IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)
e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 12, Issue 3 Ver. I (March. 2018), PP 01-10
www.iosrjournals.org

Effects of Animal Husbandry on Vegetation Surface Cover In Zango Kataf Local Government Area, Kaduna State, Nigeria.

Bitrus Dogo Ajeye, I. I. Y. MALLO (PhD), Samson Henry Dogo (PhD)
[1]*Department of Geography Kaduna State College of Education Gidan Waya, Kaduna State*
[2]*Department of Geography University of Abuja, Abuja, Nigeria*
[3]*Department of Mathematical Sciences Kaduna State University Kaduna, Nigeria*
Corresponding Author: Bitrus Dogo Ajeye

Abstract: *The effects of animal husbandry on vegetation cover of four selected districts in Zango Kataf Local Government Area of Kaduna State was conducted using a quadrat method for grazed (impacted) areas and un-grazed (control) areas. The aim was to examine the effects of animal grazing on vegetation cover of the study area. Results of data analysis revealed significant detrimental effects of animal grazing in grazed (impacted) areas which is chiefly caused by grazing of cattle, goats and sheep. The results of Vegetation Surface Cover (S.C.I.) for Grazed and Un-grazed Areas showed significant difference at p < .05 (.001). The pairwise comparison of pos hoc analysis using Tukey HSD test also showed that the overall mean difference was significant at p < .05 level. Grasses were the dominant vegetation type affected by grazing. The differences in vegetation surface cover were observed to be as a result of differences in grazing intensities and soil type especially in Abet-Bajju district where the lateritic hardpan duricrust occur which does not favoured vegetation growth. The similarity in vegetation surface cover however, in the other three sites was attributed to similarities in soil type and grazing intensities. Based on the findings, the study recommend that rearing of animals be restricted to built enclosures, ranches, reserves or otherwise controlled to enable effective monitoring, diseases control, tracking and treatment, environmental conservation and elimination of clashes between farmers and animal breeders.*

Keywords: *Animal Husbandry, Grazing, Vegetation Cover, Quadrat, Impacted, Control*.

Date of Submission:22-02-2018 Date of acceptance: 10-03-2018

I. Introduction

Animal husbandry is an important form of agriculture in the world; it is practiced in various forms, such as mixed farming, nomadic herding, commercial grazing and others. This activity is an essential to agricultural activity/production as cultivation receives inputs from livestock and, in turn, provides output for livestock in the form of animal feed (Khan 2006, Iqubal, 2010; Devendra, 2012; Herrero *et al*. 2012). Animal husbandry provides employment for millions of poor and small rural landholders. It provides a significant contribution to the national economies of developed and developing countries (Swanepoel, 2012; Aqubal 2013; and Pradère, 2014. Bayer and Water-Bayer (1992) observed that livestock enable savings, provide financial security, allow resource-poor household (and women, who typically cannot own land) to accumulate assets. According to Aganga (2013), the keeping of livestock also helps finance planned expenditures as well as unplanned events such as illness. They provide livestock products including milk, meat, egg, manure and draught power. The rearing of livestock also contributes to improvement of household nutrition and helps maintain social capital and status within community. Research conducted by Herrero *et al.* (2012), Aqubal (2013) and World Bank (2013) shows that rapid urbanization and increase in income are expected to continue in developing countries and consequently, the global demand for livestock production will continue to increase significantly in the coming decades.Globally, animal rearing is the world's largest user of land, and accounts for almost 40 percent of the total value of agricultural production (Wik *et al*., 2008). In developed countries, this share is more than half, while in developing countries, it accounts for one third. A major challenge in animal husbandry is the potential conflict between devoting land to feed production instead of food production (Galloway *et al*., 2007). It is observed that livestock production accounted for about 33 percent of arable land and the demand for arable land for the production of animal feed will continue to increase thereby putting more constraints on land resources needed for other purposes. In a similar vein, FAO (1995), observed that land degradation has often been exacerbated where there has been an absence of any land use planning, or of its orderly execution, or the existence of financial or legal incentives that have led to the wrong land use decision, or one – sided central planning leading to over – utilization of the land resources.

The amount of cultivable land in the world is finite and any land that has been degraded is almost irreversibly lost for production. The average per capita available has been reduced from 0.50ha in 1950 to 0.25ha in 2013 (Verheye, 2014); in some East Asian countries it is 0.15ha or even below. The pressing demand for food and space from the fast growing world population has created a competition for land (Verheye, 2014). This pressure on land is one of the many causes of land degradation, herders/farmers clashes which have caused a lot of losses in terms lives and properties.

Abdel – Magid *et al*. (1987) found out that severe trampling of land by animals especially cows increased soil bulk density by 3% and decreased infiltration by 57%. On the other hand, Savory (2013) observed that Hoof action of animals is a tool to break up detritus accumulation and incorporate it into the soil in grassland ecosystems of temperate environment.

