

Socio-economic aspects of animal power: a diagnostic study in Zimbabwe

by

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Abstract

A diagnostic participatory and questionnaire survey of 451 farmers was conducted in Tsholotsho, Chinyika and Mutoko Communal Areas in Zimbabwe to understand farmers' crop production constraints in relation to draft power. Nearly half (49%) of all the farmers had no draft animals but 55% of these had access to neighbours' or relatives' animals. The rest hired or worked in others' fields in exchange for draft use. Animal diseases and shortage of grazing land were noted as the major problems in animal production. Both farmer education and experience as well as household herd were found to vary between districts ($p < 0.001$). Tsholotsho had the largest number of farmers (53%) with more than 10 years' experience and Mutoko had the largest proportion (43%) of 'master farmers'. Farmer education and experience were found to be independent of gender. The average land holdings per farmer for Tsholotsho, Chinyika and Mutoko were 6.2, 4.2 and 1.6 ha, respectively. Tsholotsho is a dry area whilst Chinyika is a resettlement area. Mutoko is a typical communal area with a high population pressure. Maize is the main crop in Chinyika and Mutoko whilst millet is common in Tsholotsho.

Introduction

Animal traction is a critical component of smallholder farming systems. Animals provide the energy source for plowing, ridging, transport and cultivation for many small-scale farmers. In addition, they provide manure, which is the main source of fertiliser for crops for some farmers. Farmers with cattle were found to have larger arable holdings, and did more winter plowing and manure application (Shumba, 1984).

Scientists have often been accused of top-down approaches to problem-solving. In many cases the

prescriptions they have given have ended up either aggravating the problem, underestimating it, or farmers refuse to adopt it due to problems of affordability, appropriateness and sustainability. In either case, these approaches have been expensive failures. Farmer participation is, therefore, important in research efforts in communal areas since it can identify their problems and then develop appropriate interventions.

It is in light of these facts that a diagnostic survey was conducted to study the draft power situation in three districts of the communal areas of Zimbabwe. The objectives of the study were to establish:

- the role of animal traction in small holder farming systems
- linkages of draft power supply and demand with other sub-systems
- possible areas of intervention.

It is further intended that this work will provide reliable data on draft power that will aid in the development of an animal traction model for smallholder farming systems in Zimbabwe that use oxen, cows or donkeys for crop production.

Materials and Methods

Data collection

A participatory diagnosis was conducted using a questionnaire survey of farmers in three districts in the communal areas of Zimbabwe. The survey was carried out during the 1994–95 growing season in Mutoko, Tsholotsho and Chinyika (Chinyudze in particular). Chinyika and Mutoko are in agro-ecological zones II and III, respectively, and Tsholotsho is in zone IV. These areas are fairly representative of the smallholder sectors of

Zimbabwe which consist of communal, resettlement and small-scale farming areas.

The questionnaire consisted of questions on farmer, crop production, and livestock production characteristics. To complement the survey, an informal diagnostic discussion was held with the farmers. The farmers cited their production problems and suggested possible solutions. This was done to establish the farmers' perceptions of their problems so that research priorities would be formulated in light of their needs.

Statistical analysis

A total of 452 records were used in this analysis. The data were analysed using the SAS computer programme's General Linear Models Procedure. Frequencies, means and Chi-square tests for association were calculated for the respective characteristics.

Results and discussion

Farmer characteristics

A statistically significant ($p < 0.001$) association was found between farmers' levels of education and their district. This may be due to differences in extension efforts and arrangements in the three districts. The level of education of the farmers has a bearing on the agronomic practices and the ease with which new technologies can be adopted.

In Tsholotsho 12% of the respondents ($n=126$) were master farmers, 11% were trainee farmers and 78% were ordinary farmers. Chinyika ($n=173$) had 4% master farmers, 35% trainees, and 61% ordinary farmers. On the other hand, Mtoko ($n=153$) had the largest proportion of master farmers (43%) with 3% trainee farmers and the remainder ordinary farmers.

Farmer experience was also associated with district. Tsholotsho had the most farmers with greater than ten years experience (53%) compared to 4% for Chinyika and 43% for Mtoko. The low level of experience in Chinyika may be attributed to the fact that it is a newly-commissioned resettlement area. There were no significant associations between farmer education or farmer experience and gender implying that farmers tend to receive the same education opportunities regardless of gender.

