DETERMINANTS OF PROFITABILITY AMONG GRASSCUTTER FARMERS IN OSUN STATE, NIGERIA

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Abstract
This study analysed the determinants of profitability among grasscutter farmers in selected Local Government Areas of Osun State. Data were collected from the respondents with the aid of a questionnaire. Multi-stage sampling technique was used in selecting 120 respondents. However, 112 questionnaires were retrieved and analysed. The analytical tools employed were descriptive statistics, gross margin and multiple regression analyses. The study revealed that grasscutter farming in the area was dominated by males (70.5%) whom were married with average age of 48years. The regression analysis shows that determinants of profitability in grasscutter farming include: education and labour cost, which were positive and significant at 10%. Housing (5%), feeding (5%) and transportation cost (10%) were negative and also significant. The major challenges to grasscutter farming in the study area include; unstable market price, high cost of housing and finance. The study therefore calls for policies aimed at provision of free and affordable education to enable grasscutter farmer's access and process information on innovations that will enhance profit. There is also need to subsidize the cost of feed and housing to mitigate the high cost of inputs in the enterprise. There is also need for provision of access roads to reduce the transactions cost of grasscutter marketing in the area.

Keywords: Education, housing cost, labour cost, cost of feeding transport cost, grascutter, income

Introduction

Thryonomys swinderianus, commonly called grasscutter is widely distributed in West Africa. Grasscutter (*Thryonomys swinderianus*) belongs to the rodent family, it has a spiny fur on the back and round nose that make it look different from regular rats. They are closely related to the porcupine, almost look alike but are bigger than porcupine. It reaches a length of about 720mm when fully mature and has a gestation period of ±150 days. Grasscutter feed extensively on elephant grass and harvested maize stalk and can also be fed with concentrate mixed with multivitamins. *Thryonomys* species are intensively hunted as an important source of protein throughout their range, and they are typically hunted with dogs, spears, and fall traps or by burning vegetation. It is estimated that in West Africa, 80 million are harvested annually, equaling 300,000 metric tons of meat (Hoffman, 2008). In a bid to increase meat availability, *Thryonomys* species have been domesticated and currently efforts are being made to expand the industry. The protein content of grasscutter is higher than that of chicken, rabbit and guinea pig, while it has lower fat compared with pork, beef and lamb (AU-IBAR, 2016). Grasscutter production could serve to generate income, lead to reduction in hunting, and also serve as a source of employment in both urban and rural areas (Unaeze, 2016). Furthermore, consumption of grasscutter meat has also appreciated for its tenderness and taste (Abdulazeez, 2011).Grasscutter plays an important role in traditional African medicine such as preparation of concoctions for fertility (Aluko *et al.,* 2015). The hair of the animal is used to season food just as much as its stomach and intestinal contents, and the pancreas of the cane rat contains a high concentration of insulin which is used for local preparation for the treatment of diabetes (Bello *et al*., 2012; Aluko *et al*., 2015).

Several studies have suggested that grasscutter farming possess environmental- related advantages such as reduction in bushfires and poaching (Jori *et al.*, 1995; Adedapo and Adekunle, 2013). The commercial production of grasscutter can aid in conserving the species and other bush meat species that are overhunted, while simultaneously protecting savannah habitats that are threatened by bushfires organized during bush meat hunting operations (Jori *et al*., 1995). This protection of local vegetation can occur because the captive

propagation of grasscutters would provide a readily reliable food protein source and in effect, reduce the need to draw endangered species such as grasscutters out of the bush through intuitional fires which is often becoming uncontrollable. Grasscutter farming would also lessen catch of other target species through the poisoning of water sources and capture via snares which do not discriminate between species (Asibay, 1974; Jori *et al*., 1995).

