



Developing agriculture with animal traction

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PRETORIA

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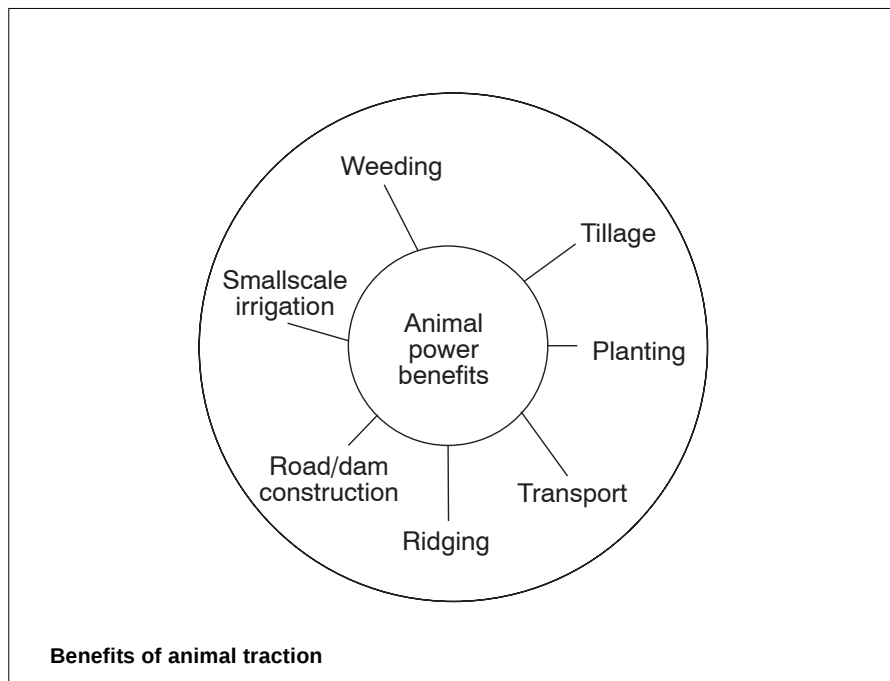
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What is animal traction?

Animal traction is the use of animals [cattle (bulls, oxen and cows), donkeys, mules, horses, goats, camels, water buffaloes, etc], to assist farmers in carrying out the following tasks:

- In **agriculture**, for ploughing, harrowing, planting, ridging, weeding, mowing and harvesting.
- In **transport**, for pulling carts and loads over a surface, logging and carrying loads (pack animals).
- In **irrigation**, for driving water-pumps and pulling water from wells.
- In the **building industry**, for assisting in earth moving for roadworks, for carrying bricks, etc.
- To **provide power** for the operation of stationary implements such as threshing machines, grain mills and food processing machines.



Brief history of animal traction in South Africa

Animal power has been used for thousands of years in Asia, Europe and North Africa. In South Africa, animal power was used by the indigenous peoples long before the Europeans arrived in 1652. Since then it has played an important role in the development of agriculture in the country.

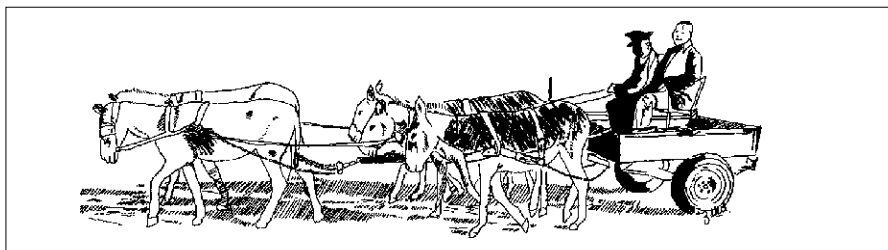
- Oxen were used to draw transport wagons, for ploughing and crop cultivation.
- In the cities mules and horses pulled coaches while oxen were used to pull wagons with heavy loads.
- Farmers used oxen, donkeys, horses or mules for cultivating fields and for transport.

In the course of the twentieth century farmers started to rely more on fossil-fuelled power for transport, mining and large-scale agriculture. From 1960 to 1980 the use of animal traction declined on commercial farms and was replaced almost entirely by tractor-powered mechanisation. For small-farmers and rural communities animal power, however, remained essential to their livelihood despite the introduction of government subsidised tractor schemes.