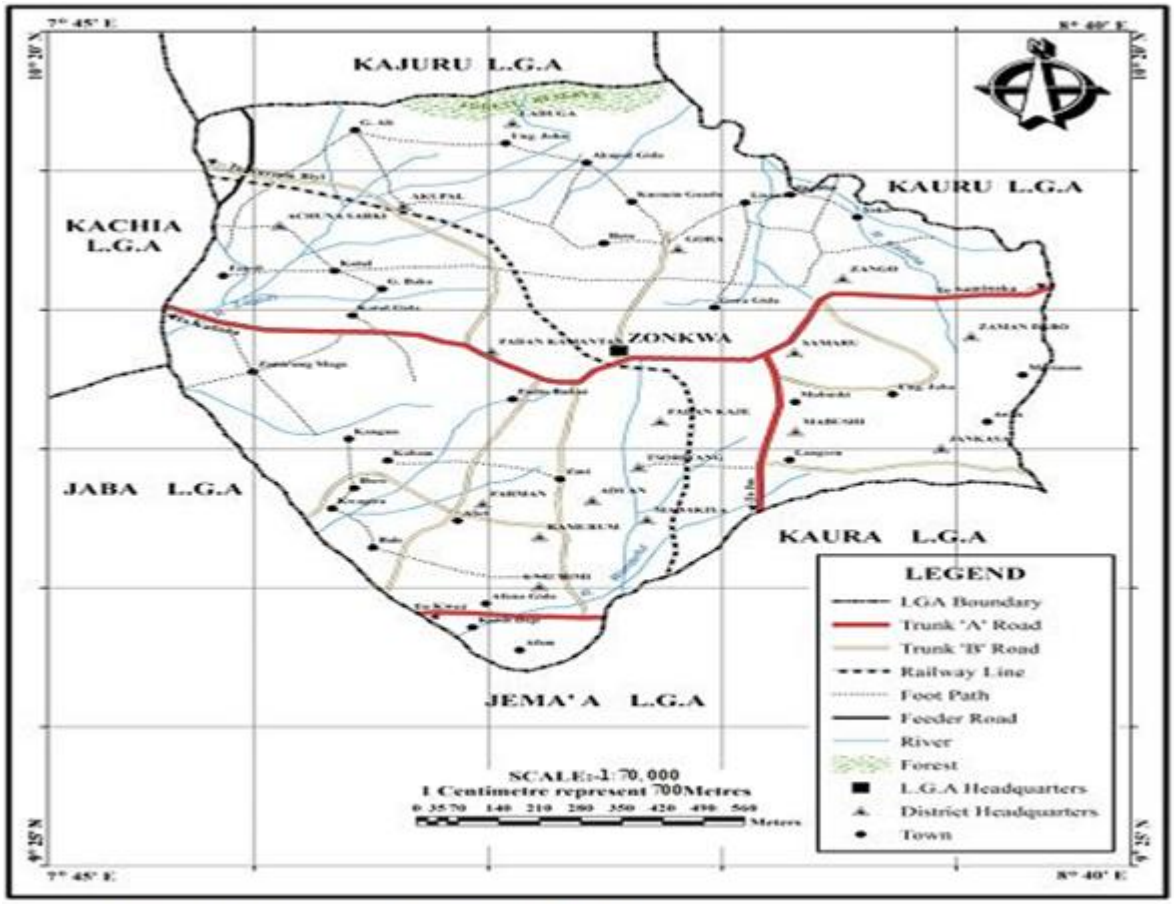
Where there is no appropriate land use, animal husbandry rather than been beneficial can affect the environment especially the vegetation negatively (Nhojo, 2011). This article examines the effect of animal husbandry on vegetation surface cover in Zango Kataf Local Government Area, Kaduna State, Nigeria. The pertinent questions the article attempts to answer include whether animal husbandry causes decreased in vegetation surface cover? And whether vegetation surface cover differs from one location to another within a locality as a result of animal grazing?

II. Materials And Methods

Description of Study Area

Zango Kataf Local Government Area (LGA) of Kaduna State, Nigeria lies between latitudes 9º 25´N and 10º 20´N and between longitude 7º 45´E and 8º 40´E, with a total land area of about 5,625km^2. Zango – Kataf LGA is located within the tropical continental climate (Koppen's A_W) with two distinct seasons –wet and dry. The vegetation type found in the study area is Southern Guinea Savana type characterized by thick woodlands, tall grasses and herbs with riparian forest along streams and river banks (Udo, 1981). The Guinea savanna is the broadest of all the vegetation types in Nigeria, covering the area which has 1000mm to 1500mm of annual rainfall where the rainy season lasts for 6 months. There are numerous tree species in the Guinea savanna biome prominent among which are *Andasonia digitata, Afzelia Africana, Daniellia oliveri, Isoberlina doka, Terminalia macroptera, Terminelia glaucens* among others. The species of grasses that dominated the study area include; *Andropogon gayanus, Monocymbium ceresiiforme, Hyparrhenia, Panicum maximum* among others (Areola, 1978). The study area is drained by several perennial streams and rivers such as River Zagom, River Wonderful and River Kaduna taking their sources from the western escarpment of the Jos Plateau.

