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Economics of Leafy Vegetable Production among Pastoralists in Kwara State, Nigeria

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Abstract

Degradation of grassland and the environment restricting access to grazing resources increased pastoral vulnerability to drought and loss of livestock assets which pose threat to pastoral based livelihoods. In respond to these threats many pastoral communities diversify their livelihood to agro-pastoralism. This shift led to increased sedentarization of the pastoralists with many growing crops and vegetables commercially. Therefore, the study estimate the costs and returns to leafy vegetable production; and examine the technical efficiency level of the pastoralists' leafy vegetable farmers. A multistage sampling was used to select one hundred and twenty one (121) pastoralist leafy vegetable farmers as the sample for the study. Data were collected by means of structured interview schedule. Information was obtained on age, marital status, years of formal education, farming experience, land ownership, costs and revenue. Percentages, means and frequencies were the main descriptive statistical tools utilized. While the inferential statistics used is Stochastic Production Frontier. The study revealed that leafy vegetable production among pastoralist in the study area is profitable with mean net income of 23,379.47. Also, the technical efficiency ranges between 60.1% - 99.0% and the mean technical efficiency of the pooled sample is 86.9%. The study therefore concluded that vegetable farming among pastoralists is a profitable venture. Therefore it is recommended that farmers should be encouraged by giving inputs and incentives. They should also be trained by extension agents on proper farming techniques so as to increase their profit.

Keywords: Pastoralists, Efficiency, Vegetables, Cost

1. Introduction

Globally pastoralism is characterized by keeping large herds of indigenous breeds (Magembe *et al*., 2013). In Nigeria, 90 percent of cattle are owned by the Fulani ethnic group and they constitute the core of traditional pastoralist. This group of people is settled in the arid and semi- arid regions of the country. They however, migrate from one part of the country to another in search of grazing land and water for their animals (Ega and Erhabor, 1998). Pastoralism is a subsistence system for producing meat, milk, and other animal products from domesticated animals such as goats, sheep, cattle, and camels. It is practiced in marginal areas where crop production is extremely difficult. Access to communal land offering potential for grazing and water resources promote mobility in pastoral production system.

Transhumance pastoralism was originally a way of life among communities whose lives and livelihood are inseparably intertwined with cattle, goats, sheep and other ruminant species that depend on natural rangeland for grazing resources. In spite of the advent of monetized economy, pastoralism has remained a veritable source of livelihood and food security as cattle, goats and sheep perform economic, as well as traditional, social and exchange functions. However, the world is witnessing the adverse effects of climate change which include frequency and intensity of storm, thunder, flood, drought, hurricanes, increased frequency of fire, poverty, reduced agriculture productivities, adverse effects on

grazing land and pasture quality. It had a cumulative effect on natural resources and disruption of eco-system (Ayanda, 2013). Therefore changes restricting access to these grazing resources increase pastoral vulnerability to drought and loss of livestock assets, which pose threat to sustainability of pastoral – based livelihoods (Mwangi, 2005; Coast *et al*., 2006). Faced with such threats, many pastoral communities have responded with diversification of livelihoods to agro- pastoralism (Binbergen and Watson, 2008; Galvin, 2009). Transhumance is declining due to increasing population growth, land pressure and political perception of pastoralism as a backward lifestyle (Desta and Coppock, 2004). Therefore an increasing number of cattle keepers have adopted a sedentary lifestyle and are practicing mixed crop livestock farming and deriving livelihoods from other non-pastoral activities (Fratkin& Mearns, 2003). Agro-pastoralism is a set of practices that combine pastoral livelihoods with production of millet, sorghum, maize, vegetables, and pulses (annual legumes). These systems are extremely important and are the most prevalent land-use in arid and semi-arid environments.

However, Bruggomen (1994) and Oyesola (1998) asserted that certain modifications are occurring in the pastoral economy, which are fundamentally changing women's right and access to livestock. First, increasing sedentarization and degradation of grassland means that the herds tend to be kept at cattle posts in remote areas away from the homesteads. Two, the growing importance of beef production and marketing of stock is adversely affecting women property right to livestock. Access to extensive land offering potential for grazing and water resources promote mobility in pastoral production system. Therefore, changes restricting access to these grazing resources increase pastoral vulnerability to drought and loss of livestock assets, which pose threat to sustainability of pastoral-based livelihoods (Coast *et al.,* 2006; Mwangi, 2005). Faced with such threats, many pastoral communities have responded with diversification of livelihoods to agro-pastoralism (Binsbergen and Watson, 2008; Galvin, 2009; Freeman *et al.,* 2008).This shift in livelihood strategy was initially mainly for subsistence purpose, some households have switched to commercial growing of crops using intensive farming practices. The crops produced include tomatoes, kales and capsicums. These "new" farmers use seasonal rivers to irrigate crops early in the dry season and excavate river beds to extract water to support production later into the dry season.

