



Socio-economic determinates of pastoralism in the Kilum mountain forest reserve north west region, Cameroon

Abubakar Ali Shidiki ^{1*}, Martin Ngankam Tchamba ², Etienne Tedonkeng Pamo ²

¹ *University of Bamenda, College of Technology. P.O Box 39 Bambili, Cameroon*

² *Faculty of Agronomy and Agricultural science, University of Dschang. B.P 222 Dschang, Cameroon*

Abstract

This study examines the socio-economic determinants of pastoralism in the Mount Oku forest reserve, Cameroon. Respondents were drawn from a cross section of livestock grazers in the Mt. Oku area. 332 pastoralists were selected through a stratified random sampling and interviewed using structured questionnaires. Data was collected on socio-economic characteristic of Pastoralist, decision to own livestock and preferred species. Bivariate analyses of variables were carried out using Chi-square analysis and standard deviation on the socio-economic characteristic of respondents and livestock type. Logistic regression was used to analyses the prediction of pastoralist on their socio-economic determinant to own livestock in the study area. The results revealed that all the pastoralist (100%) were male folks and majority were adults (86%) with ages above 41years, followed by youth's age below 40years who make up (14%) respectively. Age, educational status and primary occupation have a significant difference ($P = < 0.005$) on the decision to keep livestock in the study area. The logistic regression results showed that pastoralist without an alternative source of income to sustain their livelihood were more likely to own livestock ($P < 0.005$). Furthermore, owners of small ruminants were significantly different ($P < 0.005$). Gender, ethnicity, and perception of risk associated with species are a major factors affecting people's choice of species. The study reveals that livestock particularly small ruminants are a financial and economic source of the pastoralist livelihood.

Keywords: Small Ruminant; Pastoralist; Decision; Determinants; Ownership

Published by ISDS LLC, Japan | Copyright © 2018 by the Author(s) | This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.



Cite this article as: Shidiki, A.A., Tchamba, M.N. and Pamo, E.T. (2018), "Socio-economic determinates of pastoralism in the Kilum mountain forest reserve north west region, Cameroon", *International Journal of Development and Sustainability*, Vol. 7 No. 3, pp. 950-961.

1. Introduction

The Millennium declaration set 2015 as a target to halving the number of people living in extreme poverty; progress has been made although many more remain destitute by the targeted date (United Nation, 2000). Also, came the Rio+20 summit in 2012 that generated a parallel concept to the United Nations MDGs: the so called Sustainable Development Goals SDGs (Rio+20, 2012). The SDGs otherwise post 2015 international development agenda is divided into two parts: Agenda 1: human development objectives (poverty reduction, food security, education, health etc.) and Agenda 2: provision of global goods (limiting climate change, containing infectious diseases, stability of financial markets etc.), the SDGs main concern is shaping development in a sustainable manner (d.i.e, 2012).

Globally, the percentage rate of poverty has steadily declined during the last decade; an achievement due to economic growth (World Bank, 2008a). Cameroon has successfully reduced its poverty percentage from 57.8% to 37.5% between 2005 and 2014 (UNDP, 2017). This exceptional progress in reducing poverty also posted improvements in HDI scores of 0.486 to 0.532 during these periods. (UNDP, 2017). In addition, an agricultural GDP per worker grew and contributed to poverty reduction by up to 52% (Povcalnet, 2009, WDI, 2009). The average Nominal rate of Assistance (NRA) for Cameroon between 2000 and 2005 is -0.13 (Anderson and Valenzuela, 2008), indicating less assistance to agricultural sector (crops and livestock), export taxes, overvalued exchange rates, no subsidises etc.

