# Animal traction in Mozambique: results from a survey of small-scale farmers

*by*

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## Abstract

*In 1994 the Department of Statistics of the Ministry of Agriculture of Mozambique conducted a national survey in which 2749 households were interviewed with the goal of producing basic information on subsistence and small-scale farmers. A multistage sampling method was used as follows: 10 provinces x 3 districts x 8 villages x 12 households = 2880 households.*

*The main results relevant to animal traction were:*

*Cattle are the main base for animal traction in Mozambique. Less than 1% of the households use donkeys for draft power.*

*From the estimated 2,465,000 households for the whole country, about 100,000 own some 470,000 cattle, mainly concentrated in the southern provinces.*

*About 60% of the farmers owning cattle use them for animal traction, mainly for plowing and to some extent for transport.*

*Animal-powered planting and weeding are rare.*

*Gaza Province has the highest use of animal power with16% of households using animal traction. In the northern provinces, the use of animal power is negligible.*

*Although the farmers owning and using cattle for work purposes are a minority (about 60,000 households or 2.5%) they plowed about 550,000 ha or 12% of the country's cropped area. They cultivate a larger area (average 3 ha) than farmers using manual labour (average 1.7 ha). In addition, they hire out their services to other farmers. Farmers hiring draft animals cultivate 2 ha on average.*

*About 1.5% of all households owned ox carts; this corresponds to 34% of farmers that own draft animals.*

*As a consequence of the war, the cattle population was reduced drastically. Families who previously owned and used cattle lost their herds. The survey shows that 8% of farmers own plows while only 4% own draft animals.*

*As in other countries, more men than women use animal power.*

## Introduction

Animal traction was the main power source for the family farming sector in southern Mozambique during colonial times. The number of cattle was estimated to be 1,400,000 (SV, 1973), most of them owned by small-scale farmers. Oxen were used mainly for plowing and to a limited extent for transport. As at present, planting and weeding using animal traction were rare.

As a consequence of the war and the disruption of the economy, particularly in the agricultural sector, the number of cattle has been reduced drastically. At present the cattle population is recovering.

The peace accord signed in 1992 widened the possibilities of countryside development, making it possible to implement new policies and projects in the agricultural sector that were unrealisable during the war. The need for reliable data on the actual situation of the subsistence and small-scale farmers (the 'family sector', according to Mozambique terminology) was evident. However, statistics covering the whole country did not exist in 1993, so the Ministry of Agriculture restarted carrying out annual agricultural surveys. Based on a survey carried out in 1994 and analysing the data from an "animal traction point of view", this paper presents information on the use of animal power in Mozambique.

## Methods

In 1994, the Department of Statistics at the Directorate of Agricultural Economics in the Ministry of Agriculture conducted a national survey in which 2,749 households were interviewed. The goals of the survey were:

- to produce basic statistical data on the family sector
- to have a reference point to evaluate future changes for field data collection and analysis
- to further refine the methodologies in the field and centrally.

The main topics of the questionnaire were:

- household composition and type
- agricultural production and its utilisation
- animal production
- resources (land, labour, farm implements, seed, fertiliser and pesticides).

The following multistage sampling method was used:

- three districts in each one of the ten provinces of the country were chosen in a deterministic way from a priority list (Figure 1)
- eight villages in each district were selected at random with a probability according to their size
- within each village, twelve households were chosen randomly.

In summary the planned sample size was:

- 10 provinces x 3 districts x 8 villages x 12 households = 2880 households.

The actual number of households interviewed was 2749, reflecting a 4.5% no-response rate. This was considered statistically acceptable.

To draw conclusions at national level, the provinces and districts were weighted as follows:

- District weight = total population in the district / sum of the number of members of the households interviewed
- Provincial weight = total population in the province /sum of the number of members of the households interviewed
- National weight = sum of the results from provincial level.

The field work of the survey was executed from August to October in 1994 by staff from the Ministry of Agriculture. The personnel involved were trained properly in the objectives of the survey and the questionnaire. The raw data were entered on computer and stored and analysed using the Statistical Analysis System (SAS) program.


*Figure 1. Map of Mozambique showing the ten provinces and the districts surveyed*

## Results

### Main crops and cultivated area

The main crops cultivated by the family sector are presented in Table 1. The chief crops are maize, cassava, sorghum and rice. The only cash crop of some significance for the family sector was cotton (4% of the total area).

### The level of farm mechanisation

The majority of farmers in the family sector still cultivate by hand. From the weighted estimate of 2,464,000 households for the whole country, 87% use only human energy for land preparation, 8% also utilise animal traction – owned, hired or borrowed – and 5% tractor mechanisation, largely through hiring (Table 2). Only 2.5% of households both own and use cattle for work (Table 3). Animal traction is predominantly practised by a minority of the households in the southern provinces of Manica, Inhambane and Gaza (Table 3). As the utilisation of tractor and animal traction is limited to plowing and to a certain extent to transport, the importance of hand labour for agriculture is greater than is reflected by the figures presented in Table 2.

