

## Determinants of Rabbit Keeping in the Tropics: Evidence from Nigeria

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### Abstract

The study examined the determinants of rabbit keeping in the tropics. The study was conducted in South-western area of Nigeria. Multi-stage sampling technique was adopted in selecting 150 rabbit keepers. The study made use of primary data obtained through structured questionnaire supplemented with oral discussion. Data covering socio-economic characteristics such as age, farm size, farming experience, et cetera, were elicited from the respondents. Data collected were analysed through the use of descriptive statistical tools such as means and percentages as well as multiple regression technique of analysis.

The results showed that 58% of the rabbit farmers were within the age bracket of 31 and 40 years. 66% used the green leaves to feed their rabbits. The majority (70%) of the farmers were males while the remaining 30% were females. 54% were married, while 46% were single. 62% of the respondents had formal education, while 38% did not attend any school. About 70% of the farmers had household size greater than five with the mean of six. None of the farmers took rabbit farming as full time. 64% of the respondents' main occupation was farming. The major determinants of the number of rabbits reared were, age of the respondents, farming experience, annual net farm income and accessibility to loan. It was recommended that more awareness on rabbit production and marketing should be created in order to increase the earnings of farmers.

**Keywords:** Consumption, Farmers, Labour, Production, Rearing, Regression,

### Introduction

The area of the world bounded roughly on the north by the Tropic of Cancer and on the south by the Tropic of Capricorn, a vast land that embraces large parts of Latin America, Africa, India, Australia, and South East Asia contain climates less favourable to agriculture and human settlement than those of the temperate zones (Encyclopaedia Britannica 2011).

The climates known as tropical exist within the equator-centered area, which are characterized by two general types: warm and wet, and warm with partly deficient rainfall. The area also has high temperatures with little variation the year round. Vegetation flourishes in the tropics along with different species of domesticated animals. In this region, the vegetative cover is undermined by fluvial erosion or mass movement.

In the wake of the deterioration of our planet's natural resources, the worsening global economy, and the spread of Avian influenza, the role of the rabbit- to provide a regular supply of high quality protein is presently recognized as a major livestock species in many parts of the world especially in the tropical region (Guauy, 2011). The domestication of the major livestock species (cattle, sheep, etc) is lost in the dawn of prehistory. But rabbit domestication dates back no further than the present millennium. Beginning in the late nineteenth century and picking up speed in the twentieth, hutch rearing led to rabbit population explosion made possible by the selection, protection and multiplication of breeds and mutants unadapted to the wild.

However, most of the countries do not include rabbit production in their national statistics. Estimate for all countries in the world suggests a possible 1 to 5 million tonnes of rabbits' carcasses (Lebas and Colin 1994). This would mean a per caput annual consumption of roughly 280g of rabbit meat. The production and consumption of rabbit meat in some of the western countries are still low. But there is large number of fancy breeders in Germany who raise a few pedigree animals as a hobby and also eat a small proportion of the rabbits produced for this purpose. Also, there is tradition of rabbit production in few Africa countries. Per caput production varies from 0.27kg to 0.78kg.

In Sub-Saharan Africa, Nigeria and Ghana are the two main producers of rabbit. In these countries most rabbitries are family-owned, with part of the output for market. For rabbit, the actual volume of international trade is quite small – about 6 to 7 percent of world output. It has been argued that rabbit meat production is generally for domestic consumption. Rabbit meat consumption is much easier to develop where people are already used to eating widely different kinds of meat, as from hunting. According to FAO (1981), survey of 64 developing countries reporting on the development potential for rabbit production in their countries, 70 percent thought it feasible and 22 percent considered that social customs would not favour it. The remaining 8 percent were against it for religions or other reasons.

Moreover, apart from food, other uses of rabbit might also be of economic benefit to developing countries. The fur of rabbits is a main ingredient of felt, and in making hats and coats, rabbit pelts could be used. In modern

hospitals, the brain of rabbit is used in making a blood-clothing agent. Fine rabbit leather has the ideal tension and quality required for tiny drive belts used in delicate machines such as tape recorders. In recent years there has been increased awareness of the advantages of rabbit rearing in the tropical region, as a means to ensuring food security (Oden 2009). This is largely attributable to the rabbits high rate of reproduction; early maturity; rapid growth rate; high genetic selection potential; efficient feed and land space utilization; limited competition with humans for similar food; and high-quality meat with low cholesterol (Cheeke 1980).