There are four major tribes that constitute almost 80% of the entire population of this Local Government; they include Atyap (Kataf), Bajju (Kaje), Ikulu and Kamanton. Other minor tribes include, Hausa, Fulani, Yoruba, Igbo, Tiv among others. According to National Population Census (2006) the Local Government had a population size of 318,991. However, the National Bureau of Statistics (2012) estimated the projected population size of 370,615 by the year 2011. Average population density of the Local Government is about76 persons per squares kilometer. The sex ratio of this population (NPC, 2006) stood at: 162,047 males to 156,944 females (approximately 50.8: 49.2). The structure of the population indicates that a higher proportion are children and youths who constitute about 65% of the entire population, a relative low middle and old age group. Thus, it is basically a fast growing population. The growth rate has been estimated to be 3.0% per annum (National Bureau of Statistics, 2012). About 70% of the total population is engaged in at least one form of subsistence, cultivation of crops and rearing of animals



Source: Department of Cartography and GIS, Kaduna Polytechnic, Kaduna.

Data collection

The data for this research was collected primarily from four sites, Jankasa – Atyap Chiefdom (N09º 43′ 22.3″, E008º 27′ 31.7″, Elevation 1035m), Kamantan – Kamantan Chiefdom (N09º 48′ 20.8″, E008º 10′ 51.0″, Elevation 807m), Kamuru station – Ikulu Chiefdom (N09º 52′ 34.0″, E008º 11′ 14.4″, Elevation 792m); and Abet – Bajju Chiefdom (N09º 40′ 35.6″, E008º 11′ 02″, Elevation 749m) of the study area. The sites were chosen in each of the four chiefdoms where grazing intensities and animals rearing are more pronounced with well favoured rearing environments. The coordinates of the sites were taken using a hand held GPS instrument – Garmin 101 Gecko. A quadrat is a frame that is laid down to mark out specific area of the vegetation community to be sampled (Beltran, 2014). Within the quadrat frame, the total area occupied by plants is determined by estimating the percentage area covered by plants within the quadrat frame. The shape of the quadrat can be squared, rectangular or circular. They also vary in sizes depending on the nature of the vegetation study. For this research study, a 1m x 1m squared quadrat was used for collecting data on the vegetation of the sites under study. Surface Cover Index (SCI) is defined as the percentage area of the quadrat occupied by plant excluding areas covered by moss, stones and bare ground (Beltran, 2014) while the Leaf Cover Index (LCI) is defined as the percentage area covered by leaves of trees or shrubs excluding areas covered by moss, stones and bare ground. For each of the site, a **1m** x **1m** Quadrat was casted at intervals of **10m** apart at random. The Surface Cover Index for each quadrat casted was determined by estimating the area cover by vegetation through observation, then calculate the percentage of vegetation by;

$$\%\ vegetation\ surface\ cover = \frac{Area\ cover\ by\ vegetation}{Total\ area}. \qquad (1)$$

This procedure was repeated in 100 areas each for **grazed (impacted)** and **un-grazed (control)** areas. The data is then tabulated as a paired data consisting of 400 paired samples.

Hypothesis

1. H_o: There is no significant difference in average % vegetation surface cover between grazed and un-grazed areas.
   H_1: There exists a significant difference in average % vegetation surface cover between grazed and un-grazed areas.

Methods of Data Analysis

The data obtained from survey were subjected to descriptive and inferential statistics. Specifically, tables, histogram and charts, were used to present the data and to provide graphical representation of the average percentage of the four different sites considered. In order to established significance result for data, multifactor one - way analysis of variance (ANOVA) was used. ANOVA is a popular statistical technique used to indicate whether a factor (or an independent) variable has a significant effect on a response (dependent) variable. In this study, the response variable is the percentage vegetation surface cover, while site (location) and status of the area (grazed or un-grazed) were the independent variables.

Let A_i, for $i = 1, 2$ be the independent variable, that is, the factors suspected to influence the percentage vegetation surface cover of an area. The objective in ANOVA is to determine whether there exists a significant difference in percentage vegetation surface cover due to factor A_i. To perform the analysis, a null hypothesis which states that there is no significance difference in percentage vegetation surface cover due to factor A_i for $i = 1, 2$ is set. Then calculate an F-statistic by

$$F_{A_i} = \frac{MSA_i}{MSE}, \qquad (2)$$

where MSA_i is treatment mean square of factor A_i, which is obtained by dividing the treatment sum of squares by the degrees of freedom, and MSE is the mean square of the error obtained by dividing the sum of squares of the residual error by the degrees of freedom. The null hypothesis that there is no significant difference in percentage vegetation surface cover due to factor A_i is rejected if $F_{A_1} < F_{\alpha,u,v}$, where α is a pre-specified level of significance for the test, u *and* v are the degrees of freedom of MSA_i and MSE, respectively. However, the statistical software SPSS is used in the analysis of data, in which the null hypothesis is rejected if the p-value is less than the pre-specified significance level ($\alpha - level$). See Montgomery (1991) for a detailed discussion on ANOVA.