A recent animal traction survey has indicated that at least 400 000 small-scale farmers still use animal traction.

Because of high oil prices, the weak rand and tractor scheme failures, animal traction has begun to be reconsidered as a source of power that could complement tractor power.

There is, however, a need for greater Government support in terms of a definite animal traction policy as well as training, research, development and extension in animal traction.



Rural donkey-cart taxi

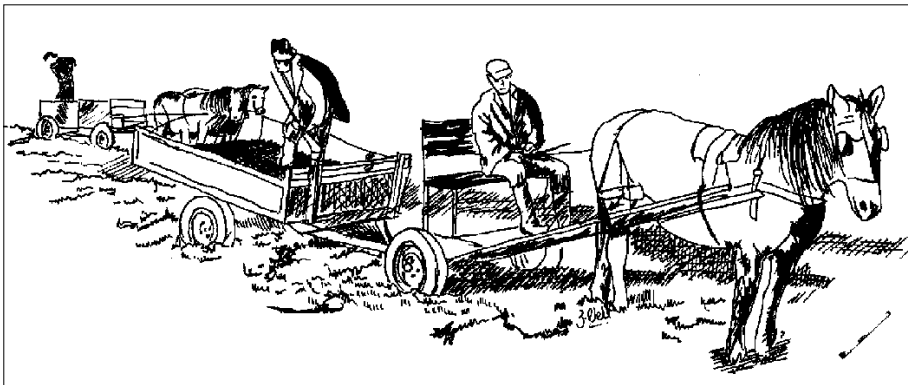
How widely is animal traction used?

Today in South Africa, the use of animal traction by large-scale commercial farmers is uncommon, but it is on the increase.

A small number of large-scale commercial farmers use horses and oxen for on-farm transport and the cultivation of crops. They have found it more economical than using tractors. Riding horses are frequently used for herding stock and inspection of grazing and fences.

A animal traction survey carried out in 1994 has established that in the rural areas of the country 40 to 80 % of the smallholder farmers visited were using animal power for transport and cultivation.

Even in areas where tractors are used for ploughing, weeding and transporting manure are done by means of draught animals. They are also used for mowing and raking hay, spreading fertiliser, dam building, logging, and often for transporting goods and people in townships.



Manure spreading with hitch-cart and trailer

Networking in animal traction

International and national networks for information exchange and cooperation in animal traction have been established. The Animal traction Network for Eastern and Southern Africa (ATNESA) was launched in 1990 with the aim to:

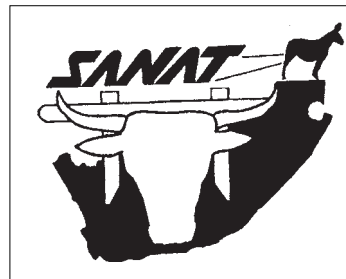
- improve information exchange and regional cooperation
- unite farmers, researchers, manufacturers development workers, NGOs and institutions dealing with animal traction throughout Eastern and Southern Africa.



Membership is open to all interested individuals and organisations.

In 1993 the South African Network of Animal Traction (SANAT) was established. Because of its affiliation with ATNESA, SANAT is in a position to learn from the experience of other countries in Eastern and Southern Africa. Its aims are to:

- promote the use of animal traction wherever it is applicable.
- link people and organisations involved in animal traction
- encourage the establishment of animal traction training and research centres in South Africa as well as its neighbouring countries.



National network elsewhere in Africa include:

- APNEX (Zimbabwe) – Animal Power Network for Zimbabwe
- KENDAT (Kenya) – Kenya Network for Draught Animal Technology
- TADAP (Tanzania) – Tanzania Association of Draught Animal Power
- ENAT (Ethiopia) – Ethiopian Network for Animal Traction

Benefits of animal traction

Animal traction is an appropriate, affordable and sustainable technology which is increasingly being used in eastern and Southern Africa. The benefits of animal traction are:

- providing smallholder farmers with vital power for cultivation and transport.
- empowering rural communities and providing an alternative but complementary power option.
- providing employment and transport, and promoting food production and security, thereby leading to a higher standard of living.
- making marketing and trading easier.
- relieving women of the burden of transporting water by hand, head or wheelbarrow. Animals are easy to use and donkeys, specifically, can be handled by children and women.
- making transportation of the harvest and shopping easier.
- improving fertility by ploughing manure from draught animals back into the soil.
- It is an affordable and sustainable technology. In comparison with mechanical systems, animal power has the advantage to rural families of being available, timely and affordable.

