ISSN 0189-0514
J. Anim. Prod. Res. (2017) 29(1):403-409

National Animal Production Research Institute
Ahmadu Bello University
P.M.B 1096, Shika-Zaria,
Kaduna State, Nigeria.
Email: japr@napri.gov.ng
Website:http://journals.napri.gov.ng

ANALYSIS OF HONEYBEE PRODUCTION AMONG WOMEN BEEKEEPERS IN KADUNA STATE

[1]Ojo, I. H., [2]Hiikyaa, A. N. and [1]Oladimeji, Y. U.
[1]Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria
[2]Department of Agricultural Education, Federal College of Education, Zaria

ABSTRACT

The study analysed honeybee production among women beekeepers in Kaduna State. Information was elicited from 128 women beekeepers randomly selected from a sample frame of 256 women beekeepers by means of structured questionnaire and interview schedule. Analytical tools employed were frequency, percentage, mean and gross margin analysis. Result showed high level of awareness for honey and beeswax. Moderate level of awareness of pollen, propolis, royal jelly and bee venom was obtained. Honey and beewax was the major products produced by the beekeepers, and few beekeepers produced pollen and proplis. Gross margin analysis for honey and beewax production was ₦80,528. Result further showed that for every ₦1 invested a profit of ₦2.75 was made. Constraints militating against production of honeybee products aside honey and beewax were lack of equipment, lack of technical knowledge, inadequate knowledge of the values of other honeybee products and unassured market. Based on findings of the study, beekeepers are encouraged to pool their resources together to buy equipments that can be collectively owned and jointly used by members. Donor agencies should assist the beekeepers with modern beekeeping equipments on soft loan. This will encourage beekeepers to produce as many honeybee products as possible.

Keywords: awareness, honeybee, products

INTRODUCTION

Beekeeping or apiculture entails the rearing of honeybees with the aim of exploiting its products for use by man. Honeybee belongs to the order of insects called hymenoptera (Adinya *et al.,* 2008). It provides man as well as other forms of life with basic services for survival. Bees for Development (2002) assert that honeybees are the only livestock capable of harvesting nectar and pollen and converting them to high value products. The species of bees responsible for all the benefits to man are varied. However, the predominant honeybee species in Africa is *Apis mellifera adonsonii.* Africa is known to have about 10% of the total world's bee population with Nigeria as one of the largest reservoirs (Hussein, 2000). People in communities all over the world keep honeybees for their products and services they offer (Hilmi *et al.,* 2011). It is a profitable agricultural enterprise with little investment made (Gurung 2005). It is also an important foreign exchange earner for countries that export honey and beeswax. In addition to honey and beewax, honeybees produce other interesting products for multiple usages**.** These products are additional source of income to the producers.

The estimated world honey production in 2013 was 1,663,797.73 tonnes with leading producer as China, Turkey, Argentina, Ukraine and Russia who contributed 450,300; 94,694; 80,000; 73,713 and 68,446 tonnes, respectively, while the total honey production in Africa same year was only 169,306 tonnes (10.2%) (Yoseph, 2016). Honey and beeswax are the main hive products from beekeeping in most African countries. The production of the two products is estimated to be less than 10% and 25% of their potential respectively (Wilson, 2006). In Nigeria, Fadare *et al.* (2008) report indicated that the average honey yield per

colony for modern and traditional technology was 12.35kg and 6.72kg respectively. These figures are under world average honey yield of 20kg.

Traditionally, honeybees are kept in many countries and their products are valued as food, medicine (apitherapy), cultural purposes and source of income. Products of honeybee include honey, beewax, pollen, propolis, royal jelly, bee venom, bee brood among others. Honey, which is a major product in beekeeping, is a sweet natural food and is most commonly consumed in its unprocessed state. It is eaten as food, or incorporated as an additive in a variety of food and beverages. Honey can be consumed whole or mixed with other foods as supplement. It is composed of plant sugars that are readily absorbed by the body. It contains plenty essential vitamins and minerals which are indispensable to all living things. According to Onabe (2005) honey contains 29% of protein, 19% of amino acid, vitamins and minerals for body building. Bee brood and adult bees contain reasonable amounts of protein (Krell, 2006) while royal jelly and pollen are consumed for their high protein value.