There was also an association ($p < 0.001$) between household heads and district. In Tsholotsho 62% of

the households were headed by males compared with 84% in Chinyika and 80% in Mtoko. The results are shown in Table 1. The household head is usually the principal decision maker and this has direct implications on the production system such as the type of crop grown. Crops such as groundnuts and beans are usually regarded as "women's crops" (Truscott, 1991). Female-headed households have been found to be poorer in terms of arable land ownership, draft animal ownership, implement ownership and access to agricultural loans (Shoko and Sithole, 1995).

Production problems and coping strategies

Ownership

Most of the farmers had a major shortage of draft power. Out of 451 respondents, 49% did not have any draft animals. In Tsholotsho, Chinyika and Mutoko, 33%, 51% and 36%, respectively, had at least five animals. The majority (55%) of those who did not have draft animals were allowed access to relatives' or neighbours' draft animals.

On the other hand, 36% of the respondents with fewer than two draft animals teamed up with relatives. The remainder hired draft power or worked in other people's fields in return for use of draft animals. The high proportion of cows in Tsholotsho (Table 2) seems to indicate that cows are utilised more for draft. However, cows have been reported to be 20–30% less efficient than oxen (Howard, 1980). This will then lead to decreased crop productivity. A span of two oxen requires about three and a half days to plow a hectare of land on wet soil (Francis, 1993).

According to the farmers, the implications of having no or inadequate draft were delays in planting and failure to carry out winter plowing. This had an adverse effect on crop yields. They said that crops grown in winter-plowed fields had better chances of survival in seasons of drought. However, most farmers did not winter-plow their fields since crop residues form an important livestock feed source, particularly in the dry season.

Disease

The majority of farmers cited disease as the main problem in cattle production. Of those who cited disease, 79% ranked it as the number one problem (Table 1). The diseases that were mentioned as problematic are red water, heart water and eye

Table 1: Farmers' ranking of problems affecting cattle ownership in all three villages (n=451). The figures show the percentage of farmers mentioning each constraint who ranked it 1, 2 or 3 in severity.

<i>Rank (%)</i>	<i>Grazing</i>	<i>Disease</i>	<i>Ticks</i>	<i>Dipping</i>	<i>Labour</i>	<i>Drugs</i>	<i>Theft</i>
1	61	79	78	41	40	50	19
2	32	16	13	45	40	40	65
3	7	5	9	14	20	10	16
n mentioning	79	152	23	56	20	58	43

infections in summer. Six farmers complained that they had problems in contacting veterinary officials or that their response to emergencies was too slow. Other problems mentioned are shortage of drugs, dipping, cattle rustling (a recent problem arising from hardships due to the economic structural adjustment programme), and drought.

Grazing land

Grazing shortage was the second important problem. Of those who mentioned it as a problem, 61% ranked it as the number one problem (Table 1). Most of the farmers asserted that grazing was particularly a problem in the dry season. They claimed that the communal grazing areas were apportioned the most infertile and desolate areas.

However, in Chinyika each farmer is allocated some land and there is no competition between grazing land and arable land. In a follow-up discussion with 11 farmers in Mutoko all the farmers indicated grazing land shortage as one of the main problems in the area. This is likely to be a result of shortage of grazing land. Most respondents suggested the use of winter supplements and paddocking of grazing areas as possible solutions.

Others

One farmer mentioned the cost of hiring draft as prohibitive, and two farmers cited each of restocking, labour shortages and low calving rates as problems. Fertiliser was also cited as one of the production problems due to its prohibitive cost. Those who have cattle use manure as an alternative.

Relationships between draft animal use and tillage practices.

Most farmers in Mtoko and Tsholotsho plow their fields only once whilst the majority of farmers (76%) in Chinyika plow twice (Table 3). This is most likely to be a result of the high adoption of winter plowing in this area. Even though ridging has been found to be very useful in low rainfall areas (in terms of moisture conservation), quite a substantial number of farmers in Tsholotsho (93%) were found not to have adopted this practice at all. This may be due to the low crop yields obtained in this region relative to the effort required to construct the ridges, as well as the shortage of draft power.

