their livelihood.

How cattle herders operate in this dispensation by moving herds and accessing different lands which they do not own, raise the issue of sustainability of cattle herding as a livelihood strategy in Nigeria, particularly in the conflict-prone zones, populated primarily by arable farmers with different way of life. Herd mobility which is seen as a tool for managing environmental variability in the pastoral system is presently at disadvantage. This is because cattle herders' daily decisions such as where to go and how to relate with the people they meet are often made in response to their social, economic and personal situations especially due to scarcity of free and available grazing land. Hence causing herders and farmers to compete for the few available fertile land necessary for either grazing or farming. (Salih *et al*., 2023).

The causes of farmer-herders conflict have been studied with the premise that land use change is the major cause of the crises (Mohammed, Ismaila and Bibi, 2015). According to study of Ikpe, Ejeh and Kim (2020) land use in the country has been radically disrupted due to containment policy of the colonial period, recurrent droughts and by the intertribal conflicts during the post-independence period. Insecure borders have also led to abandonment of more dependable pasturelands, while the more secure areas are over-used. As a consequence, cattle herders' livelihood all over the country are threatened.

Also various studies in Nigeria have provided very important insights into the multiple factors that shape herders' decisions about pasture destinations, they have also provided much-needed empirical understandings of the different dimensions of livestock herding. Other studies however point to growing constraints to cattle herding particularly the mobile forms of livestock husbandry due to the expansion of crop agriculture and diversion of labor from herding (Turner 2017). However, there is still the need for studies that could document the effect of land use change on cattle herders' livelihood thus a clear gap that needs to be filled has being identify. Therefore, with glaring conflict arising on a daily basis on land issues between farmers and cattle herders, suggest that detailed and well-documented study to assess the relationship between land use change and its effect on cattle herders' livelihood in the study area is paramount. Therefore, it is against these backgrounds that the study addressed the following objectives:

i. describe the socio-economic characteristics of the herders in the study area
ii. determine the level of awareness on issues of land use change by cattle herders
iii. examine herders' perceptions of the effects of land use change on their livelihood

iv. determine the coping strategies of cattle herders on the effects of land use change

METHODOLOGY

The study was conducted in Katsina State. The state is located at the North West zone of Nigeria.

The study adopted a multistage sampling technique whereby all Local Governments Areas (LGAs) were first grouped based on ecological zones of North, Central and South in Katsina State. Secondly, purposive sampling technique was used to select two LGAs from each zone, while random and purposive sampling were used to determined actual wards and settlements respectively

Data collection focused on households as units of observation. Hence, open transverse survey was conducted along each path in every selected village to mark every household. Using systematic random method, every third household in each path that engaged in herding was selected till the required number of sample for the community was obtained. 50% of the number of herders from each community were taken form a total of 232 cattle herders used for the study.

Data for this study were obtained from primary sources. The primary data were collected by administering questionnaire instrument to the respondents.

The analytical tools that were used for this research were; descriptive statistics (such as frequency and percentages,) to achieve objectives (i), (ii), (iii) and (iv). Data on perception of cattle herders on effect of land used change on their livelihood were collected and analysed using 5-Point Likert scale. Inferential statistics (Tobit regression analysis) was used to determine the effects of land use change as independent variables on cattle herders' livelihood as dependent variable.

Focus group discussion was carried out by picking three cattle herders from each ward with sufficient experience to form a group of six cattle herders for each LGA. Twelve cattle herders were interviewed, that is one cattle herder from each of the twelve groups.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Respondents

The results in Table 1 reveals the socio-economics characteristics of herders. Regarding sex, about 92% of the herders were males. This implies that herding as an occupation is male dominated in the study area. In actual fact, the tending of cattle requires long distance travelling on daily basis. This is probably beyond the scope of the female (Ayanda and Salau 2024).

