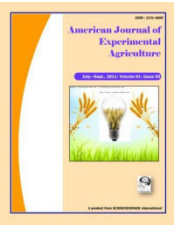

American Journal of Experimental Agriculture
4(2): 183-192, 2014

SCIENCEDOMAIN *international*
www.sciencedomain.org

Assessing the Feasibility of Commercial Meat Rabbit Production in the Kumasi Metropolis of Ghana

J. Osei Mensah[1*], R. Aidoo[1], D. Amponsah[1], A. E. Buah[1], G. Aboagye[1] and N. S. Acquah-Harrison[1]

[1]Department of Agricultural Economics, Agribusiness and Extension, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

Authors' contributions

This work was carried out by cooperation between all authors as team work as follow: authors DA, AEB, GA and NSAH were responsible for the design of questionnaire, data collection and writing of the first draft of this manuscript. Authors JOM and RA supervised the entire research process from idea development to through questionnaire design, data collection and analysis. Authors JOM and RA were also responsible for revising and fine-tuning the draft manuscript into the final manuscript.

Original Research Article

Received 1st July 2013
Accepted 23rd July 2013
Published 7th November 2013

ABSTRACT

Aim: The study aimed at assessing the feasibility of commercial meat rabbit production in the Kumasi Metropolis of Ghana.
Place and Duration: The study was conducted in Kumasi, the capital of the Ashanti region of Ghana between February and May, 2013.
Methodology: Structured and unstructured questionnaires were utilized in obtaining information from two hundred meat consumers and 15 meat rabbit farmers. Data were analyzed using Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost Ratio (BCR)/ Profitability Index (PI) technique, percentages and chi-square contingency test.
Results: The study found that the current demand for rabbit meat is low (36%). The desirable nutritional attributes of rabbit meat and other socio economic factors of meat consumers make the potential demand for rabbit meat high (69%). It was estimated that GH¢5,292 (approximately $ 2672) was needed as a start-up capital for a 40-doe unit meat rabbit farm in Kumasi Metropolis. The cost of breeding animals, housing and equipment

**Corresponding author: Email: mojemmy@gmail.com;*

formed 12.47%, 53.97% and 24.87% respectively of the initial estimated capital. A Net Present Value of GH¢ 5,910.75 (approximately $ 2984) was obtained at the end of the fifth year, with an Internal Rate Return and Profitability Index of 70% and 1.12 respectively. The major constraints identified in meat rabbit production were low price of rabbit meat, shortage of fodder, pest and diseases, high cost of capital, high cost of operating materials and veterinary care.

Conclusion: Based on the analysis it was concluded that meat rabbit production is feasible in the Kumasi Metropolis of Ghana. The study recommends embarking on mass advertisement; farmer association and adapting to new technologies in the production process will help to enhance productivity.

Keywords: Feasibility; commercial meat rabbit; production; Kumasi, Ghana.

1. INTRODUCTION

The global food market is experiencing a lot of transformation and this is predominant in developing countries. These major transformations can be seen in the consumption pattern of animal food products of which is influenced by increased income and improved living standards of large percentage of the populace living in the cities. Animal husbandry has been identified to bring significant household benefits both for short- and medium-term needs and in the long-term for savings [1]. Rabbit production has been identified as an important meat source capable of helping to meet this objective.

In many developing countries of which Ghana is part, the rabbit is reared purposely to achieve protein self-sufficiency for the home. Rabbit production which was introduced into Ghana in 1971 as an alternative for solving the protein shortage has not been given adequate attention despite its potential to meet the animal protein supply [2]. Rabbit production in Ghana can be said to be of less economic importance. This is because its production is left in the hands of children and micro-scale producers. The cost involved in obtaining high quality and healthy meat in the metropolis for consumption in order to meet ones protein requirement is relatively high. This chief evil is manifested as a result of local meat production not keeping pace with population growth, thus forcing the country to depend on meat imports to the neglect of the development and sustenance of the local livestock industry in Ghana [3].