If the result of the ANOVA indicates that there is a significant different in percentage vegetation surface cover to one of the factors, for example site, the implication is that the percentage vegetation surface cover in at least one of the sites differs from the others. However, it is not possible to identify the exact site which percentage vegetation surface cover differs from the others, and to what amount through the ANOVA. Therefore, an additional pos hoc analysis for pairwise and subgroup difference comparison is required. The common tests for pairwise differences analysis proposed was the Tukey Honestly Significant Different test. The Tukey (1953) honestly significant different (Tukey HSD) test was chosen due to its simplicity and understandability. Let a and b be two subgroups of factor A_i, then the Tukey HSD test statistic is defined by

$$HSD = \frac{M_a + M_b}{(\frac{1}{2}MSA_i(1/S_a + 1/S_b))^{1/2}}, \qquad (3)$$

where M_a and S_a , and M_b and S_b are means and standard deviations of groups a and b, respectively. Under the null hypothesis that there is no significant difference in percentage vegetation surface cover due to the subgroups, the sampling distribution of the test statistic HSD is approximately a t-distribution with $N - d$ degrees of freedom, where N is the total observations for the main ANOVA test and d is the degrees of freedom of the subgroups a and b. The Tukey HSD test was adopted in the pos hoc analysis in this study. The statistical package used for the above analysis was the SPSS.

III. Results

Effects of Animal Husbandry on Vegetation Surface Cover (S.C.I.)

The effects of animal husbandry on vegetation cover were presented (Table 1) and discussed. The effects of animal rearing on the vegetation could either be advantageous or harmful, advantageous in terms of reduction in unwanted weeds and severity of wildfire. However, the negative effects often out – weights the positive ones especially overgrazing and trampling by cattle which reduced the vegetation, stunting of plants growth and exposing the soil to erosion and soil compaction.

Table 1: Analysis of Average Vegetation Surface Cover (S.C.I) in Zango Kataf L.G.A.

Location	Vegetation Surface Cover Grazed (%)				Vegetation Surface Cover Un-Grazed (%)			
	$\bar{X}$	Std. Dev.	Var.	Std Error	$\bar{X}$	Std Dev.	Var.	Std Error
Jankasa - Atyap	54.16	14.50	210.38	2.05	58.92	22.06	486.77	3.12
Kamanton	44.36	13.63	185.86	1.93	71.02	15.83	250.60	2.24
Kamuru – Ikulu	37.72	15.79	24.51	2.23	59.84	16.64	276.97	2.35
Abet - Bajju	23.66	11.87	140.84	1.67	71.90	13.18	173.64	1.86
Overall Average	39.97				65.37			

Source: Field Survey, 2016

Table 1 showed that the overall average vegetation surface cover had lower value (39.97%) in grazed (impacted) areas compared to un-grazed (control) areas (65.37%). The cause of lower value of surface vegetation cover is

as a result of grazing by cattle, goats and sheep. In places like Abe – Bajju where grazing intensity is high (Plate 1, Plate 2), grazing have removed significant portions of the vegetation and exposed the soil to runoff and erosion.

Plate 1: Un-grazed (Control) Vegetation in Abet – Bajju.