In addition widely identified and major constraints to rabbit keeping are; the association of rabbits as pest rather than food-producing animals; limited marketing opportunities in the tropics; insufficient promotion; erratic product supply; unreasonable prices competition from other meats; and lack of product diversification. Therefore, the objectives of this paper were to describe socio-economic characteristics of the rabbit rearers as well as ascertaining which of these characteristics significantly influence the rearing of rabbits. Also the problems militating against rabbit keeping in the study area would be investigated.

### Methodology

The study was conducted in South-western area of Nigeria. This area consists of six states namely, Ekiti, Ondo, Ogun, Osun, Oyo and Lagos States. The area lies between latitudes 6<sup>o</sup>N and 9<sup>o</sup>N and approximately between 2<sup>o</sup>E and 7<sup>o</sup>E longitude. The rainfall in the region ranges between 2000mm and 3000mm while the temperature ranges between 28<sup>o</sup>C and 30<sup>o</sup>C. Farming is the main occupation of the people. Agriculture in the zone is practiced under a largely traditional system. Crops such as, yam, oil palm, maize, cassava among others are grown in the zone. Also pigs, goats, sheep, poultry, rabbits are kept by the people of this area.

In selecting one hundred and fifty rabbit keepers, multi-stage sampling technique was adopted. The last stage involved random selection of the respondents from the list of the rabbit keepers earlier compiled in the region. The study used primary data obtained through structured questionnaire. This was supplemented with oral discussion. Data covering socio-economic characteristics such as age, farm size, farming experience, household size, income earned, et cetera were elicited from the respondents. Data collected were analysed through the use of descriptive statistical tools such as means and percentages as well as multiple regression analysis. The estimated model for determinants of rabbit keeping is implicitly stated as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, U_i) \dots \dots \dots (1)$$

Where Y, number of rabbit kept; X<sub>1</sub>, age of respondent (years); X<sub>2</sub>, farming experience(years); X<sub>3</sub>, annual net farm income(Naira); X<sub>4</sub>, educational level(years); X<sub>5</sub>, household size(number); X<sub>6</sub>, accessibility to loan(access=1, no access=0);and U<sub>i</sub>, error term. Four functional forms of the equation were tried and the one producing the best fit was chosen on the basis of a priori expectation, coefficient of multiple determinations (R<sup>2</sup>) and the number of variables that were significant. The functional forms tried are stated explicitly as:

$$Y = b_0 + b_1X_1+b_2X_2+b_3X_3+b_4X_4+b_5X_5+b_6X_6+e_i \dots \dots \dots (2) \text{ Linear form}$$

$$Y = \ln b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + e_i \dots \dots \dots (3) \text{ Semi-logarithmic form}$$

$$\ln Y = \ln b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + e_i \dots \dots \dots (4) \text{ Log-log form}$$

$$\ln Y = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + e_i \dots \dots \dots (5) \text{ Exponential form}$$

where: ln, is the natural logarithms; b<sub>0</sub>..... b<sub>6</sub>, the estimated coefficients and e<sub>i</sub>, estimated error term . Other variables are as earlier defined.

### Results and Discussion

Table 1 shows that 58 percent of the respondents were within the age bracket of 31 and 40 years with the mean age being 38 years. The majority, 86 percent were less than 41 years. This shows that rabbit rearers are young and are in their productive age. Also, they would have enough strength and energy to cut green fodder needed to feed the rabbits. In the study area, rabbits are fed mainly with green fodder. 66 percent of the farmers used green leaves alone. The plants used include; *Aspilia Africana* and *Americana*, *Centrosema* spp, *Tridax* spp, *Emilia* spp, *Calopogonium* spp and Sweet potatoes leaves. The keepers that used green leaves alone fed the young rabbits (fryers) with *Aspilia Africana* and *Tridax* spp. These plants have low water content. In addition, only 7 percent of the farmers used concentrate alone to feed their rabbits. Most of the concentrates are in form of poultry growers mash. Atimes poultry growers' mashes in form of pellets are used. In the study area, rabbit pellets are not readily available. Also, 27 percent of the rabbit rearers used both concentrates and green leaves. Concentrates are fed to the pregnant does and fryers while the rest are fed on green vegetables. Due to lack of fund, most of the farmers could not use concentrate.