As consumers try to meet their protein needs through the consumption of meat, they try not to compromise on their health. Currently, most meat sold on the market, according to personal interviews with consumers in the metropolis, have been characterized by high levels of fat, high cholesterol and relatively low protein. Rabbit meat is highly valued for its nutritional and dietary properties, because it is a lean meat with less cholesterol than other meats. Table1 shows the nutritional values of rabbit meat as compared to other micro-livestock reared in Ghana.

Table 1. Nutritional Value of various Livestock

Livestock type	Protein (%)	Fat (%)	Calories (g)	Cholesterol(g)
Rabbit	22.8	6.3	1247.4	1559.3
Beef	29.9	10.1	1729.4	2069.6
Pork	27.7	14.8	1701.0	2041.2
Chicken	28.9	7.4	1530.9	2268.0

Source: [4].

With the same levels of feed and water fed to both rabbit and cow, the rabbit can produce six (6) pounds of meat as compared to the one (1) pound produce by cow [5]. Also, there exist little publicity and knowledge on rabbit as a source of meat (food) to supplement the meat obtained from other macro and micro livestock.

Against the fore mentioned elucidation, it can be inferred that meat rabbit can serve as a healthy alternative to traditional meat sources in Ghana. However, rabbit production is predominantly on backyard levels making it difficult for consumers to meet the demand for meat rabbit. In order to meet the gap it is important for rabbit meet production to be carried out on commercial basis. However, in order to invest in commercial meat rabbit production it is therefore practically wise to evaluate its feasibility of such a venture in the country so as to realize these attributes of rabbit meat, hence this study. Also, the constraints that hinder the performance and development of meat rabbit production in the Kumasi metropolis of Ghana would be identified and analyzed.

A critical output from the study would be an indication of the viability of a commercial meat rabbit production. If viable, the results from this study can be used to compile a comprehensive business plan for the meat industry.

A feasibility study is relatively an inexpensive way to safeguard against wasting one's limited resources. According to [6] feasibility studies are undertaken to proof whether the proposed idea will be feasible and thus worth investing resources in. The total feasibility of a project is determined by assessing these four main areas of the proposed project; the market availability, financial feasibility, technical feasibility and analysis of the actual and potential constraints.

A feasibility study is generally defined as a structured way to efficiently organize the information that is needed for confident decision making regarding a specific proposal. Information gathered through the feasibility study is used to prepare a business plan for the proposed business [6].

Rabbit's potential remains unrealized in many developing regions which contribute less than 20% of total world rabbit meat production [7].The potential of rabbit production was assessed in the NEH region of India in the areas of socio-acceptability, eco-viability and techno-feasibility of the production. In the nut shell, rabbit production was said to be highly remunerative in the NEH region as per the analysis made [8].

In a study of rabbit production under tropical conditions in Mozambique, it was realized that production of rabbits in Mozambique has faced various constraints, resulting in low productivity and high mortality rates among young animals. It was concluded, that for rabbit production to be feasible in the country, there is the need to undertake good management practices on the farm [9].

2. METHODOLOGY

2.1 Sampling and Data Collection

Eight communities were selected based on the availability of meat rabbit producers operating in those areas. The selection of the farmers was done using the snowball sampling technique; this is because rabbit farmers are not easy to come by and also there exist no

association of farmers where they could be traced. Selected farmers were interviewed with a structured questionnaire to gather relevant data for the study. Also, convenience sampling technique was used in accessing meat consumers, this is because the total population of meat consumers in the metropolis is unknown hence the easiest population members from which to obtain information are selected. In all, fifteen (15) rabbit farmers and two hundred consumers were selected for the study

The study made use of primary and secondary data. Primary data gathered revealed sources of capital, developmental costs, operating expenses, how sales of rabbit meat is undertaken, sales made weekly/monthly/yearly, litter size and mortality rate of the rabbit in their individual farms was collected from the producers. On the part of consumers, information such as their readiness to substitute the meat they are consuming recently with that of rabbit meat based on the health benefits of rabbit meat, how much of their income is spent on meat, and others that will aid in the assessment of the level of demand of rabbit meat. The secondary data were obtained from published documents, journals, periodicals, the internet, magazines, newspapers, report and other relevant state and non-state institutions that have publications in relation to the study.

