Animal traction as a source of power for agricultural development in Nigeria

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Abstract

Nigerian farmers have small farm holdings and considering their economic status cannot afford gigantic machinery for their operations. There is inadequate credit facilities to purchase farm machinery. Draught animal power can greatly reduce the enormous problems being encountered by Nigerian farmers due to scarce tractor services. This paper discusses animal traction as an alternative source of power for agricultural development in Nigeria.

Introduction

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. Several Governments agricultural programmes such as Operation Feed the Nation (OFN), Green Revolution and Food for all programme etc. placed emphasis on tractorization (Ladeinde, 1996). 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. This is further compounded by the fact that the tractors that are available for direct use or hiring services are often grounded due to tractor systems failure. Oni (1987) attributed some of the reasons for the frequent breakdown of these tractor sub-systems to poor quality of fuel and lubrications used, seasonal nature of tractor use and lack of proper preventive maintenance.

All these pathetic situations, therefore, calls for exploring once more other possible alternative of farm power systems such as the draught animal power for mechanizing farm operations.

Animal traction technology in Nigerian agriculture

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).

The current animal traction areas of the country can be classified into four distinct regions, namely:

- Active Animal Traction Region (AATR)
- Semi-Active Animal Traction Region (SAATR)
- Introductory Animal Traction Region (IATR)
- None Animal Traction Region (NATR)

Each of the current animal traction states in the country can be appropriately grouped into one of these regions as indicated in Figure 1.

The following is the overall view of the animal traction technology in Nigerian agriculture;

(i) Over 2 million farmers spread across 19 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.

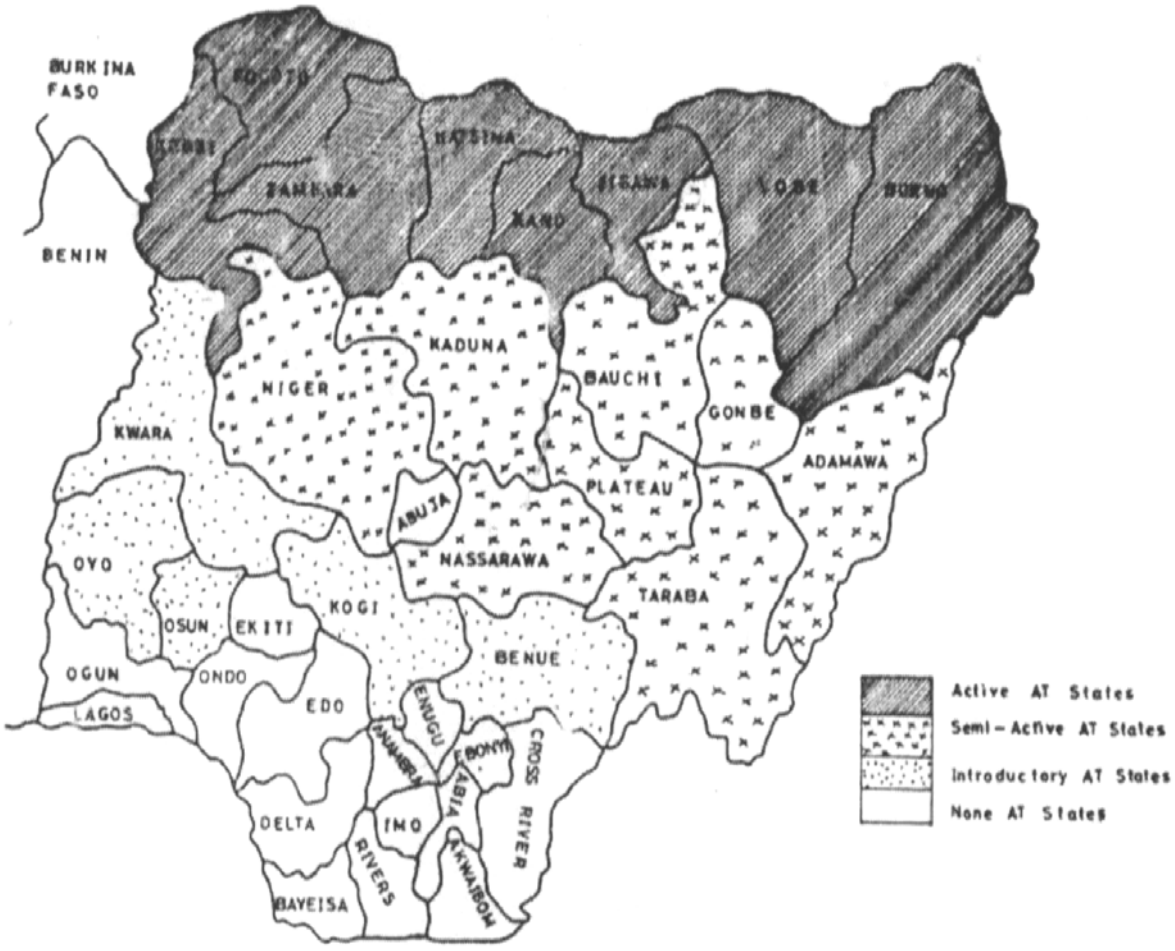
(iv) Animal traction implements/equipment are mostly produced and maintained by local blacksmiths. These blacksmiths are mostly constrained by insufficient funding, unavailability of raw materials, inadequate workshop facilities and ineffective marketing strategies.

