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Food Security Among Households: Evidence from Yam Production Economics in Oyo State, Nigeria

W.A. Sanusi and K.K. Salimonu
Department of Agricultural Economics and Extension,
Ladoke Akintola University of Technology, Ogbomoso, Nigeria

Abstract: The study assesses the economics of yam production has a food security crop in Oyo state. The data for the study were collected using interview schedule from 82 yam farmers with the aid of a well structured questionnaire. The data were analyzed using descriptive statistics, gross margin and net profit and regression techniques. The study revealed that most farmers are male, virile but with little formal education, they also operate at small scale level. The budgetary analysis revealed that yam production is profitable in the area with an average gross margin and net profit of N24, 688.79 and N22, 790.79, respectively, the value of hired labour, family labour, yam seeds/sets and income from other enterprises significantly affect the value of yam produced. Yam farmers underutilized both land and other miscellaneous input (mulching, staking etc) while labour and yam seed/set were over utilized.

Key word: Economics, yam production, food security, crop

INTRODUCTION

Yam is an important food crop especially in the yam zone of West Africa, comprising Cameroon, Nigeria, Benin, Togo, Ghana and Cotet'vore. This zone produces more than 90% of the total world production, which is estimated at 20-25million tons per year. Nigeria alone produces above 70% of the world total. There are also growing interests in yam production in other African countries Hahn,[1]. Available data also shows that, yam is one of Nigeria leading root crops, both in terms of land under cultivation, the volume and value off production. FAO[2] give the volume of yam production in 1997/98 planting season as 24,713 tones and this represented about 41% of the total root crops and 27% of the total food crops. Another perspective of viewing the importance of yam in economy is by comparing it nutritional value with other root crops, Oyenuga[3] shows that yam contains a higher value in protein (2.4%), substantial amount of vitamins (Thiamin, Riboflavin and Ascorbic acid) and some minerals like calcium, phosphorus and iron than any other common tuber crops. Infact, some species of yam are only marginally inferior to maize and rice in protein value, of particular interest is that of *Dioscorea dumetorum* reported to be richer in essential amino acid than commonly growth species Hahn,[1]. Yam is also comparable to any starchy root crop in energy (calories) value and the fleshy tuber is one of the main sources of carbohydrate in the diet of many Nigeria. The crop remains the most preferred by million of people in African as a source of carbohydrate, it is either boiled and eaten or processed into yam flour or pounded yam. These food products were preferred to fufu, Gari and cassava flour (lafun) made from cassava. Apart from this, yam also plays vital roles in traditional culture, ritual and religion as well as local commerce of African people. Coursey[4] reported that yam is part of the religion heritage of several Nigeria tribe and up to date often plays a key role in religion ceremony, the new yam festival marking the on set of the harvest period is still an outstanding social event in almost every where in the yam growing belt of west-African. Yam also has the potential of becoming an export crop primarily from West African and Caribbean countries to area in Europe and North America where there are sizeable population of yam eaters. Nigeria like other under developed countries is still facing a persistent food shortage problem, despite her vast land area of about 923,768 km^2; she can not produce enough food and fiber (in adequate quality and quantity) to feed her estimated 127 million people described by FOS[5]. The food problem is indicated by high food import bill, consistent rise in domestic food price, high annual growth rates of food demand when compared with supply and nutritional problem among other. In view of the significance of yam

Corresponding Author: W.A. Sanusi, Department of Agricultural Economics and Extension, Ladoke Akintola University of Technology, Ogbomoso, Nigeria

among the food crop in Nigeria as analyzed before and noted food security problem experience in Nigeria, it is therefore important to take a critical look at economics of yam production as a food security crop in Oyo state.

The specific objectives are to:

- Identify the socio-economic characteristics of yam farmers in the area.
- Carry out a cost and return analysis of yam producing farmers in order to determine the profitability of the enterprise.
- Determine the optimum level of resources use in yam production
- Identify constraints that affect yam farming and suggest possible solutions to them.

