

ECONOMIC ANALYSIS OF SMALLHOLDER BEEKEEPING INDUSTRY IN ADAMAWA STATE, NIGERIA.

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(Received 16 November, 2005; Revision Accepted 24 May, 2006)

ABSTRACT

The paper determined the economics of beekeeping Industry in Adamawa State, Nigeria, with the aim of providing an alternative source of cheap and sustainable form of income to the small-scale farmers who actually feed the nation. Data were analysed using production function, farm budgeting and gross ratio. Results showed that beehive size and value of beehives were significant explanatory variables at 1%. The Beta coefficient ranking results indicate that beehive size was the most important input. Both net return to apiaries (N11.5m) and gross ratio (0.0492) revealed a highly profitable enterprise and marketing for beehive products. It was recommended that authorities that intend to improve on the aspect of beekeeping should concentrate on designing appropriate beehives in terms of size and bee spacing.

KEYWORDS: Smallholder, beekeeping, beehive, Adamawa, honey.

INTRODUCTION

In Nigeria, 95 percent of the food producers are small-scale farmers. Of this population, 55 percent of them are women (Jiggins and Olawoye, 1977). These women have been found to contribute 60 percent of the labour force, produce 80 percent of food, earn 10 percent of the money income and own a meager one percent of the farm assets (Adisa and Okunade, 2005). In addition to these, women are saddled with the responsibility of child-bearing, house chores and even taking care of the husband. Furthermore, the Federal Ministry of Health (FMOH) and World Health Organization, WHO, (2002), noted that the bulk of this population reside in rural areas where poverty and hunger continue to increase. This trend cannot continue if the very much publicized economic empowerment for the rural poor by the three (3) tiers of governments (Federal, State, Local) has to be achieved.

In realization of the contribution of women to national economy, the Nigerian Government, noted Adisa and Okunade (2005), set up certain programmes to empower them. These include the Better Life for rural women launched in 1987, the Women-In-Agriculture (WIA) established by the Federal Agricultural Coordinating Unit (FACU) in all the Agricultural Development Programmes (ADPs) in 1991, the Family Support Programme established in 1994 as a transformation of the Better Life Programme and of recent, the Family Economic Advancement Programme (FEAP).

All these efforts have not created the desired effects intended by successive governments. Odigbo and Onwualu (1994) observed that the imbalance between the food demand and actual production has continued to widen. The contribution of agriculture to the Gross Domestic Product (GDP) has declined from about 60% in 1960 to 20% in 1990. Furthermore, the Special Programme for Food Security, SPFS, (2004) reported a relatively steady rise again with a growth of 36.70%, 35.58% and 34.62% in 1999, 2001 and 2003, respectively. In spite of this recent development, the fact still remain that the country had to import some food in order to feed its teeming population. The failure of these programmes to improve the living standard of the women and by extension their families for whom they were created to, could be attributed to two (2) factors. For one, a high level of misappropriation of funds from the side of the implementing government officials was eminent. The second factor has to do

with the nature/design of these programmes entirely, which are quite demanding financially.

Beekeeping which is a very cheap, affordable and readily sustainable programme was introduced to help the populace. The requirements (beehives, ropes, bee baits etc) for beekeeping can be obtained from the immediate environment of the farmers. The bee-plants (trees and flowering plants etc), which serve as sources of nectar to the bees, are equally available in the rural areas. Hence, as plants keep flowering, bees keep working and the honey and beeswax keep flowing, the income of the farmers will be assured.

This study, therefore, determines the profitability of beekeeping towards poverty reduction among the neglected small-scale farmers which women constituted the majority. Specifically, the study sought to

- i) Determine the input – output relationship in beekeeping;
- ii) Determine the relative importance of resources in beekeeping;
- iii) Determine the costs and returns of beekeeping; and
- iv) Determine the marketing efficiency of honey

METHODOLOGY

Study Area and data Collection

The study was conducted in Adamawa State which is essentially an agrarian state and has great potentials for beekeeping due to its vegetation basically composed of some of the good bee-plants (*Pakia biglibosa*, *Butynosporum paradoxum*, *Azadirachta indica*, *Adansonia digitata* among others) and appropriate weather condition for apiculture.

