Effects Of Animal Husbandry On Socio – Economic Development In Zango Kataf Local Government Area, Kaduna State, Nigeria

Bitrus Dogo Ajeye

Department of Geography, Kaduna State College of Education,
Gidan Waya, Kaduna State

Abstract: The effects of animal husbandry on socio – economic development in Zango Kataf Local Government Area of Kaduna State was conducted using a structured questionnaire method. The aim was to examine the effects of animal husbandry on socio – economic growth and development of the animal rearers in the study area. The purposive random sampling was used in collecting data from the selected districts in the four chiefdoms. A one – way multifactor analysis of variance (ANOVA) was used to analyze data. Presentation of results was done using the descriptive and inferential statistics, using the Social Sciences Statistical Package (SPSS) software. The results of variation of occupational brackets involvement in animal rearing between the four chiefdoms showed that F = 63.160, P = .000 (significant) at p < .05; The implication of variation in occupational brackets among the four chiefdoms was observed to be caused by values differences among families, individual interest and accessibility of educational facilities/employment. The results on animal types reared showed that F = 35.921, p = .000 (significant) at p < .05, for animal types. The results however were not significant when comparison was made among tribes. The implication was that animal types reared varied irrespective of the tribe depending on family interests; however, there was no significant variation in animal type reared when compared from one tribe to the other in the study area. The results for the income groups showed that F-value = 14.047, p-value = .000 (significant) at p < .05. The implication of this result was that income earned from sales of animal had significant impact and differences when compared between income groups, the higher the income realized from sales of animals the better the socio – economic status of the rearer. It was observed that the lowest income group of 0 – ₦50,000 had the highest percentage implying that majority are poor and a lot of commitment in terms of financial support is needed to improve the socio – economic status of animal rearers in the study area.

Keywords: Animal Husbandry, Socio – economic, Income, Development and Study Area.

I. BACKGROUND TO THE STUDY

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, *et al*., 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, *et al*., 2012; Iqubal, 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, eggs, manure and draught power. The rearing of livestock also contributes to improvement of household nutrition and helps maintain social capital and status within the community. Research conducted by Herrero, *et al.* (2012), Iqubal (2013) and World Bank

(2013) showed 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.

Wik *et al.* (2008) observed that income growth, relative price changes, urbanization and shift in consumer preferences have altered dietary patterns in both the developed and developing countries. In Asia, Africa and Latin America, diets have shifted away from staples such as cereals, root tubers and pulses towards more livestock products, vegetable oils, fruits and vegetables.

Harnessing livestock bi-products to improve agricultural production has been a traditional practice of many smallholder farmers. This practice has gained popularity in recent times as a result of increase in prices of chemical fertilizers. The use of organic manures for crop production has been found to give better yields and more lasting soil fertility (due to huge concentration of nitrogen and carbon faeces and urine of ruminants (USEPA, 2013). Nowadays there is a steady increase in the use of cattle, poultry and goat dung as manure in farmlands not inly in Zango Kataf Local Government Area but also in many countries in the world.

Globally, animal rearing is the world's largest user of land with grazing land and crop land dedicated to the production of feeds representing 80% of all agricultural land (FAO, 2009). Animal husbandry also 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 (that is, about 3.4 billion hectares for grazing and 0.5 billion hectares for feed crops, FAO, 2009) 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.

One major way of managing land resources for efficient rearing of animals to avoid clashes with farmers is to divide the pieces of land into grazing units (Redden, 2014). Sub – dividing pastures has long been accepted as a method of increasing uniformity of utilization in the Unites States. Barnes *et al.* (2008) found that smaller paddocks and intensified grazing rotation increased grazing distribution and uniformity of pasture used compared to continuous grazing. Grazing rotation is mostly practiced in countries with efficient land use policies. In Nigeria, grazing is continuous, unrestricted and land degradation is further been exacerbated by the land tenure system. This study has been under taken to examine how animal husbandry stands to benefit farmers and also how it affects the environment.

There are different methods of rearing animals. First, there is the *traditional or village system* which constitutes over 85% for all species of animals reared (Tewe and Bokanga, 2001). Under this system, the animals are allowed to scavenge for food, the owner can decide to resort to "cut and carry" to feed the animals, and during a favourable weather seasoning, tethering can be used, fattening and compound is also used for these ruminants. Secondly, *nomadic or pastoral system* which allows for mixed farming and peri – urban and modern livestock husbandry.

A. PROBLEM OF THE STUDY

Animal husbandry is an important element of agricultural ecosystem. Expectedly, substantial research information on it is available in developed countries such as the United States and developing countries such as Asia, Latin America, Eastern and Southern Africa, (Ndlovu, 2012; Nesamvuni *et al.* 2012; Swanepoel *et al.* 2012; Zippy *et al.* 2012).

Extensive studies on the effects of animal husbandry on socio – economic development have been conducted, but to a large extent, in Nigeria they are very scanty and have never been conducted in the study area. Researches have also been conducted on the benefits derived from animal rearing in terms of improvement in household income, nutrition and health status of families, social security and household insurance as exemplified in the works of Ndlovu (2012), Nesamvuni *et al.* (2012), Swanepoel *et al.* (2012) and Zippy *et al.* (2012). These researches have been conducted in different parts of Africa and elsewhere in the world. Researches on linkages between livestock production, the environment and sustainable development have also been conducted by Herrero *et al.* (2012) and Pradère (2014). In Nigeria and specifically in the study area, there is lack of information on effects of animal husbandry on socio – economic development. Animal husbandry has been used as a tool to improve rural income in some parts of developing countries such Indonesia, Java, Ethiopia, and Kenya (World Bank, 2001; Upton, 2004; IFAD, 2011). However, where there is no appropriate land use as the case is in the study area, animal husbandry rather than been beneficial to the population, is becoming a major source of environmental degradation and conflict between herders/farmers. The conflicts have resulted in loss of lives and properties worth millions of naira while states and federal government spent millions of naira on security votes annually. Comparatively, little is known about the extent to which animal husbandry affects socio – economic and land resources development especially soil and vegetation development in the study area.

This study attempt to answer the following basic questions related to the effects of animal husbandry on the socio – economic development in Zango Kataf Local Government Area, Kaduna State. What are the background (demographic, socio-economic and socio-cultural) characteristics of the rural populace involved in animal husbandry in Zango Kataf Local Government Area? What are the types of animals reared and the type of technologies used? What are the socio – economic benefits associated with animal husbandry? The aim of this study is to examine the socio – economic benefits of animal husbandry and its impacts on rearers' development in Zango Kataf Local Government Area of Kaduna State.

