

Government financial assistance programmes to improve the profitability of animal traction in Botswana

by

A Panin, M Mrema and M Mahabile

*Department of Agricultural Economics and Extension
Botswana College of Agriculture, Private Bag 0027, Gaborone, Botswana*

Abstract

This analysis evaluates the effects of government financial assistance programmes on animal traction profitability in Botswana. Using secondary data, it compares variables such as area planted and harvested, crop productivity and ownership of various technological packages for two groups of farmers using animal traction—one receiving government financial assistance and the other not. The overall results indicate that government financial assistance programmes are important to animal traction. They enable resource-poor farmers to overcome the major impediments to the adoption of animal traction and other technologies and thereby increase productivity. The analysis further supports the notion that small farmers are, and can be, efficient and productive if they are financially assisted. It is therefore recommended that other African governments should learn from Botswana's experience. Financial assistance programmes designed for animal traction projects should encompass all equipment associated with the use of draft animals.

Introduction

Unlike many other African countries, Botswana has a long history of animal traction, covering more than 80 years (Baker, 1988). The technology is popular and is used extensively in the traditional farming systems.

Almost all traditional farming households rely on animal traction for plowing. Over the past few years there has been a trend towards the use of tractors, largely as a result of plowing grants which were made available to farmers during the drought period of 1981–86. However, available evidence (MoA, 1991) indicates that animal traction technology is more efficient, economically, than tractors, and because most farmers cannot afford to buy tractors, animal traction will continue to play a crucial role in arable farming in Botswana for the foreseeable future. The total number of draft animals is estimated at 350 000, of which 200 000 are oxen and 150 000 donkeys (Poulsen and Purcell, 1989).

As in many parts of sub-Saharan Africa, lack of capital and draft animals are the main factors

limiting profitability and sustainability of animal traction (Srivastava, 1991).

Since 1981, the government, in line with its policy of assisting farmers to increase agricultural production and productivity, has introduced financial assistance programmes such as the Drought Relief Programme (DRP), the Accelerated Rainfed Arable Programme (ARAP) and the Arable Lands Development Programme (ALDEP). Both DRP and ARAP, introduced in 1982/83 and 1985/86, respectively, have been phased out. ALDEP, also introduced in 1982/83, is still operational and figures prominently in the National Development Plan 7 (MoF, 1991). ALDEP is supported by loans from the African Development Bank (ADB) and the International Fund for Agricultural Development (IFAD). The envisaged value of the project at the time of its formulation in 1981 was 23 million Pula (then about US\$ 22 million).

The main objective of this paper is to evaluate the performance of ALDEP in order to find out whether or not animal traction profitability improves with government financial assistance. The analysis uses secondary data on animal traction farming systems in Botswana. It compares cropped area, area harvested, crop productivity and number of animal traction packages used by ALDEP-aided farmers and non-aided farmers.

Agriculture in Botswana

About 76% of Botswana's 1.3 million people live in the rural areas and derive their subsistence from mixed crop and livestock farming (MoA, 1989). Livestock are the major source of farm income. However, cattle distribution is very skewed; about 40% of the farming households own no cattle, while over 60% of the national herd, 2.3 million head, are owned by less than 10% of the farming households.

Low crop productivity is the primary agricultural problem (MoA, 1991). Yields of cereal crops (sorghum and maize), the main staple food of the country, are very low, ranging between 200 and

400 kg/ha. Because of this, most of the annual staple food requirements of the country are imported. Imports amount to about 60% of the total grain requirement in good years and as much as 90% in bad years. Because of the importance of agriculture in the economy, even though its share of GNP is 4% (MoA, 1991), development of this sector and rural areas is a major concern of the government.

Climate

Botswana is a semi-arid country. It is characterised by high pressure, which results in dry air with temperatures reaching as high as 39°C in summer and frost at night during winter. As a result the country is prone to recurrent drought.

The average rainfall is 475 mm per year, ranging from 600 mm in the north to 250 mm in the south-west. This rain, which falls in summer, is erratic, poorly distributed and unreliable; it falls in short heavy showers and most of it is lost through run-off. Coupled with this problem, much of the soil moisture is lost through a high rate of evaporation, which far exceeds the incoming rainfall. This has left Botswana with very little surface water or perennial rivers, making even irrigation a very costly exercise.

Evapotranspiration during the growing season (October to April) reaches as high as 1800 mm or four times the seasonal rainfall (Cooke, 1978; MoA, 1991). The soils are sandy and characterised by low levels of minerals, especially nitrogen and phosphorus. This makes arable farming very risky, and so farmers prefer livestock to arable farming.