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

Figure 1: Distribution of animal traction development in Nigeria.



(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.

In order to illustrate the trends of animal traction at the State level, an example is given below of Zamfara State where animal traction is practised (Umar, 1997).

Tables 2 - 4 show the trends with respect to the following:
(i) Existing farming system, operation, crops grown and species of traction animal used,
(ii) Personal statistics of farmers and working experiences.
(iii) Traction animal management and income generation.

Possible utilization of animal traction equipment in existing farming systems

Draught animals are mainly used for tillage, seeding, weeding and interculture. However, there is a considerable scope of utilizing them during idle periods on many stationary jobs requiring their rotary mode of operations. Concern for sustainable transport modes is increasing. Much food production wastes can be said to be a result of inadequate agricultural transport. Transport to distant villages or even the nearby towns to sell farm produce at good prices pose an enormous obstacle to increase in rural productivity. Oxen drawn carts can be used to provide transport and can also be used by women for collecting firewood and conveying farm produce to markets.

The following implements have potential for animal power:
(i) Disk harrow, it is available in half tandem (6 disc, single action and offset design, 8 discs double action). These are useful for wheat and rice growing areas, and have scope for use in Fadama.
(ii) Puddler: This can be used for puddling rice field.
(iii) Bund former: It is a tool used in making bunds for efficient use of irrigation water.
(iv) Seed-cum-fertilizer drill: This drill can be used for planting rice, wheat sorghum, millet, etc. Fertilizer can also be applied simultaneously. While seed cum fertilizer planter can be used for planting bigger seeds like maize, groundnut, cow pea and cotton on flat.
(v) Inter-row cultivator: useful implement for weeding.
(vi) Land leveler: This tool is important in leveling fields for proper water application.
(vii) Tropicultor: It is a multipurpose animal-drawn wheeled tool carrier. It is capable of performing many types of farm operations under different soil conditions. The tool has several unique features such as adjustable wheel track, lifting and lowering implements like traction.
(viii) Thresher: Wheat crop can be threshed very smoothly with the use of "Oplend thresher".
(ix) Processing machinery: The animal drawn oil extractor can be used to extract oil from oil seeds (i.e groundnut, mustard, guma seed).
(x) Sugarcane crusher: With the use of work animals to drive the sugarcane crusher, juice can be extracted from sugar cane.
(xi) Water lifting device: With this device, the burden of water lifting by the rural women can be reduced.

Ox drawn water bowsers can be used to fetch water by women in groups to transport larger volumes thereby reducing the burden of repeated visits to water sources. The time so saved can be used to participate in functional literacy, and the experience gained to further enhance group organizational capacities.

Constraints on wider use of animal traction

Resistance to adoption can be said to be largely responsible for the slow use of animal power. Claims of disease, non familiarity often cited are no longer real. An extension programme can break this resistance. Oxen power is relatively cheap compared to alternative farm power from machines. Although the relative convenience of a 12 hp machine is attractive, the initial capital outlay is an obstacle to this technology.

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 and oxen drawn equipment can provide power and take the drudgery out of land preparation.

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With appropriate research and development, the prospect of making agriculture responsive to the changing situations to increase productivity should be possible. The role of animal traction in the intensification of agricultural production of Nigeria seems to be enormous.

Table 2: Existing farming system (Source: Umar, 1997)