B. RESEARCH HYPOTHESIS

To guide in analyzing the results of the study the null hypothesis which states that Animal husbandry has no significant impact on socio – economic status of the rearers in Zango Kataf Local Government Area of Kaduna State was statistically tested at 0.05 confidence level.

C. SIGNIFICANCE OF THE STUDY

Livestock serve as means of livelihood and income – generating ventures in the rural areas in the following ways: By providing meat, milk, eggs, hide and skin. They can also ensure food security and promote living standards of rural people. Can be effective in reducing poverty; can give natural fertilizers and boost agriculture and demand growth can provide significant opportunities for many rural poor to increase returns from their livestock resources. Thus, this study is linked with the millennium development goals number one who addresses reduction in rural poverty. The increasing clashes between herders / farmers and the corresponding increase in human population and livestock competing on this limited land resources with no immediate solutions in the study area justifies the need for the study.

II. MATERIALS AND METHODS

A. LOCATION OF THE STUDY AREA

Zango – Kataf Local Government Area (LGA) lies between latitudes 9º 25´N and 10º 20´N of the Equator and between longitude 7º 45´E and 8º 40´E of the Greenwich Meridian, with a total land area of about 5,625km², (Kaduna State Official Gazette, 2014), Figure 2.1. The study area is located within the areas with Tropical Ferruginous soils characterized by duricrust hard pans in some areas called laterite/duricrust Udo, (1981). Due to variations in micro – topography and drainage, some areas have alluvial deposits of clay to silt (Bello, 2007).
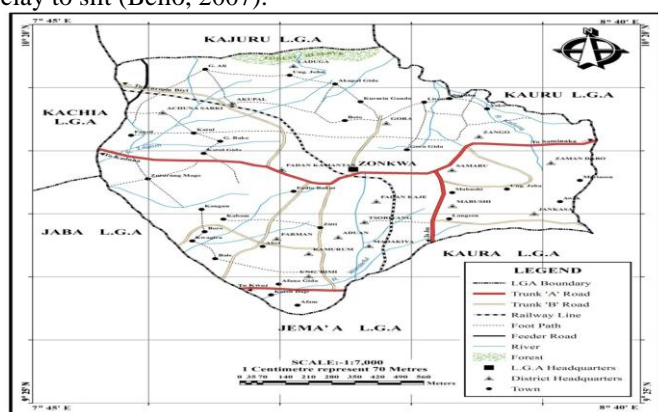

Figure 2.1: Location of Districts in the Study Area. Source: Kaduna Polytechnic GIS Laboratory (2015)

Zangon – Kataf Local Government area, experiences a Tropical Continental climate characterized by two distinct seasons in a year each lasting for six months. The rainy season starts from April and ends in October while the dry season begins in November and ends in March. Temperatures are generally high with an annual average of 30ºC. Minimum temperature may occasionally fall to 17ºC during the Harmattan period in December and January, while maximum temperature may rise to about 37ºC between February and April which is the hottest period of the year. Two major air masses namely: the Tropical Maritime Air Mass (T.M.) from the Atlantic Ocean and the Tropical Continental Air Mass (T.C.) from the Sahara Desert of Africa move across the area in the rainy and dry seasons respectively. The (T.M.) is the south – west monsoon winds which bring rain to Nigeria while the (T.C.) is the North – East Trade winds which bring no rain but Hamattan dust from the Sahara Desert. Rainfall in Zangon – Kataf LGA is characterized by a single maximum with a peak in August. The mean annual rainfall total ranges from 1130mm to 1500mm, (Udo, 1981). The study area is drained by several perennial rivers including River Kaduna that drains the north – eastern parts, Zagom River that drains the north – western part and River Wonderful that drains the southern parts of the Local Government Area. The vegetation of the study area is Southern Guinea Savanna type characterized by riparian forest along streams and river valleys, thick woodland with thick undergrowth of shrubs, grasses and herbs (Enoh, 2007).

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). 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 settler tribes include, Hausa, Fulani, Yoruba, Igbo, and 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.

III. LITERATURE REVIEW

Animal husbandry is the management and care of farm animals by humans for profit, in which genetic qualities and behavior, considered to be advantageous to humans, are further developed. The term can refer to the practice of selective breeding and raising livestock to promote desirable traits in animal utility, sport, pleasure, or research (Encyclopedia Britannica, 2013). The majority of the world's estimated 1.3billion poor people live in developing countries where they depend directly or indirectly on livestock for their livelihoods (World Bank, 2008; FAO, 2009). Globally livestock contributes about 40 percent to the agricultural gross domestic product (GDP) and constitute about 30 percent of the agricultural GDP in the developing world (World Bank, 2008).

Mixed crop-livestock systems account for most of the meat and milk production in Asia, and 40-60 percent of the cattle, sheep, goat, and poultry meat production in sub-Saharan Africa (Herero *et al*. 2012). These resource-poor

households typically grow crops, often at the subsistent level, earning whatever off-farm income they can, while raising a few chickens, sheep, goats, pigs or cattle. According to Ndlovu (2012), a spatial integration of crops and livestock is achieved when animals are grazed by herders on fallow fields between plots cultivated by farmers.

In Africa, grazing systems are also important, contributing nearly two-thirds of the beef produced and three-quarters of milk produced (Herero *et al*. 2012). Huge projected growth in the human population, increasing demand for land and food, coupled with serious water, land and labour constraints are becoming increasingly evident in both mixed crop-livestock and grazing systems (World Bank, 2008).

In developed countries such the U.S. and Netherlands, animal breeding has passed through several stages of technological advancements. While millions of dollars are spent yearly on selective breeding traits, others concentrate on Genetic Modification and Cloning (Riley, 2011). On the other hand, others spent their time and resources producing specialized feeds that increases meat production, reducing and reusing animal wastes, improving animal health and welfare; and decreasing the environmental impacts of livestock wastes as observed by (IAEA, 2010; Garg, 2012; and Gerber, 2013). Animal husbandry in the United States of America and other developed countries has changed significantly since the 1960's, transitioning towards larger operations separated from the land-base that produces feeds into specialized production of one animal type, and often at one stage of its life cycle from *feeds farm* during the initial life stages, to a *feeder-to-finish farm* and finally to *slaughter plant* (USEPA, 2013).

