Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.13, No.10, 2022

Sesame Production in Benue State: A cost benefit analysis

Nwafor, Solomon Chimela[1]., Solomon Arumun Agba[2]., Ndubuisi, Perpetua O[3] and Confort Ugbem-Onah [4]

[1]Farming Systems Research and Extension, National Root Crop Research Institute, Umudike, Nigeria

[2]Department of Sociology, University of Mkar, Benue State, Nigeria

[3]Micheal Okpara Universityof Agriculture Umudike

[4] Department of Sociology, Benue State University, Benue State, Nigeria

*Corresponding author's E-mail: solomonnwafor8@gmail.com

Abstract

The study analyzed the cost and benefit of sesame production in Benue North-East Zone. A total sample size of one hundred and twenty (120) sesame farmers were selected across three (3) local government areas (Kwande, Katsina-Ala and Vandeikya: these are most prominent in sesame production in North-East Zone of Benue State) using multistage sampling techniques. The results of this study revealed that majority of the respondents were still within the active age. Sesame production in Benue State was still primarily male dominated enterprise as women only constituted 35.8 percent of the respondents and majority of the sesame farmers were married (50%) and the result further revealed that majority of the respondents used hired labour (60%). The mean gross margin was N132,910, the maximum was N1290,000 and the minimum gross margin was -N31700 and the mean total revenue was N254,000 per hectare while the mean total variable cost was N121,470 per hectare and labour cost N72,989 per hectare was pin-pointed as the highest cost in the production sesame in Benue state. The study thus concludes that sesame production is profitable and recommends review of the production practices and training for farmers on good agricultural practices to reduce increase gains and reduce labour cost.

Key word: Sesame; cost-benefit analysis, Production

DOI: 10.7176/JESD/13-10-09
Publication date: May 31st 2022

Introduction

Sesame (*sesamum indicum*) is an oil seed grown predominantly as an export crop. is an annual self pollinating plant with an erect pubescent, branching stem. It is between 0.60 to 1.30m tall. The leaves are ovale to oblong. While the lower leaves are tri-lobed, the upper leaves are undivided, irregularly serrated and pointed. The older cultivators have smooth cupped leaves with leaf like out growth on their lower surfaces. Some cultivators have many branches while others are relatively unbranched. The flowers are tabular, pendulant, bell shaped and two lipped with a pale purple or rose to white colour and are 1.9 to 2.5cm (0.75 to 1 inch) long. In addition, the flowers are borne on short glandular pedicles. One flower is produced at each leaf axil and the lower flowers usually bloom 2 to 3 months after planting with continuous blooming until the upper most flowers are opened. The fruit is an oblong, mucronate, pubescent capsule containing numerous small, oval and yellow, white, red, brown or black seeds.

The seeds are pear-shaped, (with cotween 26 to 30% while that of the meal varies from 48 to 59%. The protein is high in methionine and essential amino acid with surplus (up to 34%). This is unusual for most plant proteins. The defaulted meal prepared from dehulled seed does not contain undesirable pigment. These unique properties make sesame an excellent protein source for supplement soybean, peanut and other plant proteins, which lack sufficient methionine, to increase their nutritive values (RMRDC Survey, 20004).

It is grown for its seed and the primary use of sesame is a source of cooking oil. It is common to find roasted sesame seed sold either (sole or with groundnut) and eaten as snack among rural and urban dwellers across Nigeria. According to NAERLS (2010), the seed cake is an excellent protein supplement in the animal feed industry. Raw Material Research and Development Council, (2004), documented it as one of the food crops that could mitigate food insecurity and poverty in Nigeria. Sesame is an important crop to Nigerian agriculture, it is quite extensively cultivated, it yields in relatively poor climatic conditions, and widely used within Nigeria and is an important component of Nigeria's agricultural exports. As a small holder crop, often intercropped with others, the extent of cultivation is poorly known and there is little information on yields or productivity. For the

most part the surplus crop is commercialized bulked up and exported with minimal processing limited to drying and cleaning (RMRDC Survey,2004)