S/No.	Local Govt.	Type of operation	Type of crops grown	Farming pattern	Draught animal power/ breeds of work bull*
			CR LG RC HT		
1.	Gummi	All operations	5 5 5 5	4 both, 1 Sole	Bull Sokoto Gudali
2.	Anka	Ploughing not applicable	5 5 5 5	5 both	Bull/Gudali/WF
3.	Bukkuyum	= do =	5 5 4 5	5 both	= do =
4.	Maradun	All operations	5 5 5 5	5 both	Bull Sokoto Gudali
5.	Kiyawa	= do =	4 4 2 -	4 mix	= do =
6.	Talata-Mafara	= do =	5 5 5 3	5 both	Bull Sokoto Gudali
7.	Bakura	= do =	5 5 5 5	5 both	Bull Sokoto Gudali
8.	Bungudu	= do =	4 4 1 4	3 both, 1 Sole	Sokoto Gudali/WF
9.	Chafe	= do =	4 4 1 2	4 both	= do =
10.	Shinkafi	= do =	5 5 - 1	5 both	Bull Sokoto Gudali
11.	Kaura Namoda	= do =	5 5 1 3	5 both	= do =
12.	Gusau	= do =	4 4 2 4	5 both	= do =
13.	Zurmi	= do =	4 4 2 4	4 both	Bull Gudali/WF
14.	Maru	= do =	4 4 4 4	4 both	= do =
			When at least one crop from a group is grown it is considered as full grown.	Majority practice mix farming pattern, this is mainly due to lack of land.	Sokoto Gudali are mostly employed due to their availability and adaptability to the weather, they are also believed to be docile and hard working.

* Bulls are generally worked for average of 5 hours per day during early morning starting from about 6.00 a.m. Bulls of about 4 years cost between N 20,000.00 to N 25,000.00, while younger ones of about 11/2 years costs between N 10,000.00 to N 15,000.00.

KEY: CR - Cereals 100% LG - Legumes 100%
RC - Root crops 95% HT - Horticulture 95%
SG - Sokoto Gudale 100% WF - White Fulani 90%

Table 3: Statistics of farmers: educational status and working experiences

S/no	Local Govt.	No. of farmers	Ownership pattern	Educational status			Size of farm in Hectare	Type of farm upland/ fadama	Range of working experience (yrs)
				Primary	Secondary	Others			
1.	Gummi	5	Individual	2	-	3	5	both	30-60
2.	Anka	5	Individual	2	1	2	5	both 4/irri.	30-43
3.	Bukkuyum	5	Individual	4	-	1	5	upland/F	-
4.	Maradun	5	Individual	-	-	5	1.5	upland/F	-
5.	Kiyawa	4	Individual	3	-	1	1.5	upland for	16-35
6.	T/Mafara	5	Individual	-	-	5	1.5	all	15-30
7.	Bakura	5	Individual	-	-	5	5	upland/irr	-
8.	Bungudu	4	Individual	-	2	2	1.5	both/irri.	20-34
9.	Chafe	4	Individual	1	1	2	1.5	upland	8-17
10.	Shinkafi	5	Individual	5	-	-	1.5	upland	2-40
11.	K/ Namoda	5	Individual	1	2	2	1.5	upland	5-25
12.	Gusau	4	Individual	-	1	3	1.5	upland	15-35
13.	Zurmi	4	Individual	-	-	4	1.5	upland	25-30
14.	Maru	4	Individual	-	-	4	1.5	upland	15-30
	Total	64 Farmers	100% individual	18 22%	7 9%	39 69%	100% < than 5ha		

Source: Umar, 1997

Table 4: Draught animal management and income generation (Source: Umar, 1997)

S/No.	L/Govt.	Income generation Naira /ha	Management of animals*	Housing	Implements	Harness tool
1.	Gummi	-	CSC-G.nut hay	Open shade	RSP	RYC
2.	Anka	200:00	Rohage c/stock	Open shade	RSP	= do =
3.	Bukkuyum	800:00	= do =	= do =	R	R
4.	Maradun	-	Concentrate/roughage	Open shade	-	-
5.	Kiyawa	400:00	= do =	= do =	PW	R
6.	T/Mafara	500:00	= do =	= do =	PR	R
7.	Bakura	-	= do =	= do =	PR	R
8.	Bungudu	-	= do =	= do =	RWC	R
9.	Chafe	600:00	= do =	= do =	Rwe	Ra:W
10.	Shinkafi	600:00	= do =	= do =	PR	RY
11.	K/Namoda	1000:00	= do =	= do =	P	RY
12.	Gusau	700:00	= do =	= do =	RWT	YCR
13.	Zurmi	1000:00	= do =	= do =	RWT	R
14.	Maru	-	= do =	= do =	H	CYR
			= do = The source of the concentrate and the roughage is from farm produce.	Over 90% do not provide any shed for their animals		

\+ Source of animals are mostly through purchases, while in about 20% of cases it is acquired by inheritance.

\- The working life span ranges between 2-8 years with 5 2 years as average.

\- Farmers acquire training through mobilizing and ATTC. Training of both animals and operator can take a duration of between 7 days to sometimes 3 months.

RANGE: N 400.00 - N 1,000.00 per hectares.

KEY: R = ridger; S = sprayer; P= plough; W = weeder; C = cart; T= transport; H= harrow; R = rope; Y = yoke and C = chain.

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