Aims of ALDEP

The Arable Lands Development Programme (ALDEP) is designed to assist farmers. The main beneficiaries are poor smallholders who comprise about 70–75% of the traditional farmers (Mokone and Sebolai, undated; MoA, 1991). However, they cannot produce enough food to satisfy their subsistence requirements. The rationale behind the introduction of ALDEP was the recognition by the government that most of the smallholders, if left unassisted, will languish in a technical and economic equilibrium trap. The main aims of the project are:

- to achieve household food self-sufficiency by addressing some of the known constraints of small farmers
- to free small-scale farmers from dependence on large-scale farmers for the supply of inputs, by providing essential inputs to small producers that will enable them to undertake timely

plowing and planting operations for full utilisation of the available moisture which is so essential in semi-arid conditions of Botswana.

Types of assistance

ALDEP assistance designed for the farmers should enable them to acquire farm investment goods which are crucial to improving crop productivity, and thereby increase agricultural production in the country. The assistance covers the following on-farm investment packages (MoA, 1991).

Draft animals, including donkeys, oxen and mules.

A farmer can get a maximum assistance of 1400 Pula (about US\$ 700 in 1991) and 2400 Pula (about US\$ 1200) for the purchases of donkeys and oxen, respectively. The aim of providing draft power and plows is to enable farmers to plow and plant early in order to take advantage of the short-lived soil moisture following rain.

Animal drawn implements, including plows, planters, cultivators and harrows. The amounts granted for these vary according to implement. Planters are used for row planting, and they are provided to encourage farmers to plant in straight rows. Cultivators are meant for effective weeding in row-planted fields.

Fencing materials (a maximum value of 4500 Pula). This assistance will encourage farmers to put up a fence to keep their livestock within their premises and to keep wild animals out.

Water catchment tank (a maximum value of 3600 Pula). The purpose of the water tank is to provide draft animals with water and hence help in timely plowing and planting. Without such a facility animals have to trek long distances in search of water.

Animal-drawn carts (a maximum value of 1900 Pula—about US\$ 950 in 1991). The purchase of these will facilitate transport of farm inputs and outputs.

Fertilisers (a maximum value of 100 Pula). These will obviously increase crop productivity when applied at the right time.

As a result of changes in input prices, the maximum amounts granted under each item are revised from time to time.

Implementation of ALDEP

When ALDEP was first introduced farmers were offered assistance in the form of loans and subsidies. This scheme was not successful, probably because resource-poor farmers lacked collateral for the loans.

Table 1: Draft animal ownership by ALDEP aided and non-aided farmers (1982–88)

Period	Aided farmers		Non-aided farmers	
	Number sampled	% owning draft animals	Number sampled	% owning draft animals
1982/83	1 284	69.4	na	na
1983/84	1 181	64.3	na	na
1984/85	4 890	62.9	4 890	40.8
1985/86	11 249	42.2	11 235	44.3
1986/87	15 825	55.2	15 809	40.1
1987/88	20 760	50.4	na	na
Average ¹		57.4		41.7

na = not available

¹ Present authors' calculations

Source: Adapted from Srivastava (1991)

After 18 months, therefore, the form of assistance was changed to grants and downpayments.

The new arrangement, intended to favour all potential beneficiaries, has no loan component, but the subsidy component has been raised to 85% of the value of each package. Farmers are therefore required to find only the remaining 15%. The only exception to this regulation is that a farmer with 11–20 cattle, who wants to acquire draft oxen through the programme, is requested to contribute 40% of the total value.

To qualify for ALDEP assistance, a farmer has to satisfy the following conditions:

- the farmer must own fewer than 40 head of cattle. (Judged by this criterion alone, about

85% of traditional farmers qualify for ALDEP assistance)

- the annual income of the farmer must be less than 7500 Pula (about US\$ 3750).

Effects of ALDEP

Draft animal ownership

ALDEP's effect on draft power ownership is demonstrated in Table 1. Between 1982 and 1988, almost 60% of ALDEP-aided farmers managed to acquire their own draft animals, compared with about 40% of non-aided farmers. It is worth noting that the difference would have been greater if ARAP had not been introduced in 1985/86. The maximum potential effect of ALDEP is distorted by ARAP because most of farmers not aided by ALDEP received grants from ARAP. It is clear that government financial assistance programmes such as ALDEP are crucial in helping farmers to acquire their own draft animals.