Sesame has been reported to be a typical crop for farmers in the developing countries (Bennet, 2011). This is because it has deep roots and is well adapted to withstand dry conditions. It grows on relatively poor soils in climate generally unsuitable for other crops, and so it is widely valued for its nutritional and financial yield. It is well suited to small-holder farming with a relatively short harvest cycle of 90 - 140 days, allowing other crops to be grown in the field (Chemonics, 2002; Naturland, 2002; Nigeria's Harvest, 2009) and often intercropped with other grains. This makes it favourable for Nigerian farmers. Production can thus be sustained by farmers under minimum management with average yield of 700kg per hectare (Nigeria's Harvest, 2009). The genus consists of about 36 species of which the most commonly recognized is sesamumindicum (Purseglove, 1974). Other species includes; *s. angus, s. tifolium, s angolense, s. radiatum, s. indicatum, s. capense, s. alatum, s. schekiti, s. laciniatum, s. prostratum, and sesamumoccidentate.* The local names includes; Ridi in Hausa, 'Ishwa' in Tiv, 'Yamati or Eeku' in Yoruba, 'Igorigo' in Igbira, 'Ocha or Igogo' in Idoma, 'Ehia' in Igede, and 'Doo' in Jukun. Other tribes in Nigeria also have names for it.

Sesame seed has been identified as an important component of Nigeria's agricultural export (Chemonics, 2002). It currently ranks second to cocoa in terms of export volume in Nigeria and is fast becoming prominent among non-oil exports because it is one of the few cash crops that can earn the country foreign exchange. Attributed to its high demand, any quantity of the product offered to the market is easily sold. Although it is quite extensively cultivated, it is mainly a small-holder crop, often intercropped with others crops (Abu, G.A, Abah, D. and Okpachu S.A, 2011). Available records showed that Nigeria exported 140,800 tonnes of sesame seed worth $139 million in 2010. It was also recorded that Nigeria earned N210 billion from the export of sesame seed products in the first half of 2012 (Ciuci, 2013).

This increasing demand for sesame seed provides Nigeria an opportunity to increase its production to meet the local and international demand for the commodity. Market opportunities exist in Korea, India, the Middle East and Mediterranean countries where sesame seed oil is in very high demand (Ciuci, 2013). This therefore provides Nigeria with the opportunity to broaden its market base. Currently only about 300,000 hectares of the estimated 3.5 million hectares of Nigeria's 90 million hectares of arable land that is suitable for cultivating sesame seed is presently being used in the production of sesame seed (Tunde-Akintunde T.Y, Oke M.O, Akintunde B.O, 2012). By investing more in sesame seed production, the Nigerian government could increase annual revenue from sesame seed export from N21 billion to about N86 billion annually (Ciuci, 2013).

The realization of the potential of sesame production in the acquisition of foreign currency for the country made increased production of the crop a prominent priority in the Agricultural Transformation Agenda of the Federal Government of Nigeria. To this end, farmers are being encouraged to produce sesame in all agro-ecological zones of the country to meet this need.

Recently, with the recognition of the economic and nutritional importance of sesame, efforts have been made by both federal and state government to increase its production in the country. The demand for the crop has been intensified through massive campaign by Local, state and Federal Government and other organizations. Its high demand calls for intense research to introduce and implement measures that will ensure efficient use of resources in order to raise production to keep pace with the increasing demand.

Sesame is extensively cultivated in Benue state but there is little information on the productivity as well as the profitability. Therefore, there is the need to evaluate the cost and returns in sesame production.

