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PRODUCTION AGRICULTURE AND TECHNOLOGY (PAT)



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RESOURCE USE EFFICIENCY IN APICULTURE IN UMUAHIA -NORTH LOCAL GOVERNMENT, ABIA STATE, NIGERIA

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Abstract

The resource use efficiency in apiculture was studied in Umuahia-North Local Government of Abia State, Nigeria. The data for the study were collected through the use of questionnaire, randomly administered on 40 honey producers. The data were analyzed using enterprise budgeting technique and regression analysis. The study showed that apiculture is profitable in the study area. The net profit was ₦22,435.42 per farmer with an average of 24 hives per farmer while the rate of return on the total investment was ₦1.06. This indicated a good financial performance. The result of regression analysis shows that the combined effect of the resource inputs on the output of honey was high ($R^2 = 0.95$). Baiting materials, number of bee hives and labour were significant in the production of honey. The production function was of an increasing return to scale indicating that some resources were not efficiently managed. The research suggests efficient management of resources by the honey producers. More awareness should be created through seminars and extension services to encourage farmers to engage in apiculture due to its enormous potential.

Key words: Apiculture, beehives, profitability, resource use efficiency, gross margin analysis

Introduction

Bee keeping is one of the lucrative enterprises in many parts of the world. It serves as a source of revenue and export in many countries including United States of America, Australia and Tanzania (Cook, 1989). The production has undergone a great developmental process, which has brought about improvement in the quantity of bee products especially honey which has numerous economic importances. Honey is used industrially as raw material in the manufacture of cosmetics. It is also used culturally at ceremonies, traditionally for the treatment of hemorrhoids and medically for the treatment of cough (Mutsaers, 1991). According to Gentry (1982), there are two major types of bee-keeping managements. The traditional method, which involves the use of traditional equipment and the modern method uses, the modern hives.

In Nigeria, bee keeping started decades ago, yet the economic potentials have not been well utilized. The production is at the development phase and gaining ground in

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many parts of the country, including Abia State. Agricultural Policy in Nigeria has paid little or no attention to non-timber products in the planning process. Moreover, many of the studies that have been carried out laid emphasis on bee-keeping generally (Crane and Graham, 1985); FAO (1984); Mutsaers (1991); Ntenga and Mugongo (1991) and Wilson (1997). Studies on the economics of bee keeping are few in literature especially in Abia State.

This study therefore studied the profitability of bee farming in Umualhia North Local Government Area, Abia State, Nigeria. Specific objectives were to:

- examine the demography of the honey producers in the study area
- describe the processes involved in honey production in the study area
- determine the costs and returns involved in honey production
- determine the effect of the production factors on the level of output
- identify the problems in honey production in the study area and
- suggest policy recommendations from the findings of the study.

The findings of this study is expected to highlight the potential of bee-keeping to both the rural and urban populace, thereby enhancing income generation and poverty reduction. The study will also help the policy makers in formulating policies that will encourage farmers to invest in honey production.

Materials and Methods

This study on apiculture was carried out in Umualhia North Local Government Area of Abia State, Nigeria. Bende Local Government, Umualhia South in the East and Isuikwuato in the West bound the study area in the North. The inhabitants are predominantly farmers who produce tree crops, which encourage the practice of apiculture in the study area.

Random sampling technique was used to collect the data. A list of 45 beekeepers in Umualhia North Local Government Area of Abia State was compiled with the assistance of the extension officers in the agricultural department of the Local Government. Out of this number, data were obtained from 40 beekeepers with the use of questionnaire. The information collected included the demographic characteristics of the honey producers, information on production and processing, costs of inputs and outputs and problems encountered in the honey production.

Multiple regression analysis, gross margin analysis and descriptive statistics were used to analyze the data collected.

1) Model Specification

(i) Gross Margin Analysis
Gross margin analysis

Net Profit $\sum_{i=1}^n$ (31)

Where

i

x_i

B_i

E_j

D_j

k

n,m

(ii) Multiple Regression

Multiple regression
on the level of output

$y = f(X_1, X_2, \dots, X_n)$

Where

Y = Amount

X₁ = Number

X₂ = Cost

X₃ = Number

X₄ = Cost

X₅ = Total

e = error

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D) Model Specification

(i). Gross Margin Analysis

Gross margin analysis of the bee-keeping was accessed as follows.

$$\text{Net Profit} \quad (9i) = \sum_{i=1}^n x_i B_i - \sum_{j=1}^m l_j D_j - k$$

Where

- i Profit or net income in Naira
- x_i Price per litre of honey in Naira
- B_i Estimated amount of honey produced in litres
- l_j Unit price of variable input j
- D_j Quantity of variable input j
- k Depreciated fixed cost in Naira
- n,m Sample size.

