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Assessing Economic Benefits of Cattle Fattening in Sardauna Local Government Area of Taraba State, Nigeria

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Abstract:

The study examines the profitability of cattle fattening in Sardauna Local Government Area of Taraba State, Nigeria. Primary data were collected through the administration of structured questionnaires to 64 randomly selected cattle fatteners. The data were analyzed using descriptive statistics including gross margin analysis, regression analysis and marginal analysis of input utilization. The analysis reveals that cattle fattening is a profitable venture with an average gross margin of \$105.68 per head for a period of three months and \$1,373.85 per farmer. Results of the regression analysis revealed that feeds, labor and fattening duration were the major determinants of weight gain. Additionally, fatteners in the study area could maximize returns by reducing the quantity of feeds and increasing labor input. The study identified high cost of feeds, inadequate extension services and credit facilities as the major constraints to cattle fattening in the study area. Training on feed formulation, improvement in extension services and co-operative societies among farmers for easy access to credit facilities are recommended.

Keywords: Profitability, cattle fattening, costs and returns, resource utilization, sardauna

1. Introduction

The key role played by livestock in enhancing human welfare and growth in agricultural production has been well emphasized in the extant literature (Bamiro et. al., 2015; Gabdo et. al., 2005; Nwafor, 2004; Ogunniyi et. al., 2014; Ojiako and Olayode, 2008; Umar et. al.; 2008). Livestock farming serves as a source of employment, income, farm energy, manure, food requirement, fuel and draft power for cultivation and transportation. Additionally, the livestock industry in 2013 accounted for about 6.6% of agricultural GDP and around 2.3% of national GDP (Central Bank of Nigeria, 2014).

In the African farming system, most farmers keep one form of livestock or the other in addition to crop production. For example, with a good crop harvest livestock provide an important investment opportunity for surplus funds while in a poor crop production year they are sold to buy food for the sustenance of the household. In spite of the roles the cattle sub-sector play in Nigeria, it is shocking that there remains a general lack of information about the costs and returns associated with the enterprise. Many marketers that are into small-scale fattening are always conscious of turnover on their operations hence, the viability or otherwise of the enterprise are determined largely by the corresponding profit margin.

The conducive agro-climatic environment in Sardauna local government area coupled with relatively easy management practices has stimulated high concentration of cattle in the area (TADP, 2005). Notwithstanding the great importance of cattle in the area, studies which could assess the performance of the industry are still inadequate if not lacking. In view of this, the present study describes the socio-economic characteristics of cattle fatteners, determines the costs and returns associated with cattle fattening, determines the inputs and output used in cattle fattening and identifies the major constraints faced by cattle fatteners in the study area.

2. Methodology

The study area is Sardauna Local Government Area of Taraba State, Nigeria with Gembu as its administrative headquarters which came in to existence in 1976. The area is a plateau which is situated in the south-eastern corner of the state and has a total population of 224,437 (NPC, 2009). It is bordered in the north by Gashaka, to the southeast by Cameroun Republic and to the west by Kurmi local government area. Sardauna lies between latitude 6^o 30' North and longitude 11^o 15' East of the equator and covers an estimated land area of 3,885km² (TSP, 2008).

The combination of purposive and snow ball sampling techniques were used in the selection of the respondents. The study area is made up of eleven wards; ten (10) wards were purposively selected because of their fattening activities and eight (8) fatteners were sampled by the use of snow ball technique from each of the wards. A total of 80 structured questionnaires were administered to respondents in Nguroje, Mayo-Ndaga, Ndumyaji, Kakara, Gembu A and Gembu B, Mbanga, Titong and Kabri respectively. At the end, a total of sixty four (64) questionnaires were correctly completed and used for the analysis.

Data collected include Socio-economic Characteristics of the respondents such as age, sex, level of education, household size, sources of capital, farming experience, costs and returns, inputs and outputs relationship and constraints of cattle fatteners were identified and collected. Descriptive statistics was employed to describe the socio-economic characteristics as well as constraints faced by the respondents while gross margin (GM) analysis was used to determine the costs and returns associated with cattle fattening. The GM is specified as:

$$GM = TR - TVC \quad (1)$$

Where,

GM = Gross margin in naira (US\$)

TR = Total revenue in naira (US\$)

TVC = Total variable costs in naira (US\$)