Vegetables may be described as those plants, which are consumed in relatively small quantities as a side dish with the staple food. The term 'vegetable' can also be used to designate the tender Edible shoots, leaves, fruits and roots of plants that are eaten whole or part raw or cooked as a supplement to starchy foods and meets (Williams *et al,* 1991). Vegetables can be distinguished from field crops by the fact that, vegetables are harvested when the plant is fresh and high in moisture while the fields crops are harvested at the mature stage for their grains seeds, roots fibreetc. In human nutrition, vegetables are an essential protective food containing vitamins and minerals. Any balanced diet should include vegetables and fruits for this reason. The proportion of vegetables required in a balanced diet per capita per meal is of the order of 45% of the total volume of the food. Vitamin A maintains health of the respiratory and the eye tissue; vitamin B is essential for development of the nervous system; vitamin C maintains health of blood cells and tissues; vitamin D maintains health of bones and teeth; vitamin E maintains heath of the reproductive system; and vitamin K is essential for blood clotting. Iron, which is particularly plentiful in green vegetables, is part of haemoglobin which is found in the blood. The high fibre content of vegetables is essential to maintain the health of the bowels, and a diet which is low in fruit and vegetables frequently results in constipation. The leaves of lettuce and cabbage combined supply 184g water; 2.9g protein, 8g carbohydrates, 1.5mg Iron, 49mg phosphorus, 55mg Ascorbic acid, 1.1mg Niacin, 0.8mg Riboflavin, and 0.2mg Thiamin nutrients per 100g of edible portion.

In Africa, three major classes of vegetables are consumed. These include those that are gathered from the wild such as baobab leaves; those indigenous vegetables which are often gathered but are also cultivated such as amaranthus; and imported vegetable species which are cultivated (Richter et al. 1994). The vegetables under study (amaranthusspp and Ewedu) fall under the second category. These vegetables are cultivated in the country and are highly patronized by most people especially the middle and high-income classes in the urban areas.

Leafy vegetables are an important feature of Nigerian's diet that a traditional meal without it is assumed to beincomplete. In developing countries, the consumption of vegetables is generally lower than the FAO recommendationof 75kg per year in habitant (206g per day per capita) (Badmus&Yekini, 2011).In Nigeria, vegetable production has been on -going for decades, providing employment and income for the increasing population especially during the long dry season. However production is constrained by inadequate infrastructure, agronomic and socio-economic variables (Sabo and Zira, 2008).In recent years, the pastoral production system in the horn of Africa is in critical situation, and unable to support

basic needs of people whose very survival is strongly linked to the performance of this system (Ahmed *et al.*, 2002).

As a result various authors have reported that pastoralists and agro pastoralists in sub-Sahara Africa have long suffered from natural calamities, and manmade disasters such as drought, political isolation, conflict due to competition for natural resources and falling levels of per capita income (Ahmed *et al.,* 2002). In response to all these identified constraints, increasing numbers of households are shifting from pure pastoralist livelihood to crop farming with many growing vegetables commercially. This paper therefore, intends to estimate the costs and returns to leafy vegetable production and examine the technical efficiency level of the pastoralists' leafy vegetable farmers.

2. Materials and methods

2.1 The study area

The study was carried out in Kwara state, Nigeria which is located within the North Latitude 11° 21 and 11° 451. It falls between longitudes 2° 451 and 6° 401 East of Greenish meridian (Figure 1). The state is bounded in the south with Oyo, Ekiti and Osun State. It is bounded in the West by Benin Republic while in the North and the East, it is bounded by River Niger, and Kogi State, respectively. The state has a land area of 32,5002 km (3,250,000 ha) with a temperature range between 30 and 35°C. The vegetation in the northern parts of the state is mainly savannah grass land while to the southern part is wooded Guinea Savannah. The rainfall pattern both in quantity (900 to 1500 mm) and distribution (6 to 7 months) and vegetation types favour production of cattle, goat, sheep and arable crops. The favourable climatic conditions are responsible for the exodus of Fulani from the northern parts of the country where adverse effects of climate change are mostly felt. The population of Kwara State is 2.3 million people (NPC, 2006). Kwara State is naturally endowed for livestock production. Crop production (rice, yam, cassava, guinea corn, maize, groundnut, sweet potato, cotton etc) is the major farming enterprise of the major tribes (Yoruba, Nupe and Baruba) in the State while livestock production is the major means of livelihood of the migrants Hausa/Fulani.

