



# PROFITABILITY ANALYSIS OF WORKBULL OWNERSHIP AMONG SMALL SCALE FARMERS IN GIWA LOCAL GOVERNMENT AREA OF KADUNA STATE NIGERIA

Abdulsalam Z., T. M. Kudi and Samuel Tanimu

Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria, Nigeria

E-Mail: [zakabdu2001@yahoo.co.uk](mailto:zakabdu2001@yahoo.co.uk)

## ABSTRACT

Utilization of animal traction (work-bulls) in farming is being promoted among small-scale farmers by the government especially in the northern part of the country where there are favourable climatic and soil conditions. In order to determine the profitability of ownership of work-bulls among the small scale farmers, this study was conducted in Giwa local government area of Kaduna State in northern Nigeria. Data on costs and benefit were generated from sixty purposively selected work-bull owners. Simple descriptive statistics and net profit model were the analytical tools used to analyse the data. It was found that the Benefit: Cost Ratios for respondents with ox-drawn ridger only, those with ox-drawn ridger plus cultivator, those with ox drawn ridger plus ox-cart and those with three implements (ox drawn ridger, cultivator and ox- cart) were 1.92, 1.54, 2.10 and 1.79, respectively. These imply that investment in work-bulls with various types of implements is profitable. Furthermore, the payback periods for the work bulls alongside the various implements were found to be 12, 14, 10, and 8 months, respectively. It was recommended that credit should be given to the resource poor farmers to invest in this energy saving technology in view of its profitability and usefulness. This could serve as one way of encouraging entrepreneurship amongst the rural people and as well promote increased agricultural production. This will increase their incomes and improve their standard of living.

**Keywords:** work bull, small-scale farmers, nigeria, payback period, benefit, cost analysis.

## 1. INTRODUCTION

The predominant occupation of the rural dwellers in most parts of Nigeria is farming where the majority of the farmers operate on small-scale using rudimentary tools to cultivate their farm lands. Animal traction, especially work bulls plays an important role in meeting the farm power requirements in many parts of developing world. This is because it is recognized as an appropriate, affordable, and sustainable technology requiring few external inputs and hence relatively low capital investment. (Umar, 2006)

Despite the superiority of tractor over animal traction power in terms of heavy returns, labour and time saving, its purchasing cost, maintenance and availability of spare-parts are major problems which the small scale farmer cannot afford to bear. The government of Nigeria, in its effort to boost agriculture, introduced tractor hiring units with the aim of providing services to small scale farmers to expand area and volume of production, but it was a failure (Kjaerby, 1987). Despite government massive support for tractor mechanization, agricultural production remained low indeed. This of course, may be linked to the fact that most of the small scale farmers who are supposed to benefit from this scheme could ill-afford the tractors and implements. According to Bolaji (1989), the solution to the problem of improving farmers' production lies in the promotion of and encouragement of the use of animal power as an alternative to machine power.

The relative importance of animal traction in terms of availability, affordability and running cost, cannot be over-emphasized. Animals like donkeys, camels, horses, cattle etc. can be used as source of farm power. A

pair of work bulls would allow a farmer to cultivate his land at the optimum time and allow him to earn additional income by hiring out his bulls and plough to other farmers.

Furthermore, utilization of animal traction reduces farm drudgery as trained animals are used to perform different farming operations such as ploughing, harrowing, ridging etc. work bulls can be used for carrying farm inputs and produce. Harif and Sarker (1990) reported that in Bangladeshi, animals are used as source of power for traditional crushing of gin or brown sugar. A study by Dijkman and Campbell (1990) showed that animal traction are used in the oil palm plantation in Columbia to transport bunches of fruit from the trees to the road side for onward transportation to the processing plant.

In Nigeria, due to the problems in the use of tractor, attention has been directed to the promotion of the animal traction, especially in the northern part of the country where there are favourable conditions for its use. The conditions include:

- Vegetation of the area, which is grassland savannah; and
- Availability of livestock particularly cattle that can be used for these operations (Bolaji, 1989).