(ii) Multiple Regressions

Multiple regression analysis was used to establish the effects of production inputs on the level of output in apiary production. The model was specified thus:

$$y = f(X_1, X_2, X_3, X_4) + e$$

Where

- Y Amount of honey produced in litres
- X_1 Number of apiary locations
- X_2 Cost of baiting materials in Naira
- X_3 Number of bee-hives
- X_4 Cost of fixed inputs
- X_5 Total labour used (family and hired) in mandays
- e error term.

Results and Discussion

The demography of the beekeepers is presented in Table 1. The result shows that majority of the respondents were married men (87.50%) who were above fifty years old (65.00%). This implies that bee keeping requires patience, which is easily provided by old men. Moreover, most of the respondents were educated having above secondary school education (95.00%). Thus, the respondents were able to source for new improved technologies on apiculture especially from research reports.

Table 1: Table Showing Demography of the Bee Keepers

Particular	Frequency Distribution	Percentage %
Sex		
Male	35	87.50
Female	5	12.50
Total	40	100.00
Age		
Less than 20 years	0	0
20-29	0	0
30-39	2	5.00
40-49	12	30.00
50	26	65.00
Total	40	100.00
Marital Status		
Single	3	7.50
Married	35	87.50
Widowed	1	2.50
Divorced	1	2.50
Total	40	100.00
Educational Level		
No formal education	0	0
Primary school	2	5.00
Secondary education	11	27.50
Post secondary education	27	67.50
Total	40	100.00
Years of experience in bee keeping		
1-5	13	32.50
6-10	8	20.00
11-15	9	22.50
16-20	10	25.00

Source: Field survey, 2002

2) Honey p
Table 2 presents

Table 2: Process

Item
Mode of Operation
Part time
Full time
Site Location
Compound
Bush
Farm
Number of Apiary
1-2
3-5
6-8
9 and above
No of Hives Owned
1-10
11-20
21-30
31-40
41-50
Type of Hive
Langstroth hive
The pot hive
Back hive
Period of Hive Flow
Jan-Mar
April-Jun
July-Sept
Oct-Dec
Rate of Inspection
Daily Basis
Weekly
Fortnightly
Monthly
Source of Labour
Family
Hired Labour
Friends

2) Honey production and harvesting

Table 2 presents the processes involved in bee keeping and harvesting.

Table 2: Processes of Honey Production/Harvesting

Item	Number of farmers	Percentage of farmers
Mode of Operation		
Part time	31	77.50
Full time	9	22.50
Site Location		
Compound	2	5.00
Bush	25	62.50
Farm	13	32.50
Number of Apiary Location		
1-2	18	45.00
3-5	22	55.00
6-8	0	0.00
9 and above	0	0.00
No of Hives Owned		
1-10	3	7.50
11-20	17	42.50
21-30	12	30.00
31-40	4	10.00
41-50	4	10.00
Type of Hive		
Langstroth hive	40	100.00
The pot hive	0	0.00
Back hive	0	0.00
Period of Hive Location and Baiting		
Jan - Mar	3	7.50
April - Jun	23	57.50
July - Sept	12	30.00
Oct. - Dec	2	5.00
Rate of Inspection		
Daily Basis	5	12.50
Weekly	24	60.00
Fortnightly	9	22.50
Monthly	2	5.00
Source of Labour		
Family	22	55.00
Hired Labour	15	37.50
Friends	3	7.50

3) Result of Gross-Margin Analysis: The costs and returns involved in beekeeping are presented in Table 3.

Table 3: Gross Margin Analysis of Bee-Keeping

Item	Value	₦
Costs for 24 hives		
Variables costs		
Baiting materials	300.00	
Bottles	920.00	
Labour	12,690.00	
Transportation	520	
Total variable costs		14,430.00
<u>Fixed costs</u>		
Hives	14,63.48	
Hive uniforms	673.04	
Boots	372.80	
Smoker	427.10	
Matchet	201.22	
Basin	270.00	
Hive tool	800.00	
Wheel barrow	2,400.00	
Sieve	500.00	
Total fixed costs		7,107.64
Total production cost		21,537.64
Returns for 24 hives		
Yield (litres)	92.04	
Gross returns		46,020.00
Net returns		24,482.36
Rate of return on the total investment		1.14

Source: Field Survey, 2002.