Honey and other honeybee products are ingredients used in pharmaceutical industries and in medicines prepared by traditional healers. Bee venom, honey and propolis are used for treatment of many conditions following the antibiotic nature of the products. The conditions treated using bee products include cough, constipation, diabetes, sore, burning, indigestion and arthritis (Famuyide *et al.,* 2014). It has been scientifically confirmed that honey is very useful in treating many diseases such as diabetes, asthma, high blood pressure, disserve, infertility, ulcers, lungs, burns, snake's bite, throat sore (Gidey and Mekonen, 2010). Processed beewax from honey comb is used for diversity of products, often in combination with honey and propolis to produce soap, candles, shoe polish, cosmetics among others. Honey is used for beverage brewing and occasionally served at important cultural ceremonies such as weddings. It is also served to very important guests as sign of high regard. In some African cultures, honey is used to pay dowry (www.auibar.org/component/jdownloads/finish /142/260).

Honeybee products can be marketed locally or abroad to get money, with or without value addition. Beekeeping industry provides incomes to various stakeholders in the value chain. These include bee farmers, artisans, pharmaceutical, food, beverage industry and honey dealers. Stephen (2013) asserts that products from beekeeping are complementary sources of income, school fees and emergency for the family. Mburu, *et al.* (2015) also states that products of beekeeping generate income for the beekeepers and non beekeepers. In spite of the undeniable evidences of the benefits of the entire honeybee products to man, their production and processing are not common in the study area. Majority of the beekeepers are only interested in honey production with very few beekeepers producing beewax, while other valuable hive products such propolis, royal jelly, and pollen often go to waste. Therefore, drawing from the aforesaid, this study attempts to ascertain the respondents' awareness of the different honeybee products; estimate cost and returns associated with honeybee production, and identify the constraints militating against the beekeepers' ability to produce some honeybee products.

MATERIALS AND METHODS

This study was carried out in Kaduna State. Kaduna State is in the North-Western part of Nigeria. The State is located between latitude 11° 10´N and longitude 7° 39´E. Annual rainfall is between 1500mm and 2000mm. The target beekeepers for the study consisted of the women beekeepers of Beekeeping Extension Society (BES). Women in BES were purposively selected for the study because of their active involvement in honeybee

production. A sample of 128 female beekeepers was selected from a sample frame of 256 using simple random sampling technique. Structured questionnaire and interview schedule were used for data collection. Data collected were analyzed using frequency, percentage, means and gross margin analysis (GM). Level of awareness in this study is by comparing the number of beekeepers that are aware of each of the honeybee product to the total number of beekeepers and categorized into high, moderate and low. Awareness level of each product with 72% and above was categorized as high, moderate level was between 71%-60% and low awareness was 59% and below. The mathematical model of GM analysis was expressed as shown:

GM=TR–TVC

Where GM is gross margin (₦); TR is total revenue (₦); TVC is total variable cost (₦)

RESULTS AND DISCUSSION

Awareness Level of Honeybee Products

For a particular product to be produce, people must know about it. Result in Table 1 showed high level of awareness (100% and 93%) for honey and beewax respectively. This is probably the reason why honey and beeswax are the main hive products from beekeeping. Moderate level of awareness (72%, 68%, 61% and 59%) was obtained for pollen, propolis, royal jelly and bee venom while low level of awareness was reported for bee bread; apinarnil and apinanil prop with 5%; 1% and 4% respectively. Finding lends credence to Ramachandra *et al.* (2012) that farmers are unaware of other valuable by-products of beekeeping.

Table 1: Awareness Level of Honeybee Products

Honeybee products	Frequency	Percentage
Honey	128	100
Beewax	119	93
Pollen	92	72
Propolis	87	68
Royal jelly	78	61
Bee venom	76	59
Bee bread	6	5
Apinarnil	1	1
Apinarnil prop	4	4

Cost and Returns of Honey and Beewax Production

Costs and returns in honey and beewax production were estimated and presented in Table 2. An average of 79.23 liters (L) and 22.86 kilograms of honey and beewax respectively was produced per annum. The average total variable cost incurred for production of both honey and beewax of 79.23L and 22.86Kg respectively was ₦21,429 while average revenue obtained for said production was ₦101,957. The average gross margin of ₦80,528 was obtained. The result of gross margin indicates that honey and beewax production is profitable. Further analysis on the extent of profitability of the enterprise gave ₦3.75, implying that for every one naira invested, the beekeeper made a profit of ₦2.75. Finding is

supported by Yahaya and Usman (2008) and Qaiser, *et al.* (2013), whose findings gave an average profit of ₦4.6 and ₦1.47 respectively on every naira invested by the beekeepers.