However, despite these advantages many farmers in northern Nigeria do not own and use work-bull in their farming systems. Furthermore, the opportunities through government initiatives and effort to encourage small scale farmers by mandating Nigeria Agricultural, Cooperative and Rural Development Bank to provide credits to the farmers so that they can purchase and use work-bulls have not been utilized by many of these small scale farmers. This study was, therefore, intended to assess the



profitability of work-bull ownership among small scale farmers. The specific objectives to achieve this aim were:

- (a) Determine the costs and returns in owning work-bulls and implements by small scale farmers in the study area; and
- (b) Determine the pay back period for the invested fund in the work-bull and implements ownership in the study area.

### 1.1 Justification of the study

Many reported investigations on work bulls have been on their utilization, constraints, implements, selection, training and maintenance (For example: Blanch, 1987; Frick, 1988; Otchere *et al.*, 1988; Bolaji, 1989; Harif and Sarker; 1989, and Gefu *et al.*, 1990). However, there is limited information on the cost benefits of owing work bulls by small scale farmers. The availability of such information will definitely provide empirical information on the profitability or otherwise to small scale farmers and also help guide the farmers on whether to embark on animal traction investment.

## 2. MATERIALS AND METHODS

### 2.1 Study area

Giwa Local Government was chosen for this study purposively because it is one of the areas in Kaduna State where animal traction is used in farm operations. It consists of eleven (11) districts with many villages.

The study area covers 3350 square meters and lies 30km north-west of Zaria on the Zaria-Sokoto road. It lies between latitudes  $11^{\circ}$  -  $11^{\circ} 30'N$  and longitudes  $7^{\circ}$  -  $7^{\circ} 45'E$ . The vegetation is of the northern guinea savannah type (Otchere, *et al.*, 1987). The climate in the area is characterized by the occurrence of a wet season between June and September and a dry season from October to early May. The dry season is further divided into a cool-dry season which is referred to as Harmattan period from November to February and hot dry season from March to early May. The main occupation of the people in the area is farming.

The presence of the National Animal Production Research Institute is particularly felt. An outreach programme of research and extension has been carried on in the area by the Livestock System Research Programme of the Institute. This has probably led to adoption of animal traction technology by some farmers in this area than other areas of the state.

### 2.2 Sampling technique and data collection

The sampling population consisted of farmers owing/using work-bulls for crop production and other off-farm activities. Sampling was restricted to only those farmers owing/using one pair of work-bull and accessories during the 2006 farming season. Sixty (60) work-bulls owners were purposively randomly sampled from the villages. Structured questionnaire was administered to collect data from the farmers. The variables on which the data were collected comprised of:

- i) **Production variables** The types and number of operations, land area cultivated (ha), cost of operation using work-bulls and also cost of using human labour.
- ii) **Animal traction investment variables** Cost of work-bull, implements, accessories, cost of feeds, drugs/treatment, and repairs implements
- iii) Revenue (income) generated from using and/or hiring out of work-bulls, implements and accessories (providing service to other farmers).

The study was conducted between February and April, 2007.

### 2.3 Analytical techniques

The techniques that were used for data analysis to achieve the objectives of the study include:

#### 2.3.1 Farm budgeting technique

The budget technique was used to analyze cost, revenue and profitability of operations carried out using animal traction. The farm budgeting technique used was the Net Profit (NP) model. The net profit is the difference between Total Revenue (TR) and the Total Cost (TC). That is;

Net Profit (NP) = Total Revenue (TR) - Total Cost (TC) of using animal traction.

where

TR = Total revenue from operations carried out by work-bulls.

TC = Total cost of investment (this involves both the variable and fixed costs)

The variable cost included items like the cost of feeds, drugs and repairs while the fixed cost included depreciation in farm tools like ridgers, cultivator, carts etc. The straight line depreciation method was used to calculate depreciation of the farm tools.