2.2 Data Analysis

The Discounted Cash Flow approach was used to determine the financial returns. The study made emphasis on three financial indicators: the Net Present Value (NPV), the Internal Rate of Return (IRR) and the Profitability Index (PI).Descriptive statistics such as percentages was used to analyze the data on the present and future consumption of rabbit meat. Chi-square contingency test was used to determine whether consumption patterns are independent of the socio-economic characteristics of the target market. All challenges indicated by individual farmers were screened for similarities and in order to obtain the overall rankings of the various constraints.

3. RESULTS AND DISCUSSIONS

3.1 Description of Meat Rabbit Farmers

Fifteen (15) backyard meat rabbit farmers having between 20 and 176 rabbits in the study area were interviewed with structured questionnaires to gather data on production, management and sale of rabbit meat in the metropolis. The average years of rearing rabbits among the farmers were 1.8 years. Majority of the farmers were educated (87%) with the highest level of education being secondary level. Forty-three per cent of the farmers had the management of the farm as their main occupation with family as the main source of labour. Most of the farmers (80%) kept the rabbits in hutches made of wood with the remaining keeping the animals in galvanized iron wire. The rabbits were fed predominantly with greens and water as per the farmers' choice. Supplements which were fed where obtained from the compounding of wheat bran, soyabean meal, millet mash, di-calcium phosphate, vitamin premix and common salt. The average litter size was found out to be 4.8 kits per litter.

3.2 Consumers' Access to Information about Rabbit Meat

From the field survey it was realized (as shown by table 2 below)that 88% of the interviewed consumers have had access to information on rabbit meat before while the remaining 12% have heard nothing on rabbit meat as a source of food before. The 88% respondents who

have heard some information on rabbit meat before accessed this information from mostly family and friends.

Table 2. Consumers' access to information about rabbit meat

	Frequency	Percentage
Yes	176	88
No	24	12

Source: field survey (2013)

3.3 Consumers' Perception of the Price of Rabbit Meat

It can be seen from Table 3 below that 2% of the respondents perceived the price per kg of rabbit meat (GH₵ 9.00) as higher while 36 per cent regarded the price per kg to be lower when compared with other substitute products like beef, chevon, and mutton. Also 58 per cent of the respondents perceived the price per kg of rabbit meat as reasonable with 4 per cent recognizing the price as same level with the other meat types.

Table 3. Consumers' perception of price of rabbit meat relative to other meat types

	Frequency	Percentage
Lower	72	36
Same (as competitive products)	8	4
Reasonable	116	58
Higher	4	2

Source: field survey (2013)

3.4 Consumers' Satisfaction with the Nutritional Level of Rabbit Meat

Consumers were asked to indicate whether they were satisfied or not with the nutritional level of rabbit meat. From the field survey (as shown in table 4), it was realized that 30% were indifferent of the nutritional level of rabbit meat while 6 per cent of the respondents were not satisfied with the nutritional level of rabbit meat. Also, 36 per cent of the respondents were satisfied with the nutritional level of rabbit meant while 28 per cent were averagely satisfied with the nutritional level of rabbit meat.

Table 4. Consumers' Satisfaction with the Nutritional Level of Rabbit Meat

	Frequency	Percentage
Not Satisfied	12	6
Moderately Satisfied	56	28
Indifferent	60	30
Very Satisfied	72	36

Source: field survey (2013)

3.5 Empirical Results

3.5.1 Financial feasibility

The data collected from the farmers served as the basis for the assumptions made in this study and the prices of capital items were averages of the prices of the farmers in the study area. The important assumptions made for the financial analysis are presented in Table 5.

Details of the initial estimated capital (GH¢5,292.10) for the 40-doe-unit farm are given in Table 6. The estimated annual operating cost (GH¢ 4,108.65) is detailed in Table 7. The operating cost is subjected to a 9% increment over the period as prices are liable to change over a year; that is the average inflation rate over the last three years.