2.2 Target population

The target populations for the study are the pastoralists in the sixteen local government areas (LGAs) of Kwara State. The local governments areas include Asa, Ilorin East, Ilorin West, Ilorin South (Kwara Central); Baruteen, Kaiama, Edu, Patigi and Moro (Kwara North); Irepodun, Ifelodun, Oyun, Offa, Ekiti, Oke-Ero and Isin (kwara South). There is preponderance of pastoralists in all the 16 LGAs in the state. The pastoralists constitute the sample frame from which the respondents were selected.

2.3 Sample size and sampling technique

A three stage multi- sampling technique was employed in sample size selection. Stage one involved a random selection of seven (43.75% of the LGAs in the state) local government areas. These include Asa, Moro, Ilorin West, Ifelodun, Kaiama, Edu and Ilorin East LGAs. Stage 2 involved a random selection of five pastoralists' settlements (Gaa) in each LGA. The 'extension agents' in each LGA assisted in the compilation of the lists of the pastoralists, to the extent possible, within their areas of jurisdiction. Stage three involved a random selection of Twenty (20) pastoralists in each LGA. This gives a total of 140 pastoralists. However, the required number of 140 agro- pastorals envisaged for this study was not met due to circumstances beyond control. Thus, a total of 121 pastoralists were selected from the seven (7) LGAs as respondents. Data were collected by means of structured questionnaire.

2.4 Instrument for Data Collection

Data for the study was obtained with the use of a structured questionnaire. Data gathered for the study were analyzed using both descriptive and inferential statistics. The descriptive statistics such as percentages were used to describe the socio economic characteristics of the farmers while the farm budgeting and stochastic frontier model were used to estimate the costs and returns to leafy vegetable production and examine the technical efficiency level of the pastoralists' leafy vegetable farmers respectively.

2.5 Model Specification

Farm Budgeting:

The farm budget analysis was used to assess the costs and returns to vegetable production in the study area. The returns to farmer's labour and management is expressed in Naira per hectare (N/ha). Costs comprise both fixed and variable cost.

Fixed Cost (FC) includes: cost of land rent, labour and depreciation charges on simple farm tools and production. Variable Cost (VC) include: cost of fertilizer, seed, agro-chemical, hiring cost, repair, maintenance, and transportation. Returns are revenue that accrues from the sale of produce.

GM = TR – TVC
NFI = GM – TFC
NFI =R LM = GM – TFC
Where TR = Total Revenue
TVC = Total Variable Cost (N
TFC = Total Fixed Cost (N
GM = Gross Margin (N/Plot)

NFI = Net Farm Income (N)

RLM = Return to Farmer Labour and Management [N]

2.6 Profitability index (return to Naira invested): Stochastic Frontier Model:

For our empirical analysis, the Stochastic frontier production function specifies the technology of the production process. The major tool of analysis used in this study was the stochastic frontier model by Battese and Coelli (1995). The stochastic frontier production function model is specified in the implicit form as follows: $Y_i = f(X_i, \beta) + (V_i - U_i)$

Where: Yi is the output of the ith farm Xi is a k x l vector of input quantities of the ith farm β is a vector of unknown parameters to be estimated Vi are random variables which are assumed to be normally distributed N(0,δv 2) and independent of the U_i .

It is assumed to account for measurement error and other factors not under the control of the farmer. Ui are non-negative random variables, called technical inefficiency effects (Aigner et al., 1977).

A Cobb-Douglas Production form of the frontier used for this study is presented as follows:

$$\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + V_i - U_i \ldots\ldots\ldots(1)$$

Where: Y = Vegetable Output was measured in kilogram (Kg)

X_1 = Farm size (ha)

X_2 = Labour (man-day)

X_3 = Manure (kg)

X_4 = Irrigation water used (litre)

X_5 = Vegetable seeds (kg)

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$, = Parameters that were estimated

3. Results and discussion

3.1 Socio – Economic Characteristics

The socio-economic characteristics of the respondents considered in this study are as follows: age, gender, marital status, household size, educational level, income, farming experience, farm size, land ownership pattern, number of extension contact, membership of other farmer groups and access to credit and training. Selected socio-economic characteristics of the groups represented by the respondents are also presented in this section. Table 1 gives a summary of the results.