1.1 Theoretical Literature Review

The theoretical basis of this study is anchored on Cobb-Douglas (CD) production function. A production function is a mathematical relationship which describes the ways in which the quantity of an output depends on the quantity of inputs used. It expresses output as a function of variable input used. It expresses output as a function of variable inputs given the quantities of fixed input which remain unchanged during a production period. The Cobb-Douglas production function was derived from the observation by Cobb (1937) and douglas (1948) that over the long run, the relative share of national output earned by labour (L) and capital (K) tends to be constant. The CD function further assumes constant returns to scale and unitary elasticity of substitution. The CD production is generally given by the equation.

$X=AL^{b1}K^{b2}$ ----------(1)

where:

X= total output.

L= labour.

K= capital.

b_1 and b_2 = substitution parameters

b_2= (L-b_1) and (b_1+b_2) =1.

Linear homogeneity of CD production function.

If we increase each factor in equation (1) by a constant λ, we have

$Q= A (\lambda L)\ b_{1,}$ $(\lambda K)b_2$---------- (2)

$Q=A\lambda Lb_1 +$ $b_2Lb_1Kb_2$

$Q= \lambda ALb_1Kb_2$ (since $b_1+b_2=1$) ---------- (3)

Therefore, λ=1

From equation (3) we observed the CD production is linearly homogenous in labour and capital. This implies that if we increase all input by a constant multiple (Y), output will increase by that same constant. Thus the Cobb-Douglas function is to be characterized by constant return to scale.

The optimum amount of or efficient resources use is also determined by considering the profit equation as a functions of input.

The profit equation is $Y.P_y-(K+X.P_X)$

Where;

Y= output (Yield)

P_y= unit Price of output.

P_x = unit price of input.

X = Quality of input.

K = fixed input.

$\partial = YP_y-(XP_x+k)$

$\frac{\partial^{\wedge}}{\partial_x} = \frac{\partial_y}{\partial_x}P_y-P_x$

Also MPP $=\frac{\partial^{\wedge}}{\partial_x}$

Where MPP= marginal physical product.

$P_y.MPP - P_x$

$MVP=(P_y.MPP = MPV)$

Where MVP= marginal value product.

$MVP=P_x$

MR= MC

MR= marginal Revenue, MC =Marginal cost

APP= $\frac{TPP}{X}$

Where,

APP =Average physical product.

TPP= Total physical product.

X= units of input.

EP = $\frac{MPP}{APP}$

The producers will use inputs as long as the marginal (MR) revenue of the output is equal to or greater than the magical cost (MC).

In the short run, the farmer will produce as long as he is able to cover the variable cost ie, where MC is equal to or greater than the average variable cost (AVC). In a single input Case, the optimum point of resources use is where the value of marginal Product is equal to input price (MVP=Px) Highest price point (HPP).

1.2 Profitability Analysis

Profitability measures the ability of farmers to cover their costs and it is an important concept, because it provides incentives for entry into and longevity in the farming business. While many studies of Nigerian farms across the country report profitability, profit margins are often very small (IFPRI, 2011), the small profit margin may not be unconnected to poor resource allocation by farmers and inadequate or lack of infrastructures that leads to waste of output. The objective or goal of farm firms is to maximize profit or minimize cost. Profit can be defined as the total value of production less the total cost of production, while the total value of production is the product of total yield and price. The total cost of production comprises of two components the operating or variable costs and fixed costs. Variable costs vary according to output and are incurred at each production process; examples are seeds, labour, herbicide and fertilizer. Fixed costs are those that do not vary with output in the short run as in the long run, all inputs become variable (Olukosi and Erhabor, 1988).Thus, all these are used in estimating the gross margins as well as the net farm income. The gross farm income or total revenue is the total physical product per unit price of the product. The difference between the gross farm income and total cost of production (fixed and variable cost) is referred to as the net farm income (Olukosi et al, 1988). The net farm income measures the strength and weakness of the farm. According to Kay, A.E, Edwards, W.M, and Duffy, P.A. *(*2008), the NFI should be a starting point for analysing farm profitability, rather than used as the only measure of farm' s profitability.