Pastoral livelihoods sustain millions of people in West Africa, especially in the savannah and Sahel, but also in the humid zone as transhumant pastoralists move southwards. Pastoralism is a wide spread form of resource extraction in the wild (extensive livestock grazing), with some reserve being grazed by livestock (Kothari et al., 1989; Mahazotahy, 2006)). Pastoralism in West Africa is adapted to local climatic and ecological conditions and involves the rearing of different livestock, including different breeds of cattle, sheep, goats, and horses. But pastoralists face growing political and ecological pressure across the region, as traditional grazing lands have been gazetted in to reserves and transhumant routes have been cultivated due to the expansion of agriculture, or lost to urbanisation (Shidiki et al., 2017). In West Africa the number of livestock is estimated at 256.9 million head or 103.1 million TLU (FAOstat, 2009). Out of this livestock figure small ruminants account for 73% while cattle contribute 23%. Small ruminants have the fastest growth, 7.1% for goats and 5.8% for sheep. Livestock is a treasure and used to reduce ricks of income losses and food security. In West Africa livestock contribute 15% of household budget (CSAO/OCDE, 2007; FAO/ECOWAS, 2012). Despite this, the sector receives a weak support from public investment in terms of processing and packaging infrastructure. To alleviate poverty the livestock sector should be supported as is a livelihood source for the poorest section of the population; and provides food and cash income (Dicko et al., 2006).

Cameroon aspiring to become an emerging country by 2035, with agri-business contributing 12.6% of GDP (UNDP, 2017) has a total surface area of 465000 km² with pasturelands occupying up to 7% of the total surface, estimated to be about 3million hectares (Azuhwi, 2017). These rangelands are predominantly grasses, grass-like forbs or shrubs that are grazed or potentially to be grazed by livestock and wildlife (Allen et al., 2011). It is estimates that pasturelands make up at least a third of the earth surface (Herrera et al, 2014). Cameroon grasslands (savanna) divided into three distinct types namely: Guinea Savanna, Sudan savanna (derived

montane grasslands of the Western highlands and the Sahel savanna with little rain fall and long dry season (Pamo, 2008). The pastoralists in Cameroon are diverse with majority been the Fulani ethnic group who share a common access to natural resources (Moritz et al., 2015). The age and gender of pastoralist are very important elements to consider when examining livestock ownership patterns, particularly amongst African smallholder farmers (Roberts, 1996). In the Mt. Kilum area livestock rearing run alongside small vegetable gardening but using animal droppings (Zephania, 2015). This gardening together with bee farming helps in subsidizing household income and improve livelihood of gazers (Fornkwa, 2013).

The objectives of this study were to investigate the socio-economic factors influencing the decisions of household heads and members to keep livestock, types of livestock's in the study area and to understand the reason for the choice of species. In other to achieve these objectives; the following research questions were formulated: which are the socio-economic characteristic decisions that influence the choice of livestock that household heads own? What type of livestock's is rear in the study area? What are the determinants of preference of livestock species individual household kept?

2. Methodology

2.1. The Study area

Mount Oku divided into two parts namely: the Kilum Mountain and Ijim ridge which forms the largest remaining patch of montane forest in West Africa (FAO, 2002; Shidiki et al., 2017). It has exceptional levels of flora and fauna endemic especially amongst bird's species (Forboseh and Maisels, 2002; Forboseh et al., 2003). Some amphibian species are endemic; with 5 species endemic only to Mt. Oku, 7 endemic to the Bamenda highland and 18 resisted (replace) to the highlands of Cameroon and Nigeria (Doherty-Bone and Gvozdk, 2017). Mount Oku is the second highest Mountain in West Africa, with an elevation of 3,011 meters. The grid reference of Mt Oku forest reserve is between latitude $6^{\circ} 07'N$ to $6^{\circ} 17'N$ and longitude $10^{\circ} 20'E$ to $10^{\circ} 35'E$ (FAO, 2002; Zaphinia and Jude, 2015). The Southern slopes are the Ejim Mountains while northern slopes are the Kilum Mountains. The forest reserve extends between 2022m and 3011m above sea level. Land under natural forest including degraded forest is 6900 ha, the area under tree and scrub savannah is 2400 ha; grass savanna is 1240 ha and area occupied by Lake Oku (Maawes) is 260 ha (Shidiki et al., 2017). This area became a reserve in 1931, but it was not until 1975 that the demarcation of the forest boundary started. In the 1990s, forest legislation evolved from state ownership and management to participatory management with some local communities. The Kilum-Ijim forest is surrounded by 42 villages, and these villages have 18 Forest Management Institutions (FMI) (FAO, 2002; Thomas et al., 2001). Mt. Oku forest covers a land area of 17,325 ha. A population of about 300,000 people lives within a day walks of the forest and depend on it for their livelihoods (FAO, 2002). The forest provides local employment and livelihood, Honey, woodcarving, bush-meat, fuel wood, clean water and the extraction of non-timber forest products are important local economies with the potential for improvement. The forest and Lake Oku have strong cultural and spiritual importance to the