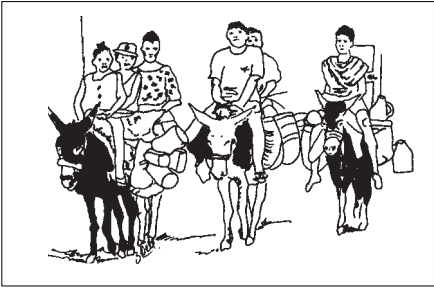


Woman with donkey carrying water

Choice of draught animals

Animals should be chosen according to the type of work to be performed, the local environment, socio-economic conditions and the availability of local animals. Indigenous breeds tend to be well adapted to the local climate, feed availability, diseases and to traditional management systems.

Donkeys

- Donkeys provide power for agriculture and transport at the low cost.
 - Donkeys adapt well in dry areas.
 - They eat less than cattle and for this reason do better than cattle under drought conditions and in heavily stocked areas.
 - They are also lighter and smaller than cattle.
 - Donkeys can live a long life and can be worked up to 25 years of age.
 - They can carry goods and people on their backs in hilly as well as flat areas, pull carts, turn mills and waterwheels, cultivate fields and can even be used to guard sheep against predators such as jackal and lynx.
- 
- Girls riding donkeys to fetch water
- 
- A woman and pack donkey
- Carts can be pulled faster than in the case of oxen, but donkeys are better suited to lighter field work and cannot work for long periods.
 - Women and children can also handle donkeys.
 - The animals are very patient, hard working and dependable.
 - The common idea among the general public, commercial farmers and extension officers that donkeys are lazy or eat too much is quite unfounded.

Cattle

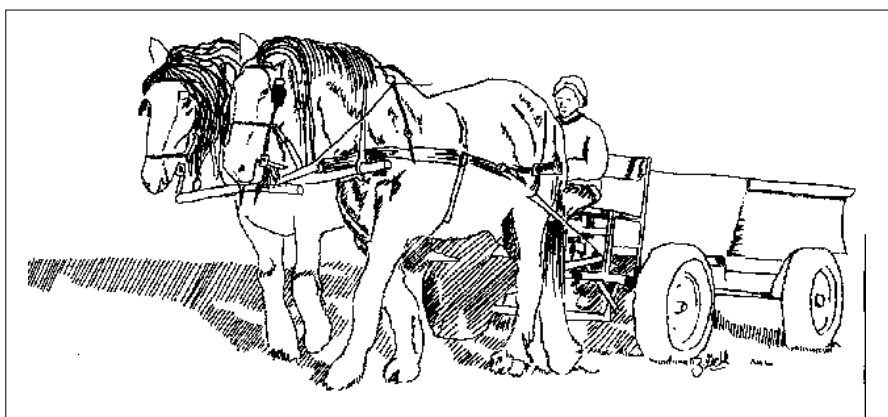
- Oxen are some of the most powerful draught animals currently used in south Africa, but they are slow and labour intensive.
- They are generally used for heavy work where speed is not essential (ploughing and pulling heavy crts and wagons).
- Cows can be used where the work is light and infrequent (planting and cultivating).
- Bulls can also be used as part of a span.



Ripping and planting using oxen

Horses and ponies

- Horses and ponies are mostly used for riding in highland areas.
- They provide strong, fast transport but do not generally have the hardiness of other draught animals.
- They may be used for ploughing, harrowing, planting, weeding and transport. These animals have not been used as widely as oxen as a result of horsesickness which occurs in low-altitude areas.



Two Shire horses pulling a hitch-cart and trailer

- Horses are used to pull carts in the rural areas.
- Sometimes “thoroughbreds” are bought cheaply from the racing industry. As they have not been bred as draught animals, they do not do well and generally do not live long.
- Heavy breeds such as Percherons, Clydesdales and Shires may be used as traction animals on farms. The Percheron appears to adapt best to South African conditions.

