

# Animal traction in South Africa into the 21<sup>st</sup> century

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## Abstract

*Surveys conducted in rural areas during the last six years have revealed conclusively that there is wide scale use being made of animal traction by rural communities in South Africa as well as, to some extent, by commercial farmers. The cost of tractor powered mechanization and the demise of government tractor schemes is the main cause of the recent increase in interest in this important power option. The National Government has now recognized the importance of animal traction and an Animal Traction Policy has recently been included in the latest government "Green Paper" on agriculture. This paper discusses the current status quo as far as animal traction in South Africa is concerned and looks ahead to possible developments in the next century.*

## Introduction

Animal traction is seen by farmers and policy makers in many parts of the world as an appropriate, affordable and sustainable technology, which requires few external inputs Starkey et al 1995. Draught animals can provide small scale and resource poor farmers with power to produce crops and to provide transport (Kotsokoane, 1998).

Animal power has been used throughout the world for thousands of years and the progress of civilizations can be ascribed in part to the role that draught animal have played in the history of mankind. Unlike many countries in Africa, South Africa has a long history of animal traction going back to before the arrival of the colonists from Europe in 1652. The subsequent development of the region was, until the beginning of the 20<sup>th</sup> century, largely dependent on animal power (Joubert, 1995).

The invention of the internal combustion engine and the development of the agricultural tractor has resulted in radical changes to the use of these animals during the last 70 years. The result has been that for the last two generations animal traction has been marginalised to the extent that until very recently it was considered by many to be outdated and old fashioned and to have no relevance to agriculture or the development of rural communities.

Recent surveys in all the provinces of South Africa show conclusively that despite the fact that animal traction has all but disappeared from the commercial scene in the country, it is still widely used by small scale farmers and rural communities. This paper looks at the past present and future situation with respect to animal traction in South Africa, in the light of the renewed interest in animal traction that has taken place over the last six years.

## A historical overview

Prior to the arrival of the first European settlers in 1652 the use of draught animals was common place and oxen were used by the Khoi-Khoi for riding, packing and war (Joubert, 1995).

The settlers began by using oxen, which were the only form of draught animal available for transport and the production of food crops. In the late 1650's the first horses and donkeys were imported but due to the equine unfriendly nature of the environment it was over 100 years before they became established and were widely used (Child, 1967).

For the first 250 years of colonization, animal power increased and spread both amongst the settlers as well as the indigenous peoples. Oxen were used to pull the trek wagons and carts and for cultivation purposes (Botha, 1962). The transport of heavy goods between cities and towns was generally by ox wagon, while horses, mules and donkeys pulled the passenger coaches and carts. By the turn of the century animal traction was an important power source to all sections of the population (Bossman, 1988; Burman, 1988).

After the first world war with the rapid development of fossil-fueled engines and as a result of the huge losses of draught animals, particularly horses during the war a major shift to the use of tractor powered farm machinery began (Blakewell, 1991), mainly on commercial farms. By the early 1960's draught animals had all but disappeared on these farms and as a form of transport power in commerce.

Despite this small scale farmers and rural communities continued to make wide scale use of it. During the 1950's, 1960's and 1970's a supportive infrastructure of Education, training, research and the supply of equipment and spare parts developed in support of tractor-powered agriculture while the situation in so far as animal traction was concerned

became one of almost total marginalisation. Although millions of rural people were still using it there was no training, research, extension or development of a supportive infrastructure of equipment and spare part supply. Due to a genuine belief that tractors would eventually become the sole power source on farms world wide, government subsidized tractor ploughing schemes were introduced in the rural small scale farming communities and small farmers were encouraged to get rid of their draught animals.

The lack of any form of training, extension or research in animal traction has left farmers using animal traction to their own devices and at least one generation of agriculturalists have graduated without any formal training in animal traction and with no idea that it had any role to play. These graduates ultimately became the policy makers and as a result animal traction was not even considered as a power option and became even more marginalised

The oil crisis of the 1970's started people thinking about the future role of fossil fuel power and in many African countries a renewed interest in animal traction developed. International networks were formed to promote information exchange and collaboration.