CONCEPT OF FOOD SECURITY

Reut linger and Pellekan[6] defined food security as the ability to meet target consumption level in the face of fluctuation production, prices and incomes together with ensuring absolute availability at any price. The objective of food security as stated by Hussain[7] is for all people at all times to have both physical and economic access to food. According to Sengooba[8] food security has three component, adequate food supply, stability in availability and access to food by those who need it. Food insecurity can therefore result from destabilizing any of these three components. There are two types of food insecurity; chronic and transitory. Food security is a chronic problem whereby the people are always under fed, but in many studies, however, transitory food security problem are experienced due to a temporary decline in household access to enough food, due to physical, biological or political causes. According to Didiza[9] the extent and depth of food insecurity. In developing world at the turn of a new century and millennium remain unconscionable, about 800 million people or one sixth of the developing world's population do not have access to sufficient food for healthy and productive live; about 180 million of these people are in sub-Sahara Africa. The recent projections from the food and agricultural organization FAO[10] world food summit goal of having the number of food insecure people from 800 million in 1995 to 400 million by 2015 will not be achieved until 2030 due to lack of commitment on the part of third work countries.

METERIALS AND METHODS

The study was conducted in Oyo-State. The state covers a total of 27,249 square kilometer of land mass. The state has 32 Local Government Area. Agriculture is the main traditional occupation of the people. The tropical nature of the climate favours the growth of variety of food and cash crops. Annual rainfall ranges from 50.4 cm (46 inches) in the North and about 61.3cm (56 inches) in the South. Two distinct seasons, namely the rainy season and dry season prevails.

The target population of this study was yam farmers in the study area. A multistage random sampling technique was employed in selecting the sample needed for the study. The first stage involves a purposive selection of five Local Government Areas in the state. These are Iseyin, Itesiwaju, Atisho, Saki east and saki west local government areas. The Local Government Areas selected have been identified among others in the state as the major producers of tubers crops. The second stage involves selection of two villages in each of the selected local government area on a random basis. The last stage is the selection of ten yam farmers each within the selected villages. This gave a sample size of one-hundred yam farmers. However 82 questionnaires were used while others were rejected due to irregularities and/or inconsistencies. Cross sectional data were collected from sample yam farmers with the aid of interview schedule. The interview schedule was found to be the most appropriate since most of the farmers were illiterates.

The data generated was subjected to different statistical analysis. These include

- Descriptive statistics such as frequency counts and percentages, to analyze socio-economic characteristics of the respondent.
- Cost and return analysis was used to determine the profitability of yam enterprise in the study area.

The cost and return analysis was done as specified below:

GM = TR – TVC

Net profit = GM – TFC

Where,

GM = Gross Margin

TR = Total Revenue

TVC = Total Variable Cost

TFC = Total Fixed Cost

- Regression analysis: This was employed to determine the resource use efficiency of yam farmers in the area.

In this study, the total value (N) of yam was expressed as a function of the following explanatory variables on which multiple regression was carried out.

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6 \; e)$

Where

Y = value of yam (N)
X_1 = land annual rent (N)
X_2 = hired labour input (N)
X_3 = family labour input in (N) equivalent.
X_4 = value of planted yam set/seed (N)
X_5 = other expenses (N)
X_6 = income from other enterprise (N)
e = Error term,

Different forms of production function such as double long, exponential, semi log and linear function were evaluated and the lead equation was chosen based on some underline criteria.

- Appropriateness of sign of regression coefficient and the direction of influence of the equation as postulated by the economic theory.
- Goodness of fit using the magnitude coefficient of multiple determination.
- The significance of each of the regression coefficient of the explanatory variable, as judge by their t-ratio value
- The over all significance of the model as revealed by the F-value.

In order to examine the efficiency level of input usage, the relationship as indicated by Olayide and Heady[1] and Yusuf *et al.*[12] was used.

MVP = r

Where, MVP is the marginal value product i.e. additional revenue generated as a result of a unit increases in input usage while "r" represents the price per unit of input.

Here, since analysis was done using naira value, then the relevant identify is dy/dx = 1

Where dy/dx is now the MVP and N1 represents the value of input following from this,

MVP = 1 Implies efficient use of resources
MVP > 1 = implies under utilization of resources
MVP < 1 = implies over utilization of resources.

RESULTS AND DISCUSSION

Table 1 shows the summary of socio-economic characteristics of yam farmers in the study area. The result reveals that majority of the farmers fall between 21-40 years age groups constituting 46.3% of the total respondents. This shows that the bulk of the farmers fall into active and virile age group which is very important since yam production is labour intensive. Table 1 also shows that 96% of yam farmers were male while 4% were female, this may also be due to labour intensivity of yam production hence female farmers may prefer to grow crop like vegetable, maize, millet. The table also reveal that the bulk of the farmer (42%) have no formal education, most of them (67%) are also full time farmers and have above 10 years farming experience. Further, socio-economic analysis indicated a modal family size of between 8-10 and an average farm size of 1.74 ha. The above result is in consonance with the features of a typical peasant farmer in sub-Sahara Africa. Olayide and Heady,[11].