Table 1. Socio- Economic Characteristics of Pastoralists Vegetable Farmers

Socio-economic characteristics	Frequency	Percentage
31-40	8	6.61
41-50	54	44.6
51-60	47	38.8
61-70	12	9.92
Total	121	100
Gender		
Male	57	47.1
Female	64	52.9
Total	121	100
Marital status		
Single	1	0.83
Divorced	1	0.83
Widow	23	19.0
Married	96	79.3
Total	121	100
Household size		
1-5	24	19.8
6-10	62	51.2
11-15	35	28.9
Total	121	100
Education		
No formal education	66	54.5
Quranic education	49	40.5
Adult education	1	0.83
Primary education	4	3.31
Tertiary education	1	0.83
Total	121	100
Land Ownership		
Rented	54	44.6
Inheritance	38	31.4
Donation	2	1.7
Free	27	22.3
Total	121	100
Experience		
1-15	12	9.91
16-30	90	74.4
31-45	19	15.7
Total	121	100

Table 1 reveals that the highest age group of the respondents was 41-50 with mean age of 50.85. This result suggests that the farmers are less likely to be very physically active. The minimum age of 30 years may also be an indicator of less participation of youths in vegetable farming among the agro-pastoralists in the study area. The table also reveals that the pastoralists' vegetable farmers were predominantly female. This is evidenced by the fact that 52.9 percent of the respondents in the study area were female. This is a clear indication that female farmers are more involved in vegetable farming than their male counterpart especially small scale farming which involves cultivation of small area of land. This study is therefore in line with a the study carried out by Economic Commission for Africa that African women do between 60 to 80 percent of agricultural work including animal husbandry, gardening, food processing, marketing and distribution. Similar study by the Food and Agricultural Organization (FAO, 2005) reveals that women farmers make up more than forty percent of the developing world's agricultural labour force and grow at least half of the world's food supply. Being married may be used as a sign of social responsibility. Also, married people are more engaged in farming probably because they have support from their family members in terms of labour. Unlike those that are not married. Table 1 shows that majority of the respondents 79.3% were married and in total only 20.7% are unmarried as widow , single and divorced were considered unmarried in this study. A large household size discourages the use of hired labour as more family members would be engaged in farming activities. This shows that high household size is at advantage when it comes to farming business. Table 1 shows that the modal class of 6- 10 has the highest household size and the lowest 51.2% fall within the class of 1-5. The table also reveals that greater percentage (54.5%) of the respondents had no formal education and that about 40.5% are with Quranic education.The analysis on the animal types reared by the pastoralist vegetable farmers is as presented in Table 2. From Table 2, it is shown that the pastoralist vegetable farmers rear cattle, sheep, goat and poultry. This study is in line with the work of Magembe *et al*., (2013) which discovered that there is dominance of poultry and goats in agro – pastoral household. However, the study also shows that most of the pastoralists (that is 81.8%) rear cattle while about 22.3% of the pastoralists are into poultry farming. The farm budget analysis was used to assess the costs and returns to vegetable production in the study area. The returns to farmer's labour and management is expressed in Naira per hectare (N/ha). Costs comprise both fixed and variable cost.

Table 3 shows that the average total variable cost was N129,766.23, constituting about 97.2% of the total cost of production while the fixed cost was N3,797.52 just 2.8% of the total N133,563.75 incurred on production. Labour cost accounts for over 80% of the total cost of production. This shows that labour cost is very high and the most important factor of production since it coordinates all other factors of production. It was revealed by farmers during the course of this research that high cost labor is one of the main factors that scare people away from farming. The farmers added that most farmers especially the young educated youths abandoned farming because they could not make enough profit due to high cost of labor. This is in line with the work of Omotesho *et al*., (1994), which also found that labor constituted the single most important cost item in the production of crops . The table also shows that the average total revenue of the pastoralist vegetable farmers is N156, 943.90 given total net revenue of N23, 379.47. The gross margin to enterprise was also N27, 176.99 indicating that the enterprise was able to recover all variable costs during the production period. The result of the analysis therefore, considering both the average and total values shows that vegetable production among pastoralists is profitable in the study area since both fixed and variable costs were both covered during the course of production. One of the objectives of this study is to provide the estimate of technical efficiency level for vegetable production among pastoralists in the study area. Table 4 shows the distribution of efficiency estimates of selected leafy vegetable producers among pastoralists in the study area. The result indicates a slight difference in efficiency levels among production units. It is therefore of less importance to question why some producers can achieve relatively higher efficiency. Also, the study shows that technical efficiency ranges between 60.21% - 99.00%.The lowest level of efficiency is 60.21% which is far below the efficient frontier by 39.79%. Such production units are technically efficient. The highest level of efficiency is 99.0% which is only 1% away from the frontier. Such production units can be classified as being technically efficient since in reality production units hardly operate at 100% level of efficiency. The mean technical efficiency of the pooled sample is 86.9%. The 86.9% mean technical efficiency implies that on the average, 13.1% more output would have been produced with the same level of inputs if producers were to produce on the most efficient frontier following best practices. A greater proportion of the production units (44.62%) are concentrated in the efficiency class of 80 – 89.99%.