In the early 1990's despite the fact that animal traction in many circles had an extremely poor image and was not considered by the authorities as an option, many people in South Africa, academics, farmers, NGO's and government officials began to realize that animal traction was still being widely used in the rural communities and that it did in fact have great relevance for the future development of not only small scale, but also commercial agriculture as well.

In 1993 the South African Network of Animal Traction (SANAT) was formed with a view to promoting the relevant training, research, extension and policies concerning the use of draught animals in South Africa. SANAT is affiliated to the Animal Traction Network of Eastern and Southern Africa (ATNESA) and is as a result able to learn from the experiences of other African countries where animal traction is used. At the time of its inauguration little was known about the use of animal traction in South Africa. Many believed that it had almost completely died out no one was sure of the extent to which it was actually used and in 1994, SANAT commissioned a nation wide survey to investigate the use of animal traction. This survey revealed that between 40 and 80% of all the rural communities visited were using animal traction in one form or another for agricultural as well as transport purposes. From the survey it was possible to estimate that at least 400 000 small scale farmers were making use of animal traction at the time (Starkey *et al.*, 1995). The survey also revealed

that a number of commercial farmers were using it with substantial reductions in their mechanization costs.

Since 1993 SANAT has developed an effective network linking animal traction users throughout the country and the picture as far as animal traction is concerned is much clearer. It has succeeded in promoting and publicizing animal traction to the extent that it is now gaining wide scale recognition and is recognized by the National Government as one of the power options not only for agriculture but also for rural communities in general.

### **The present animal traction situation in South Africa**

Agriculture in South Africa comprises two sectors; the commercially run farms of the former 'White' owned farmers and the small scale farms which occur in the former 'Black' rural communities (Kotsokoane, 1998). In the former areas draught animals have all but disappeared except for a few farmers who report financial savings from the use of heavy draught horses and oxen for a wide range of agricultural as well as transport tasks on their farms.

In the latter areas hundreds of thousands of oxen, donkeys, mules and horses are used by small holder farmers for agricultural as well as transport purposes, while many rural peoples use draught animals for transport purposes.

### ***Socio-economic aspects of animal traction***

Draught animals play an important role in the lives of rural communities. Oxen have played an important role in the customs of many of the indigenous peoples for thousands of years. Donkeys horses and mules to a lesser extent have in more recent times come to be very important for reducing the drudgery particularly of women who use them to haul water fire wood and groceries as well as for the cultivation of crops and transportation of the harvest. Horses are mainly used for riding but many are now using them to plough harrow and cultivate their crops.

Oxen and horses are generally regarded as being within the male domain while donkeys are usually managed and used by the women and children although it is not uncommon for men also to work them (Jaiyesimi-Njobe, 1995).

In remote areas farmers take great pride in their traditional ways of handling their draught animals but in the peri-urban areas animal power is perceived as an outmoded technology (Jaiyesimi-Njobe, 1995).

Most farmers whatever their scale would like to own or use tractors and other motor vehicles but many are

beginning to realize that they cannot afford them. Some farmers are reluctant to admit to the use of draught animals for fear of being perceived as backward.

This situation is particularly prevalent amongst the young, many of whom perceive the use of draught animals as backward and who are not interested in taking up the technology. At school they have learned that it is old-fashioned. Existing indigenous knowledge is mainly a skill belonging to the old people and it is not generally being passed on to the young.

Starkey *et al.* (1995), reported that in some provinces senior agricultural staff dismissed local use of draught animals as negligible despite the fact that they were in fact widely used in their rural areas. Official perceptions however are not all negative and during the last six years, as a result of the transformation that has taken place in the country, many officials are now positive with regard to the use of animal traction.

Workshops, farmers days and displays put on at Agricultural shows, which have been arranged under the auspices of SANAT, have stimulated interest in the subject and there is now considerable interest amongst academics professionals as well as government officials in the investigation and development of animal traction technologies. The most recent development in this regard is that the National Department of Agriculture has recognized animal traction as an important and viable power option and has prepared an Animal Traction Policy, which has been published in the most recent 'Green Paper' on Agriculture.

