

Role of draft animal power in Ghanaian agriculture

by

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Abstract

Draft animal power in Ghana was first introduced into the dryer north of the country in the 1930's to support the production of cereals and other export crops. Today there are over 35,000 pairs of work oxen out of a total cattle herd of 1.2million. Nearly 15,000 donkeys are being used as draft animals especially for carting. The use of animal traction as an efficient means of production to save labour and reduce drudgery is concentrated in the Northern region which holds about all of the national work oxen. There are only a few other areas in the central part of the country where animal traction is being introduced. Most work animals are oxen, but in the Upper East Region many farmers use bulls. Donkeys for ploughing and ridging are used especially by women groups and farmers in the upland areas, and along the borders where cattle rustling is on the increase. No horses or cows are used for traction. This paper discusses the current status and potential of animal draft power utilisation in the country and the role played by the various stake-holders; scientists, extensionists, blacksmiths, farmers and development workers. Churches and non-governmental organisations (NGOs) have been in the fore-front in pushing the technology among resource poor farmers over the years. Tamale Implement Factory (TIF) and a host of village artisans (some trained by TIF) have been manufacturing implements for farmers use. Among the many constraints associated with animal traction, dry season feed and water, cattle rustling, lack of spares, poor quality implements, lack of animals and cultural practices are reported by farmers as most important.

1. Introduction

Animal traction (AT) technology was introduced in Ghana by the British colonial government in the 1930s. The technology is widespread in the North of the country especially in the Upper-East, Upper-West and Northern regions where the tradition is deeply rooted. There are few places in upper Brong Ahafo, parts of Ashanti, Volta, Greater Accra and Eastern regions where animal traction is being gradually introduced.

Animal traction is mainly employed for ploughing, ridging and transport of farm produce. Little animal power is used for planting, weeding, harvesting and threshing. In many parts of the country animal traction is seen by many farmers, researchers and policy makers as an appropriate, affordable and sustainable technology, requiring few internal inputs. Work animals are providing farmers with vital power for crop production and transportation to reduce the drudgery and intensity agricultural production, so raising living standards throughout the communities to benefit men, women, young and old.

It is believed the efficiency of labour in Ghana's agriculture could be increased several

fold if animal traction and animal-drawn implements would replace the current method of land preparation and crop cultivation. Current practice is for most smallholder farmers to use the hand hoe and cutlass. The regional distribution of animal traction farmers, local artisans producing and repairing the animal-drawn implements has many shortcomings. Availability of animals for work, research facilities, management and health constraints and socio-economic problems are not well known or documented.

1.1 Objectives

The main objective of this paper is to report the findings of an animal traction technology resource mapping study carried out to establish a complete databank on numbers and distribution of draft animals and related infrastructure as well as promotional policies and strategies in Ghana.

Specifically, the project sought to document identifiable animal traction technology infrastructure in Ghana in the areas of:

- work animals availability in the country,
- implements in use and repair needs,

- ox-carts and donkey carts in use and repair needs,
- blacksmith and artisanal support,
- breeding centres and local sources of work animals,
- research work in animal traction and training centres,
- constraints facing animal traction development in the country.

The results of the study are intended to assist in the development of animal traction policy and technology generation in areas that are viewed as critical in pushing forward the frontier of the technology.

Important beneficiaries include district and regional agricultural development programmes, manufacturers, importers, distributors of animal-drawn implements and spare parts, non-governmental organisations, researchers and extension staff involved in the development and promotion of animal traction.

2. Historical perspective and developments

2.1 Animal traction history in Ghana

Animal traction technology was introduced as an alternative farm power source for tillage and transport in the Northern regions in the 1930s. Training centres were established at Zuarungu (Upper East Region) in 1934. Bawku, Navrongo and Tamale had centres built in 1938. The use of the technology was catching up well with farmers until the advent of independence in 1957. At this time the Government's agriculture expansion programme saw tractors imported in large numbers, into towns and surrounding areas where AT training centres had been set up. The relative speed for doing work with tractors and the government subsidized lower cost of tractor services reduced interest considerably in the use of the AT technology. Since then, the promotion of AT technology has been left to be promoted by Churches and other NGOs. They provide training and credit facilities to farmers to acquire animals and implements.

The situation remained unfavourable until 1974, when the Ghana-German Agricultural Development Project (GGADP) intervened to give it a new boost. This project was set up initially as a fertiliser project, with the primary objective of distributing and encouraging the use of chemical fertiliser. Realising the existing tillage problems in the regions, the GGADP decided to encourage animal traction. In this regard, training stations were opened

and stocked with the necessary training materials, and implements to train interested farmers. Bullock banks and an implement factory were established by the project to assist interested farmers.

