

Australian Journal of Basic and Applied Sciences, 4(6): 1152-1156, 2010
ISSN 1991-8178
© 2010, INSInet Publication



Utilization of and Constraints on Animal Traction in Jigawa State, Nigeria

M.S. Abubakar and D. Ahmad

Department of Biological and Agricultural Engineering Faculty Engineering, Universiti Putra
Malaysia
43400 Serdang, Selangor Darul Ahsan Malaysia

Abstract: A survey was carried out to investigate the utilization of and constraints on animal traction in Hadejia Local Government Area of Jigawa State, Nigeria. Farmers having five hectares farm size and below were selected for the study. Farmers were categorized into four (4) groups based on their farm sizes, which are Group I – farmers having farm size equal to or less 1 hectare, Group II – farmers having farm size of 2 hectares, Group III – farmers having farm size between 3-4 hectares, Group IV – farmers having farm size of 5 hectares. Thirty (30) farmers were interviewed in each of the groups. A total of 120 sample data were collected and analysed using simple descriptive statistics. Data on breed types, implement and yoke used, source of the work animals, animal feeds and shelter were collected using structural questionnaire and oral interviews. The results showed that Sokoto Gudali bulls were the popular breed (73.3%) of cattle used by the respondents across the four groups while 26.7% of the respondents used White Fulani bulls. Source of work animals were mostly through personal purchased (45.8%) and loan by State Government (33.4%), while very few farmers acquired by inheritance (20.8%). Eighty percent of the respondents used Emcot and Kazaure animal drawn implement while 20% of the respondents used Arava and Strad. Yoke and rope were the common harness tools having 93.3% of the respondents using them while 6.7% of the respondents used combinations of yoke, rope and chain as harness tools. Work animals were training between 4-6 weeks before fully use for farm operations. Feeding of animals was mainly on free range during the rainy season and crop residues during the dry season. The constraints reported by the farmers include lack of funds, inadequate formal education, limited feed resources, few implements are used, disease treatment, lack of shelter for the animals and poor extension services. It was suggested that utilization of animal traction would be increased significantly if more fund are injected in animal traction technology by the state and local Government.

Key words: Utilization; constraints; work animal; traction; Nigeria

INTRODUCTION

Jigawa state, with a population of about 3.5 million people, is blessed with large expanse of agricultural land, rivers and flood plains suitable for crops, livestock and fish production. Out of the 2.24 million hectares total land area of the state, about 1.6 million hectares is cultivable during the rainy season. Over 90% of Jigawa state adults solely depend on agriculture as a means of livelihood (CBN, 1999). Peasant farmers cultivating small land holdings of about 2-5 hectares control agricultural production in the state. Farming is for subsistence as production rarely satisfies the family needs despite the high potentials for market-oriented intensive agricultural production (CBN, 1999). The need to increase power in Nigerian agriculture to supplement and replace human (manual) labour has been recognized. This has led to the introduction of both animal and mechanical sources of power to boost agricultural production (Ladeinde, 1996). Farm mechanization in Nigeria has been generally perceived to be synonymous to the use of tractor and other engine powered machine and equipment for carrying out farm operations. Since early 1970s, Several Nigerian Government Agricultural Programmes such as Operation Feed the Nation (OFN), Green Revolution and Food for all programme, have been geared mainly towards tractorization which have not yielded expected results, for a number of reasons such as; lack of skilled operators and maintenance personnel, lack of suitable implements and spare parts, farm land fragmentation, increases in the cost of tractors and implements (Ladeinde, 1996).

Corresponding Author: M.S. Abubakar, Department of Biological and Agricultural Engineering Faculty Engineering, Universiti Putra Malaysia
43400 Serdang, Selangor Darul Ahsan Malaysia
E-mali: abubakarms@gmail.com, +60172122985

Thousands of tractors were procured and recent investigations shows that over 50 percent of these tractors have either broken down or are unserviceable due to various reasons including; lack of spares, poor operation and maintenance, and the unhealthy national macro-economic trend which has affected adversely tractor and equipment prices (Babatunde, 1996). According to Bepplier and Hummeida, (1985) the accumulated repair costs of tractors may be as high as 1.6 times the purchase price mainly due to inflation. The current high cost of ownership of farm tractors in Nigeria, militates against the use of tractors by majority of the farmers who are poor and live in rural areas. Oni, (1987) attributed some of the reasons for the frequent breakdown of these tractor subsystems to poor quality of fuel and lubrications use, seasonal nature of tractor use and lack of proper preventive maintenance. In developing countries, like Nigeria, the most viable alternative to the use of mechanical power is animal power, supplied by oxen, camels, donkeys and horses. It has been reported that draught animal power utilization could be an alternative to the use of farm machinery and it is better in terms of return to land, labour and capital compared to both manual cultivation and tractor powered mechanization (Abiye and Cirma, 1998; Ingawa, 1987; Havard *et al.*, 1998; Umar, 1997; Shittu, 1996). This study was aimed to investigate the utilization of and constraints on animal traction in Jigawa state and also to make suggestions on the way forward.