surrounding communities. Pastoralism has been practiced in the Mt. Oku area for centuries before the demarcation of the forest into a protected area (FAO, 2002).

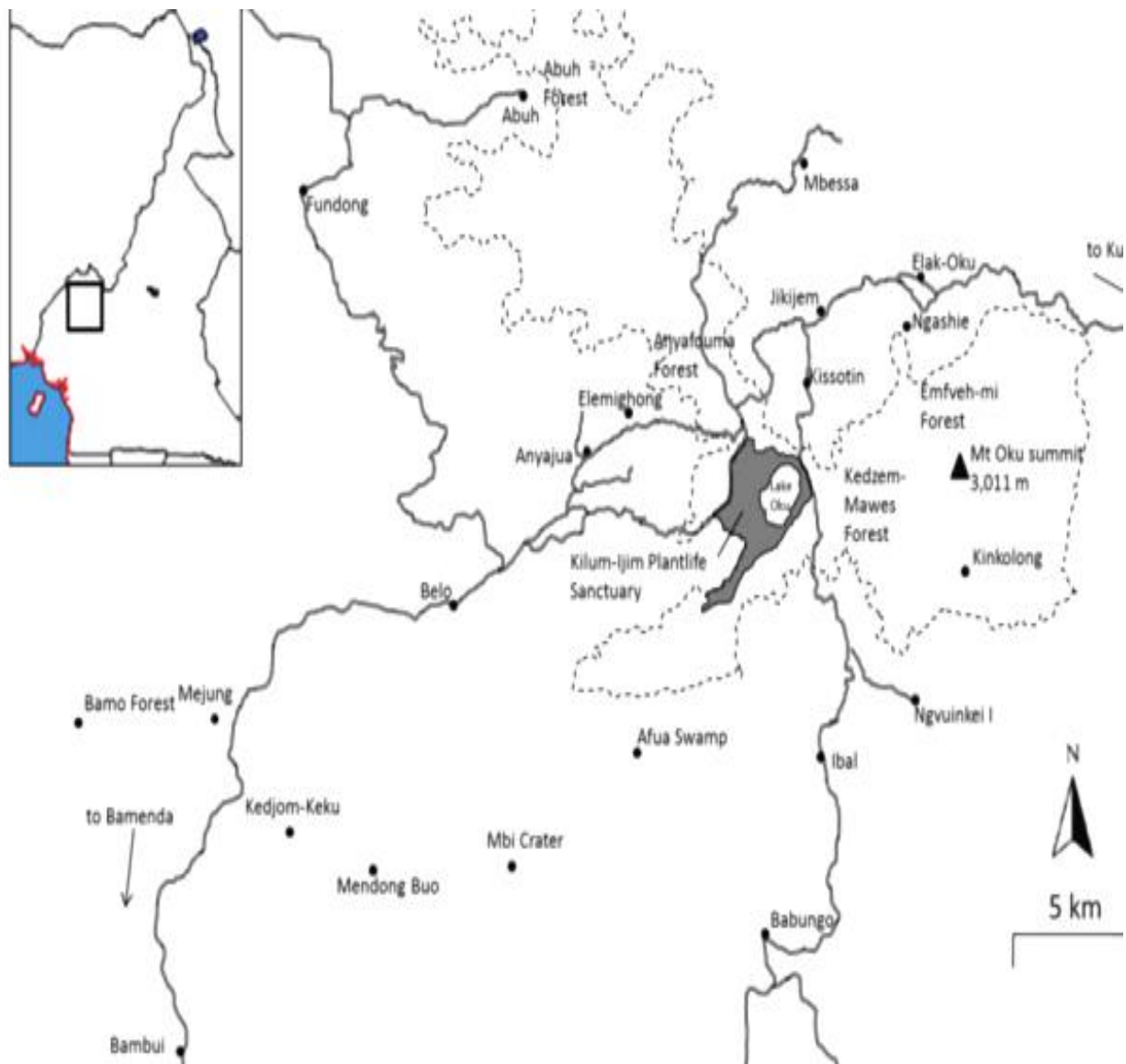


Figure 1. Map of Mt Oku (Source: Doherty-Bone and Gvozdk, 2017)

2.2. Sampling Procedure and data collection

Data were collected through a two-stage survey in 2016 and 2017. Pastoralists from two rural administrative unites (sub-divisions) were randomly selected for the study. The pastoralists were classified into two categories: 1. those who are members of the grazers union, 2. Pastoralist who did not belong to any grazers associations. The list of pastoralist was obtained during a recognisance survey in 2015 and was updated in

2017. The new list now has 332 pastoralists instead of the 242 in 2016. Out of 332 pastoralists, 294 belong to a grazers union and 38 did not belong to any association. The Elack rural council in 2017 estimated that Kilum forest reserve harbours over 700 small ruminant grazers of which, only 12 grazers own cattle (Elack council, 2017). Structured questionnaires were used for the study. The questionnaires asked for general household information including household population, sex status, educational status, land ownership, primary and secondary occupation, number of animals, ownership patterns of livestock etc. Out of the 332 household surveyed, 320 kept small ruminants, 12 own cattle amongst which 5 had horses.

During the survey, only household heads were interviewed. Other livestock species commonly raised horses and domestic birds. Information on the motivation for keeping the livestock's, type of livestock own and the perception of keeping small ruminants versus cattle with regards to economic benefits and risks involved.

2.3. Statistical analysis

The data were analysed with the statistical package so social sciences version 20 (SPSS Inc. 2011). First bivariate analysis and chi-square were used to investigate the socio-economic variables that affected the decision to rear livestock.