However, lack of disease-free parent stock, improved technologies, inadequate market outlay, lack of resource inputs and inadequate information among others has reduced the motivation for grasscutter production (Obi *et al*., 2008). The dearth of information on the biology of the animal has resulted into poor production performance under captivity compared to the rabbit (Adu *et al*., 2017). Among the major constraints are poor growth rates and low reproductive efficiency (Adu and Wallace, 2003). The profound dependence on farm produce alone exposes the farmers to a lot of risks, especially, crop failure and fluctuating market prices (Boamah, 2002). The latter is a common phenomenon because the need for money often compels the farmers to sell a greater percentage of their farm produce immediately after harvest at which time their prices are still very low (Boakye *et al*., 2008). As a result of this, most of the farming households are poor as they do not have access to additional source of income. Therefore, grasscutter farming can serve as an alternative source of income and animal protein for the farming households. There have been several studies on economic analysis of grasscutter production (Olatidole *et al*., 2019), economic aspects of grasscutter farming (Aiyeloja and Ogunjinmi, 2013) and challenges and prospects of grasscutter farming (Ijeomah *et al*., 2016). Despite the fewer studies that have been conducted on grasscutter production, farming and challenges, little or no study has been done on factors that influence profitability of grasscutter farming in Nigeria, particularly in the Southwestern region. Hence, this study will provide necessary insight on the existing gap. This will enable both practicing grasscutter farmers and prospective farmers to increase the productivity and profitability of their businesses. This study will, therefore, examine the production activities in grasscutter farming, identify factors affecting income generated in grasscutter production in the study area.

Methodology
Study Area
Osun State is located in the Southwestern part of Nigeria. It covers an area of approximately 14,875 square kilometers and a population 4,137,627 according to 2006 population census. It lies between longitude 04 00E and 05° 5 and latitude $05^\circ 558N$ and 08° 07W. It is bounded by Ogun, Kwara, Oyo, Ondo, and Ekiti States in the South, North, West and East respectively. The State lies within the tropical rain forest, divided into three Senatorial Districts; Osun I (West), Osun II (Central) and Osun III (East). Each of these districts is further divided into two Zones, making a total of six zones. Osun I is made up of Ede and Iwo zones, while Osun II comprise of Osogbo and Ikirun. Osun III consists of Ilesha and Ife. The State is made up of thirty (30) Local Government Areas and Ife-East Area Office. The major occupation of the people is farming. Arable farming in the State engage considerably migrant labour. The land tenure system, originally communal in nature, has long given way to individual tenure. This has considerably constrained access to land for agricultural and industrial purposes.

Sampling procedure and sample size
Multi-stage sampling technique was used for the study. In the first stage, two out of 3 senatorial districts were randomly selected which were Osun East and Osun West senatorial districts. The second stage involved the purposive selection of five (5) communities each from the two senatorial districts to make a total of ten (10) communities which are Ayadaade, Ejigbo, Iwo, Ayedire, Irewole, Atakunmosa, Ife-East, Ife-Central, Ilesha-West and Ibokun. This selection was based on the predominance of grasscutter farmers in those areas. The third stage employed the use of snowball sampling technique to select twelve (12) registered grasscutter farmers from each community to make a total of hundred and twenty (120) respondents which represents 70.8% of the population of grasscutter farmers in selected communities.

Analytical techniques
A combination of analytical tools such as descriptive statistics, gross margin analysis and linear regression model were used to present and analyse data obtained for this study.

Multiple Regression model
The regression model was used to examine the relationship between income generated from grasscutter farming, farm expenditures and some socioeconomic variables. The implicit form of the multiple regression model is specified thus;

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}) + e$$

Where;
Y = Income (TR – TVC)
X_1 = Age of farmer (Years)
X_2 = Educational level of farmers. (Number of years spent in school)
X_3 = Sex of farmer (dummy variable; 1=male, 0=female)
X_4 = Family Size (number of persons)
X_5 = Housing cost (depreciated in ₦)
X_6 = Labour cost (₦)
X_7 = Cost of feeding (₦)
X_8 = Cost of drugs (₦)
X_9 = Cost of feeding and drinking equipments (depreciated in ₦)
X_{10} = Transportation cost (₦)
X_{11} = Years of experience in grasscutter farming
e = Error term.

Results and Discussion

Socio-economic Characteristics of Grasscutter Farmers

Table 1 shows the socioeconomic characteristics of grasscutter farmers in the study area. Results show that majority (70%)of the respondents were male, while 29.5% were female. This implies that grasscutter farming is a male dominated business. This corroborates the findings of Aiyeloja and Ogunjinmi (2013) that females engage mostly in marketing; while male do most of the production activities. Many (44%) respondents were within the age range of 41 to 50 years, followed by 22.3% (51 to 60 years). This implies that most of the respondents in the study area were in their economic active age with sufficient energy to execute the task of grasscutter farming. Majority (59%) were married, while others were single (9%), widowed (5.4%), divorced (15.1%) and separated (13.4%). It can be inferred that married people constitute the largest population and this may likely improve their productivity in grasscutter farming. This aligns with the findings of (Unaeze, 2016), where 58% of the respondents were reported to be married. The study revealed that about 41% were full-time farmers, 27% civil servants and 33% artisans. It can be inferred that farmers were more involved in grasscutter production in the study area. In other words, most of the grasscutter farmers engaged in grasscutter production as their major occupation. Majority of the respondents (78%) had one form of education or the other i.e. primary, secondary and tertiary education, while 22% had no formal education. This is an indication that there is a considerable literacy level in the study area. The household size of the respondents showed that many of the respondents (48%) had between 6 and 10 household members and 36% had ≤5household members. This may suggest that the respondents possibly employed the use of their large household size in production activities.