In much of sub – Saharan Africa livestock in animal husbandry practices are kept by smallholders in small pieces of land as compared to modern systems such as ranching feeds, and battery-keeping of chicken and other large – scale forms of animal production in peri – urban and urban areas (Lughano and Dominic, 1996; Zipp *et al*., 2012).

Mixed crop-livestock systems account for most of the meat and milk production in Asia, and 40-60 percent of the cattle, sheep, goat, and poultry meat production in sub-Saharan Africa (Herero *et al*. 2012). These resource-poor households typically grow crops, often at the subsistent level, earning whatever off-farm income they can, while raising a few chickens, sheep, goats, pigs or cattle.

A lot of Researches have been conducted on the benefits derived from animal rearing in terms of household income improvement, improvement in nutrition and health status of families, social security and household insurance, for example, Ndlovu (2012); Nesamvuni *et al.* (2012); Swanepoel *et al.* 2012 and Zippy *et al*. (2012). The result of their findings shows that animal husbandry is a major driving force of the rural economy especially in developing countries.

An estimated 50% of land in Africa (40% in Sub Saharan Africa - SSA) is considered to be suited uniquely for pastoralism due to limited and highly variable rainfall (Eswaran *et al*., 1997; IRIN, 2007). Pastoralism is defined as the use of extensive grazing on rangelands for livestock production with an estimated 50 million pastoralists and agro-pastoralists in SSA (Rass, 2006). Many pastoralists are subsistence herders often living in multiple family groups with sufficient labour to 'track' changes in pastures closely by

moving and splitting herds quickly (West, 2008; Niamir-Fuller, 1999). Such systems, which have developed over thousands of years, allow herders to use resources as and when they become available, giving grazing lands time to recover before return (Reid, 2012b). When systems are disrupted by restrictions or loss of movement recovery periods may also be disrupted. The main constraints hindering the productivity of the livestock sector in most sub-Saharan countries are Diseases; Poor Breeding Policies and Poor Management.

A. EFFECTS OF ANIMAL HUSBANDRY ON RURAL INCOME

According to Upton (2004) livestock are capital assets that contribute to rural livelihoods, employment and poverty relief. IFAD (2011) states that the use of livestock for both production and wealth creation can increase financial and food security in rural areas even in the absence of financial services, investment in livestock often provides cash flow through sales of milk, eggs, meat, or wool, the proceeds of which help cover various household expenses (such as schooling and healthcare). Case studies of rural development through animal husbandry have been successfully implemented in Maldhari rural villages in India (World Bank 2001), credit in kind (animals given out for loan) in Java – Indonesia, (World Bank, 2001) and the Mongolia Arhangai rural poverty alleviation project by IFAD (2011) where 10-20 Bods (one Bod corresponds to one cattle or yak or seven sheep) of livestock were given to herders on loan. The overall result shows that animal husbandry is a key to reducing rural poverty and improving livelihoods of rural poor communities.

Zango Kataf LGA had a total population of 318,991 (NPC 2006), and it is made up of 162,047 (50.8 %) males and 156,944 (49.2%) females. The study adopted the sample selection model by 600 respondents were chosen using Godden (2004) sample size formula which gives larger sample size. Godden (2004) model of sample size was chosen because it accommodates finite and infinite population. A proportional random sampling technique was used in selecting respondents from the sample frame constructed. The choice of random sampling is informed by its power to afford every member of the chiefdoms in the study area the opportunity to be selected.

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. A one – way analysis of variance (ANOVA) was used to analyze the data, using the statistical package SPSS.

IV. DATA PRESENTATION, RESULTS AND DISCUSSION

The results of the analysis of the data were presented and discussed on the socio – economic effects of animal husbandry to the rearers of the study area from questionnaire administration.

A. DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

In compliance with the first objective of this study, the demographic characteristics of animal rearers in Zango Kataf Local Government Area were analyzed and discussed here. Table 4.1 gives the gender composition of respondents. The results showed that males constitute 53.72% of the population compared to the females who make up 46.28%. The age groups of respondents involved in animal husbandry varied with the age groups however, the age group of 31 – 45 years (46.17%) indicates that animals are reared by young adults who are struggling to improve income earnings to cater for their livelihood.

The results (Table 4.1) suggest that females were less involved in animal rearing compared to males. The dominance of males suggests their overwhelming representation in this aspect of agriculture which is traditionally carried out by males in the study area. It was observed that the age bracket of 31 – 45 years was the majority. This implies that animal husbandry is dominated by active young men and women with majority being males.

Demographic Characteristics of Respondents

Gender of Respondents	frequency	percentage
Males	308	53.72
Females	266	46.28
Total	574	100.00
Age of Respondents	frequency	percentage
0 – 15 years	03	0.52
16 – 30 years	157	27. 35
31 – 45 years	265	46.17
46 – 60 years	130	22.65
61yrs and above	19	3.31
Total	574	100.00

Source: field survey 2016
Table 4.1: Demographic Characteristics of Respondents

B. SOCIO – CULTURAL CHARACTERISTICS OF RESPONDENTS

In compliance with the objective of this study, the socio - cultural characteristics results of those rearing animal in Zango Kataf Local Government Area were analyzed in Table 4.2 and discussed. Table 4.2 also revealed that 222 (38.68%) of respondents were from Bajju Chiefdom, 190 (33.16%) were from Atyap Chiefdom, 102 (17.77%) were from Ikulu Chiefdom and 60 (10.45%) were from Anghan Chiefdom. In terms of ethnicity, the table showed that 200 (34.84%) were Bajju, 161 (28.05%) were Atyap, 92 (16.03%) were Ikulu, 41 (7.14%) were Kamanton, 12 (2.09%) were Hausa, and 22 (3.83%) Fulani while other tribes were 46 (8.01%).

The dominance of the Bajju and Atyap tribes in terms of number involved in animal rearing was a reflection of the ethnic composition of the study area. Rearing of animals is traditional to the people of the area and it is done in combination with cultivation of crops. The animals reared are additional sources of income to the farmers.