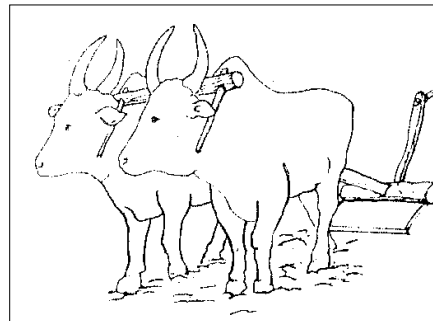
Mules

- Mules are strong, intelligent, hardy and hard-working animals.
- Because they are large animals, they are more easily used by men than by women or children.
- They cost the same as oxen, but are considerably more expensive than donkeys.
- Mules can be used for ploughing, harrowing, planting and logging.
- They can also be used for packing and to pull carts and wagons.
- The animals can work on poor quality feed, under hard conditions up to an age of 35 years.

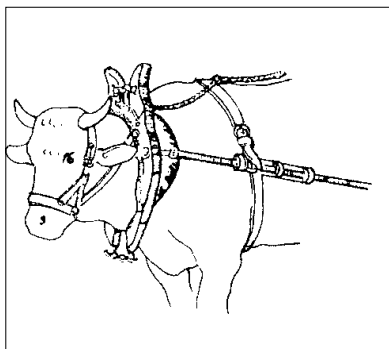
Equipment for draught animals

Yokes, harnesses and in-spanning

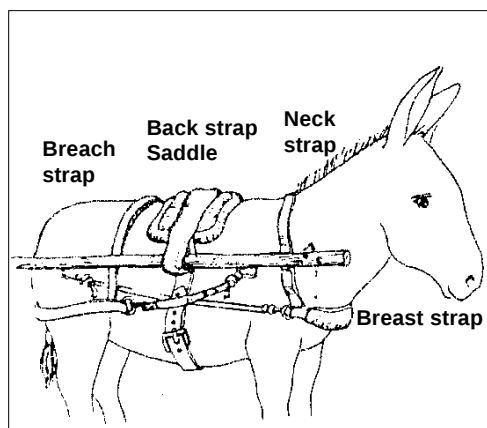
- **Cattle** are yoked in pairs using wooden yokes, skeis, strops, riems and trences. Longer yokes are necessary for planting and weeding. Trek chains are attached between the yokes and the implement to be pulled.
- **Oxen** are strong enough to be harnessed and trained when they reach the age of two to three years.
- **Horses, mules and donkeys** pullbest from their chest and shoulders, so a breast-strap or a collar harness should be used.
- The breast-straps are made from different materials such as leather (most expensive), synthetic webbing, or (least expensive) industrial webbing, belting and tyre webbing.
- Check the cheek pieces on the bridle every day. If you change the bridle from one horse or donkey to another, it may not fit correctly and the bit may cut the corners of the mouth.



Double neck yoke



Ox with collar harness



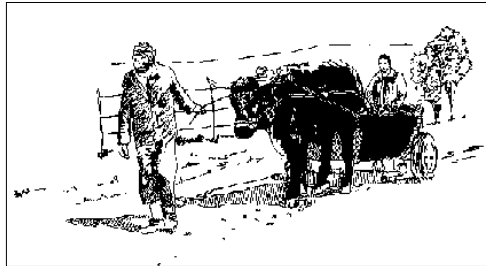
Donkey with breast band harness

Animal-drawn carts

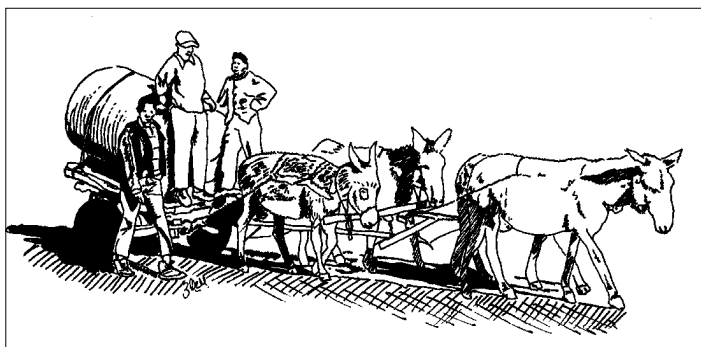
Animal-drawn carts can be made by local craftsmen from wood and material obtained from scrapped motor vehicles.

Two-wheeled carts are pulled by two to four animals. Four-wheeled wagons are pulled by two to eight animals and they can be used to transport heavier loads.