Finding in Table 2 also show that only 4% and 1% of the beekeepers produced pollen and propolis but no record of the quantity produced. Furthermore, pollen and propolis produced were not sold. This will reduce the amount of profit of the beekeepers. This finding is in agreement with Ayansola (2012), who found that honey and beewax were the major products of beekeeping.

Table 2: Estimated Average Costs and Returns of Honey and Beewax Production

	Items	**Quantity**	Values
A	**Output**		
	Honey output per annum (L)	79.23	
	Beewax output per annum (kg)	22.86	
B	**Returns from honey and beewax production (₦)**		
	Honey		90956.68
	Wax		11000
	Total revenue from bee products (TR)		**101,957**
C	**Variable costs (₦)**		
	Family labour		5671.3
	Hired labour		7256
	Baiting materials		1821.74
	Smoking materials		1157.14
	Transportation		3018
	Packaging		2504.37
	Total variable cost (TVC)		**21,429**
D	**Gross Margin (GM) = TR-TVC**		**80,528**
E	**Returns per naira invested= B/C**		**3.75**
F	**Honeybee products produced but not estimated**		**%**
	Pollen (kg)		4
	Propolis (kg)		1

Constraints Militating Against Production of Some Honeybee Products

Awareness of different honeybee products is expected to translate to production of these products for maximum returns to investments. Contrary to this assumption, overwhelming majority of the beekeepers only produce honey and beewax. Some of the major reasons adduced for not producing all the honeybee products known by the beekeepers were: no equipments and equipment related problems (expensive, sophisticated and not available locally) were reported by 19% of the beekeepers. No technical knowledge on how to produce and harvest these products was reported by 14% of the beekeepers. Result further showed that 22% of the beekeepers were not aware of the market demand for those honeybee products. This response indicates that availability of market is an important driving force for production of all the honeybee products. Another 18% of the beekeepers claimed they were not trained on how to process those products, while others (5%) claimed that their interest is

in honey production only. Furthermore, 15% of the beekeepers claimed they don't know the value of those products while 7% claimed that wax extraction using fire wood is difficult and hectic. Findings on alluded reasons for not producing all the honey honeybee products known by the beekeepers is supported by Nebiyu and Messele (2013) who state that lack of knowledge on the importance of beewax as an income generating hive product compared to honey, lack of processing skills, lack of market, and lack of processing materials were reasons for not producing beewax by beekeepers. Another related publication also states that pollen, royal jelly, propolis and bee venom are hive products which call for experience and specialized skills in production and marketing (www.beekeeping. com/articles/ us/small _bee keeping/hive_ products.htm)

Table 3: **Constraints Militating Against Production of Some Honeybee Products**

Constraints	**Frequency**	**Percentage**
Not aware of their market demands	41	22
No equipments/equipment related issues	34	19
Not trained on how to process	33	18
I don't know their value	28	15
No technical knowledge on how produce and harvest	26	14
Wax extraction using fire is hectic/difficult	13	7
Interest in honey only	9	5
Total	***184**	**100**

*Multiple responses

CONCLUSION AND RECOMMENDATIONS

The results of the analysis showed that honeybee production is a very rewarding and profitable enterprise. Lack of equipment and lack of technical knowledge on how to produce other honeybee products, inadequate knowledge of the values of honeybee products and unassured market were among the major constraints for not producing all the known honeybee products. Few beekeepers reported difficulty of wax extraction. To overcome the constraints identified by beekeepers, it is recommended that:

The beekeepers should be trained on production of different honeybee products by BES. Also information on the value of different honeybee products as well as linking beekeepers to marketing channels/information should be provided by BES.

In beekeeping, some equipment such as honey frames, honey press and solar wax extractor is needed periodically. The individual's may not necessarily own one. Beekeepers were encouraged to pool their resources together, through cooperatives to buy such equipments for collective use by group members.

Donor agencies should complement the effort of BES by providing modern beekeeping equipments that can be jointly use by beekeepers. Furthermore, equipment that cannot be jointly used should be given to beekeepers on soft loan by donor agencies/BES. This will encourage beekeepers to produce as many honeybee products as possible.

REFERENCES

Adinya, I.B., Ayuk, E.A., Akpet, S.O. and Agiopu, B.F. (2008). Determining Costs-Returns Profitability in Honey Marketing in Cross River State, Nigeria. *Journal of Agricultural Economics*, 2: 44-51.

Ayansola, A.A. (2012). An Appraisal of Apicultural Practices in Southwestern Nigeria. *Journal of Agricultural Science*, 3(2): 79-84.