Chiefdom of Residence		
Bajju	222	38.68
Atyap	190	33.10
Ikulu	102	17.77
Anghan	60	10.45
Total	574	100.00
Ethnicity of Respondents		
Bajju	200	34.84
Atyap	161	28.05
Ikulu	92	16.03
Kamanton	41	7.14
Hausa	12	2.09
Fulani	22	3.83
Others	46	8.01
Total	574	100.00

Source: Field Survey, 2016
Table 4.2: Socio – Cultural Characteristics of Respondents

C. OCCUPATION OF RESPONDENTS

The occupation of respondents was analyzed to realize the first objective of the study. The overall average results in Figure 4.3 showed that civil servants were the major occupational bracket (39.72%) involved in animal husbandry in the study area. This figure did not implied that they are more populated than other occupations, however the finding revealed that majority of the people have at least a formal education that enables them to be gainfully employed. Majority of them confessed that they rear animals to compliment other sources of income apart from salary. The next occupational bracket was farmers (39.19%). According to Lughano and Dominic (1996), Ndluvu (2012), and Fasae *et al.* (2014) rearing of animals serves as a source of additional income and insurance against crop failure. Though crop failure in the study area is rare due to location of the study area, rearing is done as additional source of income.
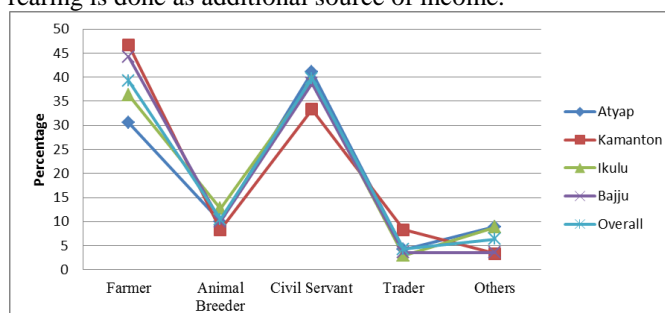

Figure 4.1: Occupation of Respondents.   Source: Field Survey, 2016

A one – way analysis of variance (ANOVA) to test for variation of occupational brackets involvement in animal rearing and between the four chiefdoms showed that $F = 63.160$, $P = .000$ (significant) at $p < .05$ (Table 4.3); the significant variation in occupation was graphically presented in Figure 4.1. The implication of variation in occupational brackets among the four chiefdoms was observed to be caused by values differences among families, individual interest and accessibility of educational facilities/employment. The farmer's occupational bracket was observed to be those people not gainfully employed including retirees. Findings made

further revealed that particular tribes, for example, Fulani dominated the occupational bracket of animal breeders which formed one of their core values.
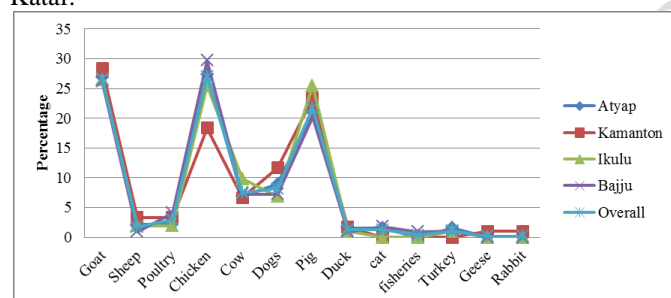
	Sum of Squares	df	Mean Square	F-value	Significance
Between Groups	4743.985	5	948.797	63.160	.000
Within Groups	270.399	18	15.022		
Total	5014.384	23			

Result is significant at p < .05 (.000).
Table 4.3: ANOVA for Occupation of Animal Rearers

D. IDENTIFICATION OF TYPES OF ANIMAL REARED

In compliance with the second objective of this research, identification of the types of animals reared in the study area was analyzed and discussed. The types of animals reared in any given locality depends on certain factors such as socio – cultural, socio – economic and environmental characteristics of the place. The overall average results in Figure 4.2 showed that chickens were the most dominant animal type reared in the study area (27.00%) followed by goats (26.65%) and pigs (21.78%). Other animals reared include dogs (8.19%) and cows (7.49%). Animals such as fishes, geese and rabbit constitute the least types of animals reared by households in the study area with values of 0.35%, 0.17% and 0.17% respectively. Reasons given by respondents for the lower number of fishes, geese, and Rabbit was as a result of difficulty involved in rearing them and there is no cultural value attached to these animals in all the tribes of Zango Kataf.

Source: Field Survey, 2016
Figure 4.2: Identification of Animals Reared

A one – way analysis of variance (ANOVA) on animal types reared was carried out in view of differences in tribal norms and values of the tribes found in the study area (Table 4.4 and 4.5). The results showed that F = 35.921, p = .000 (significant) at p < .05, for animal types (Table 4.4). The results in Table 4.5 showed that F = .000, p = 1.000 (not significant) at p < .05 comparison among tribes. The implication of results in Tables 4.4 and 4.5 was that animal types reared varied irrespective of the tribe; however, there was no significant variation in animal type reared when compared from one tribe to the other in the study area.

Variation in animal types reared according to respondents interviewed was due to cultural values attached to particular animals for example, pigs, chickens, goats and dogs. Chickens and goats are typically given as part of bride price and in some cases; they are used as fines for offenders of particular crimes committed by individuals according to traditions. This practice is common among Atyap, Kamanton, Ikulu and Bajju tribes in Zango Kataf Local Government Area. Rearing of pigs

traditionally has been the main source of income generation for the Atyap, Kamanton Ikulu and Bajju, but the Hausa and Fulani tribes did not reared them because their religion forbids it. Other animals like dogs were reared for hunting purposes and home security, while Cats were reared as pets and used to control rat's population from destruction of their farm produce especially grain crops. The similarities in animal types reared among the tribes in Zango Kataf p = 1.00 (not significant) at p <.05. Table 4.5, was observed to be as a result of tribal norms similarities among the tribes, they also share the same micro - climate environment in the study area.

	Sum of Squares	df	Mean Square	F-value	Significance
Between Groups	7438.190	11	676.199	35.921	.000
Within Groups	677.687	36	18.825		
Total	8115.877	47			

Result is significant at p < .05 (.000)
Table 4.4: ANOVA for Animal Type Reared

	Sum of Squares	df	Mean Square	F-value	Significance
Between Groups	.000	3	.000	35.921	1.000
Within Groups	8115.876	44	184.452		
Total	8115.877	47			

Result is not significant at p < .05 (1.000)
Table 4.5: ANOVA for Animal Type Reared by Tribe