Logistic regression allows the prediction of group membership from a set of categories and or continuous variable (x). The dependent variable is dichotomous and can take the value 1 with a probability of success y, or the value 0 (non member) with a probability of failure 1-y. The relationship between the dependent and independent variables is not a linear function. Logistic regression function (logit) was used to transform the value of y.

$$\text{Logit } [y(x)] = X + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_i X_i$$

Where X= the constant of the equation and β = the coefficient of the independent variables.

The model shows the coefficient of multiple determinations (R^2), which explains the 'goodness of fit' for the relationship between the dependent variable and each independent variable in the equation. (Source: Hosmer et al., 2013.)

3. Results

3.1. The socio-economic characteristic of pastoralist households:

The bivariate analysis (Table 1) showed that the percentage of households keeping livestock varied significantly ($P < 0.005$) with head of households involved into secondary activities was significantly increasing.

Table 1. Socio-economic characteristic of pastoralist (n=332)

Variable code	N	% Household	X ²	significance
Sex of respondent			0.000	Ns.
• Male	332	100		
• Female	-	-		
Age of respondent			0.616	Ns
• 20-40 yrs	47	14.0		
• 41-60 yrs	182	55.0		
• Above 61 yrs	103	31.0		
Marital status			0.000	Ns
• Married	264	79.6		
• single	42	12.5		
• divorce	15	4.6		
• widower	11	3.3		
Education			0.267	*
• Non	138	41.7		
• Primary	80	24.1		
• Secondary	44	13.2		
• Koranic	70	21.0		
Primary occupation			0.000	Ns
• Small ruminant	320	96.4		
• cattle	12	3.6		
Secondary occupation			0.426	*
• Petit trading	23	6.6		
• NTFP	59	17.8		
• Caving	40	11.9		
• Hunting	33	9.8		
• Bee farming	177	53.9		
Ethnic group			0.000	*
• Oku	282	85.0		
• Bansa	34	10.0		
• Fulbe	16	5.0		
Religion			0.000	Ns
• Muslims	31	9.2		
• Christians	199	59.8		
• Traditional religion	102	31.0		