The age distribution of respondents has indicated that 22.8% of respondents were between the ages of 31-35 and the average age of 29years. This by implication suggests that herders in the study areas are made up of young and able bodied youths. At this age bracket, Dika, Tolossa and Eyana, (2021) reported that herders are capable of handling tedious farming activities such as covering long distances to graze animals, fetching water from well for the animals to drink, collection of fodder or hay for the animals during scarcity.

It can be seen from the results in Table 1 that about 83% of the pastoralists are married. The probable reason for the high number of married people is not far-fetched. The study area is largely pastoral and a Muslim setting, where early marriage is encouraged owing to cultural and religious beliefs. This is similar to the finding of Saifullahi, Ozdeser, Cavusoglu and Shagali (2021) which revealed that majority of transhumant pastoralists in the area were married.

Table 1 Socio-Economic Characteristics of Cattle Herders

Items		**Frequency**	**Percentage (%)**	**Mean**
Sex	Male	212	91.4	
	Female	20	8.6	
Age	<21	10	4.3	29
	21-25	41	17.7	
	26-30	25	10.8	
	31-35	53	22.8	
	36-40	13	5.6.	
	40-45	37	15.9	
	46-50	16	6,9	
	>50	37	15.9	
Marital Status	Married	192	82.8	
	Single	40	17.2	
Household Size	< 5	32	13.8	17
	6-10	56	24.7	

	11-15	88	37.9	
	16-20	20	8.6	
	21-25	28	12.1	
	>26	8	3.4	
Level of	Tertiary	38	16.4	
Education	Secondary	74	31.9	
	Primary	27	11.6	
	Islamic	85	36.6	
	Informal	8	3.4	
Level of Income	<100,000	16	6.9	407,800
	100,000 – 300,000	28	12.1	
	301,000 – 500,000	36	15.5	
	501,000 – 700,000	91	39.2	
	701,000 – 900.000	40	17.2	
	>900,000	21	9.1	

Regarding household size, Table 1 reveals that the mean household size is 17 persons. It is apparent that the study area has abundant family labour supply that could be used to carry out herding operations as this would save cost. This finding agrees with Nyamai, Amwata and Kilungo (2024) who noted that large households are more willing to choose labour-intensive adaptation measures.

Pastoralists in Katsina State were literate to varying degrees. Data from Table 1 shows that about (37%) had Koranic education. This is followed by secondary education about (32%) and tertiary education about (16%). The high proportion of respondents with Koranic education is suggestive of the fact that the study area is predominantly Muslim and Koranic education is the rudimentary learning stage in Islam. According to Kehinde (2014) low level in education could prevent farmers from keying into the Agricultural Transformation Agenda of the Federal Government of Nigeria and the Nomadic Education Programme which may thus affect their socio-economic status.

Concerning income level of herders, Table 1 also shows that majority (39%) earned between N500,000 to N700,000 annually. This is followed by 17.2% who earned between N701,000-

N900,000 and 15.5% whose annual income is between N301,000 to N500,000. This finding discloses that, in general, herders in Katsina State are in the medium economic, living above one USD per day and hence may have positive perception to adopt improved adaptation practices. Success and Onubuogu *et al.* (2014) corroborated this finding by noting that herders' incomes have a positive relationship with having positive perception to adopt new agricultural technologies or strategies require to adapt to effect of land use change.

> *Tending of cattle is a must for us. Butter and Cheese are our main livelihood support products. It is the only reliable source for us (Umaru, 12/2/2024)*

Herders Awareness on Issues Relating to Land Use Change

Base on herders' awareness on issues of land use change table 2 shows that herders in the study area are aware of the different issues related to land used change as all items have a mean score above one (1). Their high level of awareness on the issues of land use change can be explained by the introduction of modern technology such as handset and radio that made information easily accessible. According to Kwaja and Smith (2020) Advances in technology have given people more ways to access an increasing amount of information. Therefore, herders having this modern technology grant them access to unlimited information on current land issues. Hence, herders in the bush can have access to information on land issues with their phones or radio.