Bees for Development, (2002). Strengthening Livelihoods, Exploring the Role of Beekeeping in Development. *Community Development Journal*, 38(2):166-167.

Fadare, S.O., Ojo, S.O. and Imoudu, P.B. (2008). Analysis of Production Performance of Beekeeping in the Niger Delta Area of Nigeria. *Apiacta*, 43:37-48. Retrieved on July 11, 2012 from www.beekeeping.com/apimondia.org/apiactaus.htm.

Famuyide, O.O., Adebayo, O., Owese, T., Azeez, F.A., Arabomen, O., Olugbire, O.O. and Ojo, D. (2014). Economic Contributions of Honey Production as a Means of Livelihood Strategy in Oyo State. *International Journal of Science and Technology*, 3(1):5-7.

Gidey, Y. and Mekonen, T. (2010). Participatory Technology and Constraints Assessment to Improve the Livelihood of Beekeepers in Tigray Region, Northern Ethiopia. *MEJS*, 2 (1): 76-92.

Gurung, M.B. (2005). Improving the Cash Income of Poor Mountain Households through *Apis Cerana* Beekeeping: An Experience from Nepal; ICIMOD Newsletter from International Centre for International Mountain Development, Khumaltar, Nepal. No. 48:18.

Hilmi, M., Bradbear, N. and Mejia, D. (2011). Beekeeping and Sustainable Livelihoods. FAO diversification booklet 1, second edition. 1-64. Retrieved on November 18, 2012 from www.philipinebeekeeping.com/site/ihttp://dx.doi.org/10.1603/0022-049395.2.2 27.

Hussein, M.H. (2000). Beekeeping in Africa: North, East, North-East and West African countries. *Apiacta*, 1:33-48. Retrieved on July 7, 2012 from www.lrrd.org/lrrd22/5/ okwe22086.htm.

Krell, R. (2006). Value Added Products from Beekeeping. Agricultural Services Bulletin No. 124. FAO Rome. Retrieved on November 26, 2012 from www.fao.org/docrep/w0076e /w0076e00.htm

Mburu, P., Affognon, H., Irungu, P. Mburu, J. and Raina, S. (2015). Beekeeping for Women Empowerment: Case of Commercial Insect Programme in Kitui County, Kenya. Retrieved on June 27, 2014 from https://editorialexpress.com/cgi-bin/conference/ download.cgi?db_name.

Nebiyu, Y. and Messele, T. (2013). Honeybee Production in the Three Agro-ecological Districts of Gamo Gofazone of Southern Ethiopia with Emphasis on Constraints and Opportunities. *Agriculture and Biology Journal of North America*, 4(5):560-567.

Onabe, M.B. (2005). *Handbook on Beekeeping: How to Start Bee Farming.* Heroes Team Publishers: 1-10.

Qaiser, T., Tahir, A., Taj, S. and Ali, A. (2013). Benefit Cost Analysis of Apicultural Enterprise: A Case Study in District Chakwal, Pakistan. *Pakistan Journal of Agricultural Research*, 26(4):295-298.

Ramachandra, T.V., Subash, C.M.D. Joshi, N.V. and Balachandran, C. (2012). Beekeeping: Sustainable Livelihood Option in Uttara Kananada, Central Western Ghats. Retrieved on 10 August, 2016 from www.wgbis.ces.iiernet.in/biodiversity/pubs

Stephen, E.M. (2013). Measuring Rural Beekeepers Benefits Goes Beyond Income, Inputs and Poverty Line. Retrieved on 17 May, 2016 fromwww.apimondia.com

Wilson, R.T. (2006). Current Status and Possibilities for Improvement of Traditional Apiculture in Sub-Saharan Africa. Retrieved on March 28, 2016 from http:/www.map sofworld.com>world-topten-/honet-producing-countries.html.

www.au-ibar.org/component/jdownloads/finish/142/260. The Importance of Beekeeping**.** Retrieved on May 28, 2016.

www.beekeeping.com/articles/us/small_beekeeiping. Hive Products. Retrieved on May 17, 2015 from www.beekeeping.com/articles/us/small_beekeeiping.

Yahaya, A.T. and Usman, L. (2008). Economic Analysis of Kastina State's Beekeeping Development Project. *Savannah Journal of Agriculture*, 3:69-76.

Yoseph, S.M. (2016). The Honey Industry in Comesa: Opportunities and Challenges. *Bulletin of Animal health and Production in Africa*, 207-216