### ***Draught animals***

The use of draught animals and the type adopted varies from province to province. Oxen are preferred in the Eastern Cape and Kwa-Zulu, donkeys in the North West, Northern and Mpumalanga provinces as well as in the Western and Northern Cape (Starkey *et al.*, 1995).

Oxen remain the most important draught animal in the country, they are powerful accessible and the trek-gear needed to in-span them is cheap, durable and readily available. Oxen generally appreciate in value over their working life. Many farmers have reported that the numbers of draught oxen have decreased over the years and that it is harder, these days, to acquire trained oxen and people with the skill to train and use them are becoming fewer and fewer.

Donkeys are hardy, have a working life of two to three times that of oxen and are low cost.

Furthermore they can be managed and used by men, women and children. The harness for in-spanning donkeys is however not always available and is very expensive, with the result that most farmers make their own, which sometimes leads to the development makeshift tack which results in harness sores. Donkeys have replaced oxen in some areas due to the droughts, which have occurred in recent years and the fact that oxen and cattle generally have died. Donkeys being small and hardier have managed to survive better. Starkey *et al.* (1995), found in their survey that donkeys tended to have a very poor image amongst agricultural extension workers. There appeared to many myths and misconceptions about donkeys and it was reported that officials believed that donkeys eat more than cattle and destroy the veld, that they are non productive and expendable. By and large the value and importance of donkeys to the rural communities has been ignored by the authorities.

Horses and ponies are found mainly in the highland areas, where there is less likelihood of them being infected with African horse sickness and where there are no tsetse flies. They are mainly used for riding but also to a significant extent for pulling carts and for the cultivation of crops. Horses generally are a prestige animal and are usually the domain of the men (Child, 1967).

Mules are no longer common in South Africa. They are extremely hardy, can be worked for even longer than donkeys and can be used for transport crop cultivation or for work in the forest slipping timber. The demand for mules is greater than the supply and at the present time they are bred (by crossing a donkey jack with a horse mare) mainly on 'white owned' commercial farms but also to a lesser extent by farmers in the rural communities. The only two mule breeding stations in the country have recently closed down.

### ***Animal nutrition and health***

By and large draught animals graze under communal grazing conditions and may have their diet supplemented with lucerne hay or some other hay during hard work They are usually expected to work with a minimum of supplementary feed. Veterinary services in the rural communities have deteriorated in recent years and as such, farmers using draught animals generally find it difficult to obtain medicines or veterinary services. This means that they have, in many instances to rely on their own indigenous knowledge and make use of the wide range of plants which are known to have medicinal qualities.

A research project, undertaken jointly by the Universities of Edinburgh and Fort Hare, has over the

past three years investigated the supplementary feeding of draught oxen.

### ***Draught animal technology***

The majority of draught animals is used for ploughing and transport (Starkey *et al.*, 1995). However they are also used for a wide variety of other tasks including harrowing planting weeding mowing raking dam construction and logging. According to Starkey *et al.* (1995), there are some 200 000 ploughs, 60 000 planters and 90 000 cultivators in current use with annual sales of new implements running at approximately 6 000 units per year of each of the three items mentioned.

Harnessing of draught animals is usually by means of the traditional yoke, skeis, riems and strops in the case of oxen. The oxen being yoked in pairs and the total cost of the equipment required being about R 250. Horses donkeys and mules are normally harnessed using the breast type harness with breaching. The material used is either leather or Webbing and the cost is high ranging from R 4 500 for a double leather heavy horse harness to R 1 000 for a double Webbing harness for two donkeys. Because of the high cost of these harnesses many farmers make their own breast harness out of leather seat belt material or rubber belting (Joubert, 1997).

It is usual for farmers using oxen to work two four or six at a time sometimes as many as eight may be inspanned when the soil is heavy and hard or where the load to be dragged is heavy. Normally three people work with the oxen no matter how many are in spanned. Horses are usually worked singly or in pairs and donkeys in pairs or four and even six in some cases. It is normal for only one or two people to work with horses and donkeys

### ***Animal-drawn implements***

Both the implements and spare parts for the basic agricultural activities such as ploughing, harrowing planting and cultivating are available in the major centres of the country. However the implements and spare parts are often not available in remote rural areas which results in implements not being used because the spares cannot be obtained. The modern tendency is for teams and spans to be smaller and for women and to a certain extent children to be involved in the agricultural activities and most of the equipment available is only suitable for adult men.