The results showed that on the average about 92.04 litres of honey was produced per farmer having an average of 24 hives in a production season. At an average price of ₦500.00 per bottle of pure honey, average revenue of ₦ 1,446,020.00 was generated while the total costs of production was ₦ 21,537.64. This gave a return of ₦24,482.36 with a rate of return of 1.14 on the total investments on 24 hives. This indicated that bee keeping is profitable in the study area, as every ₦100.00 invested in bee keeping generates a net return of ₦ 1,414.00. Cobb Douglas production function was chosen as the lead Equation. The function has R^2 - value of 0.95. This indicates that about 95 percent of the output of honey was as result of combined influence of the number of apiary locations, number of baiting materials, number of bee hives, labour and capital.

4) Result of regression analysis: The result of the regression analysis is presented in Table 4.

Table 4: Regression Result of Honey Output

Variables	Coefficients	Standard errors	T - ratios
Constant	1.104	0.167	0.61
Number of apiary locations (x_1)	0.091**	0.054	1.69
Baiting materials (x_2)	0.692*	0.112	6.18
Number of Bee Hives (x_3)	0.015	0.014	1.07
Capital (naira) (x_4)	0.096**	0.056	1.71
Labour (Mandays) (x_5)			
R^2	0.951		
F	132.249		
Degree of freedom (k-1), (n-k)	5,34		

* Significant at 5% level of probability

** Significant at 1% level of probability. Source: Calculations from Field Survey Data, 2002.

The t - test result indicated that the number of bee hives (x_1), cost of baiting materials (x_2) and labour (x_5) with coefficients of 0.69, 0.091 and 0.096 respectively were significant in the honey production. Number of beehives was at 0.05 level of probability while baiting materials and labour was at 0.01 level of probability. This indicated that a unit increase in the number of bee hives, cost baiting materials and number of Mandays employed in the production of honey will lead to an increase of 69, 9 and 10 litres of honey produced in the study area. Capital (x_4) did not have significant influence on the output of honey due to very low proportion of the cost of hives in the total production cost. Likewise, there was poor selection of apiary locations. The return to scale of 1.06 (sum of regression coefficients in Table 4) indicates an increasing return to scale. This shows that there is inefficiency in the use of production inputs in honey production in the study area. The producers were producing at an irrational stage of production (Olayide and Heady, 1982). More variable inputs were used to produce the outputs (honey). Number of apiary locations had no significant influence on the output due to improper management of many apiary locations.

Other problems include inadequate number of apiaries or location site (25.0%). Most beekeepers were confined to set their apiaries on the trees in the bush, on the land owned by them. Very few farmers (17.50%) expressed high cost of labour as problem. Majority (55.00%) used family labour (Table 2). Insecurity of bee hives (12.50%) posed little problems because family labour was used in the operation.

5) Problems i
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Table 5: Probl

Problems
Lack of capital
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High cost of lab
Insecurity of bee
Total
Source: Field

Conclusion

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5) Problems in Bee Keeping: The result (Table 5) revealed that major problem facing most beekeepers was lack of capital (45%). Most bee-farmers depended on personal savings, which were insufficient.

Table 5: Problems of Bee-Keeping

Problems	Frequency	Percentage of farmers
Lack of capital	18	45.00
Inadequate apiaries	10	25.00
High cost of labour	7	17.50
Insecurity of bee hives	5	12.50
Total	40	100

Source: Field survey; 2002

Conclusion

The study concludes that honey production is profitable in the study area. The rate of return on the total investment is greater than one (1.14), indicating that capital is efficiently utilized. However, the honeybee farmers were operating at the increasing return to scale of their production, indicating that the resources were over - utilized. The farmers are therefore encouraged to manage the resources to increase honey production. Apiculture enterprise is still new in Nigeria. Therefore, there is a need for creation of more awareness through seminars and extension services. Policy intervention to extend loans to honey producers is highly necessary. This will encourage honey production in the study area and generally in Nigeria.

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