Data was collected on the inputs and output in cattle fattening and multiple regression analysis was used to determine the relationship and the outcome was used to examine resource use efficiency. In this study, we utilize the Cobb-Douglas production function which is expressed in its explicit form as:

$$\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \dots + \beta_7 \ln X_7 + \varepsilon_i \quad (2)$$

Where,

Y = Final weight (Kg)

X₁ = Quantity of Feed Consumed (Kg)

X₂ = Fattening Length (Months)

X₃ = Access to Extension Services (Dummy)

X₄ = Volume of Water Consumed (Liters)

X₅ = Producers Fattening Experience (Years)

X₆ = Man-days of Labour

ε = Error term

The resource use efficiency is calculated using the ratio of MVP to MFC as expressed below:

$$r = \frac{MVP}{MFC} \quad (3)$$

Where, r is the efficiency ratio. If the ratio of MVP to MFC is equal to one, then the given resource is said to be efficiently utilized. An MVP to MFC ratio of less than 1 denotes over utilization of resources while a ratio greater than 1 implies underutilization. Furthermore, to obtain optimal input allocation requires adjustment that will equate MVP to MFC (that is, where r = 1). This percentage adjustment in absolute terms is given as:

$$\text{Adjustment Required} = \left(1 - \frac{MFC}{MVP}\right) \times 100 \quad (4)$$

3. Results and Discussion

3.1. Socio-economic Characteristics of the Respondents

Table 1 reveals that 92.19% of the respondents were male, while female farmers constituted only about 7.81%. This study revealed that men mostly undertake cattle fattening activities in the study area. The implication of this on agricultural production is that male farmers are strong and more active, and have the potential to work for longer hours, given that majority of them were in their middle ages. Their productivity is expected to be higher because of their tendency to operate more efficiently. This assertion supports the view of Norman (1974) who estimated a standard-day equivalent of male adult to be 1.00, while female adult of 15 years and above to be 0.5. Results of age distribution reveal that 10.93% of the respondents were between the ages of 20-29 years, 48.44% ranges between 30-39 years and those within the age range of 40-49 years accounted for about 28.13%. The age range of 50 years and above accounted for only 12.50% of the respondents; while no respondent was below 20 years of age. This indicates that majority (87.50%) of them were in their productive ages and could put in their best in their agricultural activities. The mean age of respondents is about 35 years which shows a youthful age and this has direct bearing on the availability of able bodied manpower for primary production. Results also reveal that 51.56% of the respondents have no formal education at all, while 48.44% attained one form of education or another. This indicates that education may not be a barrier to any prospective farmer who desires to patronize the cattle industry. The mean age of educational background of the respondents is 6 years which reflect primary educational level among the cattle fatteners. This however indicates a very low level of formal education. Majority (64.06%) of the respondents have been in the fattening business for more than six years while, only 35.94% were below six years. This signifies that fatteners with more years of experience may tend to be more efficient than those with less experience. The mean years of experience is about 15 years which is high indicating that these cattle fatteners are experienced in the business and may know the good practices involved. The study indicates that 65.63% of the respondents sourced their capital from personal savings and 17.18% obtained loans from commercial banks. Consequently 12.50% collected loans from friends and relatives while, 4.69% from government institutions. This shows that majority of the respondents

(65.63%) used personal savings to finance their agricultural activities, and this may not be adequate enough to expand cattle production in the study area. Farmers who have access to credit have been found to be more efficient than those who do not, which underscore the fact that credit facilities (financial and non-financial) improve farmers' efficiency (Ajewole and Folayan, 2008).

Socio-economic Variables	Frequency	Percent
Sex		
Male	59	92.19
Female	5	7.81
Age in years		
20-29	7	10.93
30-39	31	48.44
40-49	18	28.13
50 and above	8	12.50
Mean	35	
Educational background		
No formal education	33	51.56
Primary	17	26.56
Secondary	11	17.19
Tertiary	3	4.69
Mean	6	
Experience in years		
1-5	23	35.94
Above 6	41	64.06
Mean	15	
Source of capital		
Personal savings	42	65.63
Loan from Banks	11	17.18
Loan from Friends	8	12.50
Loan from Government	3	4.69
Total	64	100

Table 1: Socio-economic Characteristics of Respondents
Source: Computed from field survey data, 2015