#### Note

- (a) The cost of animal training, shelter and insurance was excluded as these were not under taken by the farmers in the study areas.
- (b) The estimated salvage value of equipment was based on the valuation of the farmer.

#### 2.3.2 Payback period

This is an undiscounted measure of investment worth. The payback period is the length of time from the beginning of the investment until the net value of the increment production stream reaches the total amount of the capital invested. It is obtained simply by dividing initial investment outlay by the annual net cash flow. As a non-discounted measure of investment worth, the payback period uses the investment cash flow without taking the time value of money into consideration. It is given as:

$$PBP = \frac{\text{Initial Investment Outlay}}{\text{Annual Net Cash Flow}}$$



The initial investment outlay consisted of cost of pair of work bulls, animal traction implements and accessories, while the annual net cash flow consisted of the amount of the farmers realised through the use of animal traction and annual revenue from hiring out animal and implements.

### 3. RESULTS AND DISCUSSIONS

#### 3.1 Costs and returns analysis

The average variable and fixed costs incurred annually and the net profit realised annually by each category of the work-bull owners in respect of the number and type implement owned are presented in Table 1. It was found that the work-bull owners with only implement (ox-drawn ridger plus accessories) incurred an average total cost of N34, 618.35 per annum. This category of respondents realized an average total revenue and net profit of N100, 988.00k and N66, 369.89 respectively. Respondents with two implements each were categorized into two, those with ox-drawn ridger, cultivator plus accessories and those with ox-drawn ox- cart plus accessories. The result revealed that those in the first

category incurred an average of N47, 458.37 as total cost, realized an average of N120, 468.75 as revenue generated and made the sum of N71, 910.80 as net profit. The second category incurred an average of N46, 686.66 as total cost, realized an average of N144, 968.00 as total revenue and made N98, 277.34 as net profit. On the other hand, the respondents with three implements (ox-drawn ridger, cultivator, ox-cart plus accessories) incurred an average of N67, 957.80 as total cost, realized an average N189, 280.00 as revenue and made the sum of N121, 322.22 as net profit.

The benefit cost ratio (BCR) for each category of the work-bull owners in respect of the number and type implement owned are also shown in Table 2. The BCRs for respondents with ox-drawn ridger only, those with ox-drawn ridger plus cultivator, those with ox drawn ridger plus ox-cart and those with three implements (ox drawn ridger, cultivator and ox- cart) were 1.92, 1.54, 2.10 and 1.79 respectively. These imply that investment in work-bulls with various types of implements are profitable since their BCRs are each greater than 1. The ox drawn ridger and ox-cart was however found to be most profitable.

**Table-1.** Costs and returns analysis for work-bulls and various implements.

No. of imp. (a)	No. of Respondent (b)	Average fixed cost (c)	Average variable cost (d)	Average total cost (e) = (c+d)	Average total revenue (f)	Average net profit (g) = (f-e)	Ben : Cost ratio (BCR) (h) = (g/e)
Ox-drawn ridger only	34	906.85	33,711.77	34,618.35	100,988.24	66,369.89	1.92
Ox-drawn ridger + cultivator	16	1099.58	47,458.37	48,557.95	120,468.75	71,910.80	1.54
Ox-drawn ridger + ox- cart	5	1286.66	45,400.00	46,686.66	144,968.00	98,272.34	2.10
Ox drawn ridger, cultivator + ox-cart	5	1477.80	66,480.00	67,957.80	189,280.00	121,322.20	1.79

#### 3.2 Investment cost

For any type of investment it is very important and necessary to know the initial investment (in terms of capital) requirement for effective and efficient distribution and utilization of fund. This would also enable the would-be-investor to raise or source for the required finance.