Table 5. Assumptions made in the financial analysis of a 40-doe-unit meat rabbit production farm

Item	Assumption
Feed per kilogram (GH¢)	0.38
Daily feed supplement per breeding animal (g)	60
Daily feed supplement per fryer (g)	48
Feed spilled (as percent of fryer feed)	8
Repairs (as percent of housing and equipment)	3
Weaning age (wk)	5
Weight at weaning (g)	400
Fryer market age (wk)	12
Fryer market weight (g)	1,300
Fryer selling price (GH¢)	11
Breeder replacement rate (%)	22
Pre-weaning mortality (%)	10
Post-weaning mortality (%)	4
Mortality in breeding stock (%)	3.3
Litter size at birth	4.8
Fryer sold per doe per year(5 litres/doe/yr)	21
Increase in operating cost per year (%)	9
Increase in the price of the fryer from the third year (%)	9
Depreciation (as a percentage of housing and equipment)	20
Contingency (as a percentage of total cost)	10

Source: field survey (2013)

Table 6. Initial Investment for a 40-doe-unit meat rabbit farm

Item	Quantity	Unit cost (gh¢)	Total cost (gh¢)
Breeding stock(40 does,4 bucks)	44	15	660
Housing (3 tier hutches with 9 chambers each)	9	315	2,835
Subtotal (A)			3,495
Equipment:			
Drinkers	84	5	420
Feeders	84	5	420
Kindling boxes	30	3	90
Weighing scale	1	25	25
Spade	1	18	18
Wheel barrow	1	85	85
Buckets	2	4	8
Scoop	1	5	5
Water storage tank	1	255	255
Machete	1	15	15
Subtotal (B)			1,316
A + B			4,811
Contingency			481.1
TOTAL			5,292.1

Source: field survey (2013)

The annual incomes to be generated by the farm during its five year lifespan are detailed in Table 8. Income tends to differ from the third year of operations due to a 9% increase in the price of the fryer from the end of the second year. In the final year, the herd inventory is laid off therefore causing the farm to see an increment in its income level. The only source of income for the farm is from the sale of live rabbit. Table 9 shows the discounted cash flow for the five year lifespan for the farm.

Table 7. One year operating cost of a 40-doe-unit meat rabbit farm

Item	Cost (gh¢)
Feed supplement:	
Breeding (44×365days×0.06kg feed/day@ GH¢0.38 /kg)	366.17
Fryers (840×49days×0.048kg feed/day@ GH¢0.38 /kg)	395.14
Spillage and stock that died (8% of fryer feed)	31.61
Subtotal (A)	792.92
Transportation (GH¢13 per month)	156
Water (GH¢35 per month)	420
Veterinary care (3times visit @ GH¢20 each)	60
Stationery	15
Telephone (GH¢2.5 per month)	30
Repairs	124.53
Labour (2 labourers @) GH¢140 per month)	1,680
Depreciation	830.2
Subtotal (B)	3,315.73
Total (A+B)	**4,108.65**

Source: field survey (2013)

Table 8. Income for each of the five year period

Year	Fryers	Culls	Herd inventory	Total
1	9,119*	110**	0	**9,229**
2	9,119	110	0	**9,229**
3	9,948*	120**	0	**10,068**
4	9,948	120	0	**10,068**
5	9,948	120	528***	**10,596**

** GH¢ 9,119/ 9, 948 = 840fryers- 11 replacement stock @ GH¢11/ GH¢12;*
*** GH¢ 110/ 120= 10culls @ GH¢ 11/ 12; *** GH¢ 528= 44 breeding stock @ GH¢12*
Source: field survey (2013)

Table 9. Discounted cash flow for a 40-doe-unit meat rabbit production

Year	Cost	Returns	Net returns	Discount factor (34%)	Net discount returns	Net present value
0	5,292.1	0	(5,292.1)	1	(5,292.1)	(5,292.1)
1	4,108.65	9,229	5,120.35	0.746	3,819.78	(1,472.32)
2	4,478.43	9,229	4,750.57	0.5569	2,645.59	1,173.27
3	4,881.49	10,068	5,186.51	0.4156	2,155.51	3,328.78
4	5,320.82	10,068	4,747.18	0.3101	1,472.10	4,800.88
5	5,799.69	10,596	4,796.31	0.2314	1,109.87	5,910.75