Data for the study were collected through a cost-route from the primary source (traditional beekeepers) using structured questionnaires supplemented with oral interview for two (2) production seasons (2002 – 2004). A simple random sampling techniques was used to select the respondents. The mean of two cropping seasons were obtained for the analysis.

Thirty traditional beekeepers were selected from each of the four agricultural zones of the state, making a total of 120 respondents for the study.

Analytical Techniques

Farm budgeting, Gross ratio, Double-Log Production function and Beta Coefficient models were employed for the

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analyses. The explicit form of the production function is as follows (Polycarp *et al.*, 2004)

i) Production Function

$$\text{Log } Y = \text{Log } b_0 + b_1 \text{Log } X_1 + b_2 \text{Log } X_2 + b_3 \text{Log } X_3 + b_4 \text{Log } X_4 + e \quad (1)$$

Where:

Y	=	Gross value of beehive crops (in Naira)
X ₁	=	Beehive size (in m ²)
X ₂	=	Labour (mandays)
X ₃	=	Value of beehives in (Naira)
X ₄	=	Other investment expenses (in Naira)
b ₁ , b ₄	=	Estimated regression coefficients
e	=	Error term or random disturbances

ii) The Beta Coefficients

The Beta Coefficients were used to determine the relative importance of the inputs and expressed as follows

$$B = b_i \frac{S_{xi}}{S_Y}$$

B = beta coefficient
 b₁ = estimated regression coefficient
 S_{xi} = standard deviation of the independent variable
 S_Y = Standard deviation of the dependent variable

The decision criteria is that the higher the positive

beta coefficient for a particular regressor (input), the more relevant or important the latter

iii) The Gross Ratio (GR)

$$\text{GR} = \frac{\text{Total Marketing Expenses}}{\text{Total Returns}}$$

A less than Unity (<1) ratio indicates higher returns per Naira (N) invested in a business, and therefore, best for any agribusiness

iv) Farm Budgeting

A farm budget is an organization of revenue, expenses and profit for a single farm enterprise. (Kay and Edwards, 1999). A straight-line depreciation method was applied on the fixed cost items before inclusion in the computation

RESULTS AND DISCUSSION

i) Production Function

The result presented in Table 1 indicates that the coefficient of determination, (R²), is 0.747, implying that a 74.7% variations in the gross value of beehive crops (honey and beeswax) was explained by the explanatory variables (beehive size, labour, value of beehive, other investment expenses) included in the model. Value of beehive and beehive size were significant at 1%. It could be observed that all the production elasticity of inputs, except labour is positive. What this entails is that, keeping other inputs constant, a percentage increase in any of

RESULTS

Table 1: Production Function (Double-Log) Result of Beekeeping Industry in Adamawa State.

Predictor	Coefficient	Standard Deviation	t-ratio	Beta-Coefficient
Constant	2.2565	0.4261	5.30	-
Beehive size (x ₁)	0.4449	0.1490	2.99**	0.0381 ⁽¹⁾
Labour (x ₂)	-0.0406	0.0560	-0.73 ^{NS}	0.0013 ⁽⁴⁾
Value of Beehive (x ₃)	0.4059	0.1529	2.65**	0.0357 ⁽²⁾
Other investment Expenses (X ₄)	0.1668	0.2254	0.74 ^{NS}	0.0216 ⁽³⁾
R ²	0.747			

Note: Values in Parentheses are ranks of order of importance of regressors

** Significant at P<0.01.

Source: Field Survey (2002 – 2004).

the inputs, would increase beehive output (honey and beeswax) by a proportion corresponding to the value of the production elasticity of the input. The negativity of labour as a regressor, implied that this input had been over-utilised leading to diminishing return. This latter result agrees with the findings of Olagunju (2000), who observed that an apiary having less than 100 beehives need no more than a person to manage it effectively.