Animal Traction in Nigeria:

Several types of animals draft are used in Nigeria, the most important being the bull. The White Fulani, Sokoto Gudali and Zebu are main breeds of cattle employed for traction in northern Nigeria. The use of Animal Traction Technology in Nigeria for agricultural production is dated as far as 1920's. The first demonstration of oxen as a source of power took place in 1922 in northern Nigeria under the initiative of the British government. The technology was introduced to improve groundnut production for export and also to improve the diet and income of the people living in the northern region. The deployment of agricultural officers in the northern region increased the use of animal traction from about 1 000 farmers in 1936 to an estimated 8 000 in 1968 (Musa, 1990). In 1970's, studies were carried on mechanization using oxen and donkeys. A substantial amount of research was carried out over the subsequent 8 years, primarily relating to animal drawn implement. However, not much of the research was tested off-station or adopted by farmers. Table 1 shows the extent of the involvement of animal in land cultivation. The number of work animals available in the country then was about 400,000 (Musa, 1990). The percent of cultivated land area using animal draught was about 6% (Table 1). Work bulls are mostly used in pairs, but sometimes singly, to pull tillage implements for ploughing, ridging, planting and transport. Studies have shown that work bulls develop up to 0.4 kW of power for continuous work, which is about five times the human work capacity (Musa, 1990). There have been attempts to introduce donkeys into soil cultivation operations. After training, it was found that the loading-carrying capacity of the donkeys could be increased by about five times by the use of the cart (Musa, 1990). Horses are also used in Nigeria as draft animal but are only limited to small-scale sugar cane crushing and processing. The output from the horse-powered cane crushers could be as high as 300 kg/hr which is quit well compare to the output of 700 kg/hr from a 7.3 kW an engine-powered crusher (Kalkat and Kaul, 1983).

The following is the overall view of the animal traction technology in Nigerian agriculture reported by (Ajav, 1989);

- (i) Over 2 million farmers spread across 36 states of the federation are actively involved in the use of animal traction.
- (ii) Less than 10% of the 2 million active animal traction farmers exploit the full potentials of animal traction through the use of limited available implements. Most other farmers are only familiar with the ridging and transport equipment and their operation.
- (iii) Most farmers lack animal drawn equipment like ploughs, harrows, planters, weeders and harvesters.
- (iv) Animal traction implements/equipment are mostly produced and maintained by local blacksmiths. These blacksmiths are mostly constrained by insufficient funding, unavailability of raw materials, inadequate workshop facilities and ineffective marketing strategies.
- (v) The feeding system of the animal is range land grazing with inadequate supplementary feed and health care which is a hindrance to optimal power availability and utilization.
- (vi) The available animal traction training centres (ATTCS) are faced with the problems of inadequate funding, poor infrastructure, undefined curricula and poor staffing. This limits the training of farmers and adoption of animal traction.
- (vii) Farmers with training from ATTC have not adopted animal traction due to financial constraints.
- (viii) There are no sustainable credit facilities for the benefit of farmers and blacksmiths in most of the States.
- (ix) The technical details of animal traction are rarely and poorly extended leading to the low and slow adoption of animal traction.

MATERIAL AND METHODS

2.1 Study Area:

The study was carried out in Hadejia Local Government Areas of Jigawa State, Nigeria. The area is located on 12° 26' 53N latitude, 10° 2' 37E longitudes and categorized in hot-dry semi-arid climate with hot summers and cold winters. The mean annual rainfall of the area is about 890 mm and evapotranspiration 1600 mm (Hadejia, 2006).

2.2 Data Collection and Experimental Design:

Farmers having five hectares farm size and below were selected for the study. Farmers were categorized into four (4) groups based on their farm sizes, which are Group I – farmers having farm size equal to or less 1 hectare, Group II – farmers having farm size of 2 hectares, Group III – farmers having farm size between 3-4 hectares, Group IV – farmers having farm size of 5 hectares. Thirty (30) farmers were interviewed in each of the groups. A total of 120 sample data were collected and analysed using simple descriptive statistics. Data on breed types, implement and yoke used, source of the work animals, animal feeds and shelter were collected using structural questionnaire and oral interviews.