- Sledges drawn by two to eight animals are cheap and brake more easily in hilly country, but they are hard to pull and carry only light loads. They cause damage to the veld if hauled off-road.
- When harnessing two donkeys to a two-wheeled cart, it is recommended that the draught-pole be made light and the load centre of gravity be positioned over the two wheels to ensure a minimum of upward or downward force on the necks of the donkeys.
- In cart design it is important to keep the weight of the cart low. This ensures a reasonable pay load and further that in the case of two-wheeled carts, the load centre of gravity is positioned over the wheels so as to reduce the downward or upward forces on the necks of the donkeys.



The "Golovan" one- ox cart carrying gravel for road construction

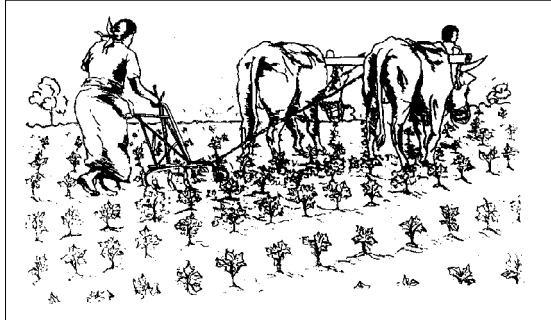


Young people carrying water for sale

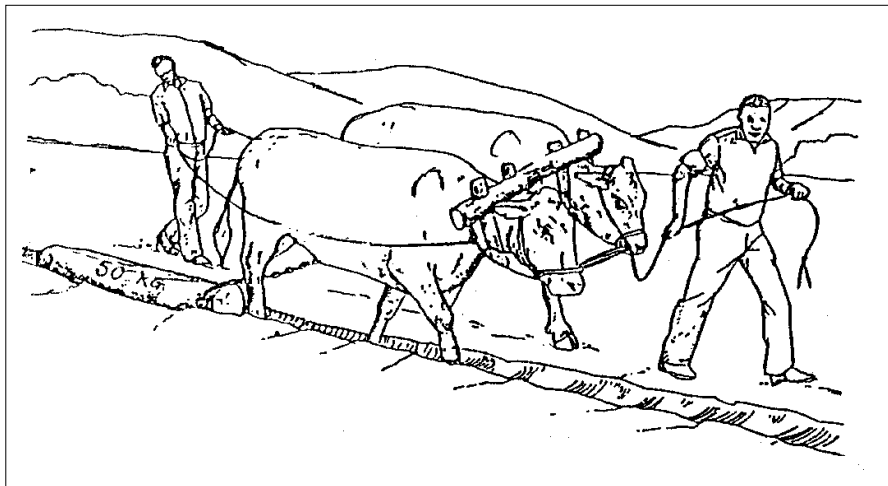
Training draught animals

Animals kept for draught purposes can be easily trained if the correct procedures are followed. Animals to be trained should be properly selected and should not be younger than two years.

- If animals are treated with kindness and patience and are firmly disciplined they are easy to train and use. People training animals should really like animals. They should never be afraid of them, as their fear will be sensed immediately by the animal and satisfactory training might then be impossible.
- Young animals are more easily trained with older ones that have already been trained.
- Each animal should be given a simple, clear-sounding name and should be fed by hand so that it gets used to people, in particular its handler.