P < 0.005, ns= not significant

Source: Field survey, 2017; Elack Council, 2017

More so, people aged above 41 years (86%) are more into pastoralism than the younger counter-partners aged below 40 year who make up only 16% of surveyed sample. 96.4% of pastoralist reared small ruminants (sheep and goats) while 3.6% were into cattle in the Kilum area of the forest reserve. Although 100% of the pastoralists in the study area were men folks, women and children also had few livestock amongst the flocks.

In the bivariate analysis, statistical significant difference ($P < 0.005$) was observed in ownership of livestock between household members who had secondary occupation and those without any. Households

whose main primary and secondary occupation were Pastoralism; were likely to own more livestock than those household who had a secondary occupation to compliment their household income ($P < 0.005$).

3.2. Types of Livestock Raised by Respondents

Analysis of respondents based on the types of livestock raised reveals the highest preference for small ruminants with about 96.4% (Table 2) with a significance difference at $P < 0.005$, and this is largely due to its wide acceptability and ease of domestication in terms of adaptability to the prevailing environmental conditions in the study area. Again, the fact that small ruminant's meat is consumed by all households in the study area and that small ruminants (sheep and goats) are used for both religious and cultural celebrations make it better placed among residents of the study area. Moreover, in terms of marketability, small ruminants are very easy to market since they are small and less costly compared with other livestock such as cattle and horses. The second highest is cattle (3.6%) and this is closely followed by horses (0.001%).

Table 2. Types of livestock rear by respondents in Kilum reserve

Variables	Number of heads	Livestock Estimates	X ²	Sig
livestock Type			0.264	*
Small ruminants	320	75000		
Cattle	12	301		
Horses	5	16		

Source: Elack council, 2017

3.3. Decision of household head to own livestock

Household heads whose small ruminants where not their main source of income and livelihood were more likely to own cattle ($P < 0.005$). Furthermore, owners of small ruminants were significantly different ($P < 0.005$). Majority of adults above 41years (86%) are more into pastoralism than the youths age below 40years (14%) are fewer in terms of numbers in the livestock sector.

Table 3. descriptive statistic and significance of household heads to keep livestock

Variable	N	Mean	SD	95% confidence interval
Age of respondent	332	2.17	0.653	0.653
No of Households	332	12.62	7.278	0.545
Secondary activities	332	3.90	1.917	1.704
Land size	332	1.48	.707	0.707
Valid N	332	0	0	332

Source: Field survey, 2017

Table 4. logistic regression predicting the decision of pastoralist to own livestock

Predictors	B	SE	Wald X ²	df	Sig	e ^β (odd ratio)
Constant	1,369	,233	-,460	1	,000	.38
Primary occupation	-,327	,095	,111	1	,001	.99
Age	,045	,055	-,160	3	,414	6.22
Education	-,115	,092	0.546	1	,216	1.02
Test						
Model: multinomial logit						
Goodness-of-Fit Tests ^{a,b}						
Likelihood ratio	0.00					
Pearson chi-square	0.00					
R ² =	0.525					
2 R ² =	0.525					