Table 1: Socio-economic characteristics of yam farmers

Age (Year)	Frequency	Percentage
1-20	1	1
21-30	35	43
41-60	37	47
Above 60	7	9
Total	82	100
SEX		
Male	79	96
Female	03	04
Total	82	100
Level of Education		
No formal education	34	43
Primary	18	23
Secondary	6	07
Post secondary	23	28
Total	82	100
Occupation		
Full time	55	67
Part time	27	33
Total	82	100
Farming experience (Years)		
1-5	19	23
6-10	22	27
Above 10	41	50
Total	82	100
Number of dependants		
0-4	08	10
5-8	32	39
Above 8	42	51
Total	82	100

Source:- Field Survey, 2004

Table 2: Cost and returns analysis per hectare

Item	Amount (N)	
Gross return		N44, 147.64
Hired labour	N5, 097.17	
Family labour	N9, 600.00	
Yam set planted	N3, 335.31	
Other expenses	N1, 426.34	
Total variable cost	N19, 458.85	
Gross margin		N24, 688.79
Fixed cost/Annum		
Land (annual/rent)	N1, 528.00	
Hoe	N120.00	
Cutlass[2]	N150.00	
Basket	N100.00	
Total fixed cost/annual	N1, 898.00	
Total cost	N21, 452.22	
Net profit		N22, 790.79
Benefit cost ratio		N1.94

1Family labour converted from man day to naira value (i.e. man-day x wage rate) 96 x N100 = N9600.00 [2]Depreciated value using straight line method with 5 years lifespan and zero salvage value

Profitability analysis: The estimate of cost and return analysis is presented in Table 2, the result shows that the variable costs incurred include cost of labour, planting materials such as yam set (seeds) and other miscellaneous expenses such as staking and mulching materials. The analysis in Table 2 shows that intensive labour input and high cost of planting material accounted for 75.6 % and 17.1% of the total variable cost of production while other expenses accounted for 7.3% of the variable cost. This result shows that the two most important inputs in yam production are labour and planting material and this agrees with the findings of Acquah and Evarge[13]. The total variable cost per hectare for an average yam farmer was N19, 554.22, while the fixed cost incurred per annum was N 1,898.00. Total revenue per hectare accrued from yam production by an average farmer in the study area was N44, 147.64 to arrive at a gross margin of N24, 688.79 and net profit of N22, 790.79. The result shows that yam production enterprise is profitable in the study area. Since both gross margin and net profit are positive. The study supported the findings of Bamire and Awujoyegbe[14] and Acquah and Evarge[13] that the yam enterprise is profitable. Also a benefit cost ratio of 1.94 obtained shows that for every naira invested in yam production, N1.94 naira is return as profit.

MULTIPLE REGRESSION AND RESOURCE USE EFFICIENCY ANALYSIS

The multiple regression analysis was used in order to assess the relationship between selected factors inputs and income from yam production enterprise. Base on the result obtained from regression analysis as presented in Table 3, double log (Cobb-Douglas) function was chosen as the lead equation. The result shows that coefficient of multiple determination R^2 is 0.752, indicating that 75.2% of total variation in income from yam production is explained by the explanatory variables included in the model. The F-ratio of 37.33 is also significant at 1% probability levels, confirming the overall significant of the model.