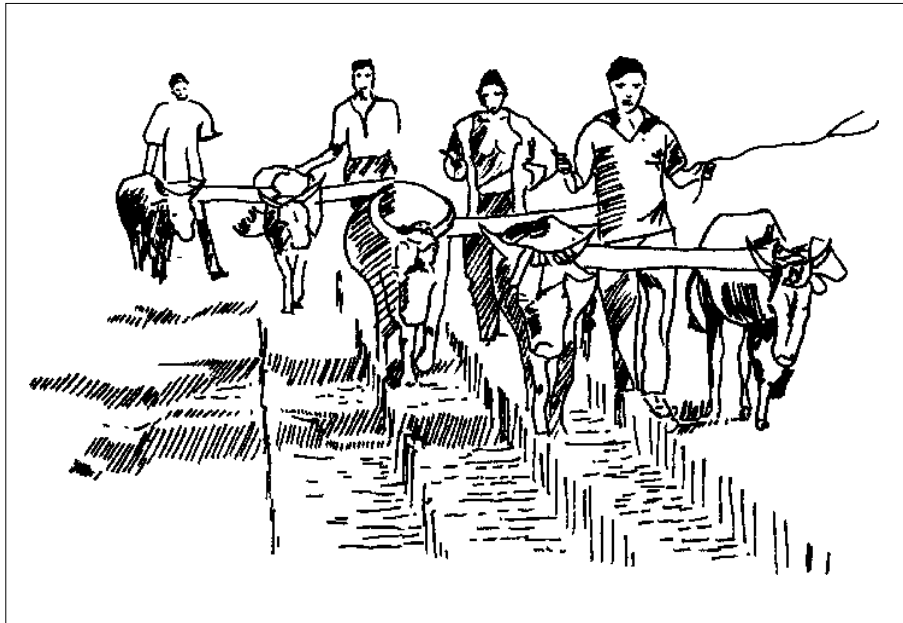


Weeding with animal draught power



Training oxen to plough: a pair of oxen being led while pulling a log in the furrow

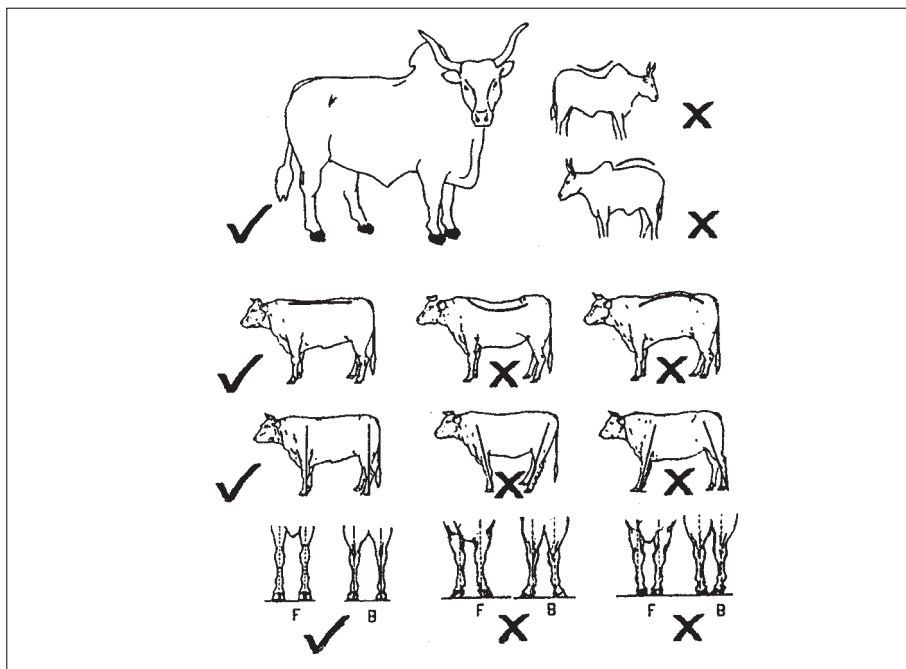
- Animals should be taught one thing at a time so that they do not get confused. They should be trained for short periods at a time but on a regular daily basis.
- In the first week of training the animal should get used to the harness by walking around with it for about one hour in the morning and one hour in the afternoon.
- When used to the harness it can be given commands. Soft but firm words and gentle whistles are the best commands. Beating animals should be avoided at all costs and one should never lose one's temper with an animal.
- Ploughing is the most difficult task, so once the animals can plough it is easy to train them for other tasks. Start with shallow ploughing and gradually go deeper. Teach the animals to walk in furrows so that the whole land is ploughed evenly.
- Always try to end each session on a good note and reward good performance with a small quantity of food.