E. NUMBER OF ANIMALS REARED

The results of number of animals reared were presented in Figure 5.3. The overall average results revealed that poultry (Broilers, Layers) had the largest overall average percentage (41.67%) in terms of number, though reared by a few households. Chickens (*Gallus gallus domesticys*) have the second largest number (25.81%) followed by Goats (*Carpa hirrcus*) (13.02%). Animals such as Cows (*Bosprimigenius Taurus*) were reared in larger number but by few Fulani households while other tribes in the study area reared at least one or at most 10 cows solely for income generation. Animals such as Dogs (*Cannis familiaris*) are also reared in very least number of not more than three but in most cases one in many households mainly for security. Animals such as Cats (*Felis catus*), Ducks (*Anatidae anseriformes*), Turkey (*Meliagris*), Geese, Rabbit (*Rodentia rattus*) are reared by very few households, this is largely due to either difficulty in rearing them or less importance attached to the animals in the study area.
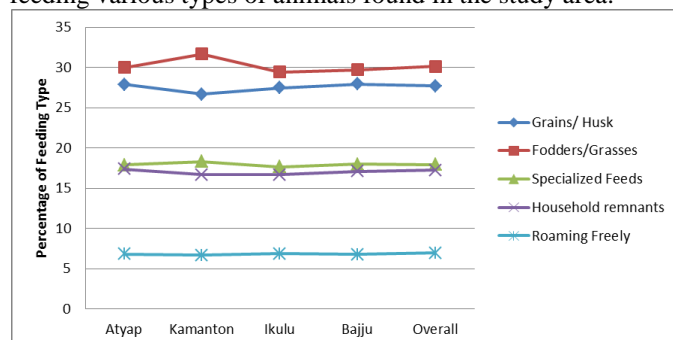

Source: Field Survey, 2016
Figure 5.3: Number of Animals Reared.

F. TYPE OF FEEDS USED IN FEEDING ANIMALS

The type of feed used for feeding animals varied with the animal type. Figure 4.4 presents the types of feeds used in feeding various types of animals found in the study area.

Source: Field Survey, 2016

Figure: 4.4: Types of Feeds Used

Overall averages results in Figure 4.4 indicated that 27.70% used grains/husks to feed the particular types of animals such as chickens, pigs, goats. 30.14% feed their animals with either fodders or grasses; such animals may include goats, cows, and sheep. 17.94% uses specialized feeds (processed cereals with concentrates that encourage growth of birds) for animals like poultry. 17.25% uses household remnants while 6.97% allow their animals to roam freely especially those rearing chickens.
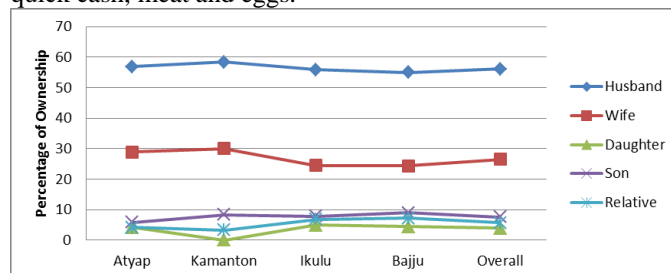
Compelling evidence observed in Figure 5.4 showed that feeding is localized with the majority depending on fodders, grasses, husk of grains and household remnants. This accounts for almost 80% of the mode of feeding of animals reared in the study area. Findings made by Riley (2011), USEPA (2013), Briskie *et al*. (2008) showed that specialized feeds used in feeding animals including grazing system were done in such a way that the health of the ecosystem is maintained. On the contrary only a small percentage of households in Figure 5.4 used specialized feeds and this mode of feeding was carried out by those rearing Poultry. Specialized feeds improve animals' health, growth and yields in terms of quality and quantity of meat, milk and eggs (Fasae *et al*., 2014). Observation made in the study area revealed that feeding animals was localized and elementary. The implication of these localized feeding methods in Zango Kataf Local Government Area is that developing and improving animal husbandry would require huge financial and government commitments which for now are not tenable.

G. OWNERSHIP OF ANIMALS REARED

The ownership status of animals reared was presented in Figure 4.5. Ownership of animals in this part of the country depends on tribal values, family interest and other socio – economic interests of households involved.

The results of ownership in Figure 4.5 showed that husbands owns the lion share of animals reared, followed by wives and children. Some households were observed rearing animals for their relatives, these household had an overall average of 5.75% of the ownership status of animals reared in the study area. It was observed that ownership of animals in this part of the country is traditionally owned by the males.

However, in recent times the involvement of females in rearing has increased significantly. Many females rear poultry (Broilers and Layers birds) which grows faster and provides quick cash, meat and eggs.

Source: Field Survey, 2016

Figure 4.5: Ownership of Animals Reared

Ownership of particular assets in this part of the country tends to reflect traditional norms and values of the people. Results in Figure 4.5 reveals that the heads of the households, that is, husbands dominate with the highest value (56.10%) doubling that of the female counterpart. The table also reveals that the values of sons also dominate that of daughters. Compelling evidence in Figures 4.5 and 4.6 revealed that ownership of animals reared by relatives had substantial value higher than that of daughters but below that of sons. The implication of this figure is embedded in the African tradition of extended family ties which is still strongly practiced in this part of the country. Involvement of husband, wife, or children, had no common bearing with tribal norms but rather personal or family interest.
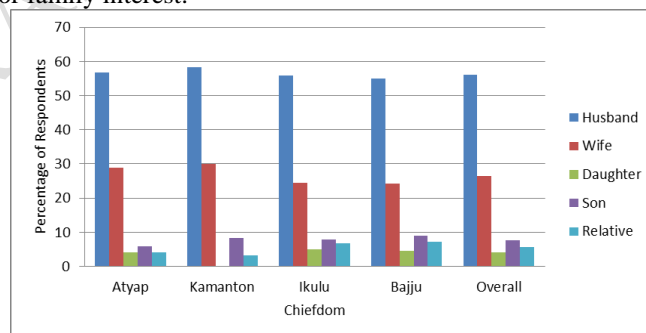

Figure 4.6: Ownership of Animals Reared

H. CHALLENGES FACED IN REARING ANIMALS

There are challenges associated with the rearing of animal and they include diseases, lack of finances, breeding space and others. Table 4.6 showed that lack of capital constituted 42.16% which is the highest problem militating against rearing of animals in the study area. Animal rearers complained of their inability to purchase feeds (especially those rearing pigs and poultry – Broilers and Layers birds). The implication of this problem is that meeting the protein needs of the growing population will continue to face challenges except adequate remedy is provided by government. Other challenges with serious consequences include lack of breeding space (16.02%), animal diseases (28.57%). Other minor challenges include lack of improved breeds (12.02%), lack of veterinary clinics/ experts to treat animals (1.39%).