Herders traveled long distances and have vast experience due to years of interaction with different communities and ethnic group on land matters. Majority of them have about 20 years of herding experience. According to Muhammad, et al (2022) described that the awareness of the farmer is positively related to farming experience and education. Having engaged on several conflicts with farmers in different localities also expose herders on how land issues and conflicts are usually resolve in different places (Chime, 2021).

Table 2: Herders Awareness on Issues Relating to Land Use Change

Items	**NA**	**A**	**∑f**	**∑fx**	$\overline{X}$	**RII**	**R**
Grazing land are currently diminishing as result of use for other purposes	36	196	232	428	1.84	0.92	2
Development of grazing reserves for cattle herders	44	188	232	420	1.81	0.91	3

Consistent conflict between herders and farmer	24	208	232	440	1.90	0.95	1
Ban on open grazing by some States in Nigeria	82	150	232	382	1.65	0.82	8
Consistent decline in grazing land as a result of climate change	40	192	232	424	1.83	0.91	3
Communities find it difficult to lease land for herders	44	188	232	420	1.81	0.91	3
Most land in Nigeria operate with a plan	64	168	232	400	1.72	0.86	6
Land tenure	72	160	232	392	1.69	0.84	7

$\overline{X}$=mean, RII=Relative Important Index, R=Rank

Perception of Herders on Effect of Land Use Change on their Livelihood

Results in Table 3 expresses effects of land use change as perceived by herders in the area of study. The results show that all the perceived effects were very severe because they all ranked 0.74 and above on the relative importance index (RII). However, decreased herd size (0.85), Increased restriction to free grazing areas (0.84), decreased animal productivity (0.83), Decrease in quantity of milk (0.81), Reduction in water quality and availability (0.79) ranked higher on the RII.

The result shows that decrease in size of herd have a mean score of 4.23 and RII value of 0.85 which suggest that herders in the area agrees to have a decrease in the number of their cattle. this agrees with the findings of Kennedy, David, Judith and Oliver (2018) which shows that majority of the pastoralists in their study areas reported a declining trend in household herd sizes over the last four decades.

The result shows that increased restriction to free grazing areas (route blockade) have a mean score of 4.22 and RII value of 0.84. This shows that herders in the study area agrees to blockage or restriction to access areas that usually are free for grazing due to land use change. This agrees with Hesse and Catley (2023) who reports that periodic movement to access pastures, water, and other strategic resources is a defining pastoral livelihood and when this access is hindered there are direct negative impacts on livestock production and health, with related impacts on herders' livelihood.

Table 3 result shows decreased animal productivity have a mean score of 4.13 and RII value of 0.83 this indicates that the respondents in the area agrees to have a decreased in animal productivity. According to Olson et al. (2004) cited in Kennedy et el, (2018) declining livestock production and productivity in most pastoral areas is partly due to the expansion of cultivation into grazing areas gradually converting the savanna grassland ecosystems suitable for grazing into farms.

Table 3 Perception of Herders on Effect of Land Use Change

Items	**SD**	**D**	**UN**	**A**	**SA**	**∑f**	**∑fx**	$\overline{X}$	**RII**	**R**
Decrease in size of herd	7	11	8	101	105	232	982	4.23	0.85	1
Decreased animal productivity	6	11	7	130	78	232	959	4.13	0.83	3
Decrease in quantity of milk	8	8	23	120	73	232	938	4.04	0.81	4
Crop loss	13	21	26	136	36	232	857	3.69	0.74	13
Reduction in income from livestock	9	8	13	176	26	232	898	3.87	0.77	9
Increased incidence of pests and diseases	7	10	27	160	28	232	888	3.83	0.77	9
Increase herd mortality	7	7	18	170	30	232	905	3.90	0.78	6
Increased restriction to free grazing areas (route blockade)	6	12	6	109	99	232	979	4.22	0.84	2
Reduction in water quality and availability	7	19	14	126	66	232	921	3.97	0.79	5
Reduced forage availability	8	4	12	192	16	232	900	3.88	0.78	6
Increased distance to market	13	16	17	159	27	232	867	3.74	0.75	11
Increased farmers-herders conflict	9	12	20	147	44	232	901	3.88	0.78	6
Increased theft of herd	11	16	16	162	27	232	874	3.77	0.75	11