Plate 2: Grazed (Impacted) Vegetation in Abet – Bajju

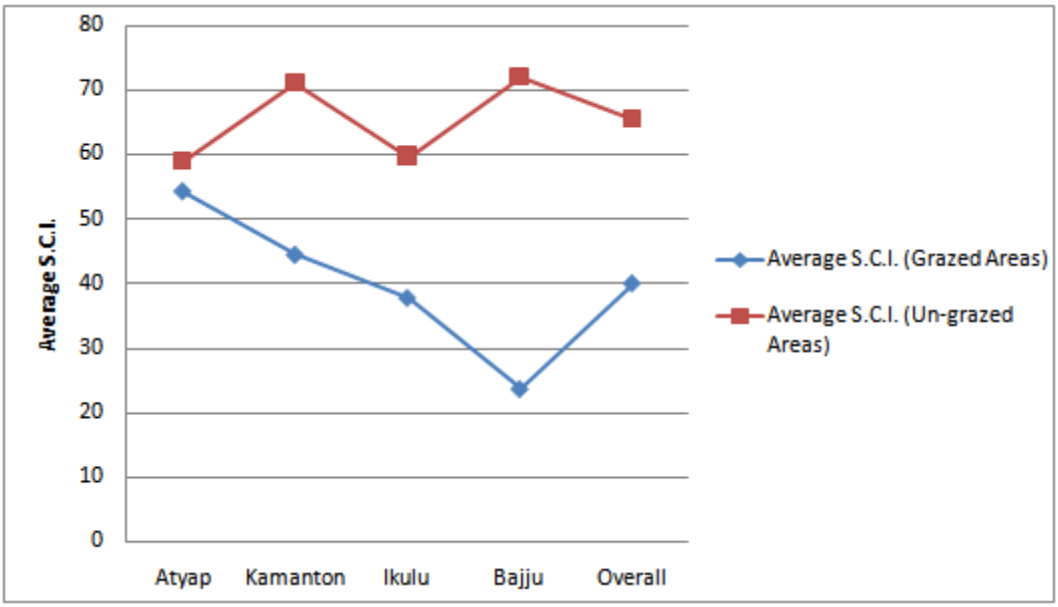


Figure2: Vegetation Surface Cover (S.C.I.) Percentage Average Results for Grazed and Un-grazed Areas showed significant difference at $p < .05$ (.000).

The hypothesis which states that animal husbandry has no significant impact on the vegetation cover in Zangon Kataf Local Government Area was tested using a one – way analysis of variance (ANOVA) for sites (Table 2). The results in Table 2 showed that $F = 5.700$, $p = 0.001$, indicating that there was significant difference ($p < .05$) in vegetation surface cover due to sites (location), hence the null hypothesis was rejected. The implication is that the vegetation surface cover in at least one of the sites (Table 2) differs from the others but ANOVA does not provide a pairwise comparison for the exact sites where the variation occurred.

Table 2: ANOVA for Vegetation Surface Cover (Sites)

	Sum of Squares	**df**	**Mean Square**	**F-value**	**Significance**
Between Groups	8000.947	3	2666.982	5.700	.001
Within Groups	185297.150	396	467.877		
Total	193280.098	399			

Result is significant at $p < .05$ (.001)

To establish the exact sites where the variation occurred, a pairwise Tukey HSD test for multiple comparisons for mean differences in percentage vegetation surface cover between sites was conducted and results presented in Table 3. The result showed that the overall mean difference was significant at $p < .05$. Furthermore, the mean difference between Jankasa and Kamanton = -1.1500, $p = .982$ was not significant at $p < .05$. Similarly, the results showed no significant differences between Jankasa and Ikulu $p = .051$; between Ikulu and Abet $p = .991$. The results however showed significant difference at $p < .05$ between Jankasa and Abet $p = .023$; between Kamanton and Ikulu $p = .018$; between Kamanton and Abet $p = .007$; (Table 3).

Table 3: Tukey HSD Multiple Comparison for Vegetation Surface Cover (S.C.I.)

(I)Sites	(J) Sites	Mean Difference (I-J)	Std Error	Significance
1	2	-1.1500	3.0590	.982
	3	7.8600	3.0590	.051
	4	8.7600*	3.0590	.023
2	1	1.1500	3.0590	.982
	3	9.0100*	3.0590	.018
	4	9.9100*	3.0590	.007
3	1	-7.8600	3.0590	.051
	2	-9.0100*	3.0590	.018
	4	.9000	3.0590	.991
4	1	-8.7600*	3.0590	.023

2	-9.9100*	3.0590		.007
3	-.9000		3.0590	.991

*. The mean difference is significant at the 0.05 level.
Note: 1 = Jankasa – Atyap, 2 = Kamanton, 3 = Kamuru – Ikulu and 4 = Abet – Bajju.
The implication of results in Table 3 was that vegetation surface cover in Abet varied significantly from the other three sites.

Effects of Animal Husbandry on Vegetation Leave Cover (L.C.I.)

Table 4 showed that the overall average vegetation surface cover had lower value $\bar{X}$ = 31.41% in grazed (impacted) areas compared to un-grazed (control) areas X = 46.07%. The hypothesis which states that animal husbandry has no significant impact on the vegetation cover (leave cover) in Zangon Kataf Local Government Area was also tested using a one – way analysis of variance (ANOVA) for sites (Table 5) and status (Table 6). The results (Table 5) for sites showed that F = 13.108, p = 0.000 and the result (Table 6) for status (grazed and un-grazed) showed that F = 31.261, p = .000, indicating that there was significant difference (p < .05) in vegetation leave cover due to sites (location) and status (grazed and un-grazed), hence the null hypothesis was rejected.

Table 4: Analysis of Average Vegetation Leave Cover (L.C.I) in Zango Kataf L.G.A.

Location	**Vegetation Leave Cover Grazed (%)**				**Vegetation Leave Cover Un-Grazed (%)**			
	$\bar{X}$	Std. Dev.	Var.	Std Error	$\bar{X}$	Std Dev.	Var.	Std Error
Jankasa – Atyap	24.74	21.29	453.58	3.01	45.34	27.98	782.84	3.96
Kamanton	34.36	27.76	770.39	3.92	55.46	30.89	954.01	4.37
Kamuru – Ikulu	40.58	12.68	160.90	1.79	55.26	28.11	790.16	3.97
Abet - Bajju	25.96	25.59	654.71	3.62	28.22	20.30	412.12	2.87
Overall Average	31.41				46.07			

Source: Field Survey, 2016

Table 5: ANOVA for Overall Percentage Vegetation Leave Cover (Sites)

	Sum of Squares	**df**	**Mean Square**	**F-value**	**Significance**
Between Groups	26967.768	3	8989.256	13.108	.000
Within Groups	271572.630	396	685.789		
Total	298540.397	399			

P < .05 is significant (.000).