There is a need for smaller light weight implements that can be managed by women and pulled by fewer animals.

### ***Transport***

Two wheeled four wheeled carts and wagons are used through out the country pulled in the case of two wheeled carts by two to four animals and in the case of four wheeled wagons by up to ten animals. These larger vehicles are used more by contractors, who hire out their services for the haulage of goods. In remote rural areas sledges are common forms of transport but they require large spans of up to six oxen to pull them due to the high dragging forces required to pull them. They are used mainly on rural roads but can be dragged almost anywhere. On steep slopes they do not require brakes, which is an advantage, however they may cause soil erosion.

### ***Animal traction versus agricultural tractors***

Animal traction is an important power option for agriculture in South Africa, but this, in no way suggests that the tractor does not have its place. This versatile powerful and durable machine has revolutionized farming throughout the world. Its versatility and strength have caused people to believe that they would ultimately become the only viable power option for farmers world wide and have blinded them to the huge financial implications of owning and operating such machines. It is now realized that it is not so much the area of land that a farmer works with his tractor that is important but rather the number of useful hours work that it does per year. Costs per hour for tractors of various sizes have been determined by researchers based on 1 000 hours of useful work per annum. These figures are often used to determine the rates to charge for small scale farmers who do perhaps 250 hours of useful work with their tractor per annum and where the cost per hour under such conditions might be as much as three to four times that of the tractor doing 1 000 hours per annum. This has led to much confusion and uncertainty amongst both farmers and extension officers in small scale farming areas and to tractor charge out rates in general being way below what they should be with the result that such farmers are losing out financially on a huge scale.

There is another factor regarding tractors, however, which is equally as important and that is the timeliness of carrying out activities. Under the subsidized ploughing schemes farmers had access to tractors at unrealistic charge out rates which meant that they had their ploughing done very cheaply. However they normally had to wait in line for a tractor to arrive and very often by the time it did arrive the soil would be too hard to plough. Thus these schemes caused a false idea of the cost of activities and at the same time severely disempowered the small scale farmer.

Tractors are effective for doing heavy work in short periods of time however they are extremely expensive are really only justified on farms where the number of useful hours of work that each tractor on the farm does is between 600 and 1 000 hours.

Starkey *et al.* (1995) pointed out that for every R 100 spent on tractor hire, most was exported from the rural area where as for each R 100 spent on the hire of draught animals, most remains within the community.

It is important also to consider the complementarity of tractors and draught animals. A number of commercial farmers make use of both tractors and draught animals; the tractors being used for the heavy work that would normally take a long time with draught animals, while the animals are used for activities which they can complete in a relatively short time at a considerably reduce operating cost.

There are many commercial farmers particularly those who farm with cattle who could reduce the number of tractors in use on their farms thereby increasing the annual hourly usage of the tractors remaining, to an economical level and thereafter, carrying out the lighter tasks such as haulage and crop cultivation using draught animals.

Small two wheel tractors have come under the spotlight in recent years and have been proposed as a possible power option for small scale farmers. Some of these tractors are available at temptingly low prices and often are accompanied by a wide range of implements which create the immediate impression that the package could be the answer to all the small farmers power needs. Some work has been done into the performance and economic viability of these tractors (Joubert, 1988) as well as into the availability of spares and the servicing back up, which is normally available. Although more investigation is still necessary it is beginning to appear that the use of such tractors by small scale farming communities in South Africa is in most cases not to be recommended.

Most small scale farmers only have 2 to 5 ha land which they work and only some 100 useful hours of work for a tractor annually. Under such circumstances it is practical and makes economic sense to use draught animals where the capital investment is only a fraction that of tractors, the operation costs are low the draught animals often appreciate in value. Under such circumstances the farmer is master of his own destiny and is able to carry out all his tasks how and when he deems it the right time.