According to table 1, the majority, 70 percent, of the farmers were males while the remaining 30 percent were females. An indication that men are more involved in the rearing of rabbits. 54 percent of the respondents were married while 46 percent were single. This implies that more married people engaged in rabbits farming. Also, 62 percent of the respondents interviewed had formal education while 38 percent did not attend any school. This shows that, the majority could read and write.

Moreover, about 70 percent of the farmers had household size greater than 5 with the mean of 6 members. This

is an indication of large family, and it is required in cutting the green vegetable for the rabbits. Furthermore, table 1 indicates that none of the respondents took rabbit farming as a full time job. 64 percent of the respondents took farming as their main occupation. Farm size measured in terms of number of rabbits reared showed that the majority, 60 percent of the farmers kept between 21 and 50 rabbits with the mean of 21 rabbits. This indicates that most of the respondents are small scale farmers and they would not be able to enjoy the economies of large scale production. According to table 1, 88 percent of the farmers used family labour for rabbits rearing while just 12 percent hired labour. Large household size could be of advantage in small scale rabbit keeping. Also, the majority (66percent) were never visited by extension agents. These people are needed to transfer innovations to farmers.

In addition, table 2 shows that 80 percent of the rabbit keepers belonged to at least one cooperative society. These societies have been of help to the farmers because most of the time, farm inputs are sold to the farmers at highly subsidised prices. Also, the societies are links through which farmers access agricultural loans.

Table 3 indicates that, most of the farmers (74 percent) financed their rabbit farms with loans obtained from their cooperative societies.

According to table 4, the majority (56 percent) of the respondents had between 6 and 10 years of experience in rearing rabbits while the means was 6 years. The number of years a farmer has spent in the farming activities could give an indication of the practical knowledge which has been acquired.

The majority of the farmers were low income earner. In table 5, 67 percent earned ₦200000 or less annually. The mean income was ₦122000. This is lower than the official minimum wage in the country (Note ₦155 = US\$1). 80 percent indicated the problem of marketing as the main constraint limiting the expansion of their rabbit farms. Other problems listed include, finance, diseases and theft (Table 6).

#### **Factor influencing the number of rabbits reared**

Results of multiple regression analysis for all the four functional forms tried are presented in table 7. Log-log functional form was chosen as the lead equation based on the high value of coefficient of multiple determination ( $R^2$ ) and more significant coefficients. The estimated  $R^2$  indicates that the included independent variables in the model explained about 74 percent in the variation of the dependent variable. Four variables, age of respondents ( $X_1$ ), farming experience ( $X_2$ ), annual net farm income ( $X_3$ ) and accessibility to loan ( $X_6$ ) were significantly different from zero while variables, educational level ( $X_4$ ) and household size ( $X_5$ ) were not significant at 1%, 5% or 10% level of significance. Variables  $X_1$  and  $X_2$  were significant at 1 percent while  $X_3$  and  $X_6$  were significant at 5 percent and 10 percent respectively. This shows that the major determinants of the number of rabbits on the farms of the farmers were age, farming experience, annual net farm income and accessibility to loan. In addition, all the estimated coefficients except  $X_1$  and  $X_5$  had positive signs which indicated that an increase in the quantity of these variables would lead to an increase in the number of rabbits expected to be reared by the farmers. The coefficient of  $X_1$  and  $X_5$  that had negative sign implied that an increase in these variables would lead to a decrease in the number of rabbits reared.

#### **Conclusion and Recommendations**

The results of the study showed that majority of the rabbit keepers surveyed were young, used green leaves to feed their rabbits, males, married, educated, had large household size, took the rearing as part time business, operated on small scale, utilized family labour, never visited by extension workers, belonged to at least one cooperative society, financed their farming activities with loan obtained from cooperative society, belonged to low income group and faced with marketing problem. Also, the major determinants of rabbit rearing were the respondents' age, farming experience, annual net farm income and accessibility to loan.