Source: field survey (2013)

A discount factor of 34% is used to discount the net returns; the discounting factor is influenced by the weighted cost of capital which considers the interest rate and the rate of dividend to be paid. From the analysis of the projected net present value five years after the initial investment, it is evident that the net present value for the production is positive (GH¢ 5,910.75). According to the net present value (NPV) decision rule that specifies that ventures with a positive NPV should be accepted it can be concluded that the commercial meat rabbit farm is financially viable. With the IRR (70%) being greater than the weighted cost of capital, it indicates that the project is worth undertaking. Decision about feasibility based on the NPV alone may be misleading especially where cash is a constraint, therefore the need to calculate the Cost-benefit ratio or Profitability Index. The Cost-benefit ratio for the project is ascertained as 1.12 which implies that for every Ghana Cedi invested a return of GH¢ 1.12 will be obtained.

3.5.2 Market feasibility

Thirty-six percent (36%) of the respondents have eaten rabbit meat before and still consume rabbit-meat. This 36% can be compared to the 38% in Kenya [10] or 31% in Hungary [11] among the general public. These consumers represent the current demand for rabbit-meat in the metropolis and they are more likely to be at least 22 years old with majority being male. They are said to have monthly incomes levels of GH¢ 500 and above. The consumers were said to have received some information about rabbit-meat before with relatives and friends being the main source of information.

Also, 59% of the total respondents agreed that the price of the meat was reasonable relative to the prices of the prevailing meat in the market at the same quantity, 33% of them having tried the meat before. Moreover 68% of the current demand was fully satisfied with the meat's nutritional content. Based on the statistical coefficient of 2.325 and 6.099 for gender and price of the rabbit meat respectively, it can be said that previous and current demand of rabbit meat is independent of gender and the price of the rabbit meat.

Sixty-nine percent (69%)of the respondents expressed willingness to buy rabbit-meat if they were made available in the general market; this represents the potential demand. As demand is backed mainly by price and other factors, it was observed that 67% of the respondents who were willing to buy saw the price per kilogram to be more reasonable with 42% being fully satisfied with its nutritional content. They are more likely to be male with least age of16 years and having income ranging from GH¢ 300. Potential (future) demand for rabbit meat is independent of gender, religion, and the rate of meat consumption of the respondents as per the statistical coefficients of 0.186, 7.493 and 0.998 respectively.

On the part of competition with other meat types in the industry, the rabbit-meat will be having a direct competition with chevon, chicken and mutton, having the highest competition from chicken. Competition was assessed on the basis of price per kilogram of each meat type.

The nutritional content (χ^2=13.160) of the meat was shown to be an important determinant to the current and future demand for rabbit; this affirms that meat consumers desire to consume healthy meat and thus they are much concern about the nutrient composition of the meat they consumed. As the future demand happen to depend on the price of the meat (χ^2 = 24.649), it can be said of the demand for the meat is price elastic, that is demand is liable to changes as the price of the meat changes. The price elasticity of the demand is associated to the several available meat substitutes and also the proportion of income

consumers spend on meat. A similar conclusion can be made for income (χ^2=11.79) as demand tend to depend on the income of the consumers, then the meat can be described as being income elastic; that is the demand is likely to change as consumers income changes.

Since retaining and satisfying irregular customers is much more difficult than maintaining more loyal customers, this is one segment that needs to be grown and the loyal rabbit customers strategies to retain them need to be initiated. That a significant proportion (64 percent) of the general population does not consume rabbit meat, this indicates that rabbit meat consumption is contained within a very narrow band of the population.

From the above expositions, it can be said that with entrepreneurial training, mass media promotion, competitive pricing and overcoming market segmentation, greater assurance of successful marketing may often be realized. Mass media promotion can focus on the low price of the meat and the meats nutritional composition as against the other meat types in the market. As entrepreneurial training is under taken, it will increase supply as more producers will be involved.