### ***Training research, development and extension***

In the past the approach to training research development and extension has tended to be 'top-down'. The tendency was generally to decide on matters related to these issues with a minimum of consultation with the small scale farmers themselves. For future training and research programs to be successful it will be necessary for the users of animal traction to be consulted at all stages. It should be based on a networking approach where ideas and experiences are shared between institutions and individuals Starkey *et al.* (1995). It should be remembered that there is much to be learned from African countries to the North

Future training and research programs need to emphasize the following:

- Low draught requirements i.e. must be suitable for donkeys and small spans of oxen.
- Fewer laborers i.e. one person only working the animals.
- Lower capital investment and operating costs.
- Convenience and ease of use and acceptability to women and children.
- Complementarity i.e. secondary tillage practices which complement tractor ploughing.
- Promotion of a modern image i.e. the use of modern techniques materials and ideas.

1. ***Training and extension:*** It is important that future generations are aware of the role that animal traction can and does play in the country. The topic should therefore be included in primary and secondary school as well as in tertiary educational curricula (Starkey *et al.*, 1995). To meet the imbalances of the past it is necessary that teachers, lecturers and extensionists receive in service training in animal traction and related technology to enable them to adequately meet the needs of the farmers they serve. It is envisaged that for training programs to be fully effective they need to be backed by animal traction resource centers where undergraduate and postgraduate training can be conducted along with animal traction research. Furthermore in depth training for extension officers and farmers is needed and these could be offered at selected agricultural colleges and schools. Finally in order to meet the huge needs of the small scale farmers for animal traction training extension and on farm research it is believed that the use of mobile animal traction training and research units would be an effective way to rapidly address such needs.

2. **The environmental impact of using draught animals:** There is a wide belief that the encouragement of the use of draught animals will lead to an increase in the number of large animals on the land with the result that communal grazing lands will be degraded (Starkey *et. al.*, 1995). Although there is no real evidence available at the present to support this it is essential that a thorough research study be conducted to determine the effect of draught animals on the communal grazing and to consider different ways in which draught animals can be maintained.
3. **Stock theft:** the problem of draught animals being stolen is becoming increasingly serious and this has been sited as a reason for not using draught animals (Starkey *et. al.*, 1995). There is a real need for this issue to thoroughly investigated and for a solution to be arrived at.
4. **Weeding technology:** generally speaking the weeding of crops using draught animals is not as common as one would expect given the comparative advantages that it offers over hand hoeing for example. The reason is mainly because of the scarcity of implements and suitable yokes as well as due to the lack of training and extension in this area. The development of light-weight weeders for use with a single donkey would be very beneficial (Starkey *et al.*, 1995).
5. **Tillage systems and tillage implements:** Research into improved tillage systems such as conservation tillage which favor the conservation of energy, soil moisture and which are more environmentally friendly is beginning to receive recognition (Simalenga, 1998). Improvement of existing implements and the development of new equipment, which is light-weight, can be used behind fewer animals and which is manageable by women is becoming available. In both these areas there is room for more research and development.
6. **Harness making:** Existing horse and donkey harness is expensive. Work is being done to find ways in which equines can be harnessed using a simpler and lower cost type of harness. Further research and development is also required in this area (Thomas-Kapp, 1998).
7. **Animal-drawn wagons and carts:** All animal-drawn transport is done using wagons, carts or sledges. Two problems which exist are firstly the pay load is often low on existing designs with the result that much power is wasted and that animals are overloaded; secondly most urban animal drawn transport has to compete with motorized vehicles which does present congestion problems. Some research is being done in the former area

but in both the former and latter areas much work is still needed (Starkey *et. al.*, 1995).

8. **Forestry and logging:** Animal traction was once widely used in the forestry industry of South Africa, and in some areas is still found (Joubert, 1997). It is not only economical but is also environmentally becoming acceptable if not essential under certain circumstances. There is room for studies to investigate the wider use of draught animals this industry.

### **Policy implications**

With a positive policy that recognizes the past, present and future contribution of animal power in South Africa draught animals will be able to serve rural communities in many key areas such as transport, food production, food security and the reduction of the drudgery of rural life, particularly that of women (Starkey *et al.*, 1995). Animal traction should however be recognized as a valuable option not only for empowering rural communities but also for improving the economy of commercial farmers and uplifting the country as a whole. Animal traction needs to be portrayed with a positive modern image. It also needs to be recognized and supported by the National Department of Agriculture.