Based on the results obtained in the study, it is recommended that loan should be made available at affordable interest rate to young and dynamic farmers who are ready to rear rabbits on large scale. Also, extension workers should visit farmers rearing rabbits in order to encourage and carry information to them on how and where rabbit could be reared and sold. There should be an organised market for the sales of rabbit's products. Rabbit farmers should be encouraged to own a slaughtering house where consumer could purchase rabbit meat. Lastly, in order to increase the farmers' income, the consumers should be sensitised about the importance of rabbit meat.

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**Table 1: Summary statistic of selected socio-economic characteristics of rabbit keepers**

Variable	Frequency	Percentage
Age(years)		
≤20	20	13
21-30	22	15
31-40	87	58
41-50	15	10
51-60	4	3
>60	2	1
Type of feed		
Green leaves alone	100	66
Concentrate alone	10	7
Green leaves & Concentrate	40	27
Gender		
Male	105	70
Female	45	30
Marital status		
married	81	54
single	69	46
Educational level(years)		
0	57	38
1-6	30	20
7-12	45	30
> 12	18	12
Household size		
<2	15	10
2-5	30	20
>5	105	70
Rabbit farming nature		
Full Time	-	-
Part Time	150	100
Main occupation		
Farming	96	64
Artisanship	19	13
Trading	15	10
Civil Service	20	13
Rabbit reared(number)		
≤10	26	17
11-20	20	14
21-30	60	40
31-40	23	15
41-50	8	5
>50	13	9
Labour utilization		
Family	132	88
Hired	18	12
Extension services		
0	99	66
1-2	32	21
3-4	15	10
>4	4	3

Sources: Field survey, 2012

**Table 2: Percentage distribution of respondents by membership of cooperative society**

Membership	No. of respondents	Percentage
Yes	120	80
No	30	20
Total	150	100

Source: Field survey, 2012

**Table 3: Percentage distribution of respondents by sources of farm finance**

Source	No. of respondents	Percentage
Friends & Relatives	9	6
Cooperative Society	111	74
Personal Money	23	15
Banks	7	5
Total	150	100

Source: Field survey, 2012

**Table 4: Percentage distribution of respondents by years of farming experience**

Years of Farming	No. of respondents	Percentage
1-5	40	27
6-10	84	56
11-15	12	8
>15	14	9
Total	150	100

Source: Field survey, 2012

**Table 5: Percentage distribution of respondents by annual net farm income**

Income(₦)	No. of respondents	Percentage
≤200000	100	67
200001-300000	30	20
>300000	20	13
Total	150	100

Source: Field survey, 2012

**Table 6: Distribution of respondents by factors militating against rabbit rearing**

Problem	No. of respondents	Percentage
Marketing	120	80
Finance	23	16
Diseases	5	3
Theft	2	1
Total	150	100

Source: Field survey, 2012

**Table 7: Regression results of determinants of rabbit rearing in the study area**

Variable	Linear	Log-log	Exponential	Semi-log
Constant	-0.737*** (2.122)	1.083 (0.974)	-4.152 (1.801)	2.134* (5.371)
Age of Respondent(Yrs)	-0.042** (1.977)	-0.856* (2.940)	0.956*** (1.680)	0.248 (1.206)
Farming Experience(Yrs)	0.070 (0.926)	0.734* (3.471)	0.144** (1.991)	0.946** (2.001)
Annual Net Farm Income(₦)	0.066 (0.996)	0.893** (1.981)	-0.342 (1.326)	0.671* (3.560)
Educational Level(Yrs)	0.910 (1.341)	0.894 (1.346)	0.744 (1.547)	0.968 (1.251)
Household Size	0.843 (1.246)	-0.652 (1.546)	0.937 (1.473)	2.347 (1.610)
Accessibility to Loan	0.125 (1.567)	0.602*** (1.741)	0.357 (0.874)	2.611 (0.318)
R <sup>2</sup>	0.51	0.74	0.47	0.54
R <sup>-2</sup>	0.49	0.72	0.40	0.50
F-value	4.613	3.431	4.533	5.765

\*,\*\*and\*\*\*denote significance of coefficient at 1,5,and10 percent respectively.

Figures in parentheses are the t-values.