3.2. Analysis of Costs and Returns

Table 2 shows the GM analysis reflecting the costs and returns of cattle fattening engaged by the respondents. The estimated average total variable cost was \$494.51. The average buying price of each cattle was \$381.87 while, the average selling price per cattle amounted to \$600.20. Consequently, average returns per head were \$105.68 and the average return per farmer was \$1,373.85. These findings suggest that cattle fattening in the study area is highly profitable. This result is in consistent with the findings of Mensah and Moses (2005), who reported that cattle fattening gives large amount of profit. The number of fattened cattle was 843 with a total number of 64 respondents. However, the result shows that the cost of bull accounted for the largest share (77.22%) of the total variable cost incurred. About 20.51% of the TVC is due to the cost of feeds. By contrast, the cost of medication, labor and transportation were relatively small. Thus, farmers in the study area spend more money in the purchase of bulls and feeds.

Items	Amount (\$)	Percent of TVC
a. Average cost per head	381.87	77.22
b. Cost of feeds	101.42	20.51
c. Cost of medication	0.98	0.20
d. Cost of labor	5.68	1.15
e. Cost of transportation	4.57	0.92
f. Total variable costs (TVC)	494.52	100
g. Average selling price per head	600.20	
h. Gross Margin per head (g-f)	105.68	
i. Fattened cattle per farmer =13		
j. Returns per farmer (h x i)	1,373.85	
No. of respondents = 64		
No. of cattle = 843		

Table 2: Average Costs and Returns of Cattle Fattening (Per Head)
Source: Computed from field survey data, 2015

3.3. Results on Regression Analysis

Table 3 presents the results of the regression analysis. The coefficient of determination (R^2) is 0.70 indicating that about 70% of the variation in weight gain by cattle is explained by the independent variables used in this model. The coefficient of feed (X_1) is statistically significant and positively related to weight gain. This implies that a one percent increase in the quantity of feed supplied will bring about a 0.78% increase in the average weight gain by cattle. Feed is therefore, an important determinant of weight gain during fattening period. This corroborates with the results of Gabdo et. al. (2005) who found that weight gain of adequately fed cattle increased considerably and maintained that feed is the most essential input in cattle fattening which constitutes the highest percentage of the total inputs. The coefficient of fattening duration (X_2) is also significant and positively related to weight gain by cattle. This result implies that as the length of fattening period is increased, ceteris paribus, weight gain increases. A one percent increase in the fattening duration would result in weight gain by about 0.21%. This suggests that when animals are properly fed, it results in a corresponding increase in the eventual weight gain vis-a-vis duration of fattening.

The coefficient of extension contact (X_3) is surprisingly negatively related to weight gain by cattle; however, it has an insignificant impact. The coefficients of water intake (X_4) and producer's fattening (X_5) experience are positive but have insignificant impacts on weight gain. According to Gabdo et. al. (2005), water intake depends on the temperature, humidity, moisture content of roughages and salt content of feed nutrients hence, for increased productivity, cattle could be given clean water ad libitum. The coefficient of labour is significant and positive. This implies that a one percent increase in the unit of labour dedicated to cattle fattening, will eventually increase the weight gain by about 0.31%. Labor in its simplest term describes the effort of human beings and is considered as one of the most important human capital that enables farmers to achieve their livelihood objectives (Shrestha and Shivakoti, 2003). Jhingan (2007) defines labor as both physical and mental work undertaken for some monetary reward.

Variables	Coefficient	Standard error	t-Statistic
Constant	0.578	1.378	0.420
Feed	0.778	0.086	9.047***
Duration of fattening	0.210	0.055	3.818***
Extension contact	-0.021	0.062	-0.339
Water consumed	0.170	0.155	1.097
Experience	0.118	0.125	0.944
Labour	0.311	0.110	2.827***
R^2	0.70		
Adj- R^2	0.67		
F-statistic	0.0000***		

Table 3: Summary of Regression Results
Source: Computed from field survey data, 2015
Note: *** denotes significant at 1% level.

The result also indicates that the return to scale (RTS) is about 1.57, indicating increasing returns to scale. This shows that a 1% increase in the amount of resources ploughed in to the enterprise would bring about a more than proportionate increase in weight gain. Thus, cattle fatteners in the study area exhibits scale inefficiency and can therefore gain efficiency by increasing production.

3.4. Resource use Efficiency in Cattle Fattening

Table 4 shows marginal analysis of input utilization. The Marginal Physical Products (MPP) of variable inputs used in cattle fattening were examined using the arithmetic mean values of output and inputs and the Marginal Value Product (MVP) for each input was calculated as a product of its Marginal Physical Product and unit price of output. These figures were calculated from the estimated regression coefficients of feeds and labor, being the significant independent variables. The Marginal Value Productivity forms the basis for measuring the resource use efficiency at a given level of technology and also provides a framework for policy decision on resource adjustment.