2. Materials and Methods

The study area is Benue North-East Zone. This zone was established as a geo-political demarcation alone side Benue North-West Zone and Benue South Zone. The Benue North-East Zone, other words known as Zone A, is comprised of seven Local Government Areas namely: Kwande, Logo, Vandeikya, Katsina-Ala, Konshisha, Ukum and Ushongo. The population of Benue North-East Zone is estimated at 3,234,660, whereas, an estimated figure of 285,454 has been recorded as regular households in the Zone (National Population Commission, 2009). The State lies roughly within the lower river Benue in the middle belt region of

Nigeria, lying between Latitudes 6.5° and 8.5° North and Longitudes 7.47° N and 100 East.

The population of study consists of all sesame farming households in North-East Zone of Benue State, made up of seven (7) Local Government Areas. The study purposively selected three (3) local government areas (Kwande, Katsina-Ala and Vandeikya). These are most prominent in sesame production in North-East Zone of Benue State.

Using a multi-stage cluster sampling and purposive sampling techniques, four (2) council wards were randomly selected from each of the three selected local government areas, and two (2) communities were randomly selected from each of the council wards. Ten (10) sesame farmers were randomly selected from each of the communities. This gave a total sample size of one hundred andtwenty (120) respondents.

Data was collected from primary sources with the aid of structured questionnaires and analyzed using descriptive and inferential statistics such as mean, frequency, percentages and Gross margin analysis.

Budgeting Techniques

The budgeting technique using gross margin analysis forms the basis for farm costs and return analysis (Olukosi and Erhabor, 1998).The gross margin is explicitly expressed as follows:

$GM = GR - VC$

But $GR = Py.Y$

$TVC = (\Sigma PiXi)$

Where;

GM = Gross margin of sesame produced in (₦/hec)

GR = Gross Revenue of sesame produced in (₦/hec)

VC = Variable cost.

P_y = Price of output (₦)

Y = Quantity of output (Kg)

X_i = quantity of various inputs.

The gross margin method of analysis is used under the assumption that fixed cost of production is negligible

3. Results and Discussion

Table 1. Socioeconomic Characteristics of the Respondents

Age	**Frequency**	**Parentage**
18-35	43	35.80
36-53	67	55.83
54 and above	10	8.33
Total	**120**	**100.00**
Male	73	60.83
Female	47	39.17
Total	**120**	**100.00**
Marital status	Frequency	Percentage
Single	40	33.3
Married	60	50.0
Separated	12	10.0
Widow	3	2.5
Widowed	4	3.3
Divorced	1	0.8
Total	**120**	**100.00**
Education	Frequency	Percentage
No formal	30	25.0
SSCE/GCE	60	50.0
OND/NCE	19	15.8
HND/B.Sc	10	8.3
M.Sc/Ph.D	1	0.8
Total	**120**	**100.00**
Household size	Frequency	Percentage
1-4	50	41.7
5-8	43	35.8
9-11	23	19.2
Above 11	4	3.3
Total	**120**	**100.00**
Farm size	Frequency	Percentage
1-4 ha	60	50.0
5-8 ha	40	33.3

9-11 ha	15	12.5
Above 11 ha	5	4.17
Total	**120**	**100.00**
Number of year in Farming	Frequency	Percentage
1-5	15	12.5
6-10	43	35.8
11-15	54	45.0
Above 15	8	6.7
Total	**120**	**100.00**

Source: Field survey 2022

The study area is dominated by middle- aged (36-53) may have a positive effect on profitability of the farmers since they are still active, strong. Middle-aged farmers are generally receptive to adoption of new technology in farming. However, age has been confirmed to determine how active and productive a farmer would be and that 20-50 years age bracket is called the "Working age" (Okurut and Bategeka, 2005). This confirms the result that majority of the farmers in the study area are energetic and in their economically productive age. The result also indicates that male farmer were more into sesame production than their female counterpart. Majority of the farmers were married with one form of formal education or the other, which according to Ajagbe, Adewoye and Ajetomobi (2007), is an indication that these farmers will generally appreciate the need to subscribe to innovation in their farming activities in order to obtained maximum output with a given level of input. Household size of more between 1-8 was more predominant in the area with farm size of about 1-4 hectares each and most of the farmers have about 11-15 years of farming experience.