Similar challenges were also identified in researches conducted by Lamy *et al*. (2012), Sahinduran (2012), Meena (2013), and Khine, Swe and Hla, (2014). With the relatively

high population densities in the study area, lack of breeding space within the inhabited areas (for animal types such as goat, sheep, pigs, chicken, poultry and others) for security reasons, forms the third highest challenge in animal rearing, because most household wants to keep their animals closely to monitor and ensure their safety and wellbeing.

Description	Frequency	Percentage
Lack of Breeding Space	92	16.02
Lack of Capital	242	42.16
Animal Diseases	164	28.57
Lack of Improve Breeds	69	12.02
Others (clinics, time)	8	1.39

Source: Field Survey, 2016
Table 4.6: Problems Encountered in Rearing Animals

In line with findings made in Table 4.6 on financial challenges, it was observed that government at all levels did not provide financial assistance to the farmers (Table 4.6). About 94.59% indicated that they were not enjoying any financial incentive from government. This negative trend contradict findings made by World Bank (2001), IFAD (2011) whereby governments of countries such as India, Iran, Pakistan and other western countries invest in huge amounts of their annual budgets in animal husbandry to encourage increased productivity.

Description	Frequency	Percentage
a. Loans	18	3.14
b. Improve Breeds	5	0.87
c. A and B Above	8	1.39
d. No Assistance	543	94.59

Source: Field Survey, 2016
Table 4.7: Government Assistance towards Animal Rearing

I. SOCIO – ECONOMIC BENEFITS OF ANIMAL HUSBANDRY

Majority of respondents (52.26%) indicated in Table 4.8 that animals were reared specifically for income generation; 40.94% indicated that they reared for both income generation and as family diet supplement. 4.53% indicated that they reared specifically as diet supplement and only 2.27% reared animals as pets/security. Table 4.8 also showed that the income realized from sales of animals is used for school fees, purchase of diet supplements, infrastructural development (13.41%), and agricultural development (14.81%). Only a small percentage (1.92%) has enough to spare in order to increase their financial base.

Research conducted by World Bank (2001) and IFAD (2011) showed that production of livestock was a means of wealth creation and can increase financial and food security in rural areas even in the absence of financial services. The use of animal husbandry as a means of solving their financial needs in the study area agreed with the findings of World Bank (2001) and IFAD (2011). Seasonal food security as observed by IFAD (2011) could be achieved where the net benefits of the harvest are invested in livestock. Cows, Pigs, Goats and Poultry have been observed by this research to be the animal type used for this purpose in the study area. These animals are usually sold at the end of the year or at the beginning of the cropping season to finance the farms. There are other types of animals that are reared not solely for income generation or diet but as pets/security these includes cats and dogs.

Purpose of Rearing Animals

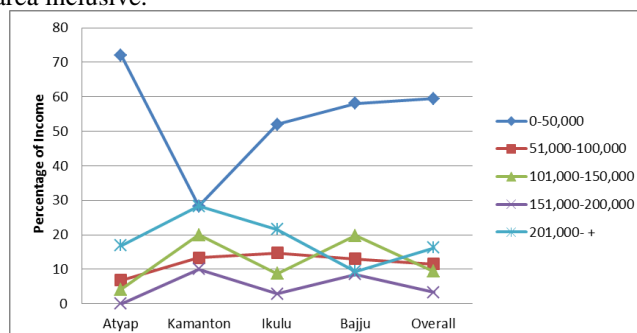| Description	Frequency	Percentage
Income Generation	300	52.26
Family Diet Supplement	26	4.53
All of Above	235	40.94
Others (pets/security)	13	2.27
Uses of Income Realized From Sales of Animals		
Description	Frequency	Percentage
Infrastructural Development	77	13.41
Educational Funding	303	52.79
Diet Supplement Purchase	98	17.07
Agricultural Development	85	14.81
Financial Improvement	11	1.92

Source: Field Survey, 2016
Table 4.8: Socio – Economic Benefits of Animal Husbandry

J. AMOUNT REALIZED FROM SALES OF ANIMALS PER ANNUM

The amount of money realized from the sales of animals per annum for the past three years is presented in Figure 4.7. The overall average results indicated that those earning from 0 – 50,000 naira annually from sales of animals had the highest percentage of 59.47%. Those earning from 51,000 – 100,000 naira from sales of animals had a total of 11.50% of the entire population sampled, while those earning from 201,000 + naira from sales of animals had a higher percentage of 16.28% of the entire population sampled. Those earning above ₦200,000 are mostly rearing poultry, pigs and cows whose sales are far above those selling chickens, goat, sheep and other domestic animals.

It was observed that those involved in poultry farming are mostly civil servants or have one form of learning or the other that placed them at a more advantaged position than other people in the study area in terms of knowledge in handling animals reared. The amount of income realized per annum concurred with the findings of (Upton, 2004) and (Iqubal, 2013) as obtained in countries like Indonesia, India and Mongolia. The differences however lie in the fact that other countries were getting financial assistance from their governments (World Bank, 2001). Rearing of animals and sales of animal products is mechanized in developed countries such the U.S.A., Canada, and Western European countries, and huge financial benefits derived from the investments, USEPA (2013). In comparison however, the sector is localized with no government commitments in Nigeria and the study area inclusive.

Source: Field Survey, 2016
Figure 4.7: Amount Realized from Sales of Animals Per Annum

K. HYPOTHESIS TESTING

The hypothesis which stated that animal husbandry has no significant impact on socio – economic status of the rearers in Zango Kataf Local Government Area of Kaduna State was tested using income derived from sales of animals which have a direct link with the economic status of the rearers. The results of a one – way analysis of variance (ANOVA) for the income groups (Table 4.9) was used. The results showed that F-value = 14.047, p-value = .000 was significant at $p < .05$, thus the null hypothesis was rejected. The implication of this result is that income earned from sales of animal had significant impact and differences when compared between income groups (Figure 4.7). Thus, the higher the income realized from sales of animals the better the socio – economic status of the rearer. It was observed that the lowest income group of 0 – ₦50,000 had the highest percentage of 59.47% (Figure 4.7) implying that majority are poor and a lot of commitment in terms of financial support is needed to improve the socio – economic status of animal rearers in Zango Kataf Local Government Area of Kaduna State.

Result is significant at $p < .05$ (.000)

	Sum of Squares	df	Mean Square	F-value	Significance
Between Group	5554.724	4	1388.681	14.047	.000
Within Group	1482.913	15	98.861		
Total	7037.637	19			

Table 4.9: ANOVA for Income Earned from Sales of Animals among Income Groups

A one – way analysis of variance on income earned between the four chiefdoms was also conducted and presented in Table 4.10. The results indicated that F-value = .009, p-value = .999 which showed no significance at $p < .05$. The null hypothesis was thus accepted. The implication of this results was that there was no significant differences in income earned from sales of animals between the four chiefdoms. Based on this findings, one can inferred that the entire study area suffers the same fate especially the plight of the lowest income earning group.