Table 1: Socioeconomic Characteristics of Grasscutter Farmers

Personal characteristics	Frequency	Percentage
Sex		
Male	79	70.5
Female	33	29.5
Age		
≤40	25	22.3
41- 50	49	43.7
51 – 60	16	14.3
61-70	12	10.7
>71	10	9.0
Marital Status		
Single	8	7.1
Married	66	59.0
Widowed	6	5.4
Divorced	17	15.1
Separated	15	13.4
Primary occupation		
Farming	45	40.2
Civil service	30	26.8
Artisanship	37	33.0
Level of Education		
Non-formal education	25	22.3
Primary	27	24.1
Junior Secondary	32	28.6
Senior Secondary	18	16.1
Tertiary	10	8.9
Household size		
≤5	40	35.7
6-10	54	48.2
>10	18	16.1

Source: Field Survey, 2019

Activities performed by grasscutter farmers

Table 2 shows the activities performed in grasscutter production by the respondents in the study area. Majority of the respondents (67%) financed their production activities through personal savings. It can be inferred that most of the respondent's source of capital is through personal savings. This corroborates the findings of Aiyeloja and Ogunjinmi (2013), where 77% of the respondents started grasscutter farming with personal savings. Number of startup stock distribution shows that

most of the grasscutter farmers (55.4%) indicated they started with ⩽5 grasscutters, followed by about 28% that started with 6 to 10. This implies that majority of the grasscutter farmers started with at least two parent stocks (1 male, 4 females). The respondents' grasscutter cage capacity distribution revealed that majority of the respondents (64.3%) had cages that can contain <10 grasscutters at a time, followed by the respondents (25%) who indicated that their cages can occupy between 11 and 15 grasscutters. This suggests that the respondents in the study area had different size of cages with reference to scale of production, available resources, and space. Many respondents (35.1%) had <5years of experience followed by 24.1% that had between 6 and 10 years of experience. This implies that many of the respondents had relatively few years of grasscutter production experience. This result aligns with the findings of Aiyeloja and Ogunjinmi (2013) in which 63% of the respondents had between 1 and 5 years of grasscutter production experience. Table 2 also shows that many of the respondents (55.4%) sold <5 litter per month, while 20% sold between 6 and 10 litter per month. This possibly means that respondents sold some set of litter based on their location, scale of production or the quality of the stock. Access to credit distribution shows that many respondents (58%) indicated no access to credit facilities, while 42% had access.

Furthermore, many of the respondents (52.7%) in the study area used wood and wire mesh for housing their grasscutter, while others made use of concrete (31.2%), and mud (16.1%). This implies that many of the respondents used wire mesh to cage their grasscutter probably because it is more convenient and affordable for them. A large percentage of the respondents (69.6%) made use of family labour to carry out several activities in grasscutter production, while other respondents employed hired labour. This implies that majority of the respondents employed family labour possibly because it is cheap, efficient and readily available. About 53% of the respondents fed their grasscutter with grasses and farm waste, while others used concentrate (25%) and household waste (22.3%). This implies that grasses and farm waste were used mostly for feeding garscutters, which may be because it is more convenient and cheaper to come by, and provides adequate vitamins and minerals needed for proper growth and development.