2.2 Present situation

Until recent times, cattle in Ghana have been raised for meat and have not been improved for milk production or draft. The Ghanaian local cattle, the N'dama and the West African Short Horn (WASH) have much lower nutritional requirements, are more resistant to diseases and can withstand periods of feed scarcity and drought. Important draft cattle breeds in Ghana are reared by Fulani nomads who are not settled agriculturists. Most of the zebus coming from the drier sahelian regions are able to withstand the heat stresses, but find it difficult to survive in areas of high tsetse challenge.

The dwindling stock of old tractors in private hands, coupled with high prices of tractors and the high interest rates compel many farmers to opt for draft animal power services in the Northern part of the country. Animal traction is mostly used in upland areas where the soils are fragile. There are over 35,000 pairs of work oxen, and nearly 15,000 donkeys being employed by Ghanaian farmers (see Table 1).

Most work animals are bullocks (oxen), but in Upper East Region some farmers also use donkeys. Donkeys are mainly used for transport on single donkey carts, but there is an increasing interest to use donkeys also for ploughing and ridging. Working cows are not employed by farmers especially in the predominant muslim communities in the North.

2.2.1 Transitional zone and Coastal Savanna

In Greater Accra, Volta, Brong, Ahafo and Ashanti Regions together, there are less than 60 pairs of working bullocks and less than 50 working equines. Constraints include limited ownership of cattle, hence, small number of bullocks to select from, lack of knowledge of animal traction, extensive farming systems based on shifting cultivation, and heavy clayey soils in certain locations.

Table 1. Summary of cattle and work oxen census in Ghana (1996).

Region	Oxen pair	Bulls	Young bulls	Bullocks	Cows	Heifers	Zebu	Sanga	Ndama	WASH
Upper West	5000	14037	19917	19735	90127	58358	25226	37538	5614	157692
Upper East	21065	23213	23184	26354	76104	34387	9510	6032	2327	196848
Northern	9088	26422	43856	27246	90127	70891	31657	42112	3830	350236
Brong Ahafo	15	105	4351	1246	22261	8662	7235	11652	3843	27262
Volta	15	3293	10189	5148	48536	22367	6434	54082	1900	50510
Ashanti	5	1535	1922	825	8959	4064	3243	8482	3009	6800
Greater Accra	15	1710	7242	1928	29732	13686	5124	51809	1545	9151
Eastern	3	1639	6314	1324	22016	12492	6206	21381	2256	23851
Central	0	329	819	341	3635	1461	534	4640	551	1917
Western	3	254	344	355	2016	924	194	847	142	3607
Total	35209	77537	118138	84502	39351 3	227292	95363	23857 5	25017	827874

Several projects being funded by International Fund for Agricultural Development (IFAD), are promoting the use of animal traction in the transitional zones at Techiman (Brong Ahafo) and Nkwanta (Volta), but the adoption rate is low. As the technology is relatively new, support services including implement supply and repair, proper selection, training and re-training of interested farmers as well as financial assistance seems to be necessary for sustainable animal traction development. The few farmers who have been assisted to obtain animal drawn carts have found them profitable mainly because of hiring services to others.

2.2.2 Northern, Upper East and Upper West regions

The three regions contain nearly all the 35,000 pairs of work oxen and all the donkeys being used by the farmers (see Table 1). In these regions there are sufficient cattle and animal traction has been used for many years. The adoption rate in certain areas especially Upper East and the Sissala areas in Upper West is very high. The Technology suffered severe set-backs in the region during the periods immediately following independence in 1957 when government embarked on tractor mechanization schemes.

From 1985 to date, many farmers have embraced animal traction. Cotton production which is concentrated in the North is one cash crop that is increasingly dependent on draft animal power especially for land preparation. Bobabee et al. (1997), confirmed that of more than 35,000 ha under cotton, animal power is

used to cultivate 25% of the area. Tractor and manual labour contributed 74.4% and 0.6% respectively. There are indications that with increases in the cost of tractors, their spare parts and imported fossil fuels, many more cotton farmers will be adopting animal traction for crop production in future. Animal traction activities in the Eastern part of Northern Region suffered a set-back due to the recent ethnic conflict.

2.2.3 Animal drawn implements

The majority of the available animal drawn implements are copies of the Eberhardt implements imported from Germany. Few Bourignon ploughs from France and Emcot ridgers are also available with the farmers. Copies of the popular Eberhardt ploughs are made by the Tamale Implement Factory (TIF) and also by many blacksmiths in the Northern regions. The implements made by the TIF have bent beams to which ploughs are fitted with imported shares and mouldboards. The type of bent beam does not allow correct depth adjustment, especially when hitched to the small WASH bullocks.