**Table 1: Estimated number of households cultivating maize, cassava, sorghum and rice, total area per crop for the country, mean area per household, mean yields and range of district mean yields for the family sector**

| | *Number of holdings (000's)* | *Total area cultivated (000 ha)* | *Mean area per household (ha)* | *Mean yield (kg/ha)*[1] | *Range of district mean yields (kg/ha)*[1] |
|---|---|---|---|---|---|
| Maize | 1,923 | 1,737 | 0.90 | 350 | 74–1,435 |
| Cassava[2] | 1,383 | 786 | 0.57 | 540 | 147–1,003 |
| Sorghum | 701 | 339 | 0.48 | 400 | 113–747 |
| Rice | 644 | 302 | 0.47 | 610 | 88–1,054 |
| **Total** | **2,464** | **4,489** | | | |

*Notes*
*1) 1994 survey, average yield for 30 districts, no distinction made for multiple cropping*
*2) Cassava yielded below average in 1994*

The area cultivated per farmer owning oxen and/or plows was about 80% larger than that of households using manual labour only, but when expressed per adult equivalent the differenceasis smaller (see Table 2). Farmers owning oxen and plows cultivated an average of 3 ha while farmers hiring animal traction cultivated 2 ha (Table 2).

The total area cultivated by the family sector using animal traction for primary tillage is estimated to be about 550,000 ha or 12%, of which

**Table 2: Estimates of number of farms, area cultivated and labour use for hand-, animal- and tractor-cultivation**

| | | *Animal traction* | | |
|---|---|---|---|---|
| | *Manual labour only* | *Own* | *Hired or borrowed* | *Tractor hiring* |
| Number of observations | 2,247 | 160 | 124 | 218 |
| % | 82 | 6 | 5 | 8 |
| Number of farmers (weighted) | 2,134,000 | 109,000 | 105,000 | 117,000 |
| % | 87 | 4 | 4 | 5 |
| Area cultivated, weighted | | | | |
| total (ha) | 3,585,000 | 331,000 | 221,000 | 352,000 |
| % | 80 | 7 | 5 | 8 |
| Mean (ha) | 1.7 | 3.0 | 2.1 | 3.0 |
| Standard deviation | 1.7 | 2.7 | 1.7 | 2.6 |
| Labour per holding | | | | |
| Adult equivalent | 4.0 | 5.2 | 4.4 | 5.3 |
| Standard deviation | 2.1 | 2.7 | 2.3 | 2.5 |
| Cultivated area per adult equivalent (ha) | 0.4 | 0.6 | 0.5 | 0.6 |

*Notes:*
*1) Animal traction and hired tractors were used for plowing only in most cases*





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**Table 3: Estimates of cattle popoulations and use for draft in the provinces of Mozambique**

| | | | | *Draft cattle* | | *Draft donkeys* | |
|---|---|---|---|---|---|---|---|
| *Province* | *Number of farmers (thousands)* | *Farmers owning cattle* | *Cattle population* | *Farmers owning and using* | *Number of animals* | *Farmers owning and using* | *Number of animals* |
| Niassa | 139 | 1,800 | 11,700 | | | | |
| Cabo Delgado | 264 | | | | | 1,300[1] | 1,300[1] |
| Nampula | 485 | 1,300 | 1,300 | | | | |
| Zambezia | 573 | | | | | | |
| Tete | 174 | 8,600 | 58,000 | 1,400 | 5,000 | 358 | 1,400 |
| Manica | 103 | 11,000 | 70,000 | 9,400 | 30,800 | | |
| Sofala | 178 | 10,200 | 42,000 | 2,100 | 4,300 | | |
| Inhambane | 274 | 20,600 | 43,000 | 17,000 | 37,200 | 4,800 | 6,900 |
| Gaza | 181 | 43,700 | 229,000 | 29,200 | 85,000 | 3,300 | 4,900 |
| Maputo | 95 | 3,700 | 13,000 | 2,200 | 6,000 | 900 | 1,100 |
| Total | 2,465 | 100,900 | 470,000 | 61,700 | 168,200 | 10,700 | 15,700 |

*Notes*
*1) One of these two figures is incorrect - it is extremely unlikely that all donkeys are used for draft*

about 60% is cropped by farmers owning animal traction and the rest by farmers hiring or borrowing animals (Table 2).

## Estimation of the number of working cattle and donkeys by province

The total number of cattle is estimated to be about 470,000 which are owned by some 100,000 farmers or 4% of the total 2,464,000 households (Table 3). As shown in Table 3, cattle are concentrated in the southern provinces, mainly in Gaza (which has about half the country's total) and Manica. About 60% of all farmers owning cattle in the country use their animals for traction, but in the provinces of Tete and Sofala only about one farmer in five uses cattle as draft animals.