In Chinyika, maize cultivation was noted to be very common. This is likely to be because of the availability of cultivators for most families in Chinyika, unlike Mutoko where only one in every 12 farmers owned a cultivator. The absence of the

Table 2: Mean draft animal ownership in the three districts in 1994 (number of animals per household ± standard error)

	<i>District</i>		
	<i>Tsholotsho</i>	<i>Chinyika</i>	<i>Mtoko</i>
Steers	1.4±0.2	2.4±0.15	0.8±0.1
Bulls	0.1±0.03	0.4±0.07	0
Cows	1.9±0.3	0.3±0.22	0.8±0.01
Donkeys	0.9±0.2	0	0

Table 3: Frequency of plowing, ridging, and weeding with animal power in Tsholotsho, Chinyika and Mtoko (% of farmers in each sample)

Frequency (per year)	Tsholotsho (n=126)			Chinyika (n=172)			Mtoko (n=153)		
	Plowing	Ridging	Weeding	Plowing	Ridging	Weeding	Plowing	Ridging	Weeding
0	28	93	48	11	19	12	5	28	77
1	71	6	39	13	67	37	55	69	22
2	1	1	14	76	14	51	38	2	1
3	0	0	-	0	0	-	3	1	-

ox-drawn cultivators tends to constrain the timely implementation of critical operations. The large proportion of plows relative to cultivators implies that weeding is still largely done by hand. However, some farmers said that they used ox-drawn plows in place of cultivators.

Crop yield and area cultivated

Although maize is the staple crop in Zimbabwe, millet is the most popular in Tsholotsho (Tables 4 and 5) mainly due to the low rainfall in the area. Other crops are considered minor. In Chinyika, maize/bean intercropping is very common. The highest maize yields were obtained in Chinyika (Table 4). This is mostly because of the better rainfall and soil in Chinyika compared to the other two areas.

Farmers from Mutoko were found to have the fewest arable land holdings (Table 5). The average land holding was found to be 6.2 ha, 4.2 ha and 1.6 ha for Tsholotsho, Chinyika and Mutoko, respectively. The low area in Mutoko is likely to be due to the high population pressures, unlike Tsholotsho (a dry area) where the population is much less and Chinyika which is a resettlement area. The low draft animal ownership per family in

Mutoko (average of 2 draft animals/family) may also be due to the high population pressure.

For maize production, the majority of the farmers in Tsholotsho (69%) used a team of four animals, unlike in Chinyika and Mutoko where use of a pair was most common. The use of pairs in Mutoko is most likely to be a result of the low draft animal numbers. The main span size in the communal areas is therefore two animals. There was a significant ($p < 0.001$) association between span size and total area cultivated in 1994. This indicated that farmers with larger holdings tended to use larger teams of animals.

For millet, 68% of the farmers in Tsholotsho used a team of four animals whilst 100% and 90% of farmers in Chinyika and Mutoko, respectively, used pairs of animals.

Conclusion

The majority of smallholder farmers do not have adequate draft power. Oxen and dry cows are predominantly used for draft work like plowing, planting, cultivation, ridging and transportation. Donkeys are relatively uncommon with the exception of Tsholotsho.

Table 4: Mean crop yields for the 1993/94 growing season (kg/ha)

Crop	Tsholotsho	Chinyika	Mutoko
Maize	218	4500	336
Millet	383	0	0
Sorghum	49	0	0
Sunflower	16	367	49
Groundnuts	88	119	24
Beans	4	138	27
Tobacco	0	114	8

Table 5: Mean area cultivated per household for each crop (ha)

<i>Crop</i>	<i>Tsholotsho</i>	<i>Chinyika</i>	<i>Mutoko</i>
Maize	1.8	3.1	1.0
Millet	3.2	0	0.2
Sorghum	0.6	0	0.1
Sunflower	0.1	0.5	0.2
Groundnuts	0.3	0.2	0.2
Beans	0.1	0.4	0
Total area	6.2	4.2	1.6

Farmers with adequate draft power can carry out timely work and are able to do winter plowing. Availability of draft animal power also reduced demand for labour for operations like planting, weeding and transport. Draft animals are an important source of fertiliser (manure) for crops.

The animal power problem has two components - unavailability (absolute numbers) and inadequacy (animal quality). Those with inadequate draft power usually planted late.

The main problems of animal production were disease (mainly tick-borne), shortage of drinking water and grazing. Animals were therefore weak for draft work. Suggested solutions were boreholes and supplementary feeding (crop residues). Other problems identified were cost of veterinary drugs, cattle rustling and a high cost of hiring draft animals or restocking after drought.

This diagnostic study indicates that there may be a vicious circle in the smallholder system which

links low crop yields, low crop residues (nutrition) and low draft power. Crop yields can be improved by efficient use of feed resources or by improving draft animal management

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