Table 6: ANOVA for Overall Percentage Vegetation Leave Cover (Status)

	Sum of Squares	**df**	**Mean Square**	**F-value**	**Significance**
Between Groups	21741.503	3	21741.503	31.261	.000
Within Groups	276798.895	396	695.475		
Total	298540.397	399			

P < .05 is significant (.000).

A pairwise Tukey HSD test for multiple comparisons of mean differences in percentage vegetation leave cover between sites to establish the exact sites where the variation occurred was conducted and presented in Table 7. The overall result showed that the mean difference was significant at p < .05. Furthermore, the mean difference between Jankasa and Kamanton = -9.7000, p = .045 was significant at p < .05. Similarly, the results showed significant differences between Jankasa and Ikulu p = .003; between Kamanton and Jankasa p = .045; between Kamanton and Abet p = .000.

Table 7: Tukey HSD Multiple Comparison for Vegetation Leave Cover (L.C.I.)

(I)Sites	(J) Sites	Mean Difference (I-J)	Std Error	Significance
1	2	-9.7000*	3.7035	.045
	3	-12.8800*	3.7035	.003
	4	7.9500	3.7035	.140
2	1	9.7000*	3.7035	.045
	3	-3.1800	3.7035	.826

	4	17.6500*		3.7035	.000
3	1	12.8800*		3.7035	.003
	2	3.1800		3.7035	.826
	4	20.8300*		3.7035	.000
4	1	-7.9500	3.7035	.140	
	2	-17.6500*		3.7035	.000
	3	-20.8300*		3.7035	.000

*. The mean difference is significant at the 0.05 level.
Note: 1 = Jankasa – Atyap, 2 = Kamanton, 3 = Kamuru – Ikulu and 4 = Abet – Bajju

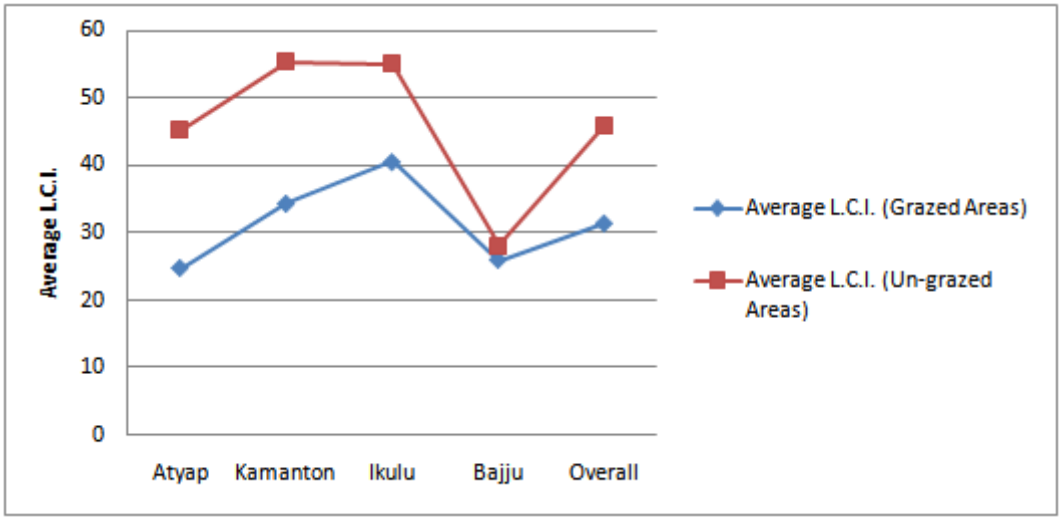


Figure 2: Vegetation Leave Cover (L.C.I.) Percentage Average Results for Grazed and Un-grazed Areas (showed significant difference at $p < .05$).