Implements made by blacksmiths have similar problems, but also lack good workmanship. Ploughs and ridgers are manufactured in preference to weeding implements which are hardly seen in the country. Ploughs are popular in all the regions except the Upper East Region and the East and West Mamprusi districts of the Northern Region, where ridging is the popular primary tillage practice. The widest range of implements including peg-tooth harrow, row market, planter and weeding

cultivator are used by the Sissala ethnic group in the Tumu and Lambussie districts of Upper West Region.

So far region-specific implement development based on the actual farmers' needs taking into account the agro-ecological conditions have not taken place. It seems that the drafts of the available implements (ploughs and ridgers) are too high for the small WASH bullocks. Other implements like weeders and groundnut lifters, as well as light implements suitable for small bullocks and donkeys are not available.

2.2.4 Tillage practices

Ploughing and ridging are the main tillage systems. Ridging as a primary tillage practice is well adopted in the Upper East Region. More appropriate soil and water conservation tillage practices based on tied-ridging, ripping and direct planting technologies are less common.

2.2.5 Animal drawn transport

Single donkey carts are widely used in the three Northern Regions, much more than bullock carts. Many women and children use single donkey carts to transport building materials, water and the farm produce. Animal drawn carts have proved effective and economically attractive for rural transport. This is evident by a high demand and supply of carts from the Tamale Implement Factory, and many artisans in Kumasi. The two-wheeled bullock and donkey carts are somehow standardized and partly made of scrap materials, particularly the axle. The more expensive double-axle carts are being promoted by few projects, but production has not been taken over by local artisans.

2.2.6 Research

There has been some socio-economic research relating to animal traction in Northern Ghana. Systematic testing and durability trials, research and development of animal drawn implements have not developed. Imported collar harnesses for donkeys and bullocks have been modified and promoted by the Animal Traction Centre under the Agricultural Research Station, Nungua. The adoption rate is low. The innovative double collar harness developed by blacksmiths and farmers at Kalijisa and other parts of the Builsa districts needs support for widespread adoption among the emerging donkey users. Improving the widely used uncomfortable double withers

yoke for bullocks is also attracting research attention.

2.2.6 Training and extension

The rising interest in animal traction farming calls for expanded training programmes on the technology at all levels including farmer training. Animal traction at Farm Institutes and Agricultural Colleges is frustrated by lack of facilities such as animals, implements teaching manuals, literature and experienced instructors.

With the exception of few extension staff frequently involved in training farmers and bullocks, and often supported by NGO's most of the frontline staffs have limited skills and exposure in training farmers and animals. Besides, there is a need for animal traction extension materials.

Most artisans have only few basic tools and equipment to manufacture the implements and spares. They copy the existing implements especially the bent beams without knowing the effects of the design on the animals. Teaching of basic agricultural engineering requirements for animal drawn implements is needed for them to be able to improve the designs. With the establishment of three steel mills in the country which siphon the scrap metals in the system as raw materials, the raw material base of these animal traction artisans has come under threat. Quality steel is necessary to support implement fabrications.

3. Constraints

Animal traction farmers are facing several constraints. Problems identified by farmers and ranked in order of seriousness are as follows:

1. scarcity of draft animals, implements and spares.
2. theft of animals,
3. death due to poor health of a work animals during peak working period,
4. lack of dry-season feed and water,
5. limited use of animals throughout the year,
6. high cost of implements and spares,
7. lack of durable accessories and spares.

The available durable implements like the ones from the TIF produce high draft for the animals to pull and this makes the animals to be tired faster especially at the start of the season.

4. The future of animal traction development in Ghana

4.1 Outlook for animal traction development

Draft animals have been important in Northern Ghanaian farming systems for a long time and are expected to become more important in the Transitional and Coastal Savanna agro-ecological zones in the future. However, there is a need for a number of strategies to systematically promote and improve the use of animal traction. Some of the strategies are:

- a) The establishment of animal traction research centre within the Ministry of Food and Agriculture. This would be affiliated to the Council for Scientific and Industrial Research (CSIR), to co-ordinate activities and to lead the necessary, on-farm testing of implements and development activities.
- b) Demand driven approach to animal traction problems with farmers playing active roles.
- c) Human resource development at all levels including training and support to blacksmiths.
- d) Effective involvement and use of universities, agricultural colleges and farm institutes to carry out necessary research and the training of extension staff.
- e) Systematic development of animal traction training manual and national standards.
- f) Applied research and extension efforts to increase the efficiency of the existing yoking system for bullocks, and the use of animal power for planting and for weeding.
- g) Gathering of more information on the profitability of animal traction in farming and rural transport and, where applicable, to include the use of animal traction in the cropping budgets.