$\overline{X}$=mean, RII=Relative Important Index, R=Rank

The result shows that decrease in quantity of milk has a mean score of 4.04 and RII value of 0.81 this shows that herders agree to have decreased in milk production in the study area

Findings also shows reduction in water quality and availability has a mean score of 3.97 and RII value of 0.79 this shows that herders agree to have reduction in water for their livestock due to land use change. According to Kima, Okhimamhe and Kiema (2016) inadequate access to water is a major impact of the changing climate. Given the affirmation by Magda et al (2023) that water is the key resource for all herders' livelihood.

> *Concerning land issues, we constantly get fresh news about what is happening in our locality, sometimes the farmers intentionally blocked some places in which they knew we make use off to gain access to water especially the river banks. this had cause conflict many times between we the herders and farmers (Yahaya, 20/12/2024)*

Effect of Land Use Change on Cattle Herders' Livelihood

Table 4 presents the effects of land use change on cattle herders' livelihood. The coefficients and marginal effects provide insights into how land use change effects (independent variables) affects herders' livelihood (dependent variable).

Fragmentation of Land with a coefficient of 0.0305 and a p-value of 0.574, was not found to have a significant effect on livelihood. This is likely due to herders' migratory nature, which allows them to avoid fragmented areas. However, Joseph, Jacob, and Joel (2024) reported that land fragmentation restricts livestock mobility, leading to overgrazing and rangeland degradation.

Table 4: Effect of Land Use Change on Cattle Herders' Livelihood

S/n	Variable	Coef.	Std. Err.	T	P>|t|
1.	Land Fragmentation	0.0305	0.0541	0.56	0.574
2.	Soil degradation	-0.2095	0.061	-3.45	0.001
3.	Decline of livestock	-0.0096	0.0016	-5.89	0.000
4.	Cattle route blockade	-0.0073	0.0063	-1.66	0.101
5.	Livestock health	0.0090	0.0025	3.56	0.000
6.	Conflict for resources	-0.0088	0.0053	-1.65	0.101
7.	Distance to market	2.56e-07	5.24e-07	0.49	0.625

8. Forage availability		0.0768	0.0391	1.96	0.051
9. Water availability		0.0089	0.0017	4.98	0.000
	_cons	0.4517	0.0552	8.18	0.000
	var(e.index2)|	0.0268	0.0026	0.0221	0.0324

Soil degradation had a significant negative effect on livelihood, with a coefficient of -0.2095. This suggests that as soil quality declines, herders' livelihoods deteriorate. FAO (2018) highlights that soil degradation leads to increased food prices, reduced agricultural output, and possible migration to more fertile lands (Abdulmalik & Zewide, 2021).

A decline in livestock numbers had a negative coefficient (-0.0096), suggesting that a reduction in herd size harm cattle herders' livelihoods. This aligns with the findings with Diana, Jeffrey, and Anna (2022), who found that declining livestock numbers negatively affect pastoralists.

Coefficient for cattle route blockade (-0.0073) was negatively significant, indicating that consistent blockage of cattle routes negatively affects livelihood. This suggests that appropriate measure to stop this blockade is necessary for peace and improve livelihood of herders (Michele, 2019).

Livestock Health with a coefficient of 0.0090, livestock health had a positive impact on livelihood. Healthy livestock reduce veterinary costs and increase market value (Caroline et al. 2023).

Conflict over resources had a significant negative effect on livelihood. This supports previous findings that land conflicts disrupt pastoral economies (Kwaja Smith, 2020).

The coefficient for market distance (2.56e-07) was not significant, suggesting limited impact. However, access to markets remains important for economic participation (Duba, Chalchissa, & Shashi, 2024).