Table. 2 Animal Types Reared

Animal	Frequency	Percent	Total
Cattle	27	22.3	121
Sheep	61	50.4	121
Goat	84	69.4	121
Poultry	99	81.8	121

Table 3. Analysis of Cost and Return to Leafy Vegetables under Study

Item	Amount (N)
Average Variable Costs	
Cost of Labour	111,619.00
Cost of Seeds	9,899.68
Cost of Water	8248.23
Total	129,766.23
Average Fixed Cost	
Cost of Land	3,797.52
Total Cost	133,563.75
Average Farm income	156,943.90
Gross Margin	27,176.99
Net Farm Income	
Gross Margin Less Fixed Cost	23,379.47

Table 4. Frequency Distribution Of Technical Efficiency Estimate

Technical Efficiency (%)	No. In Sample	Percentage	Cumulative
60.00 – 69.99	1	0.0083	0.0083
70.00 – 79.99	23	19.00	19.0083
80.00 – 89.99	54	44.62	63.63
90.00 – 99.99	43	35.54	100
Total	121	100	

Mean Efficiency 86.9%, Minimum Efficiency 60.21%, Maximum Efficiency 99.0%

Table 5. Stochastics Frontier Production Function of Pastoralists Leafy Vegetable Farmers under Study

	Coefficient	Standard Error	t-Value
β_0 (constant)	-216.6	89.09	-2.12
β_1 (labor)	7.00*	0.68	10.33
β_2 (Land)	0.008**	0.004	1.89
β_3 (Manure)	417.6*	1.96	213.3
β_4 (Water)	238.3*	34.8	6.85
β_5(seed)	5.84*	1.37	4.28
δ^2	94353.9*	1.05	90018.5
γ	0.553*	0.11	5.09

Log likelihood Fn = -839.2, LR test of the one-sided error = 2.39,
* Significant at 1% level, ** Significant at 5% level

From the Stochastic frontier production function output presented in Table 5, the estimate of the variance ratio (γ) is significant. The value is 0.553. This implies that about 55.3% of the variation in vegetable output is attributable to technical efficiency differences among production units. The value of γ suggests that there are differences in technical efficiency among the production units considered in this study. By implication about 44.7% of the variation in output among producers is due to random factors such as unfavorable weather, effect of pest and diseases, errors in data collection and aggregation and the like. The γ parameter is very important because it shows the relative magnitude of the inefficiency variance associated with the frontier model which assumes that there is no room for inefficiency in the model.

4. Conclusion and Recommendations

In analyzing the economics of leafy vegetable production among pastoralists, the study identified socio-economic characteristics of the

farmers, the cost and return to the farmers, animal types reared, and technical efficiency level of the farmers under study. The study concluded that vegetable production among the pastoralist leafy vegetable farmers studied is profitable and that the farmers are technically efficient in the use of production resources.

Also, even though technical efficiency on manure usage was not that high, it added to the success recorded by the farmers on farm budget analysis. Therefore, vegetable cum animal production should be encouraged as this type of enterprise is complementary. Thus, there is need to improve provision of extension services and increase farmer trainings so that farmers can be sensitized on enterprise combinations which will maximize their objectives given the available resource constraints at the same time conserving the environment.

Furthermore, incentives and inputs should be provided to the pastoralists to ensure expansion of production and supply of vegetables to markets for consumers. Pastoralist vegetable farmers should be constituted into co-operative groups which will enable them to have accesses to loans and subsidized inputs for vegetable production.

References

1. Ahmed, I. (2000). Remittances and their *Economic Impact in Post-War Somaill and Disaster*. 24, 380-389. Progress Report October 2004 to September 2005.

2. Ayanda, I. F. (2013). Assessment of climate change on the livelihood of pastoralists in Kwara state, Nigeria. *Journal of development and agricultural economics*, 5(10): 403-410.