Training oxen for row weeding

Buying draught animals

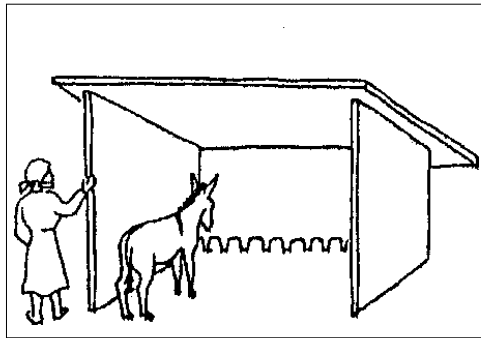
- Buy draught animals in the district where you live as they are used to the local environment, the weather and will be resistant to local diseases.
- Be careful when you buy animals—people often sell animals in a poor condition. Try to find out why the person is selling the animal.
- Examine the animals to make sure that they are healthy. If the animal's coat is dull, it might be sick. Check for lameness.
- A skin disease is often an indication that the animal has not received proper care.
- Check the animal's breathing and conformation (shape) to ensure that it is strong and suitable for draught work.



Selecting draught animals: desirable and undesirable conformation features.
the back and legs should be straight and the legs not bowed or turned in when viewed from the front (F) or back (B)

Caruing for draught animals

- Do not overwork your animals. Rest them frequently during work.
- The load on the carts should never be too heavy for the animal.
- Make sure that the brakes on carts and wagons work properly.
- Grass only may not be enough feed for the animals. Supplement the feed with other food that can be bought from a local feed store, if necessary.
- Do not feed the animals from the ground as they might get worms. Rather use a feed trough, bucket or empty drum.
- Always provide enough fresh drinking water.
- Get advice from a veterinary officer if your draught animal has worms or any other sickness.
- Never mend a harness with wire because it might hurt the animal.
- Remember to chekc the animals' feet for stones regularly.
- Check the teeth for food particles. If the teeth are too sharp, the mouth and tongue can be hurt. A horse's teeth can be filed. Ask a veterinary officer to check on this if in doubt.
- Always check the ears, face, tail and between the legs for ticks. If there are too many ticks get advice on dipping from a vet or the local stock inspector.
- Provide a good shelter for your animals.



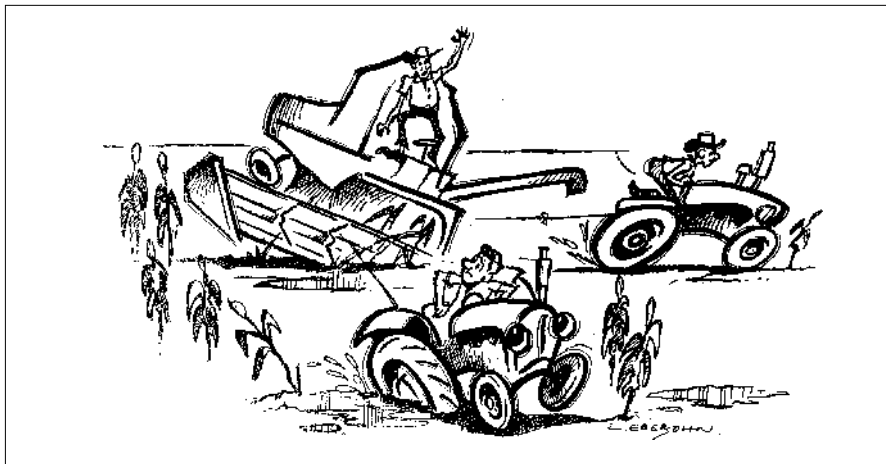
A donkey stable

Tractors vs animal power

Advantages and disadvantages

Tractors

- Tractors are more expensive to buy and to hire.
- They are much faster and more timely for those who own them, but those who hire tractors often have to wait a long time before they arrive to do the job.
- They are generally used for cultivating large areas and when the soil is hard.
- Tractors are generally only economical on large-scale commercial farms.



Tractors should be used appropriately and only where they are economically viable

- Owning or hiring a second-hand tractor for a small farm will usually disempower the farmer.

Animals

- Animals can be bought for much less and are readily available, ensuring that the farmer does not have to wait to carry out his various activities and is in full control of his farming operations.

- They are less of a risk. Owning draught animals on a small farm will usually empower the farmer.
- Animals are easy to work with and can, in the case of donkeys, be used by women and children.

Choosing between tractors and animals

The farmer must decide which of the two options is:

- the most affordable and economically viable
- the most timely and manageable
- to his or her best advantage

The farmer may even decide to use both, and on marginal commercial farms this can be highly effective.

In Table 1 different draught animals commonly used in South Africa are compared with tractors.