Table 3 also shows that all regression coefficient are positively signed inconformity with a priori expectation, this indicated that increase in the level of any of the variables would result in an increase in income from yam enterprise (Y). The table also shows that hired labour (X_2) family labour (X_3) yam seed (X_4) and income from other enterprises (X_6) were positive and significant at 5% probably level. This shows that a 1% increase in any of X_2, X_3, X_4 and X_6 holding other explanatory variable constant will increase yam income by 0.08, 0.11, 0.04 and 0.46%, respectively. All the elasticities (bi) are significantly greater than zero. In cob-Douglas function the return to scale is defined as the summation of regression coefficient (elasticities) of the explanatory variables. From the result obtained in this study, the sum of elasticity is 0.92 which indicates decreasing return to scale. That is at the given level of production each additional unit of input adds less to total output than the previous unit. This suggests that the yam producers are in the second (rational) stage of production function. In order to assess the efficiency of input usage, the marginal product obtained for the various inputs are indicated in Table 4. As shown in the methodology, it is evidence that since MVP values for land (X_1) and other expenses (X_2) are greater than 1, there is under utilization of these resources. On the other hand, the MVP value for hired labour (X_2) family labour (X_3) and yam seed/set (X_4) are less than 1, indicating over utilization of those resources. It can therefore be deduce that yam farmer in the area should increase the usage of land and other expenses, while reducing the usage of labour and yam seed/set to achieve an optimal productivity.

Table 3: Estimated production functions for yam farmers

Variable	Double log	Semilog	Exponential	Linear
Intercept	0.823**	0.889	1.246	-85.89
	(2.512)	(1.39)	(1.160)	(3.60)
Farm size	0.042	5.75	0.0041*	-45.82
	(2.59)	(2.93)	(1.15)	(2.39)
Hired labour	0.081**	11.42	-7.39	1.41*
	(2.42)	(49.202)	(3.51)	(2.79)
Family labour	0.110**	-20.75	1.05	2.99
	(1.612)	(5.81)	(2.29)	(0.23)
Yam seed	0.035*	7.53	-8.90	2.70*
	(1.933)	(10.02)	(1.43)	(4.86)
Other expenses	0.189	-66.427	0.003	1.78
	(1.116)	(12.32)	(0.003)	(2.91)
Income from other enterprise	0.463**	3.66	1.16	5.03
	(2.302)	(10.67)	(7.91)	(5.32)
R^2	0.752	0.643	0.77	0.753
R^2	0.733	0.634	0.75	0.733
F-ratio	37.32***	20.55	33.86***	38.09***

Computed from field survey 2004 Value in parenthesis is t –values. * Statistically significant at 10% ** Statistically significant at 5% *** Statistically significant at 1%

Table 4: Resource use efficiency analysis

Input	Arithmetic	Elasticity	MVP	Mean
X_1	N1,528	0.042	1.213	>1 (under utilization)
X_2	N5,097.17	0.081	0.702	<1 (over utilization)
X_3	N9600.00	0.110	0.506	<1 (over utilization)
X_4	N3,335.3	0.035	0.463	< 1(over utilization)
X_5	N1,426.34	0.189	5.850	>1 (under utilization)
Y	N44,147.64			

CONSTRAINTS TO YAM PRODUCTION

Table 5 presented the result of problems facing yam farmer in the study area as identify by the respondents. The table revealed that the most critical problems facing

Table 5: Constraints in yam production

Problems encountered	Number of farmers	Percentage
Land availability	56	68.2
Labour scarcity	67	81.7
Inadequate capital	71	86.6
Fertilizer	56	68.3
Tractor hired	51	62.2
Extension visit	54	65.9
Pest attach	44	53.7
Storage	65	79.5
Marketing	52	53.4
Weather (climate)	46	56.1
Institutional problem	20	24.2

Source: Field survey, 2004. * Multiple responses

the farmers includes, inadequate capital to invest in yam production (71%), scarcity or labour (67%) and storage problem (65%), other moderately important problem as identified by the farmers are land availability, marketing problem and climatic problem among others. These constraints need to be relaxed in order to achieve an appreciable increase in yam production and hence solve food security problem.

CONCLUSION

- On the basis of the findings presented above, it could be concluded that yam production is highly profitable in the study area with an average gross margin of N24,688.79 per hectare, net profit of N22,790.79 per hectare and a benefit cost ratio of 1.94
- The regression result reveal that some salient explanatory variables like value of labour, value of yam set and other expenses significantly determine the value of yam production.
- The return to scale value of 0.92 indicates that the yam farmers are operating at stage II (Rational) of production function frontier.
- Assessment of level of input usage by yam farmers revealed that land and other expenses are being underutilized while labour and yam set inputs are been over utilized.

It is therefore recommended that enabling policy environment be provided where farmers are further encouraged to allocate their resources into yam production since the enterprise is profitable. Policy interventions towards solving some of the revealed constraints in the study would also improve the performances of these farmers. Consequently, the food security among the farming and non-farming households would be improved.

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