As the current and future demand is ascertained, there is much that researchers will also seek to find in order to enrich the industry and ensure its sustenance. Further research could cover the areas of; factors that push consumers to purchase rabbit meat and what are the limiting factors towards consumption of rabbit meat, factors that influences the frequency of rabbit meat consumption. Also research could be done in the area of various marketing campaign aimed at promoting consumption of rabbit meat.

3.5.3 Constraints analysis

All challenges stated by individual respondents (farmers) were screened for similarities after which individual farmers were made to rank the common constraints based on what they consider to be the most binding constraints to production. Mean scores for each constraint were then computed for each for each constraint. The results of the analysis indicated that low price of rabbit meat, shortage of fodder, pest and diseases, high cost of capital, high cost of operating materials and lack of veterinary care were the major constraints faced by the farmers in decreasing order of importance.

4. CONCLUSION AND RECOMMENDATIONS

Upon assessing the financial, market and constraints in meat rabbit production in the study area, it can be said that commercial meat rabbit production in the Kumasi Metropolis of Ghana is feasible. The following recommendations are made to enhance the sustainability of the meat rabbit farming. Firstly, there is the need for the meat rabbit farmers to embark on mass advertisement or campaign of the meat as a source of food as it was observed that few knew it as a source of food with them representing the current demand (36%). Secondly, farmers are to form associations so that they can have good bargaining power. The formation of farmer associations would also enable farmers to pull their resources together to acquire services that otherwise are difficult for an individual farmer to have access to. Also they could be of help to each other as they are in groups in the area of the marketing and production of the meat rabbit. Also, there is the need for farmers to adapt to the new technologies in the production process by the farmers as it was observed that the few farmers who had adapted to the new technologies had a comparably high level of returns. Lastly, on the part of government, there is the need to develop the rabbit sub-sector of the

meat industry as it will help in the reduction of cost incurred in the importation of other meat types to support and help to meet demand for meat in the Ghana.

COMPETING INTERESTS

Authors have declared that no competing interests do exist.

REFERENCES

1. Kristensen E, Schou CK, Kyysgard CN, Madsen J, Henriksen J. Livestock Production - The twenty first century's food revolution, Livestock Research for Rural Development. 2002;16(1).
2. Owen JE, Khalil MH, Afifi EA. A review of phenotic and genetic parameters associated with meat production traits in rabbits. Animal Breed, Abstracts. 1986;54(4):752-749.
3. Frimpong J. A guide to domestic rabbit breeding in Ghana, The farmer's husbandry manual, Nungua Livestock Breeding Station. Fundamentals of Farm Business Management. Hyderabad: Kalyani Publishers; 2009.
4. Van Heerden L, Mentani PS. Rabbit Farming as alternative food security strategy', Agri- Probe. 2010;7(2):4-17.
5. Fullerton G. Meat rabbit production. Thumper Marketing. 02 4997 3112.2000.2-4
6. Thompson A. Understanding the Proof of Business Concept, Perth, Best Entrepreneur; 2002.
7. Lebas F, Coudert P, Rouvier R, De Rochambeau H. The Rabbit, husbandry, health and production. FAO, Animal Production and Health Series. 1997;No.21.
8. Das SK, Buzarbarua KM. Techno- feasibility, Socio- Acceptability and Eco- Viability of rabbit farming in India- A Review. Agriculture Review. 2005;26(1).
9. Dada AC, Demeterova M, Lopes PC. Rabbit production under tropical condition in Mozambique, FAO;2001.
10. Mailu SK, Muhammad L, Wanyoike MM, MwanzaRN. Rabbit meat consumption in Kenya. MPRA Paper No. 41517. 2012. Accessed April 19, 2013. Available at http://mpra.ub.uni-muenchen.de/41517/1/MPRA_paper_41517.pdf
11. Szakaly Z, Szigeti O, Szente V, Polereczki Z. Consumer habits on the market of Hungarian beef and rabbit meat. 4th Aspects and Visions of Applied Economics and Informatics, Debrecen, Hungary; 2009.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history.php?iid=312&id=2&aid=2433