The results of the analysis as presented in Table-2 shows that respondents with only one implement (ox-drawn ridger and accessories) invested an average of N71, 082.35 for acquiring a pair of work-bulls, implements and accessories. Those with two implements (ox-drawn ridger, cultivator and accessories) utilized an average of N97,

162.50 while those with ox-drawn ridger and ox-cart utilized an average of N95, 540.00 respectively for initial investment outlay. The respondents that owned three implements (ox-drawn ridger, cultivator, ox-cart and accessories) used an average of N102, 120.00 as their initial investment cost.

The reason for the wide differences in the initial investment costs for the various categories of the work-bulls and implements could be attributed to the differences in the size of the bulls, source of implement (locally made or imported), season during which the animals were purchased and breed preference.

**Table-2.** Distribution of respondents according to initial investment cost.

No. of respondent	No. of implement	Type of implement	Average cost of imp + acc. (₦)	Average cost of pair of w/b (₦)	Average total cost of investment (₦)
34	1	Ox-drawn ridger Accessories	4957.35 866.18	65,258.82	71,082.35
16	2	Ox-drawn ridger Cultivator, Accessories	4993.75 3181.25 800.00	88,187.50	97,162.50
5	2	Ox-drawn ridger Ox-cart Accessories	2500.00 18800.00 840.00	73,400.00	95,540.00
5	3	Ox-drawn ridger Cultivator Ox-cart Accessories	5320.00 4100.00 13000.00 1000.00	78,700.00	102,120.00

### 3.3 Payback period

The relevance of payback period to the study was to determine the period farmers (or investors) can pay back the invested capital (money), especially for borrowed money, using the revenue generated from the investment. It was found, as presented in Table 3, that work-bull owners with only an implement (ox-drawn ridger) were able to pay back their initial investment cost outlay (a pair of work-bulls, implement and accessories) in one year. Those respondents with two implements (ox-drawn ridger,

cultivators plus accessories) paid back in about fourteen months while those with ox-drawn ridger, ox-cart plus accessories paid back in about ten months. The respondents with three implements (ox-drawn ridger, cultivator, ox-cart plus accessories) paid back in eight months. These results show that those respondents with more than two implements would be able to pay back for the invested fund earlier than those with one or two implement.

**Table-3.** Payback period according to number of implement.

No. of imp./person A	No. of Respondent B	Average initial cost (₦) C	Average annual net cash flow(₦) D	Payback period (year) E = (C/D)
Ox-drawn ridger only	34	71,082.36	66,369.89	1.07
Ox-drawn ridger + cultivator	16	97,162.50	71,910.80	1.35
Ox-drawn ridger + ox-cart	5	95,540.00	98,272.34	0.97
Ox-drawn ridger, cultivator + ox-cat.	5	102,120.00	121,322.20	0.84

## 4. CONCLUSIONS AND RECOMMENDATIONS

The broad objective of the study was to determine the profitability of ownership of work-bulls among small scale farmers in Giwa Local Government Area of Kaduna State. The results of the study show that owning work-bulls with various implements is a profitable venture. With regard to payback period, majority of respondents were able pay back the initial investment cost in a period of one year. The venture is therefore worth encouraging its adoption by farmers.

Based on the findings of this study, following recommendations are offered:

- Formation of work-bull owners into cooperative societies should be encouraged as this can help the farmers' source for credit facilities and farm inputs (implements, fertilizers, chemicals, improved seeds etc.) to enhance their agricultural production;
- Formal and informal financial intermediaries should assist rural farmers with loans, since the payback period for the investment was about twelve months; and
- Agricultural extension agents should be trained on the skills/techniques of selection, training and maintenance of work-bulls and implements so as to be



well equipped to assist farmers in the effective use of the work bulls and implements.