	Sum of Squares	df	Mean Square	F-value	Significance
Between Group	12.159	3	4.053	.009	.999
Within Group	7025.478	16	439.092		
Total	7037.637	19			

Result is not significant at $p < .05$ (.999)
Table 4.10: ANOVA for Income Earned from Sales of Animals among Chiefdoms

V. SUMMARY, CONCLUSION AND RECOMMENDATION

A. SUMMARY OF FINDINGS

The main objective of the study was to examine the effects of animal husbandry on land resources and socio-economic development in Zango Kataf Local Government Area. Background characteristics of animal rearers were examined including the animal types and the Socio-economic benefits of rearing these animals. A structured questionnaire was used as tool for data collection of which sample size of 600 respondents was taken from the four chiefdoms to answer questions for the socio-economic studies.

Results revealed that there were more males involved in animal rearing than females, with majority of them falling in the age bracket of 31 – 45 years. Civil servants and farmers also emerged as the highest occupational groups involved in animal rearing. Chickens and goats emerged as the most abundant animals reared in the study area. In terms of number, poultry emerged highest reared animal. Most households kept their animals in build enclosure with the exception of larger animal such as cows. Animal rearing is sedentary in the study area.

The mode of feeding animals in the study area is practically localized with only a few using specialize feeds for poultry (Broilers and Egg Layers) while ownership of animals reared was dominated by the males.

Lack of capital was the major challenge militating against intensification of animal rearing in the study area with little governmental intervention in financing and provision of improved breeds. There was incidence of disease outbreaks in the study area occurring mostly during the raining and dry seasons. Consultation for treatment was made with veterinary experts and local treatment for known cases. Animals were reared mainly for income generation and diet supplement. Incomes realized from sales of animals were used mainly for educational development of their wards. Majority earns less than ₦50,000.00 per annum for the sales of their animals. Local chickens were mainly reared for income generation and family diet supplement while other animals reared specifically for income generation.

B. 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. While other countries have used it as a means of socio-economic empowerment of its citizens, other countries have practically neglected this sector of agriculture including the study area. This study set out to examine the effects of animal husbandry on socio – economic development of animal rearers in Zango Kataf Local Government Area of Kaduna state. The study was based on the assumptions that animal husbandry has no significant impacts on socio – economic development of the rearers in the study area. Literatures visited revealed that researches have been conducted in many aspects of animal husbandry such as its effects on nutrition, income generation and rural development, impacts on climate change and green house gases emissions, pollution, diseases and management to mention a few.

A proportional random sampling technique was used in collecting data in the four chiefdoms. A structured questionnaire was used in collecting socio – economic data. Analysis of results was done using the descriptive statistics such tables, percentages, graphs and inferential statistics using a one – way multifactor analysis of variance (ANOVA) to

analyze data collected. Social Sciences Statistical Package (SPSS) software was used for the analysis.

The results of variation of occupational brackets involvement in animal rearing between the four chiefdoms showed that F = 63.160, P = .000 (significant) at p < .05; The implication of variation in occupational brackets among the four chiefdoms was observed to be caused by values differences among families, individual interest and accessibility of educational facilities/employment. The results on animal types reared showed that F = 35.921, p = .000 (significant) at p < .05, for animal types. The results however were not significant when comparison was made among tribes. The implication was that animal types reared varied irrespective of the tribe depending on family interests; however, there was no significant variation in animal type reared when compared from one tribe to the other in the study area. The results for the income groups showed that F-value = 14.047, p-value = .000 (significant) at p < .05. The implication of this result was that income earned from sales of animal had significant impact and differences when compared between income groups, the higher the income realized from sales of animals the better the socio – economic status of the rearer. It was observed that the lowest income group of 0 – ₦50,000 had the highest percentage implying that majority are poor and a lot of commitment in terms of financial support is needed to improve the socio – economic status of animal rearers in the study area.

C. POLICY RECOMMENDATION

Based on the findings of the study, the following recommendations have been suggested:

Increased Government budgetary allocation for this sector of agriculture and loan facilities should be given priority to animal breeders which are capable of reducing rural poverty. Case studies of rural development through animal husbandry have been successfully implemented in Maldhari rural villages in India (World Bank 2001), credit in kind (animals given out for loan) in Java – Indonesia, (World Bank, 2001) and the Mongolia Arhangai rural poverty alleviation project by IFAD (2011) where 10-20 Bods (one Bod corresponds to one cattle or yak or seven sheep) of livestock were given to herders on loan. The overall result shows that animal husbandry is a key to reducing rural poverty and improving livelihoods of rural poor communities.

REFERENCES

[1] Adesiji G.B., Tyabo I.S., Bolarin O., Ibrahim M. and Baba S.T. (2013) Effects of Climate Change on Poultry Production in Ondo State, Nigeria. Ethiopian Journal of Environmental Studies and Management. Vol. 6 (3) 2013.

[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] Angassa A. (2012) Effects of Grazing Intensity and Bush Encroachment on Herbaceous Species and Rangeland Condition in Southern Ethiopia. Land Degradation and Development 25: 438 – 451.

[4] 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.

[5] Barnes M.K., Norton B.E., Maeno M., and Malechek J.C. (2008) Paddock Size and Stocking Density Affect Spatial Heterogeneity of Grazing. Range Land Ecology and Management, 61:380 – 388.

[6] 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.

[7] Bello A.O. (2007) Regional Geography of Nigeria. In: Enoh J.E. (Ed) 2007. Perspectives of Geography. Tamaza Publishing Company. Wusasa, Zaria. P125 - 133.

[8] 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.

[9] Encyclopaedia Brittanica (2013) Animal Husbandry. In: Jarman M.R., Clerk G; Grigston C., Uerpman H.P., Ryder M.L. (1976). Early Animal Husbandry. The Royal Society 275 (93) : p85-97. Doi:id.1098/rstb.1976.0072

[10] Enoh J.E. (2007) Perspectives of Geography. Tamaza Publishing Company. Wusasa, Zaria. P 137.

[11] Eswaran H.R., Reich A.P., Zdruli P. (1997) Soil Quality and Soil Productivity in Africa. Journal of Sustainable Agriculture 10(4): 75–94.