P < 0.005, **Source:** Field survey, 2017

4. Discussion

The majority (100%) of pastoralist in the Kilum area are men folks and (96.4%) of pastoralist surveyed owned small ruminants, which confirm the important role of sheep and goats in the livelihood of the rural communities in the study area. Pastoralists maintain not only genetic diversity but also important indigenous knowledge regarding the health, management and reproduction of livestock (IIED, 2013). The small size of sheep and goats has distinct economic, managerial, and biological advantages over the larger livestock's (Workhen, 2000). Economically low individual values mean a small initial investment and correspondingly small risk of loss by individual deaths (Isaac and Titilayo, 2012). Small ruminants are not only a source of food/nutrition but play a role of financial security for the rural poor (Adam et al., 2010). According to FAO (2000), more than 50 percent of milk produced for human consumption is from sheep and goats in Niger and Somalia. More households were likely to keep small ruminants (sheep and goats) when the household head has relatively fewer economic options as was the case with households whose primary occupation were pastoralism in the study area. This is because small ruminants make a very valuable contribution to household income, especially to the rural poor (Isaac and Titilayo, 2012). The result in table 1 clearly indicates the economic roles small ruminants play in sustaining the livelihood of the communities in the study area. This is in line with the studies of Coppock et al., 2006; Isaac and Titilayo, 2013, who acknowledge the important contributions of livestock's especially the small ruminants to the household income and financial security of the rural poor communities. Livestock are often regarded as producers of milk and meat, income generators, and reservoirs of wealth for the rural poor (Fakoya and Oloruntoba, 2009). According to Faizal (2015), small ruminants' are an importance source of household income, social and financial security within the rural poor. The results also highlight a strong education bias on livestock keeping. There was a significance ($X^2 = 0.0546$, $P < 0.005$). Education increases the ability of the farmer to process and use information relevant to the adoption of a new technology (Namara et al. 2013). Other studies have also reported a positive relationship between education and adoption of technologies (Traore et al., 1998; Okunlola et al., 2011).

In the study area, majority of household heads primary occupation is pastoralism although they had secondary activities such as bee farming making up 53.9%, followed by NTFP (17.9%), caving (11.9%), hunting (9.8%) and petite trading (6.8%) respectively. The older the household head, the higher the likelihood that the household keeps small ruminants to sustain their livelihood. This is probably because younger household heads are more likely to take other jobs in urban areas and also have been trained in new skills to use in sustaining their families its significance at $P < 0.005$. This is line with study of Shidiki et al., 2017 showing that youths in the Mt. Oku area have diversify their livelihood sources. Chi-square analysis shows a significance difference $P < 0.005$.

The logistic prediction of the decision of household heads to own livestock is a function of the household socio-economic activities; it is significance at 5% probability levels. These findings are in agreement with the results of previous studies (Shidiki et al., 2017; Dossa, 2008). Families divide their activities as women do the farm work while the main rear the livestock's. More youths are less involve in pastoralist activities as they occupy other position of work out of the livestock sub-sector. The livelihood of household to own livestock decreases with the ability to find an alternative employment in the public or private sector. Although household head (men) were interview, Livestock was shared with all the members of the families. Women and youth who owned livestock was probably because of their determination to increase their autonomy and their bargaining power within the household (Dossa et al, 2008.) In contrast to larger livestock's like cattle and horses which are normally concentrated and remain in the hands of a restricted number of producers (high income rural households), small ruminants are dominant in almost every low income rural household (Isaac and Titilayo, 2012). For example in the dry areas of Northern Nigeria, fewer than 20 percent of farmers own cattle (ILCA, 1980). In Côte d'Ivoire, Barry (2005) reported that, on average, fewer than four cattle were found on farms where there are close to ten sheep or goats; this ownership pattern characterizes the legacy of sub-Saharan Africa's rural economy as capital constraints limit access to cattle among poor households whilst small ruminants are well suited for the purpose.

The result also revealed a strong ethnic bias against those who keep small ruminants and larger livestock's. More Fulani were seen to keep cattle and horse while Oku and Bansa ethic groups kept more sheep and goats. However, the ethnic bias is probably due to cultural reasons, as more Fulani in the Western highlands of Cameroon do not eat goat meat and so, find no reasons for keeping them. The study also showed that the perception of people towards risk associated with cattle and small ruminant species significantly affects their decisions to own a particular species. Fulani consider cattle less risky than keeping small ruminants, although small ruminants rank high in species that provided higher return.