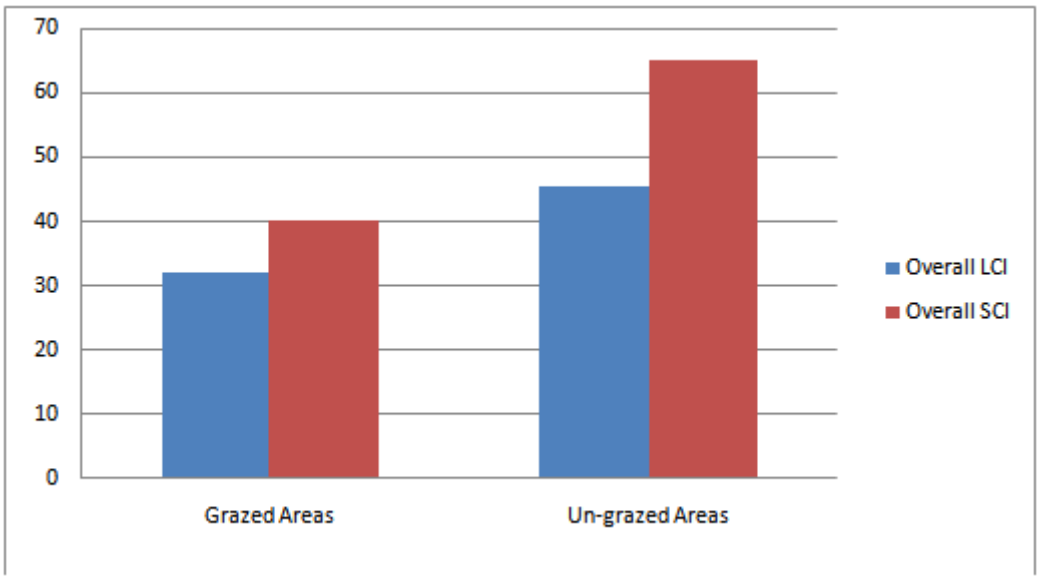


Figure 3: Combine Average Result of Percentage Surface Vegetation (SCI) and Leave Cover (LCI) for All Sites.

IV. Discussion

The differences in vegetation surface cover (Table 2) were observed to be as a result of differences in soil type especially in Abet where the lateritic hardpan duricrust occurred and does not favoured vegetation growth. The similarity in vegetation surface cover in the other three sites (Table 3) was attributed to similarities in soil type and grazing intensities. During the dry season when grasses become scarce, most herders turn their attention to feeding cattle, goats and sheep with leaves of trees. Most palatable tree consumed by these ruminants includes G. Melina and Isobelinia spp. The vegetation leave cover showed significant difference (Table 5). The result also implies that there was significant difference in leave cover between grazed and un-grazed areas. The differences in percentage vegetation leave cover was attributed to differences in soil type, grazing intensities (under the extensive system of animal production which involved continuous grazing) and differences in degree of fuel-wood harvest concurred with the findings of Fasae *et al*. (2014).

There were similarity in vegetation leave cover observed between Jankasa and Abet and between Kamanton and Ikulu. This may be as a result of similarities in traditional dependence on harvesting fuel-wood as the main source of energy supply in these rural areas but then further research is needed to confirm this observation. Grazing can impact plant species composition not only through the dietary preferences of livestock but also through the ability of a species to recover after grazing as observed by McSherry and Ritchie (2014). This might be a contributory factor in the similarity of low vegetation leave cover between Jankasa and Abet and Between Kamanton and Ikulu.

V. Conclusions

The essence of animal rearing is to generate income to supplement other sources of livelihood and to supplement family diet with the much needed proteins for healthy living and development. The study was conducted to determine the effects of animal husbandry on the vegetation cover of the study area. Four sites within the study area with unique grazing intensities and vegetation resource exploitation were selected. The Quadrat method was used for sample collection, while the results obtained was subjected to descriptive and inferential statistics.

Results of the vegetation measurement revealed significant detrimental effects of animal grazing in grazed (impacted) areas compared to un-grazed (control) areas which indicate that the nature of animal rearing in the study area affects vegetation resources development negatively. This study acknowledged animal husbandry as a one of the factors responsible environmental degradation especially by cows because of the way in which grazing is carried out in the study area which has been evident in the continuous vegetation depletion and consequently exposing the soil to higher run – off, erosion and land degradation. Based on the findings, the study recommend that rearing of animals be restricted to build enclosures, ranches, reserves or otherwise controlled to enable effective monitoring, diseases control, tracking and treatment, environmental conservation and elimination of clashes between farmers and animal breeders.

References

[1]. Abdel – Magid A.H., Trlica M.J. and Hart R.H. (1987) Soil and Vegetation Response to Simulated Trampling. *Journal of Range Management*, 36: 303-306.

[2]. Aganga A.A. (2013) Animal Agriculture and Mankind. Maiden Edition of Public Lecture. Department of Animal Science and Production, Federal University, Oye – Ekiti. September, 2013.

[3]. Areola O. (1978): Soil and Vegetal Resources. In: Oguntoyinbo, J.S., Areola O.O. and Filani, M. (1978): *A Geography of Nigeria Development.* Heinemann (Nig.), Ibadan, Nigeria, pp 115-118.

[4]. Bayer W. and Waters-Bayer A. (1992) The Role of Livestock in Rural Economy; Commission on Nomadic Peoples http://www.nomadicpeoples.info. Internet Browsed March 11, 2015.

[5]. Beltran L.A. (2014) Transect Quadrat Sampling. http://prezzi.com>vf6>trans. Internet Browsed October, 2016.