[12] 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.

[13] F.A.O. (2009) Livestock Production Livestock Policy Brief 04. Livestock Information, Sector analysis and Policy Branch Animal Production and Health Division, F.A.O Rome, Italy.

[14] 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.

[15] Garg M.R. (2012) Balancing Feeding for Improving Livestock Productivity: Increase in Milk Production and Nutrients use Efficiency and Decrease in Methane Emission. F.A.O./UN. Rome ISBN 978-92-5-107303-2 No1773.

[16] Gerber P., Mooney H.A., Dijkman J., Tarawali S. and De Haan C. (2010) Livestock in a Changing Landscape: Experiences and Regional Perspectives. Vol 2. Published by Island Press. www.islandpress.org/bookstore/details5173.html?prod-id=1950.

[17] Gerber P. (2013) Pollution from Industrialized Livestock Production. Livestock Policy Brief (02). FAO/UN Sector Analysis Branch, Animal Production and Health Division Rome. pierre.gerber@fao.org.

[18] Godden B. (2004) Sample size Formula. Williams Godden cem/samplesizeformula.pdf . Internet Browsed August-08/08/2015

[19] Halden R.U. and Schwab K.j. (2011) Environmental Impact of Industrial Farm Animal Production. A Report of the Pew Commission on Industrial Farm Animal Production.

[20] 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.

[21] International Atomic Energy Agency (2010) Improving Livestock Production using Indigenous Resources and Conserving the Environment. IAEA-TECDOC-1640. Printed by the IAEA, Vienna: ISBN 978-92-0-100310-2 Austria.

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

[23] 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.

[24] 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.

[25] Integrated Regional Information Networks (IRIN), (2007) Africa: Can Pastoralism Survive in the 21st Century? UN Integrated Regional Information Networks. World Press. Available at www.worldpress.org/Africa/2861.cfm (last accessed 22 July 2015).

[26] Khan N. (2006) Livestock Marketing and Diversification of Agriculture. Vista International Publishing House, Dali.

[27] Lughano K. and Dominic K. (1996) Diseases of Small Ruminants: A Hand Book. Common Diseases of Sheep and Goats in Sub – Saharan Africa. Edited & Published by VETAID, Easter Bush, Roslin, Scotland. ISBN: 0-9522299-5-1.

[28] National Bureu of Statistics (2012) Annual Abstract of Statistics. www.nigerian.gov.ng>pdf uploads.

[29] Ndlovu L. (2012) The Role Of Foods Of Animal Origin In Human Nutrition And Health Chapter 5: In: The Role Of Livestock In Developing Communities; Enhancing Multifunctionality Isbn: 178-0-86886-798-4. Publication Sunmedia Bloemfomtien, South Africa. www.sun-e-shop.co.za

[30] Nesamvumi E.A., Swanepoel F.J.C., and Strobel A. (2012) Interaction Between Gender, Environment, Livelihood, Food, Nutrition and Health: The Role of Livestock in Developing Communities. Pp 93-105.

[31] Niamir-Fuller M. (1999) Managing Mobility in African Rangelands. Pages 102-131. In: N. McCarthy, B. Swallow, M. Kirk, and P. Hazell, (Eds). Property Rights, Risk and Livestock Development in Africa. International

Food Policy Research Institute, International Livestock Research Institute, Washington, D.C., Nairobi.

[32] Ogusipe M.H. and Ayanda M.A. (2012) Climate Change Scenario on Livestock Agriculture. Journal of Nature and Science Vol. 10 (4). ISSN: 1545-0740. Pp63 – 68.

[33] 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

[34] Rass N. (2006) Policies and Strategies to Address the Vulnerability of Pastorlists in Sub-Saharan Africa. PPLPI Working paper No. 37. FAO Rome. Available at http://www.fao.org/ag/againfo/programmes/en/pplpi/doca rc/wp37.pdf (Last accessed 12 March 2015). 62.

[35] Redden M.D. (2014) Grazing Method Effect on Forage Production, Utilization and Animal Performance on Nebraska Sandhills Meadows. Thesis in Agronomy and Hoticulture Department, University of Nebraska, Lincoln. http://digitalcommons.unl.edu/agronhortdiss/75. Pp2 – 15.

[36] Reid R. (2012b) Savannas of Our Birth - People, Wildlife, and Change in East Africa. University of California Press, California, USA. Chapter 2, pp 17-46.

[37] Riley H. (2011) Improving Livestock. Post Note no.393. Parliament Office of Science and Technology,7 Millbank, London To20 72192040 E-post@parliament.UK.

[38] Ritchie M.E. (2014) Plant Compensation to Grazing and Soil Carbon Dynamics in a Tropical Grassland. PeerJ 2:e233:DOI 10.7717/peerj.233.

[39] 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.

[40] Tefera S., Snyman H.A., Smit G.N. (2007) Rangeland Dynamics in Southern Ethiopia: (1) Botanical Composition of Grasses and Soil Characteristics in Relation to Land-use and Distance from Water in Semi-arid Borana Rangelands. Journal of Environmental Management, 85: 429–442.

[41] Tukey J.W. (1953) The Problem of Multiple Comparisons. Unpublished Notes, Princeton University.

[42] Udo R.K. (1981) Geographical Regions of Nigeria. Heinemann Educational Books Limited. Ibadan. PP 2-6.

[43] 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.

[44] USEPA (2013) Literature Review of Contaminants In Livestock And Poultry Manure And Implications For Water Quality. EPA 820-r-13-002 P5.

[45] West M. (2008) Improving Income Generation in Rural India: ICT-trained Veterinarians Assist Small Farmers With Livestock Production. Center for Information and Society, University of Washington.

[46] Wik M., Pingali P., and Broca S. (2008) Global Agricultural Performance: Past Trends and Future Prospects. World Development Report. World Bank.

[47] World Bank (2001) Rural Development Strategy: World Bank Development Report

(http://wbln0018.worldbank.org/essd/rdv/vta.nsf/aweb/out live/&FILE/wb rural strategy outline pdf).

[48] World Bank (2008). World Bank Development Report 2008. The World Bank, Washington DC; USA.

[49] World Bank (2013) Rural Development Strategy: World Bank Development Report

(http://wbln0030.worldbank.org/essd/rdv/vta.nsf/aweb/out live/&FILE/wb rural strategy outline pdf).

[50] Zipp A., Wilke P. and Carsan S. (2012) Sustainable Livestock Intensification: The role of Livestock in Developing Communities. Pp123-150.