Farmers using donkeys for work are a minority, about 0.4% of the total number of households. The total number of donkeys is estimated to be about 15,000. Like cattle, donkeys are concentrated in the southern provinces.

## Implements

As mentioned, the plow is the most important implement utilised by farmers with animal traction. From the total sample of 2,749 households, 215 reported owning plows (about 8% of the total sample) but only 85 of them owned draft animals. About 130 households owned plows but did not use animal traction, probably as result of cattle losses during the war. On the other hand, only seven farmers who owned draft animals reported hiring plows.

Few households own ox carts, less than 2% (43 households) of the total sample, or about 34% of the farmers having animal traction. As in the case of plows, a considerable proportion (16%) of the farmers owning ox carts do not have draft animals. Hiring carts was much more common than borrowing, 40 farmers reported hiring as opposed to ten borrowing.

As planting and weeding using animal traction implements is extremely rare in Mozambique, there were no questions about this in the survey questionnaire.

**Table 4: The proportion of farm households requiring paid external labour for different tasks**

| *Number of households* | *Total* | *Primary cultivation* | *Planting* | *Weeding* | *Harvesting* |
|---|---|---|---|---|---|
| Total in survey | 2,749 | | | | |
| Number paying labourers unweighted | 516 | 226 | 96 | 326 | 137 |
| % | 19 | 44 | 19 | 63 | 27 |
| Estimated country total[1] | 2,134,000 | | | | |
| Number paying labourers weighted | 484,000 | 216,000 | 74,000 | 285,000 | 131,000 |
| % | 23 | 45 | 15 | 59 | 27 |

*Notes*
*1) Weighted number of households based on the number of responses to this question*

### Animal traction and gender

As in other parts of the world, animal traction is biased to male use. Only 5.5% of the households possessing draft animals did not have male adults compared with 10% in the group without draft animals. Most of the households in Mozambique therefore have at least one male adult and this accords with the available labour per household (Table 2).

### External paid labour

From the total sample (2,749 households), 19% of the households (516) required hired labour for agricultural tasks. A breakdown of the number of households requiring hired labour for different tasks is shown in Table 4. Most of the households required one or two person-weeks of hired labour, with a mean of 3.4 person-weeks and a standard deviation of 7. Weeding and primary cultivation required the most supplementary labour (Table 4). As primary cultivation is a power-demanding operation about 13% of the households (Table 2) executed it with the help of animal traction or hired tractors.

## Discussion

The surveys executed by the Ministry of Agriculture in 1993 and 1994 are the largest surveys of family sector agriculture for at least 20 years. As the primary intention was to obtain statistics at national level, the level of detail is not really sufficient to examine a specific issue, as in this study. However, they are one of the main information sources, if not the only one, on family sector agriculture with national coverage. One limitation is that the districts in each province were not selected randomly but were chosen from a list of "priority districts", which, in general, have better agricultural conditions. In this way, the surveys were biased to some extent.

Animal traction is still utilised by a minority of farmers in Mozambique and is used mainly in the three southern provinces. Gaza was the province with the highest rate of utilisation with 16% of the farmers owning draft animals, followed by Manica and Inhambane with 9% and 6% of the household possessing working animals, respectively.

The geographical distribution of cattle poses limitations to a rapid expansion of animal traction due to:

- high crop failure risks in the southern provinces due to erratic rains, combined with sandy soils which have low water retention capacity
- lack of a tradition of cattlekeeping and animal traction in the northern provinces where better agricultural conditions prevail
- the presence of tsetse flies and trypanosomiasis, particularly in zones distant from the coast, which has a significant



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influence on the geographical distribution of cattle.

The supply of implements did not appear to be a constraint. Agro-Alfa, a national producer of animal traction equipment, has a good manufacturing capacity but marketing is very weak. This is reflected by absence of traders of such equipment in the provinces. It is often easier to procure plows in neighbouring countries.

Ownership of animal traction does not seem to have had a big impact on increasing the area cultivated. The survey results shows the mean area cultivated by such farmers is 3 ha (Table 2). Several factors contribute to this:

since animal traction is used only for land preparation, labour shortage for other operations, in particular weeding, restricts the area that can be cultivated

the need for cash motivates such owners to rent their services

poor and/or absence of marketing services. The prolonged war was responsible for the disruption of the basic marketing infrastructure (roads, storage facilities, transport means) and displacement of people.

Power availability is one of the main constraints for the family sector for increasing production and improving their living conditions. With the present crop yields and expected increasing population, tractor mechanisation is not a viable alternative in the foreseeable future. Although not more than 4% of farmers use animal traction they plow about 12% of the cultivated area of the country. These two figures indicate that animal traction can be a realistic alternative power source in the future for many farmers who currently cultivate by hand.

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