5. Conclusion

This study confirms the role of small ruminants as a source of livelihood to the Kilum pastoralist. Small ruminants in the study area act as a source of livelihood and financial stabilities to many families. Pastoralism is men dominated activity, as their long distances from the villages to the top of the mountains were pastoralism take place. There is also a cultural bias against cattle, sheep and goats. The potentials of small

ruminants as a source of livelihood are very visible around the Mt. Kilum area. This study only concentrated on pastoralist with livestock's at altitudes above 1700m. As a result, Peri-urban pastoralists were not taken into account for this study. The revision of the protectionist policy to a conservation policy will help improve pastoralism and the livelihood of pastoralist in the Kilum forest reserve of the Mt. Oku area.

References

- Adam, H., Atengdem, P.B. and Al-hassan, S. (2010), "Innovations adoption levels of small ruminant farmers in Tolon-Kumbungu district of Ghana", *Ghana Journal of Development Studies*, Vol. 7, pp. 39- 66.
- Allen V.G., Batello C.E., Berretta, J., Hodgson, M., Kothmann, X., Li, J., Mclvor, J., Milne, C., Morris, A.P. and Sanderson, M. (2011), "An international Terminology for grazing lands and grazing animals", *Grass and forage science*, Vol. 66, pp. 5-22.
- Anderson, K. and Valenzuela, E. (2008), *Estimates of Global Distortions to Agricultural Incentives, 1955 to 2007*, World Bank Report, Washington, DC. Pp. 4-36.
- Azuhnwi, B. (2017), "Making Rangelands more secure in Cameroon", *Rangelands Issue Paper Rome Italy*, Vol.8, pp. 1-64.
- Barry, M.B. (2005), "Determinants of urban livestock adoption in the 'Zone Dense' of Khorogo, Cote I'voire a tobit approach", In Mougeot, L.J.A. (Ed.) *The Social, Political and Environmental Dimensions of Urban Agriculture*. Bath Press, London, UK, Pp. 89-105.
- Coppock, D.L., Desta, S., Tezerra, S. and G. Gebru. (2006), "An Innovation System in the Rangelands: Using Collective Action to Diversify Livelihoods among Settled Pastoral Women in Ethiopia", Paper presented at Innovation Africa Symposium November 21-23, 2006 held in Kampala, Uganda.
- CSAO/OCDE. (2007), *Renforcer le rôle des acteurs et des professionnels de l—élevage: Une nécessité pour dynamiser le commerce régional in Note aux décideurs*, Vol.4, p.4.
- d.i.e. (2012), "Post 2015: how to reconcile the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs)"? German Development Institute. Briefing paper, 2012-2, pp. 1-3.
- Dicko M.S., Mahalmdane A.D. and Sangare, M. (2006), "Les systèmes de production animal au Sahel Sécheresse", *ISSN 1147-7806*; Vol.17, No. 1-2, pp. 80-95.
- Doherty-Bone, T.M. and Gvoždík, V. (2017), "The Amphibians of Mount Oku, Cameroon: an updated species inventory and conservation review", *ZooKeys*, Vol. 643, pp. 109–112.
- Dossa, L.H., Rischkowsky, R., Birner, R. and Wollny, C. (2008), "Socio-economic determinants of keeping goats and sheep by rural people in southern Benin", *Agric Hum Values*, Vol. 25, pp. 581-592.
- Elack council. (2017), "Elack-Oku rural council department of revenue collection and statistic", Oku subdivision, North West region Cameroon, Pp.1-10.
- Faizal, Adams. (2015), *Socio-economic analysis of small ruminant livestock production in Northern Ghana*, PhD thesis Kwame Nkrumah University of Science and Technology, Kumasi- Ghana, Pp. 29-52.