Table 2: Activities performed by grasscutter farmers

Activities performed	Frequency	Percentage
Source of finance		
Personal savings	75	67.0
Family	10	9.0
Cooperative society	15	13.3
Bank loan	12	10.7
Number of Startup stock		
< 5	62	55.4
6 – 10	31	27.7
11 – 15	11	9.8
>16	8	7.1
Mean = 10		
Cage capacity		
<10	72	64.3
11 – 15	28	25.0
Above 16	12	10.7
Years of experience		
< 5	40	35.7
6- 10	27	24.1
11-15	33	29.5
>16	12	10.7
Litter sold per month		
< 5	62	55.4
6 – 10	22	19.6
11- 15	17	15.2
>16	11	9.8
Access to credit		
Yes	47	42.0
No	65	58.0
Type of Housing		
Wood and wire mesh	59	52.7
Concrete	35	31.2
Mud	18	16.1
Type of labour used		
Family labour	78	69.6
Hired labour	34	30.4
Type of feed		
Grasses and farm waste	59	52.7
Concentrates	28	25.0
Household waste	25	22.3

Source: Field Survey, 2019

Challenges militating against Grasscutter farming enterprise in the study area
Table 3 shows the distribution of the respondents according to challenges encountered in grasscutter farming. The result showed that majority of the respondents (86.6%) indicated high cost of breeding stock as a major challenge in grasscutter farming enterprise. About 58% of the respondents indicated both high cost of housing and finance. Other challenges experienced by the respondents are low demand for grasscutter (42.8%), unstable market price (52.7%), small litter size (30.3%), and pest and diseases (8.03%). This shows that high cost of breeding stock was the major constraint militating against production among the grasscutter farmers in the study area. This result strongly supports the findings of (Unaeze, 2016), who reported that a major constraint faced by grasscutter farmers was high cost of breeding stock.

Table 3: Challenges Faced by Grasscutter Farmers

Challenges	*Frequency	Percentages
Unstable Market Price	59	52.7
High cost of feeding	65	58.0
Finance	65	58.0
Low demand for grasscutter	48	42.8
High cost of breeding stock	97	86.6
Small litter size	34	30.3
Pests and diseases	9	8.0

*Source: Field Survey, 2019. *Multiple responses*

Determinants of Income in grasscutter production among farmers in the study area
Tables 5 shows the result of the linear regression that was used to examine the relationship between revenue generated in grasscutter production and some socioeconomic characteristics including cost incurred in the production process.

Table 5: Regression Analysis showing Relationship between Income generated from Grasscutter Farming, Farm expenditure and some socioeconomic variables

Revenue	Coefficient	Standard Error	t-value
Age	255.708	710.753	0.36
Educational level	882.179*	503.166	1.75
Gender	13020.67	13634.51	0.95
Household size	-2841.156	2699.879	-1.05
Housing cost	-0.246***	0.938	-2.62
Labour cost	9.345*	5.077	1.84
Cost of feeding	-8.247**	3.934	-2.14
Cost of drugs	-0.261	6.954	-0.04
Cost of drinking and feeding	0.180	4.178	0.04
Transportation cost	-31.505*	17.841	-1.77
Year of experience	280.568	883.554	0.32
Constant	585161.7	418494.75	13.97
R^2	0.69		
F-ratio	50.45		

Source: Computer Analysis, 2019
*Note:*** = 1% significance level, ** = 5% significance level, * = 10% significance level*

The R^2 value of 0.691 implies that about 69.1% of the variation in the output is explained by the independent variable. The F-ratio value was significant at 1% and indicates that the model was good. The coefficient of education was positive and significant at 10% level, implying that higher educational level of grasscutter farmers will improve the productivity and adoption of new ideas/ technologies necessary for grasscutter farming which will lead to generation of higher income. Labour cost was positive and significant at 5%, implying that if capable hands are employed in grasscutter production activities, labour cost may increase but effort could lead to increased income in the long run. Housing cost was negative and significant at 1% level, which implies that lower housing cost will lead to an increase in the income generated in grasscutter farming. Furthermore, the coefficient of feeding cost was negative and significant at 5% level, implying that lower cost of feeding in grasscutter farming will lead to an increase in the revenue generated in grasscutter business. Transportation cost was also negative but significant at 10% level. This implies that transportation cost has indirect relationship with income generated in grasscutter farming.

Conclusion
The study shows that grasscutter farmers were in their economic active age, married and are predominantly male. The study revealed that the major factors affecting income generated include education level, cost of housing, cost of labour, cost of feeding and transportation cost. The major challenges to grasscutter farming in the study area include; unstable market price, high cost of housing and finance. The study therefore calls for policies aimed at provision of free and affordable education to enable grasscutter farmers access and process information on innovations that will enhance profit. There is also need to subsidize the cost of feed and housing to mitigate the high cost of inputs in the enterprise. There is also need for provision of access roads to reduce the transactions cost of grasscutter marketing in the area.

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