Table 2. Sources of Labour and Seeds

Sources of labour	Frequency	Percentage
Family	20	16.7
Hired	72	60.0
Both	25	20.8
Other	3	2.5
Total	**120**	**100.00**
Acquisition of seed	Frequency	Percentage
Agro input dealers	72	60.0
Ministry of Agriculture/research institutes	20	16.7
Family and friends	25	20.8
Other	3	2.5
Total	**120**	**100.00**

Source: field survey 2022

According to table 2, family and hired labour are the major sources of labour in the study area. Majority of the farmers source their seeds from agro input dealers and also from family and friends.

3.1Costs and Returns in sesame production in Benue State

Table 3. Cost and Return Analysis of Sesame Production

Items	Mean	Std deviation	Miimum	maximum
Total revenue (#)	254000	218038.81	15	1500000
Cost of fertilizer (#)	25500	25254.93	0.0	160,000
Cost of chemical (#)	12600	14069.00	0.0	60,000
Cost of seed (#)	2308.87	1862.89	0.0	11000
Cost of labour (#)	72982	71282.42	0.03	400,000
Transport cost (#)	7959.28	11149.61	0.0	75,000
Total variable cost (#)	121470	101506	0.0	470,000
Gross margin (#)	132910	181627	-31700	1290000

Source: Field survey 2022

The result of the cost and return analysis in sesame farming is presented in Table 3. The result showed the mean total revenue to be N254,000 per hectare and the mean total variable cost to be N121470.. The result also showed that the mean of labour with cost of N72982 was the highest among the other costs. This shows that the farmers spent more on labour than other inputs.

Table 3 revealed that the mean gross margin is N132,910, the maximum is N1290000 and a minimum gross margin is - N31700 per hectare. This implies that some of the farmers experienced negative returns a serious from the mix inputs and outputs got from their farms. There is every need for the farmers to be educated on the required inputs needed to give the right gross margin to ensure the sustainability of the production

Total Variable Cost of Production of Sesame

Table 4. total variable cost of sesame production in Benue state N=120

TVC range	Frequency	Percentage
<20,000	15	12
20,001 – 70,000	37	31
70,001 – 120,000	16	13
<120,001	52	43
Total	120	100
Mean	121470	

Source: Field survey 2022

The result in Table 4 presented a distribution of farmers based on total variable cost (TVC) sesame produced. The results revealed that on the average, a farmer incurred a total variable cost of N121470 to produce average output of sesame of

2155.73kg. Though majority of the respondents (56.7%) incurred a total variable cost of N70001 and above in sesame production for the season, however 43. percent incurred below N70000 in producing sesame. This implies that 43 percent of the respondents are likely to make minimal profit in sesame production.

Total Revenue of Sesame Produced by Sesame Farmers in Benue State

Table 5. Total Revenue of Sesame Produced by Farmers in Benue State

TR range	Frequency	Percentage
<20,000	6	4.6
20,001 – 70,000	15	12.9
70,001 – 120,000	14	12.4
<120,001	85	70.7
Total	120	100
Mean	254400	

Source: Field survey 2022

The result summarized in Table 5 revealed the distribution of farmers based on total. The result indicated that majority (82.5%) of the sampled farmers had total revenue that range from N70,001 per hectare and above of sesame produced. The result further revealed that, on the average a farmer earned revenue of N254,000 per hectare from the production of sesame. The result implies that a small proportion (17.5%) of the respondents earned less than N70000 per hectare of sesame produced. When compared with the average total variable cost of the respondents (N121,470) the result suggests a high probability of profit making from sesame enterprise in the study area.