Crop production

Crop productivity was higher for ALDEP-aided farmers than for non-aided farmers (Table 2). While the average productivity of aided farmers is surprisingly low, it is still 65% higher than that of non-aided farmers. Also, aided farmers planted and harvested larger areas of land than their counterparts. The relatively better performance of the aided farmers can be attributed to the acquisition of the various technological packages made available to them through ALDEP. Of course, the use of such technologies might have influenced the timely execution of farming operations which are directly related in increasing crop productivity.

Table 2: Planted and harvested area and production by ALDEP-aided and non-aided farmers, 1984–88

		Number of farmers	Average area	Average arable	Average production	Average yield (kg/ha)
			planted per farm (ha)	area harvested (ha)	per farm (kg)	
1984/85	Aided	4 890	4.6	3.6	616	171
	Unaided	4 890	3.6	3.0	397	132
1985/86	Aided	11 249	5.0	4.5	616	137
	Unaided	11 235	4.1	3.9	462	118
1986/87	Aided	15 825	6.7	6.2	811	131
	Unaided	15 809	4.5	4.0	341	85
1987/88	Aided	20 760	6.4	6.2	1859	300
Total average yield ¹	Aided					184.7
	Unaided					111.7

¹ Present authors' calculations

Source: Adapted from Srivastava (1991)

Table 3: Effects of number of technological packages on area cropped and productivity, 1987/88

Number of packages	Sample size		Area planted per farm (ha)	Average yield (kg/ha)
	Number of farmers	Percentage		
One	12 871	62	5.8	282
Two	5 398	26	6.3	322
Three	1 453	7	8.3	340
Four or more	1 038	5	11.3	317
Total	20 760	100		

Source: Adapted from Srivastava (1991)

Number of technological packages and crop production

Table 3 shows the effects of the combined application of more than one technological package (ie, draft power, plow, planter, harrow and water tank) on area planted and crop yields. There is a positive linear correlation between the number of packages available to a farmer and the area planted and the crop yields. The only deviation from this trend is found where farmers use four or more packages, when productivity seems to decline slightly. There seems to be no obvious explanation for this anomaly.

Conclusions

The overall results indicate that government financial assistance programmes are crucial to animal traction. They enable resource-poor farmers to overcome the major impediments to the adoption of animal traction and other technologies. If small farmers are financially assisted they can be efficient and productive. In the particular case of Botswana, government financial assistance has enabled farmers to purchase the necessary inputs for enhancement of productivity. In this connection, ALDEP has played a useful role through three major approaches:

- helping farmers to acquire their own draft animals. This has increased the number of farms owning draft animals and reduced the number of farmers who have to hire such animals
- increasing crop productivity. This is a consequence of the first approach
- increasing the area planted to crops.

Botswana has useful lessons for other countries that intend to increase farmers' productivity through animal traction farming systems.

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References

- Baker B, 1988. *Traction use in Shoshong Agricultural Technology Improvement Project (ATIP)*. ATIP WP-22. Department of Agricultural Research, Ministry of Agriculture, Gaborone, Botswana. 53p.
- Cooke H J, 1978. Botswana: present climate and evidence from past change. In: Hinchey M T (ed), *Symposium on drought in Botswana*. Proceedings of a workshop held in Gaborone, Botswana, on 5-8 June 1978. The Botswana Society in collaboration with Clark University Press, Worcester, Massachusetts, USA. 305p.
- MoA, 1989. *Agricultural sector assessment: a strategy for development of agriculture in Botswana*. Ministry of Agriculture (MoA). Government Printer, Gaborone, Botswana. 239p.
- MoA, 1991. *Botswana's agricultural policy: critical sectoral issues and future strategy for development*. Ministry of Agriculture (MoA). Government Printer, Gaborone, Botswana. 28p.
- MoF, 1991. *National Development Plan 7, 1991-96*. Ministry of Finance (MoF). Government Printer, Gaborone, Botswana. 507p.
- Mokone F S and Sebolai M K, (undated). *Information for small projects: revised version for use by extension workers and entrepreneurs*. Ministry of Finance and Development Planning. Government Printer, Gaborone, Botswana. 98p.
- Poulsen E and Purcell R A, 1989. *Relative economics of different draft power applications in Botswana: a review of current situation and recommendations for future policy*. Ministry of Agriculture. Government Printer, Gaborone, Botswana. 71p.
- Srivastava P D, 1991. *Nine years of arable lands development programme 1982-1991*. Ministry of Agriculture. Government Printer, Gaborone, Botswana. 82p.