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Problems and prospects in the utilisation of animal traction in semi-arid West Africa: Evidence from Niger

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Sustained adoption of animal traction for crop cultivation in the semi-arid zone of West Africa has been slow despite deliberate attempts by governments, development agencies and research organisations to promote its use among small-scale farmers. The low adoption rates are partly due to demand and supply constraints, combined with the absence of certain pre-conditions (e.g. appropriate climatic and biophysical attributes, and farming practices). On the demand side, factors like the short time available for land preparation and sowing, high opportunity cost of resources tied up in animal traction, variable yield gains from animal traction tillage and long learning curves for both animals and operators have contributed to limit the adoption of animal traction. On the supply side, inappropriately designed and expensive equipment, and inadequate extension, training and support services have inhibited adoption of animal traction. Together, these demand and supply factors have lowered the profitability of animal traction and made its use unattractive to the farmer in semi-arid West Africa.

For policy makers and researchers in West Africa, the issue of how to improve the adoption, utilisation and profitability of animal traction remains an important one. This is all the more so given that animal traction has not been fully exploited in many parts of semi-arid West Africa and that its use has seldom led to the achievement of the many benefits documented for other regions of the world, particularly Asia. Factors responsible for the divergence between the potential and actual impact of animal traction, and measures to narrow the gap need therefore to be identified more clearly through empirically based research.

Evidence from Niger

Survey data collected in 1991 and 1992 in two villages situated in the Sahelian (dry) and Sudanian (wet) agroclimatic zones of Niger serve to demonstrate the regional diversity in patterns and intensity of animal traction utilisation, and potential gains associated with it.

Production function estimates showed that the use of animal traction did not have any significant impact on area cultivated, but increased yields of sorghum and maize by 12–15%. At the same time, it increased labour input by 15 man-hours/ha in the Sahelian agroclimatic zone, but reduced it by 50 man-hours/ha in the wet zone. These differences in labour use per hectare in the two villages were due to the differential uses of animal traction in the dry and wet zones. In the dry zone, animal traction increases labour requirements because it is mainly used for ploughing which adds an extra task to the cultivation process. In the wet zone, the higher degree of animal traction utilisation, particularly for weeding (in addition to ploughing), results in labour savings that offset the increase in labour input incurred in ploughing early in the season.

Multi-year partial budget streams estimated under three different scenarios also showed that rates of return on animal traction investment ranged form –4% to 18% in the dry zone and from 14% to 58% in the wet zone. The analysis indicates that benefits other than area expansion and cultivation of cash crops played a minor role in the profitability of animal traction, particularly in the wet zone. Overall, the profitability of animal traction under existing farm conditions in the study villages appears limited.

Options for efficient animal traction utilisation

The evidence presented for Niger indicates that there exists a wide regional variation in the potential for adoption and efficient utilisation of animal traction depending on a broad range of agro-ecological and economic factors. This point has generally been overlooked in previous attempts by governments and non-governmental organisations to promote the use of animal traction in Niger and other parts of semi-arid West Africa.

While simple man-to-land ratios suggest that there is ample land for expansion in villages of the Sahelian zone, the low and variable rainfall creates a short growing season. This implies a need for early planting with minimum land preparation at the onset of the rains. The extremely poor soil fertility and the limited range of crops that can be grown strictly limit potential utilisation and profitability of animal traction in the dry zone. Some limited success in maintaining animal traction in this zone could, however, be achieved by using it mainly for weeding and by easing farmers' access to inorganic fertilisers.

In the relatively better endowed Sudanian zone where the growing season is longer, soils more fertile and crops more diverse the potential for profitable use of animal traction is higher. However, realising the potential benefits will depend on using animal traction on a wide range of farm tillage operations (e.g. ploughing, planting and weeding), on a sufficiently large farm area and on high-value crops (e.g. cowpea and groundnut). Since animal traction as currently utilised in the wet zone is not sufficiently profitable, changes in existing farm practices and increased intensity of animal traction equipment use should raise the economic returns to animal traction to an acceptable level.

An option not considered in this study is the use of donkey traction which could be promoted together with changes in cropping patterns, particularly in the wet zone where the potential exists for profitable use of animal traction.

For more information on this issue see: Williams T.O. 1997. Problems and prospects in the utilization of animal traction in semi-arid West Africa: Evidence from Niger. *Soil and Tillage Research* 42:295–311.