RESULTS AND DISCUSSION

Table 2 shows that 58.3% of the farmers across the groups were having non-formal education while 41.7% farmers had formal education. This revealed that farmers in the study area are having low level of formal educational background which may be reason why they do not have interest in adopting animal traction techniques by the extension service workers. The rate of adopting animal traction by the farmers in the study area could have been much improved if farmers had high level of formal education. It seems that animal traction awareness is high among the farmers in the study area but due to lack of sufficient formal education by the farmers detailed knowledge of animal handling and equipment management is lacking by the farmers. Small-scale farmers in Hadejia used draught animals only for farm operations such as tillage, weeding and transport. Other operations like planting and harvesting are still done manually using human labour. Result shows that 20.8% of the farmers across the four groups acquired their work bulls through inheritance, while 33.4% farmers acquired through government loans and 45.8% farmers sourced their bulls by personal purchased. Majority of the farmer (79.2%) across the groups owned their work bulls on individual basis while few respondents (20.8%) owned their bulls as group (Table 2). It was also observed that farmers average income generation in Naira per hectare increases with the increased of their work bulls. This findings is similar that one reported by (Robert, 2008; Bawa and Bolorunduro, 2008).

Table 3 shows that the popular breed (73.3%) of cattle used by the farmers across the groups was Sokoto Gudali bull while 26.7% farmer used White Fulani bull. No any other breed of cattle were used by the farmers in the study apart from the two mentioned. Eighty percent of the respondents across the four groups used Emcot and Kazaure animal drawn implements while 20% of the respondents used Arava and Strad implements. This agrees with study of Ingawa, 1987 that showed that the use of Emcot and Kazaure, Arava and Strad implements can be economically justified over an area of five hectares and below. The common harness tools (93.3%) were yoke and rope by the respondents only 6.7% respondents used combination of yoke, rope and chain as their harnessing tools. All the respondents said work animals were training between 4-6 weeks before fully use for farm operations. Farmers working experience with the bulls ranges between 20-35 years (Table 3).

Table 4 revealed that feeding of animals across the four groups was mainly on free range during the rainy season and crop residues during the dry season. Animals were kept in an open shade mostly under tree.

Constraints on Animal Traction:

Oxen power is relatively cheap compared to alternative farm power from machines. Lack of sufficient funds and inadequate formal education are the major constraints on the animal traction to smallholder farmers in the study area. Farmers compliant about too much bureaucracy and cannot meet the collateral requirements of financial institutions. Work animals are not readily available and are very expensive. Few implements are used, apart from the Emcot and Kazaure toolbars. Other problems were most farmers cannot afford to buy concentrates for work animals, limited feed resources and poor extension services, disease treatment and lack of shelter for the animals.

Table 1: Estimates of areas under different power sources in Northern states of Nigeria

	Power source		
	Hoe	Animal power	Tractor
Number of farmers (million)	7.5	0.1	0.015
Area cultivated (ha/farmer/year)	1.0	5.0	50.0
Total area cultivated annually (million ha)	7.5	0.5	0.75
Percent of total area (%)	86.0	5.5	8.5

Source: Ladeinde 1996

Table 2: Farmers farm size, source of work animal and average income generation

Farmer group	Number of farmers/group	Farm size (ha)	Source of animals		Ownership pattern			Educational status		Average Income generation (Naira/ha)
			AI	AL	PP	I	G	NF	F	
I	30	≤1	20	8	2	10	20	24	6	500
II	30	2	5	10	15	25	5	20	10	700
III	30	3-4	-	12	18	30	-	16	14	1200
IV	30	5	-	10	20	30	-	10	20	2000
Total	120		25	40	55	95	25	70	50	

Key:

- AI= Acquired by Inheritance
- AL= Acquired through Government Loan
- PP= Personal Purchase by the Farmer
- I= Individual Ownership
- G= Group Ownership
- NF= Non-formal education
- F= Formal education

Table 3: Animal breed, implement type and harness tool.