4. Conclusion and Recommendation

The results of this study revealed that majority of the respondents were still within the active age. Sesame production in Benue State was still primary male dominated enterprise as women only constituted 35.8 percent of the respondents and majority of the sesame farmers were married (50%) and the result further revealed that majority of the respondents used hired labour (60%). The mean gross margin was N132,910, the maximum was N1290,000 and the minimum gross margin was -N31700 and the mean total revenue was N254,000 per hectare while the mean total variable cost was N121,470 per hectare and labour cost N72,989 per hectare was pin-pointed as the highest cost in the production sesame in Benue state. The study found sesame production to be profitable. This balances the government macroeconomic goal of expanding the livelihood base of Nigerians. The profit implies increased household consumption, increased aggregate demand and brings about sustainable development. Based on the findings of the study, Extension workers and other relevant organization should train sesame farmers on the best way of combining the various inputs used in sesame production, this is to enhance their efficiency level and Government should look into the inherent potential in sesame business as that will increase foreign earning and local industries for processing sesame into industrial usage.

Reference

Abu, G.A, Abah, D. and Okpachu S.A, 2011). ANALYSIS OF COST AND RETURN FOR SESAME PRODUCTION IN NASARAWA STATE: IMPLICATION FOR SUSTAINABLE DEVELOPMENT IN NIGERIA. *Journal of Sustainable Development in Africa* (Volume 13, No.3, 2011)

Ajagbe F.A., Adewoye .J.O., and Ajetomobi J.O., (2007). An Evaluation of The Financial Performance of Community Banks in Ogbomoso Area of Oyo State, Nigeria. *International Business Management*, 1: 65-69

Bennett, Randy Elliot(2011) 'Formative Assessment: A Critical Review', Assessment in Education: Principles, Policy & Practice, 18: 1, 5 — 25

Chemonics, 2002). Chemonics International Inc. (2002) Feature Impact: From Chalkboards to Plasma Screens. USAID Contract No. 278-C-00-02-00210-00 (Formerly 278-C-00-02-00201-00)

Ciuci Consulting (2013) Prospects and Challenges of Online Retail in Nigeria

International Food Policy Research Institute (IFPRI). (2012). Annual Report DOI : https://doi.org/10.2499/9780896299412

Kay, A.E, Edwards, W.M, and Duffy, P.A. *(2*008). Farm Management. Seventh edition published by McGraw-hill, a business unit of the McGraw-hill companies, inc., 1221 avenue of the Americas, New York, Ny 10020.

National Agricultural Extension and Research Liaison Services (NAERLS) (2010), National Report of Agricultural Performance survey of 2010 wet season in Nigeria. December. 182 pp

National Population Commission, (2009). National Population Estimates

Naturland (2002), Naturland Standards for Organic Aquaculture, Naturland, Grafelfing, Germany.

Okurut Francis Nathan & Bategeka Lawrence (2005). The impact of microfinance on the welfare of the poor in Uganda. Journal of social and economic policy. Vol. 3., 1, p. 59-74

Olukosi, J.O. and Erhabo P.O. (1998). Introduction to farm management economics: principles and applications. Agitab publishers Ltd. Zaria.

Olukosi, J.O. and Erahbor, P.O. (1988). Introduction to Farm Management Economics, Principles and Application. Agitab publishers ltd. Samaru Zaria.

Purseglove, J. (1974) Tropical Crops: Dicotyledons. Longman, Singapore, 564-570

Raw Materials Research and Development Council (RMRDC) (2004): Survey report of ten selected agro raw materials in Nigeria. BENISEED (Maiden Edition)

Tunde-Akintunde TY, Oke MO, Akintunde BO (2012). Sesame seed, oilseeds. https://www.intechopen.com/books/oilseeds/sesame-seed