ii) Relative Importance of Resources

From the ranking of the Beta coefficients in Table 1, beehive size and value of beehives are the most significant (P<0.01) regressors. The contribution of other investment expenses combined was quite insignificant. Labour contributed less in the production process. This is informed by the fact that bees accounted for more than 80% of labour in apiculture and less than 20% by the apiarist (beekeeper). Hence, more efforts by the latter would only result in additional cost of production (return to scale), while producing the same effects.

iii) Costs and Returns

Table 2 shows that, honey accounted for 79.65% of the gross revenue, with beeswax recording 20.35%, indicating that honey is the major source of revenue in beehive product. Of the total cost of production, casual labour accounted for 45.1%, whereas 17.26% and 14.39% were accounted for by beehives and baiting materials, respectively. Therefore, beehive is the major item of fixed cost in the beekeeping business. Furthermore, Table 2 shows a very high return (N11.5m) to apiaries and on every naira invested (N9.12) for the total beekeepers studied. This is an indication that beekeeping is a highly profitable industry, in spite of the traditional practices adopted by the farmers. The latter finding is consistent with Farinde *et al.*, (2005) who observed that, of the beekeepers sampled in Oyo State, Nigeria, majority (86.25%) of the respondents indicated that honey production is a viable business because it is highly profitable.

Table 2: Estimated Costs and Returns from the Apiaries in Adamawa State

Item	Value in Naira (N)	Percentage (%)
Revenue		
Honey	10,163,338.50	79.65
Beeswax	2,596,711.95	20.35
(A) Gross Revenue (GR)	12,760,050.45	100
Variable Cost (VC)		
Baiting materials	181,427.20	14.39
Environmental Remedies	122,369.00	9.71
Batteries	13,580.00	1.08
Matches	1,785.00	0.14
Corn Stock	25,410.00	2.02
Control of Pest and Predators	98,780.00	7.84
Casual Labour	568,470.00	45.10
(B) Total Variable Cost (TVC)	1,011,821.20	97.60
Fixed Cost		
Beehives	217,513.20	17.26
Ropes	5,110.00	0.41
Buckets	19,660.00	1.55
Torch Light	6,247.50	0.50
(C) Total Fixed Cost (TFC)	248,530.70	2.40
(D) Total Cost (B+C)	1,260,351.90	100
(E) Net Return (A-D)	11,499,699.25	-
Return on every Naira invested (E/D)	9.12	-

Source: Field Survey (2002 – 2004)

Table 3: Analysis of Marketing Efficiency of beehive Products in Adamawa State

Marketing Expenses	Value in Naira (N)	Percentage (%) of Total
1. Containers used in sale of beehive Products.		
Drums	12,000.00	2.12
4-litre Gallons	114,600.00	20.24
20-litre Jerry-cans	50,600.00	8.94
2-litre Dishes	159,750.00	28.22
2. Cost of transportation to the market	53,700.00	9.49
3. License fee (Permit) for beekeepers	151,500.00	26.75
4. Market Stall fee or equivalence	24,000.00	4.24
Total Marketing Expenses	566,150.00	100
Apiaries Net Return	11,499,699.25	-
Gross Ratio	0.0492	-

Source: Field Survey, (2002-2004).

iv) Gross Ratio Analysis

The analysis in table 3 indicates a gross ratio of 0.0492, which is less than unity (<1), implying that the aspect of beehive product marketing in the study area was efficient and profitable, irrespective of the method used in the sales of products.

CONCLUSION AND POLICY IMPLICATIONS

Based on the findings of this study, beehive size and value of beehives were the most explanatory variables in the production of beehive crops (honey and beeswax) in

Adamawa State, with honey representing the main product of beehive. In spite of the traditional practices adopted by the beekeepers, beekeeping is a highly profitable enterprise in all its facets.

To further realize the promising profit potential of the industry, beekeepers should pay greater attention to beehive construction specifications and adoption of modern practices. This will lead to a reduction of total work (labour) hours and result in increase in productivity in general. Both government and non-governmental organizations should incorporate beekeeping in their programmes as measure for poverty reduction among the less privileged majority.

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