Farmer group	Breed of work (Bull) animal			Duration of animal training (week)	Range of working experience (year)	Type of implement used			Harness tool		
	SG	WF	O			EK	AS	O	YR	YRC	O
I	25	5	-	4-6	20-35	28	2	-	30	-	-
II	25	5	-	4-6	20-35	25	5	-	30	-	-
II	20	10	-	4-6	20-35	25	5	-	30	-	-
IV	18	12	-	4-6	20-35	18	12	-	22	8	-
Total	88	32				96	24		112	8	

Key:

- SG= Sokoto Gudali
- WF= White Funali
- O= Others
- EK= Emcot and Kazaure
- AS= Arava and Stad
- YR= Yoke and Rope
- YRC= Yoke, Rope and Chain

Table 4: Animal draught management and farming pattern

Farmer group	Types of crop grown	Farming pattern	Farm location	Management of animal	Animal shelter
I	Cereals	Mono cropping	Lowland	Free range and crop residues	Under tree
II	Cereals	Mono cropping	Lowland	Free range and crop residues	Under tree
III	Cereals	Mixed cropping	Lowland	Free range and crop residues	Under tree
IV	Cereals	Mixed farming	Lowland	Free range and crop residues	Under tree

Conclusion:

Draught animal power is a sustainable farm power, which can greatly reduce the enormous problems being encountered by the rural farmers. Most small-scale farmers cannot afford the use of tractors therefore animal drawn equipment can provide power and take the drudgery out of land preparation. Meanwhile the following conclusions were drawn for the study;

Sokoto Gudali bulls were the popular breed of cattle used in the area however few farmers had reported using White Funali.

Emcot and Kazaure animal drawn implement was the common implement used by the farmers in Hadejia and yoke and rope were the common harness tools.

The work animals were mostly sourced through personal purchased and loan from State Government while very few farmers acquired by inheritance.

Feeding of animals was mainly on free range during the rainy season and crop residues during the dry season.

Majority of the farmers stated that their animal traction operation activities were not done for commercial purpose.

It was suggested that utilization of animal traction would be increased significantly if more fund are injected in animal traction technology by the state and local Government.

ACKNOWLEDGEMENTS

The authors are grateful by the assistance from Alhaji Ali and cooperation given by the farmers in the study area

REFERENCES

Abiye, A. and G. Girma, 1998. Draught Animal Power and Its Research in Ethiopia. *Agricultural Mechanization in Asia, Africa and Latin America*, 29(4): 15-20.

Ajav, E.A., 1989. *Mechanization Programmes for Rural Farmers in Nigeria*. Seminar Paper, Department of Agricultural Engineering, University of Ibadan, Nigeria.

Babatunde, O.O., 1996. An Appraisal of the Problem of Wheeled Tractors Used in Nigerian Agriculture. *Agricultural Mechanization in Asia, Africa and Latin America*, 27(3): 23-26.

Beppler, D.C. and M.A. Hummeida, 1985. Maintaining and Repairing Agricultural Equipment in Developing Nations. *Trans. Of ASAE*, 66(12): 11-13.

Bawa, G.S. and P.I. Bolorunduro, 2008. Draught animal power utilization in small holder farms – A case study of Ringim Local Government Area of Jigawa State, Nigeria. *Journal of Food, Agriculture and Environment.*, 6(2): 299-302

CBN, 1999. Central Bank of Nigeria: Annual Report and Statement of Accounts for the year.

Hadejia, 2006. Hadejia Encyclopaedia Britannica.

<http://www.britannica.com/EBchecked/topic/251075/Hadejia>

Havard, M., G.L. Thiec, and E. Vall, 1998. Stock Numbers and Use of Animal Traction in Sub-Saharan French Speaking Africa. *Agricultural Mechanization in Asia, Africa and Latin America.*, 29(4): 9-14.

Ingawa, S.A., 1987. Supplementary report on crop-livestock system in Nigeria. Report to Agricultural and Rural Development of the World Bank, Washington, DC, USA.

Ladeinde, M.A., 1996. Animal Traction as an Alternative Source of Power for Agricultural Development. Proceedings of the National Workshop on Appropriate Agricultural Mechanization Practices at the National Centre for Agricultural Mechanization Ilorin, Nigeria, 26–28: 84-194.

Musa, H.L., 1990. Development and Use of Animal Drawn Implements in Nigeria. Proceedings of the First National Workshop on Draught Animal Power Research and Development in Nigeria. ABU, Zaria, Nigeria.

Robert, E.S., 2008. Cattle's effect on land and labour productivity: Evidence from Zambia. *Journal of International development.*, 20(7): 905-919.

Shittu, M., 1996. Production, Management and Utilization of Draught Animals for Animal Traction. Proceedings of the National Workshop on Appropriate Agricultural Mechanization for Skill Development in Low-cost Agricultural Mechanization Practices. At the National Centre for Agricultural Mechanization, Ilorin, Nigeria, 26-28: 5-198.

Umar, M.A., 1997. Zamfara State Report on Animal Traction. Proceedings of a National Training Workshop on Animal Traction For Agricultural Development in Nigeria. National Centre for Agricultural Mechanization, Ilorin, Nigeria., pp: 61-63.