[6]. Briske D.D., Brown J.R., Fuhlendorf S.D., Teague W.R., Havstad K.M., Gillen R.L., Ash A.J., and Williams W.D. (2008) Rotational Grazing on Rangelands: Reconciliation of Perception and Experimental Evidence. Rangeland Ecology Management. 61. Pp3 – 17.

[7]. Devendra C., Swanepoel F.J.C., Strobel and Van Rooyen C.J. (2012) Implications and Innovative strategies for Enhancing the Future Contribution of Livestock: The Role of Livestock in Developing Communities. Pp171-190.

[8]. F.A.O. (1995) Planning for Sustainable Use of Land Resources: Towards a New Approach. FAO Land and Water Bulletin 2. M – 59 ISBN: 92-5-103724-8. Pp1-7.

[9]. Fasae O.A., Sowande O.S. and Adewumi O.O. (2014) APH – 301. Ruminants Animal Production and Husbandry. Lecture Notes, Department of Animal Production and Health, University of Agriculture, Abeokuta, Nigeria.

[10]. Galloway J.M., Burke E., Bradford K., Naylor R., Falcon W., Chapagain A.K., Gaskell J., McCullough E., Mooney H., Olesen K., Steinfeld H., Wassennar T., Smil V. (2007) International Trade in Meat. The Tip of the Pork. Ambio. In Press.

[11]. Herrero M., Thornton P.K., Notenbaert A., Msangi, S., Wood, S., Kruska, R., Dixon, J., Bossio, D., Van de steeg, J., Freeman, H.A., Li, X., and Parthasarathy Rao P. (2012) Drivers Of Change In Crop-Live Stock Systems And Their Potential Impacts on Agro-Ecosystems Services And Human Well-Being to 2030. CGIAR System wide Livestock Program (slp).irl Nairobi-Kenya .http://www.vslp.org/vslp.

[12]. International Fund for Agricultural Development (IFAO) (2011) Livestock and Rural Finance. Thematic Paper IFAD. http://www.ifad.org/rural finance/policy/ .

[13]. Iqubal A.M. (2010) Role of Livestock Husbandry on rural Transformation in North India: A case Study. *Journal of Geography*, 5(2).pp 83-94.

[14]. Iqubal A.M. (2013) Livestock Husbandry and environmental Problems. *International Journal of Scientific and Research Publications.* Vol.3 issue 5. ISSN 2250-3153. www.ijsrp.org.
[15]. Khan N. (2006) Livestock Marketing and Diversification of Agriculture. Vista International Publishing House, Dali.
[16]. Montgomery D.C. (1991) Design and Analysis of Experiments. John Wiley and Sons Publishers.
[17]. National Bureu of Statistics (2012) Annual Abstract of Statistics. www.nigerian.gov.ng>pdf uploads.
[18]. Pradère J.P. (2014) Links Between Livestock Production, The Environment and Sustainable Development. World Organization for Animal Health. 33(3). Paper No.09102014-00044-FR
[19]. Savory A. (2013) How to Fight Desertification and Fight Climate Change. Paper Presented to TED.@ http://.ted.com/talks/allan_savory_how_to_green the World deserts and reverse climate change.
[20]. Swanepoel F. Strobel A. and Moyo S. (2012) The Role of Livestock in Developing Communities: enhancing Multifunctionality. ISBN: 978-0-86888-798-4. SUN Media Bloemfontien, South Africa.
[21]. Tukey J.W. (1953) The Problem of Multiple Comparisons. Unpublished Notes, Princeton University.
[22]. Udo R.K. (1981) Geographical Regions of Nigeria. Heinemann Educational Book Limited. Ibadan pp 2-6.
[23]. Upton M. (2004) The Role of Livestock in Economic Development and Poverty Reduction. Pro – Poor Livestock Policy Initiative, PPLPI Working Paper No. 10. F.A.O. Animal and Health Care Division, 00100 Rome, Italy.
[24]. Verheye H. (2014) Land Evaluation: A Parametric Approach to Land Use. Land use and Land cover – vol. II Land Evaluation. National Science Foundation Flanders/ Belgium and Department of Geography, University of Gent, Belgium.
[25]. Wik M., Pingali P., and Broca S. (2008) Global Agricultural Performance: Past Trends and Future Prospects. World Development Report. World Bank.
[26]. World Bank (2001) Rural Development Strategy: World Bank Development Report (http://wbln0018.worldbank.org/essd/rdv/vta.nsf/aweb/outlive/&FILE/wb rural strategy outline pdf).
[27]. World Bank (2013) Rural Development Strategy: World Bank Development Report (http://wbln0030.worldbank.org/essd/rdv/vta.nsf/aweb/outlive/&FILE/wb rural strategy outline pdf).

Bitrus Dogo Ajeye, . " Effects of Animal Husbandry on Vegetation Surface Cover In Zango Kataf Local Government Area, Kaduna State, Nigeria." IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT) 12.3 (2018): 01-10.