### **Animal traction in the 21<sup>st</sup> century**

As the 20<sup>th</sup> Century draws to a close it is clear that despite many years of neglect animal traction is still widely used in the rural communities of South Africa. With the demise in the provision of government ploughing services and the questionable ability of private tractor contractors to successfully meet the cultivation needs of the majority of small scale farmers it is clear that animal traction is likely to increase in relevance and importance in the next millenium. Animal traction can empower rural communities but at the same time it is important to remember that it is only one component of the complete rural farming scenario. Animal traction should be seen within the broad context of the rural communities and agriculture generally in the future development of South Africa.

As South Africa moves into the 21<sup>st</sup> Century, and as professionals, academics, farmers, extension officers and NGO's gather to find ways to take animal traction forward into the new millenium there are a number of areas which have in recent years been highlighted at various workshops, farmers days and conferences, and which can be mentioned as points for consideration for inclusion in the strategic plan for the next millenium.

1. There is a need to include animal traction in the education and training curricula of schools and

relevant colleges and universities and to ensure that the trainers in animal traction are available. Furthermore it is necessary that extension programmes, preferably mobile in nature, are put into operation.

2. Research programs in animal traction in recent years have begun to address the needs in this regard but there is need for on-farm felt needs research in collaboration with farmers that will address the immediate needs of farmers. It is important that such research is multidisciplinary in nature and is based on a farming systems approach.
3. A real need exists to determine ways in which animal traction can be used to empower rural communities.
4. There is a need for an effective networking program throughout the country which will ensure that the many people involved in decision making, training, research extension and of policy formation are kept in touch with one another and with the latest developments in animal traction. The left hand must know what the right hand is doing.
5. The National Department of Agriculture has wisely incorporated animal traction into its National Agricultural Policy. But it is important that both the National as well as Regional Departments of Agriculture now begin in a positive and practical manner to implement the recommendation contained in that policy.
6. The logging industry in South Africa has for many years been managed on a capital-intensive fossil-fuel powered basis. There are however many small scale entrepreneurs living on the perimeter of the forests who could make a good living contracting their services to the forestry industry. For such entrepreneurs animal traction and basic logging equipment, which is currently widely used and available in Europe, Great Britain and North America, would provide a low cost method for them to get operational.
7. Many commercial and small scale emerging farmers are interested in using animal traction, a major deterrent for such farmers is the lack of

suitable animal-drawn equipment. Recent research in Europe and North America has resulted in the development of a range of horse-drawn hitch carts, complete with hydraulically operated three-point hitches and a power take-off, which make it possible for category one, tractor mounted implements to be hitched up and used behind two, four or even six horses. There is a need for research aimed at adapting such equipment for use in South Africa where it would provide a useful power option for emerging commercial farmers and would also be a consideration for commercial farmers currently using tractors who could benefit from an animal traction system which would allow them to use these tractor equipment behind draught animals as well.

8. Animal traction is generally regarded as a poor man's power option. This is a however a debatable conception as animal traction was the means by which many farmers in the middle of the 20<sup>th</sup> century were able to operate economically and which enabled them to purchase their first tractors. Animal traction can it is believed enable farmers particularly the small scale farmers to make a good living. In this regard it is important to keep an open mind and to also consider the introduction of for example a small scale irrigation plant which together with animal traction would provide a high technology / low technology way of farming which would be effective in areas with low or erratic rainfall but which are supplied by reliable river networks, flowing from areas of high rainfall.

Animal traction has in the last fifty years gained a poor image, this situation is changing but much still needs to be done to get animal traction accepted for the valuable component of society which it is. As South Africa moves into the next century the farmers, policy makers and all those involved in agriculture need to take the image of animal traction a step further than it's only being a power option for poor communities. Animal traction has the potential to uplift the whole country and it is believed that it should be considered in its widest context and that no possibilities for its use and inclusion in the future development of South Africa should be overlooked. Animal traction is a sure way of empowering most farmers and rural communities in the 21<sup>st</sup> Century.

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