- Fakoya, E.O. and Oloruntoba, A. (2009), "socio-economic determinants of small ruminant production among farmers in Osun State, Nigeria", *Journal of humanities, social sciences and creative arts*, pp. 1-12.
- FAO, Rome. www.fao.org/fo
- FAO. (2000), "World Watch List for Domestic Animal Diversity", Third edition, Rome, Italy.
- FAO. (2002), "Case study of exemplary forest management in Central Africa: community forest management at the Kilum-Ijim mountain forest region, Cameroon", In Christian Asanga, October 2002. Forest Management Working Papers, Working Paper FM/11. Forest Resources Development Service, Forest Resources Division.
- FAO/ECOWAS. (2012), "The cross-border transhumance in West Africa: Proposal for action", Rome, pp. 10- 82.
- FAOstat. (2009), "Food and Agriculture organization of the United Nation statistic", Rome Italy, pp. 2-18.
- Hosmer DW Jr, Lemeshow S, Sturdivant RX (2013), *Applied Logistic Regression. Third edition*, John Wiley & Sons, New Jersey
- Isaac, B.O. and Titilayo. B.O. (2012), "Small Ruminant as a Source of Financial Security: A case study of women in rural South West Nigeria", *Institute for Money, Technology and Financial Inclusion (IMTFI) working*, 2012-2, pp. 2-21.
- Isaac, B.O. and Titilayo. B.O. (2012), *Small Ruminant as a Source of Financial Security: A case study of women in rural South West Nigeria*, Institute for Money, Technology and Financial Inclusion (IMTFI) working, 2012-2, Pp. 2-21.
- kothari, A., Pande, P., Singh, S. and Variava, D. (1989), "*Management of National Parks and Sanctuaries in India*, A status report, Indian Institute of Public Administration, New Delhi, India, P. 5.
- Mahazotahy, S. (2006), *Etude de variation de la formation végétale de la région du Parc national de Tsimanampesotsa et intérêt de son extension*, plaine côtière et plateau calcaire Mahafaly". Mémoire de DEA. Université de Tuléar, Tuléar, Madagascar, Pp. 24.
- Moritz, M., Handa, S.S., Chen, Y. and Xiao, B. (2015), "Herding contracts and pastoral mobility in far Northern Region of Cameroon", *Human ecology*, Vol. 1, No. 43, pp. 141-151.
- Namara, E., Weligamage, P. and Barker, R. (2003), *Prospects for adopting system of rice intensification in Sri Lanka: A socio-economic assessment*, Research Report 75 International Water Management Institute Colombo, Sri Lanka, Pp. 3-13.
- Okunlola, O., Oludare, O. and Akinwalere, B. (2011), "Adoption of new technologies by fish farmers in Akure, Ondo state, Nigeria", *Journal of Agricultural Technology*, Vol. 7, pp. 1539-1548.
- POVCALNET. (2009), *World Bank Poverty Database*.
- Roberts, B.D. (1996), "Livestock production, age, and gender among the Keiyo of Kenya", *Human Ecology*, No.24, pp. 215-230.
- Shidiki, A.A., Tchamba, M.N. and Pamo, E.T. (2017), "The perception of small ruminant grazers and stakeholders in the sustainable management of biological resources in the Mt. Oku forest reserve northwest region, Cameroon", *International Journal of Development and Sustainability*, Vol. 6, No. 11, pp. 1743-1756.

Traore, N., Landry, R. and Amara, N. (1998), "On-farm Adoption of Conservation Practices: The role of Farm and Farmer Characteristic, Perception and Health Hazards", *Land Economics*, Vol. 74, pp.114-127.

UNDP (2017), *Human Development Index Database*.

WDI. (2009), *World Bank Database*.

Workneh A. K. (2000), *Do smallholders farmers benefit more from crossbred (Somali X Anglo-Nubian) than from indigenous goats?*, PhD thesis, Georg-August University of Gottingen, Germany, Pp. 6-56.

World Bank. (2008a), *The Growth Report: Strategy for Sustained Growth and Inclusive Development*, Commission on Growth and Development. The International Bank for Reconstruction and Development/ the World Bank.

Zaphinia, N.F. and Jude, K. (2015), "Cameroonian Protected Kilum-Ijim Forest for the development of Oku Forest Fringe Community", *Journal of Environmental Research and Management*, Vol. 6 No. 5, pp. 294 -29.