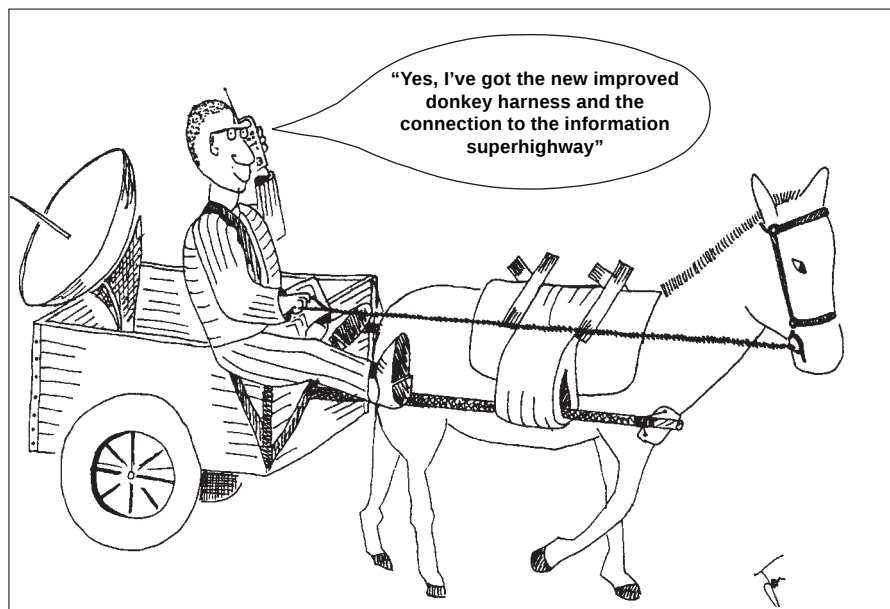
TABLE 1. Different draught animals commonly used in South Africa compared with tractors

Consideration	Donkeys	Oxen	Horses	Mules	Tractors
Purchase price (R)	50–300	1 000–3 000	800 –5 000	1 000–3 500	30 000–90 000
Working life (years)	12–25	6–9	15–20	20–30	7–15
Feed/fuel	Poor grass and working supplement	Good grass and working supplement	Good grass and quality working supplement	Poor grass and working supplement	Diesel or petrol and oil for lubrication
Management	Hardy, disease resistant, low management	Hardy, disease prone, low management	Disease prone, high management	Hardy, disease resistant, low management	Service maintenance, high management
Operator's skill	All animals respond well to patient, friendly handling and good management. Become confused and difficult when handled roughly. Horses and mules need one operator; donkeys and oxen 2 to 3 operators.				One highly trained operator with service backup team
Advantages	Easy to manage willing, produce manure, reproduce, very low operating cost	Easy to manage, strong, produce manure, low operating cost	Willing, fast, reproduce, produce manure, below average operating cost	Willing, easy to manage, hardy, long life, low operating cost	Powerful, last, effective, much work in a short time
Disadvantages	Can only work short periods, small	Slow, cannot reproduce	Need high management	Difficult to acquire, cannot reproduce	Very high operating cost, costly, difficult to repair
Daily work output: ploughing	4	6	5	6	Up to 22 h (Change operator)
Type of activities	Animals can be used to plough, harrow, plant, cultivate, transport, carry loads, pump water, thrash grain and for riding slowly				Can power all farm activities quickly
Effect on the	All animals work slowly with minimal damage to soil. Urine and faeces complement soil nutrients. Do not cause pollution to the soil or atmosphere. Can overgraze veld and cause soil erosion if mismanaged				Cause soil compaction, pollute atmosphere, can cause damage to soil structure
Operator's input	High input to inspan and to operate in the case of all types of animals. Operator must have affinity with animals, be patient and be properly trained				Low effort to operate but long hours are stressful; proper training of operator essential

The future of animal traction

Both tractors and draught animals can be used in agriculture. They can either be used on their own or combined to complement each other. Commercial farmers will continue to use mainly tractor power on large farms.'

For small commercial and emerging farmers the use of draught animals to complement tractors may improve the economic viability of the farm. Animal traction is generally the best option for small-farmers as it is affordable, sustainable, profitable and environmentally friendly in most



For animal power to be effective it is important that:

- an infrastructure providing input supplies and backup services be established.
- the concept be included in the curricula of schools, agricultural colleges and universities.
- Government policy should provide for animal traction training, research and extension throughout the country.

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