Forage availability had a significant positive effect, reinforcing its importance for maintaining herd productivity (Ouédraogo et al. 2021).

Water availability had a positive coefficient (0.0089), highlighting its essential role in livestock productivity, particularly in arid regions (Luigi et al. 2024).

Herders' Coping Strategies to Effect of Land Use Change

Table 5 presents information on various coping strategies adopted by herders in the study area. From Table 5, the following inferences can be easily drawn. The predominant coping strategies adopted by pastoralists in the study area include; moving long distances to find pasture (RII=0.83), use of crop residues as animal feeds (RII=0.83), praying to God (RII=0.83), herd splitting (RII=0.76) and Sales of natural resources such as medicine (RII=0.76). These strategies had RII score above 0.83 and 0.76, hence considered the most significant coping strategies implemented in the study area. The submission of Olanloye *et al.* (2021) is in line with this finding that more than half of the pastoralists engaged in the use of crop residue as feed supplements and herd size reduction as measures to ameliorate adverse effect of land use change on their activities. Similarly, Olanloye *et al.* (2021) opined that migrating to other areas was highly practiced by pastoralists during shortage of grasses.

Table 5: Herders' Coping Strategies to Effect of Land Use Change

S/N	Items	SD	DA	UN	AG	SA	∑f	∑fx	$\overline{X}$	RII	R
1.	Split herds	7	43	31	65	86	232	876	3.78	0.76	4
2.	Moving long distances to find pasture	0	21	20	94	97	232	963	4.15	0.83	1
3.	Resort to farming	29	45	20	125	13	232	744	3.21	0.64	10
4.	Sales of natural resources such as medicine	10	19	22	142	39	232	877	3.78	0.76	4
5.	Shifting from large stock to small stock	30	46	17	122	17	232	746	3.22	0.64	8
6.	Reduction in Numbers of Herds	36	43	36	98	19	232	717	3.09	0.62	11
7.	Adopting new management system	14	55	25	107	29	230	772	3.36	0.67	7
8.	Use of modern transport system move cattle	19	56	26	119	12	232	745	3.21	0.64	9
9.	Switch of cattle breed	4	46	45	113	24	232	803	3.46	0.69	6
10.	Fight with farmers	24	188	12	0	8	232	476	2.05	0.41	12
11.	Use of crop residues as animal feeds	3	12	4	142	71	232	962	4.15	0.83	1

12. Praying to God	2	14	29	89	98	232	963	4.15	0.83	1

According to Leanne and Jed (2017), land use change related challenges have forced many households to change livelihood choices. Generally, mobility is a well-known primary risk reduction strategy, particularly in times of drought employed by pastoralists exploiting rangelands.

> *We don't stay in one place, anywhere we notice there is enough grass for cattle we move there, especially during the dry season we used to go far to the southern and middle belt region of the country, where there are enough grasses and water for our animals. Nowadays our movements have been very restricted due to conflicts with crop farmers (Ibrahim, 02/11/ 2024)*

CONCLUSION AND RECOMMENDATION

Despite herders' high level of awareness and concern on land issues It is evident from this study that herders cannot move freely because they are experiencing obstacles caused by land use change, therefore, leading to decrease in their herd size, restriction to free grazing areas, decrease in animal productivity and reduction in water availability.

Cattle herders perceived land use change to negatively influence their livelihood. It is therefore important that agencies both Federal and State such as Federal Ministry of Livestock Development (FMLD), National Agricultural Land Development Authority (NALDA), and National Centre for Remote Sensing (NCRS) to ensure that agricultural expansion, constructions and development of all sort should be well planned and carried out, considering impacts on herders' livelihood.

To increase cattle herders' income and transition them from migratory form of herding to sedentary pastoralism, which has better production output and safety for both the cattle, herders, and farmers, it is pertinent for government and NGOs to provide enormous incentives in form of land, exposure, training and capital on a frequent basis to cattle herders.

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