4.2 Animal traction technology generation priorities

Animal traction use over the years has been limited to ploughing, ridging and carting. Tillage with animal power has enabled farmers

to increase the land under crop. However due to lack of planting, weeding and harvesting technologies with animal power, these operations are still carried out with manual labour. As a result the seemingly large expanse of land under crop does not produce commensurate yields because other operations suffer from timeliness cost depending on availability of manual labour during peak periods.

To avert this yield decrease and to close the technology gap to enable farmers derive maximum benefits from the animal traction technology, the following technologies need to be developed:

- animal drawn planters,
- weeding and harvesting technologies.

4.3 Planting with animal power

Delinted cottonseed produced by the Plantations Development Limited at Wa in the Upper West Region, and the policy of all the major cotton producing companies to plant delinted instead of fuzzy seeds, has brought to the fore the need for animal-drawn cotton planters to be developed and extended. This planter will be used on fields prepared by both tractors and animal power.

4.4 Weeding technology

With the exception of re-shaping of ridges with animal traction in the Lambussie and Tumu areas, presently all fields ploughed with animals are weeded by hand. There is therefore the urgent need to develop and promote animal-drawn weeding technology with either the rigid or spring tine cultivators. The use of the ridger to re-shape ridges should also be promoted.

4.5 Harvesting technology

Animal-drawn groundnut lifters need to be developed, tested and promoted in groundnut producing areas.

4.6 Comfortable yokes and harnesses

The present withers yoke produced from wooden planks have been reported to be uncomfortable to the animals. The point of contact on the neck of the animal is so small that the pressure developed causes harness sores and restricts the animals from giving out their best. New and improved yokes using the traditional wooden planks with the contact points made to fit the shape of the neck of the

animal should be promoted. The existing yokes could be modified through the removal of excess material at their present points of contact. The use of cushion and rags for lining contact areas could also be investigated. Additionally, the use of the lighter bamboo for withers yoke should be investigated and promoted.

The innovative collar harness developed by farmers in the Builsa district for harnessing a pair of donkeys needs further investigation and promotion. Since donkeys are not prone to rampant theft like the oxen, additional to the fact that they are equally hardy and can be used for field work, this new and innovative collar harness needs more attention.

4.7 Wear resistant soil engaging parts of implements

The implements made by TIF have ploughs fitted with imported cast shares, while those made by local blacksmiths have shares forged from mild steel without any hardening process. Locally manufactured soil engaging parts like shares and heels wear fast. Farmers sometimes change these parts about three to four times in a season cultivating under 15 hectares (Dibbits and Bobobee, 1996).

On-farm testing and durability trials are proposed for improved shares and heels to ascertain the wear and reliability of these plough parts. The imported cast shares used by TIF have average Rockwell Hardness 'C' values of 49 (HRC), compared to 70-80 HRB values obtained from the locally forged parts. There is the need to investigate and improve upon the hardness and durability of the local products to enable the farmers derive maximum benefits from their implements.

4.8 Curved versus straight beams of implements

The original imported Eberhardt implements were designed and manufactured to suit the big animals of the temperate regions. With the small WASH and Ndama bullocks being used in the country, this original designs are not suitable. The curved beam makes the hitching points to be too high thus pushing the theoretical centre of resistance of the implements far behind the implements. This has the resultant effect of the implement to be

unstable, making the implement to virtually 'walk' on the share point with the heel hanging in the air. This imposes undue pressure on the operator and high draft on the animal, leading to early tiredness of both. It is advisable that the Ministry of Food and Agriculture (MoFA) raises the issue with TIF, which is the leading manufacturer to change its present design to a straight beam to raise the productivity of both animal and operator. The other blacksmiths will follow TIF's example in producing the straight beams.

5. Conclusion

Animal traction, like electricity, education, rural road networks and communications, can empower rural communities. If one studies the history of farm power evolution in Ghana, one draws the conclusion that animal traction development has been neglected over the years. Despite the years of neglect, animal traction is still a major farm power component by farmers in the northern part of the country.

Notwithstanding the problems associated with the adoption and use of animal traction in the agriculture of Northern Ghana, animal traction still offers the best option and opportunities for increase in farm sizes, reducing drudgery in farm work, reducing labour costs, raising yields and farm production in general. However, these opportunities can only be utilised if farmers are assisted to acquire working animals and accessories at reasonable prices. The availability of quality spare parts to ensure sustainability in the use of implements is also a condition for success.

Finally the need to research into the design and development of comfortable harnesses and more appropriate and durable implements for planting, weeding and harvesting should be supported and promoted.

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