3. Badmus, M. A and Yekinni, O. T. (2011). Economic Analysis of Exotic Vegetable Production among Urban Fadama Women Farmers in Akinyele Local Government Area Oyo State, Nigeria". *International Journal of Agricultural Economics and Rural development*. 4(1):19-24.

4. Binsbergen, J. V and Watson, D. J. (2008). *Livelihood diversification opportunities for Pastoralists in Turkana*. ILRI Research report 5. Nairobi, Kenya.

5. Bruggomen H. L. J. (1994). Pastoral Women and Livestock Management: Examples from Northern Uganda and Central Chad. *International Institute for Environment and Development Paper* No. 50

6. Coast, E., Homewood, K., Kiruswa, S., Serneels, S., Trench, P. and Thompson, M. (2006). Maasai pastoralists; Diversification and poverty. London. LSE Research online. (Online Access on 23/2/2010).

7. Desta, S., Coppock, D. L. (2004). Pastoralism under Pressure Tracking System Change in Southern Ethiopia. *Human Ecology*, 32 (4): 465-486.

8. Ega, L. A and Erhabor, P. O. (1998). Farmer – pastoralist conflict in National Fadama Development Project in core states, *Proceedings of the workshop a farmer pastoralist conflict and the sustainability of Fadama users\association*. Held in Hilton hotel Abuja 25 – 26 April, 1998.

9. FAO (2005). The Special Programme for Food Security Agender 21, *United Nations Conference on Environment and development*. FAO plant production and protection paper

10. Fratkin, E. and Mearns, R. (2003). Sustainability and Pastoral Livelihoods: Lessons for East African Maasai and Mongolia. *Human Organ*. 62(2): 2003.

11. Galvin, K. A. (2009). Transitions: Pastoralists living with change. *Annual Review of Anthropology.* 38: 185-198.

12. Kalirajan, K. (1981). The economic efficiency of farmers growing high yielding, irrigated rice in India. *American Agricultural economics Journal,* 63 (3): 566-69.

13. Kalirajan, K and Shand, R. T. (1999). Frontier Production Functions and Technical efficiency measures. *Journal of Economic Surveys*, 13(2):149 – 172.

14. Kwara State Government. (2007). *Kwara State Diary*, 2007. :12-22

15. Magembe E. M., Bebe B. O., Laka J. K., (2013). Evaluation of Livestock – crop enterprise diversity associated with shift from pastoral to agro – pastoral systems in transmara west district of Narok county Kenya. Greener journal of Agricultural sciences. 4(3): 101-109.

16. Muhammad-Lawal, A., Omotesho, O. A. and Falola, A. (2009). Technical Efficiency of Youth Participation in Agriculture: A Case Study of the Youth - in - Agriculture Programme in Ondo State, South Western Nigeria. *Nigerian Journal of Agriculture, Food and Environment 5(1):20-26* .

17. Mwangi, E. (2005). The Transformation of Property Rights in Kenya's Maasai land: Triggers and Motivations. IFPRI.Washington D.C, U.S.A.

18. Nurah, G. K (1999). A base line study of Vegetable production in Ghana. Final Socioeconomic study report, National Agricultural project (NARP).

19. Omotesho, O. A. Okuneye, P. A. and Ladele, A.A. (1995). Economics of Dryland Agricultural production on the Bakolori Irrigation project, Talata Mafara, Sokoto State, Nigeria. Modeling measurement and control. D. AMSE press.

20. Oyesola O. B. (1998). An Analysis of Socio-Economic Activities of Women agro-pastoralists in

21. Ogun State, Nigeria: A Ph.D, Pre Data Collection Seminar Paper Presented to the Department of Agricultural Extension, University of Ibadan, Nigeria pp. 1-33.

22. Sabo, E and Zira, Y. D. (2009). Awareness and effectiveness of vegetable technology information packages by vegetable farmers in Adamawa State, Nigeria. *African Journal of Agricultural Research*. 4 (2): 65-70.

23. Williams, T. O., Spycher, B., Okike, I. (2006). Improving Livestock Marketing and Intra-Regional Trade in West Africa: Determining Appropriate Economic Incentives and Policy Framework. *ILRI (International Livestock Research Institute)*, Nairobi, Kenya. 122 pp.

24. Wurzinger, M., Ndumu, D., Okeyo, A. M., Solkner, J. (2008). Lifestyle and Herding Practices of Bahima Pastoralists in Uganda. *African Journal of Agriculture Research*. 3 (8):542-548.