The Marginal Value Product for feeds was 0.32, which implies that feeds were over-utilized by the respondents and profit from cattle fattening could be increased by decreasing the quantity of feeds given to the cattle. For optimal cattle production, therefore, the quantity of feeds should be decreased by approximately 213%. In contrast, Labor was under-utilized with ratio of its MVP to MFC as 351.09. Therefore, the use of labor for the fattening cycle should be increased in order to increase the weight gain by the cattle and consequently maximize returns. An increase in labor input of about 100% is needed to ensure optimum allocation.

Resource	MVP	MFC	MVP/MFC (r)	Efficiency index	Adjustment Required (%)
Feeds	5,029.87	15,720.38	0.32	Over utilized	212.54
Labor	309,150.93	880.55	351.09	Under utilized	99.72

Table 4: Marginal Analysis of Inputs Utilization
Source: Field survey, 2015

3.5. Constraints Faced by Cattle Fatteners in the Study Area

Analysis of the results in Table 5 indicates that the major constraints faced by cattle fatteners in the study area were high cost of feeds (33.33%). The high cost of feeds could be attributed to inflation, drought and seasonal change, which may consequently lead to scarcity and also make it difficult for farmers to expand their agricultural activities. Farmers' access to effective extension services is an important determinant of efficiency in their production activities. However, inefficient extension services may be as a result of inadequate motivation and transport facilities on the part of the extension agents as reported by 16.67% of the farmers. About 15.63% of the respondents complained of insufficient credit facilities which militate against effective performance of the industry in the study area. Farmers reported that lenders are also reluctant to lend to an individual farmer unless the owners personal net worth can guarantee the loan. Prevalence of diseases was a problem for only 12.50% of the participants, and could be attributed to fewer incidences of diseases since the study area is less vulnerable to cattle diseases. As weight measurement accounted for 11.98%, some of the respondents sell their cattle in terms of size by visual observation and purchase with high bargaining power from speculative middlemen and commission agents. Instability in prices (9.89%) of cattle could be associated to the economy of the country. Also, the non-availability of weighing device that would replace the pricing problems could partly be responsible for the prevailing prices. These identified constraints may not be severe but their combine effects could have a multiplier effect on fattened cattle output leading to loss of weight gain and hence, profit.

Constraint	Frequency	Percent
High cost of feeds	64	33.33
Lack of extension services	32	16.67
Lack of credit facilities	30	15.63
Prevalence of diseases	24	12.50
Lack of weighing scale	23	11.98
Price fluctuations	19	9.89
Total	192*	100.00

Table 5: Constraints Faced by Cattle Fatteners in the Study Area (n = 64)

Source: Field survey, 2015.

*Multiple responses used.

4. Conclusion

This study has revealed that cattle fattening is a profitable venture despite the constraints faced by the participants in the study area. However, profitability could be improved by addressing the identified problems confronting the respondents. Moreover, fatteners in the study area are not maximizing their profit due to over-utilization of feeds and under-utilization of labor: hence decreasing the quantity of feeds and increasing labor input would attract higher profit margin to the fatteners. Result of the regression analysis reveals that feeds, fattening duration and labour have significant and positive effects on weight gain by the cattle while volume of water intake, access to extension services and experience were statistically insignificant. The study therefore, recommends the following:

- Cattle fatteners should be educated on how to formulate feeds through organizing of workshops and seminars as this will reduce over dependence on natural pasture.
- Extension agents should be encouraged to visit cattle fatteners in their farming centers so that they can benefit from improved technology and new innovations, and as well relate farmers' problems to researchers for solutions.
- More credit facilities should be made available by both government and non-governmental agencies to the farmers at lowest possible interest rates, so as to encourage them to boost their fattening business.
- Veterinary inspection of cattle and meat should be encouraged by the farmers in order to avert the vulnerable diseases. Similarly, animal research institutes should also gear their findings to proffer lasting solutions to disease outbreak and;
- Instability in cattle prices can be controlled by introducing weighing scales in both urban and rural markets. This will aid in transforming the markets from the current traditional system to modern marketing system and also provide a solution to pricing problems which is usually done by visual observation and hand feeling methods.

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