## REFERENCES

- Abalu G.O.I. 1986. Future Prospects for Food Security in Africa. Paper presented at the symposium on: Towards the year 2000 on Agricultural Policy and African Food Security; Issues, Prospects and Constraints. African studies centre, University of Illinois, Urbana, Illinois USA.
- Adesimi A.A. 1981. Farm Enterprise Combination and Resources use among Small Holder Farmer in Ijebu, Nigeria. In Doss, C. and Olson C. (eds), African Rural Social science Research Network Service. Winrock International for Agricultural Department, Manilton. pp. 110-129.
- Berry S.S. 1984. The Food Crisis and Agrarian change in Africa- A Review Essay. African Studies Review. 27(2): 59-112.
- Bolaji A. 1989. Socio-economic Factors Associated with Draught Animal Utilization in Nigeria. In: J.O. Gefu and E.O. Otchere (eds.) Draught Animal Power Research and Development in Nigeria. Proceedings of the first National Workshop held at National Animal Production Research Institute, June 1989, A.B.U., Shika Zaria, Nigeria. p. 10.
- Blench R. 1987. Social Determinants of Animal Traction in Central Nigeria. Report to Agricultural Research Unit of the World Bank, Washington, DC, USA (Mimeo).
- Dijkman J. and L. Campbell. 1990. Draught Animals on Oil Palm Plantations in Colombia. Draught Animal News. No.13, Centre for Tropical Veterinary Medicine, University of Edinburgh. p. 31.
- Fricke W. 1988. Animal Traction in Nigeria: Impact, Constraints and Current Initiatives. In: Paul S. and Adama Faye (Eds.). Animal Traction for Agricultural Development. Proceedings for the 3<sup>rd</sup> workshop of the West Africa Animal Traction Network, Saley, Senegal. July 7-12. p. 366.
- Gefu J.O., Ahmed H.U., Otchere E.O. and Olorunju S.A.S. 1990. Observation on Animal Power Utilization in the farming systems of Northern Nigeria. In: Paul Starkey and Adama Faye (Ed.), Animal Traction for Agricultural Development. Proceedings of the 3<sup>rd</sup> workshop of the West Africa Animal Traction Network, Saley, Senegal, held 7-12 July, 1988. pp. 382-384.
- Harif M. and Sarker R.I. 1990. Draught Power Requirement and Performance Study of Animal Driven Sugarcane Crushers. Draught Animal News. No.13, p.10.
- Kalkat H.S. and Kaul R.N (undated). Interim Report on the Assessment of Animal-drawn Tool Bars in Local Farming Systems. Agricultural mechanization research Programme. I.A.R. Samaru Zaria, Nigeria.
- Kjaerby F. 1987. Villagization and Crisis: Agricultural Production in Hanang District, northern Tanzania. Project Paper D. 87.4, Centre for Development Research, Copenhagen, Denmark. p. 120.
- Olukosi J.O. and Ogunbale A.O. 1989. Introduction to Agricultural Production Economics: Principle and Applications. Agitab Publishers Ltd. Zaria.
- Otchere E.O., Ahmed H.U., Olorunju S.A.S., Olukosi and Erhabor, and M.S. Kallah. 1988. Utilization and Management of Work-oxen in a Guinea-Savannah Environment in Nigeria. In: Paul, S. and Fadel, N (Eds.) Animal Power in Farming Systems. Proceedings of the Second West Africa Animal Traction Network workshop held September 19- 25, 1986. Freetown, Sierra Leone. p. 237.
- Samuel T., Zakaria A.B., Gana J.M. and Simon M. 1994. Selection, Training and Maintenance of Animal for Traction (work-bull): A Case Study of Giwa Local Government Area of Kaduna State. HND project submitted to D.A.C./ABU Zaria.
- Samuel Tanimu. 2007. Benefit: Cost Analysis of Workbull Ownership Among Small-Scale Farmers in Giwa Local Government Area in Kaduna State. Project report submitted in partial fulfillment of the requirement for the award of Post Graduate Diploma in Farm Management. Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria.
- Umar A.B. 2006. Economic Evaluation of Investment in Animal Traction: Case Study of Katsina State. M.Sc Thesis. Submitted to the Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria.