

3

Training & Management

The experience gained from consultations with farmers, from training animals at Njala and from the study of available literature from other West African countries will be presented in this Chapter in the form of a manual or practical guide. References will only be cited when external sources contain specialist information. Techniques other than those recommended may be useful or appropriate in specific circumstances, but emphasis will be placed on the methods found most successful during the Njala trials.

3.1 SELECTION OF ANIMALS FOR WORK

3.1.1 Breed

The Sierra Leone national herd comprises about 330 000 Ndama cattle, a dwarf, humpless breed derived from Hamitic Longhorn stock (NLDS, 1979; Williamson and Payne, 1959). Although a small herd of Sahiwal cattle (exotic to Sierra Leone) is being used in an experimental cross-breeding trial at Teko Veterinary Station, the indigenous Ndama is clearly the breed of choice for work purposes. The Ndama is well adapted to the environment and, in particular, is tolerant of trypanosomiasis transmitted by the tsetse fly. It appears to be more resistant to certain other blood parasites and to streptothricosis than some other West African breeds (Roberts and Grey, 1973). Thus, in a disease environment where other breeds would have a problem to survive, the Ndama can actually thrive and be used for work purposes; its tolerance, however, is significantly reduced if stressed by too much work or by underfeeding (Traverse, 1972).

Ndama cattle are small and males at six years achieve a weight of 160-300 kg or 350-660 lb, while mature females weigh around 180-225 kg (400-500 lb).

However, they are particularly well-shaped for work being stocky, with short legs and strong muscles. It has been reported that, in proportion to their weight, their power is higher than other breeds (Travers, 1972). Ndama oxen are considered to be capable of an average traction equivalent to about 14% of their body weight as compared with 10-12% for other breeds (CEEMAT/FAO, 1972).

3.1.2 Sex

a) *Oxen*: Castrated males are the most suitable for draught work, but young bulls should be left intact for two years to allow male characteristics to develop before castration.

b) *Bulls*: These are slightly stronger than oxen and have been used successfully at Njala and on the Chinese rice stations. However, bulls are generally less docile and more difficult to train than oxen and are more likely to be aggressive.

c) *Cows*: These are less strong than oxen or bulls and do not generally reach as high a weight as males. However, they have been used successfully on Chinese rice stations.

Farmers in Sierra Leone all use oxen for draught work and it is recommended that this practice is continued.

3.1.3 Age of training

The preferred age for training is around 3-4 years, at which time the animals have 4-6 permanent incisor teeth (Figs 3.1, 3.2). Generally, the younger the animal, the easier the training, but if they are trained too young, their physical development could be affected and their work potential limited.



Fig 3.1 Mouth of ox of a good age for training. The 4 permanent teeth suggest that the animal is 2½-3 years old with potential growth.

by their small size. If training is carried out between 2-3 years (as one farmer in the Koinadugu District reports) the animals can then only pull a 6" (15 cm) plough, for the first year or two, graduating to an 8" (20 cm) plough as they grow. This system, however, may necessitate the purchase of two sizes of plough. Then, again, oxen more than four years old may be bigger and capable of heavier work, but their training may be more difficult. Also, the animals are more expensive to buy and the potential for profitable weight gain is less.

In practice, therefore, most farmers train their oxen at 3-4 years.



Fig 3.2 Mouth of older ox. The 8 permanent teeth with some wear suggest that the animal is over 5 years and is unlikely to grow more.

3.1.4 Desirable characteristics

Animals chosen should be stocky, short legged, broad chested and with strong feet. They should have strong muscles under a fine, short-haired, glossy coat. When used with head yokes, animals should have a powerful short neck, a thick nape, a wide head and strong, wide based horns of medium length and angled forward (CEEMAT/FAO, 1972). Vicious, excitable or lethargic animals should always be avoided. For work in pairs, animals of the same size, age and build are preferred, although if one is taller or stronger than the other, it should be placed on the right to become the furrow ox.

3.2 SELECTION OF YOKING METHOD AND CONTROL SYSTEM

3.2.1 Double neck yoke

The use of the double neck yoke for the Ndama has been found efficient in Sierra Leone, Guinea, Senegal, The Gambia and Ivory Coast. It has advantages over the shoulder yoke such as:

- good control of animals, making training and working easier;
- restricted movement of heads and dangers from horns are reduced;

- less skin sores and problems associated with rubbed skin because of the tight attachment of the yoke;
- its suitability for the small, humpless Ndama with its strong neck.



Fig 3.3 Neck yoke in Senegambia showing also the nose-rope and rein attachment systems.

Uncarved poles have been used in The Gambia (Fig 3.3), but at Njala these are found to be less effective than the traditional carved yoke used by Sierra Leone farmers. The pole was less easy to attach securely, required more rope, and frequently became loose, requiring re-tying. The problem of movement of the pole caused discomfort to the animals, their power was reduced and they became tired more quickly.

A carved neck yoke is therefore recommended. The traditional design is good, although some farmers use thick sacks between the head and the yoke which, together with insufficiently carved recesses for firm attachment of ropes, reduces its full potential. The yoke should be carved at the bottom where it is in contact with the neck of the animal and sacking may be nailed firmly on to the yoke around the curve.

The ends and the top of the yoke should be carved to keep the ropes firmly in position (Fig 3.4). A well-made yoke allows the strong and stable attachment of

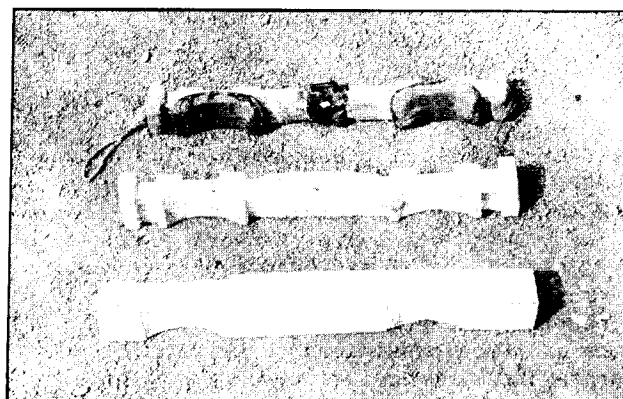


Fig 3.4 Three stages in the making of a yoke.

the ropes which is essential for good control and efficient work. The yoke can be carved in a matter of hours from a log of strong, but lightweight, timber (Fig 3.5). *Gmelina* is a fuel wood introduced into many parts of the country and has been successfully used to make light but strong yokes.

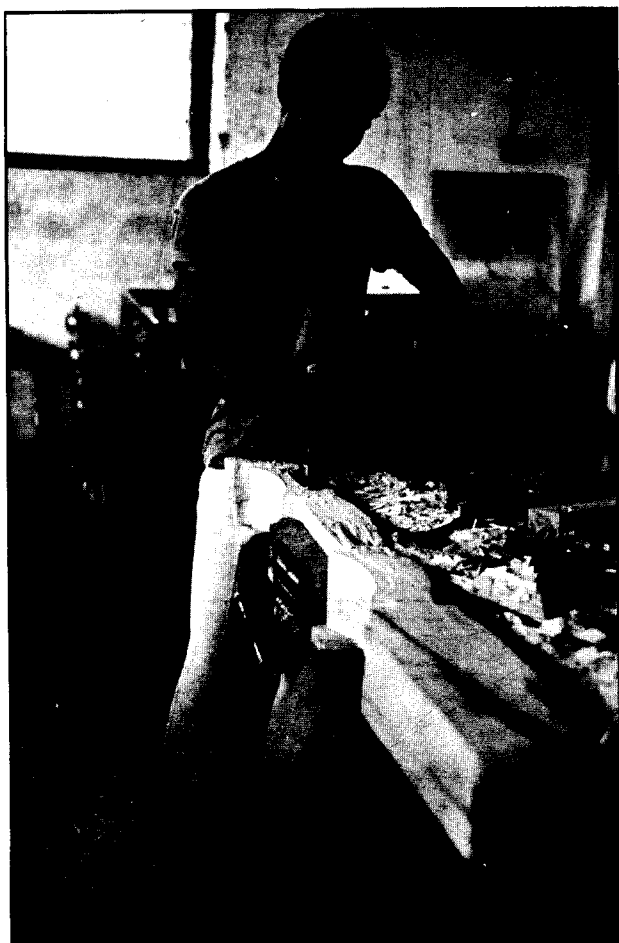


Fig 3.5 Carving a neck yoke at Njala.

3.2.2 Purpose-made double neck yokes

Dimensions for the double neck yoke are given in Fig 3.6. The nominal size, or distance between the centres of the neck curves depends on the type of work to be done.

a) *Normal yoke* (nominal size 64 cm/25") - is used for ploughing (with a 20 cm/8" plough, (See Fig 4.5), harrowing, levelling, planting, groundnut lifting and for transport work.

b) *Ridging yoke* (nominal size 90 cm/35") - is used for making ridges 60 cm/24" wide, and also for weeding rice planted in 45 cm/18" rows.

c) *Weeding yoke* (nominal size 132 cm/52") - used for weeding row crops such as groundnuts, maize and cowpeas, with a row spacing of 66 cm/26". The shape of the yoke is the same in all cases and only the distance between the necks varies (Fig 3.7). For specific functions other yokes of the same design, but different nominal sizes, may be made.

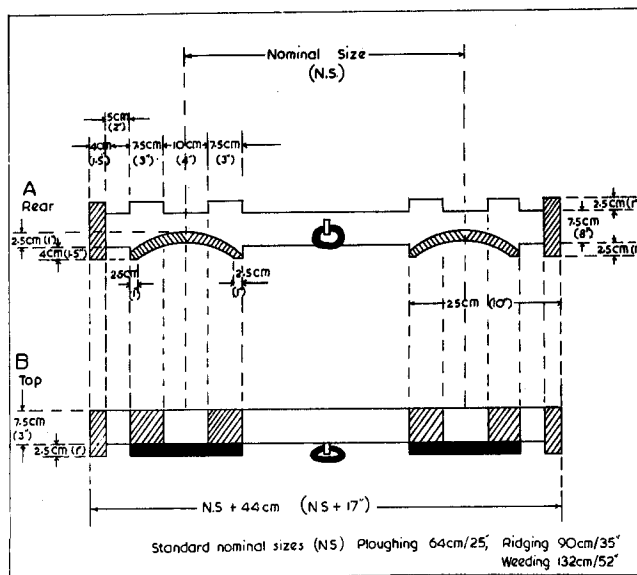


Fig 3.6 Drawings of double neck yoke.

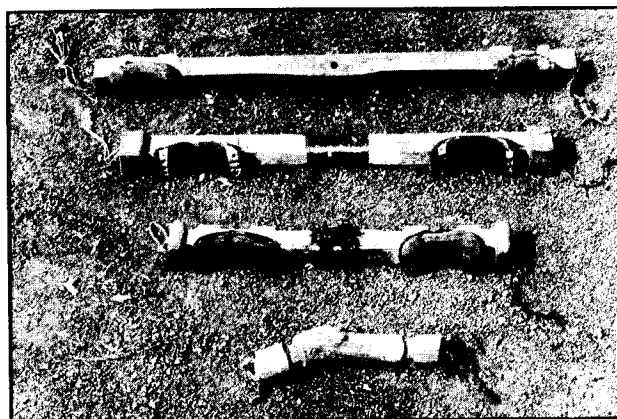


Fig 3.7 Neck yokes: single, normal, ridging and weeding.

3.2.3 Single yokes

A single animal can be used for light operations such as seeding and weeding. A single shoulder yoke has been used successfully at Chinese rice stations and at Binkolo and Masanga, but observations of this system indicated an unfortunate tendency for the attachment rope to constrict the trachea and blood vessels of the neck, (Fig 3.9).

A simple design of a single neck yoke as shown in Fig 3.9 has been found to give good results at Njala. A small log with a side branch is selected and, with the side branch in the middle, it is cut to 55 cm/22" and carved out into a curve to fit the neck of the oxen. The sawn off branch protuberance helps in keeping the ropes tightly in position and stops the yoke turning or slipping. Sacking can be nailed to the inside of the neck curve. The load is taken by ropes at either side of the yoke which are attached to a swingle bar behind the animal. This bar pulls the implements, (Fig 3.10).



Fig 3.8 Use of single shoulder yoke showing tendency for rope to constrict windpipe.

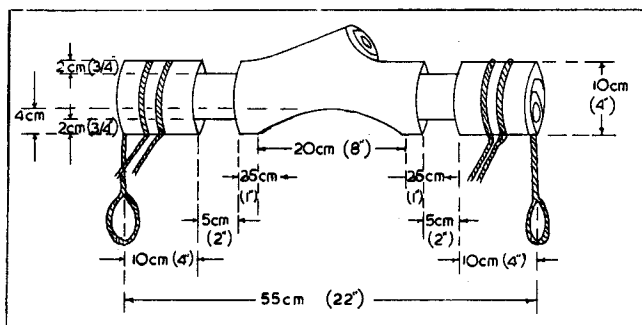


Fig 3.9 Dimensions of single neck yoke.

3.2.4 Control systems

Two different types of control systems have been used successfully at Njala and by farmers in the country:

a) *Nose ring or nose rope*: a ring is inserted into a hole punched in the septum of the nose and this is used to attach the ropes for controlling the animal. When used correctly, this is a very efficient system. Different designs of nose rings can be made or purchased overseas. Some are designed to pierce the nose and most rings can be made locally, (Fig 3.11).

When rings are not available, a piece of rope may be threaded through a hole punched in the septum and then tied to make a ring. This method is not so satisfactory as ropes can rot or fray and are more likely to get caught while the animal is grazing. They are also more likely to damage the nose when pulled hard.

When oxen are yoked together, the nose rings of the two animals are joined with a single rope; longer ropes are then tied to each ring to pass through loops in the side of the yoke, travelling backwards to the driver who uses them as reins, (Figs 3.12b, 3.30). The use of nose rings makes for good control, particularly of difficult animals, as the nose reins make excellent brakes.

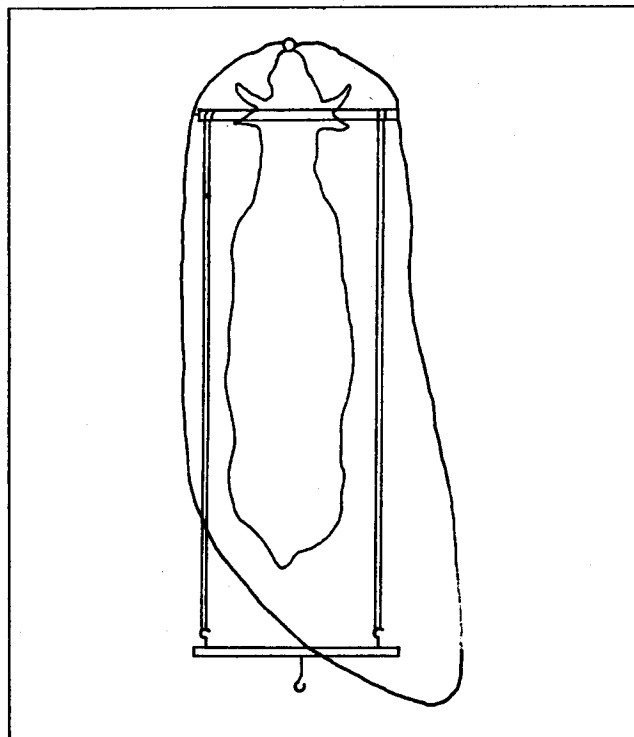


Fig 3.10 System of attaching ropes when working with a single animal.

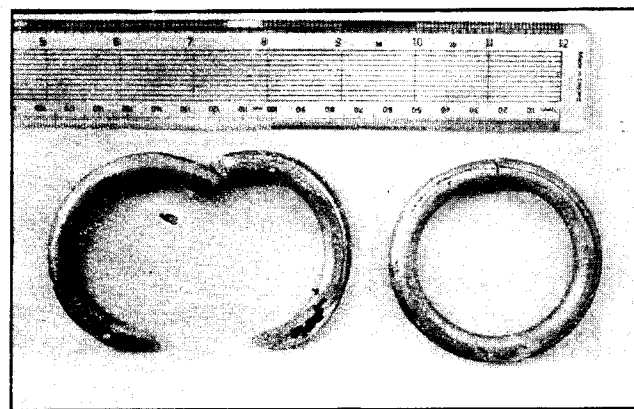


Fig 3.11 Nose rings made at Njala.

This is especially important for farmers training oxen for the first time, as good control and farmer confidence are complementary. Thus, where nose rings are available and nose piercing can be carried out easily and effectively, this system is to be recommended.

b) *Ear control*: In this system the nose does not need to be pierced; a rope is tied instead round the animal's horns. The traditional method of rope attachment, however, can lead to serious skin wounds around the base of the horn and a modified version shown in Fig 3.13 has been found preferable.

When roped for work, a rope is attached to the outside horn and passes round the inside horn to the outside ear of each animal. The rope loops round the ear, protected by a small piece of sack, and passes behind the

animals to the driver for use as reins, (Figs 3.13, 3.14). Alternatively, the rope may be attached to the inner horn, passing directly to the outer ear, as shown in Fig 3.12. Control of docile animals by this system is very effective. The nose ring system, however, is better for restraining excited animals.

Since this system does not require the piercing of the septum, it is recommended to farmers who are experienced and have docile animals.

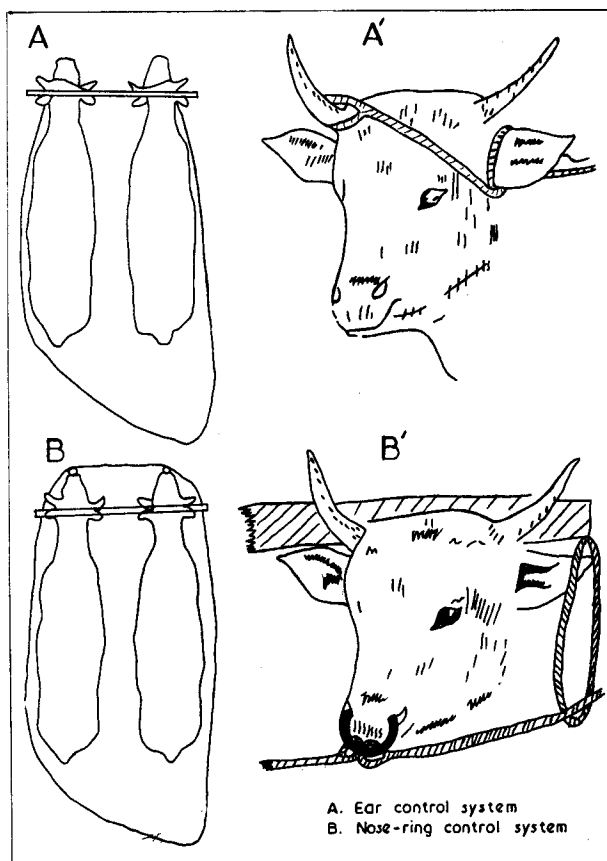


Fig 3.12 Two systems of attaching reins for control: A. Ear control system.
B. Nose ring control system.



Fig 3.13 A method of attaching ropes to horns.

c) *Other controls:* There are variations on the nose ring and the ear control systems, in particular one used in The Gambia and which has been tried at Njala. Instead of using a nose ring, a rope passes through a hole in the septum and passes behind each ear before being attached to the horns, (Fig 3.3). This rope stays securely in position and a rein is attached to the outer strand of rope on each animal. Control is reasonable, but all the disadvantages of using a rope through the nose apply. Thus, there appears no specific advantage to justify a recommendation for its adoption in Sierra Leone.



Fig 3.14 Rein passing round ear for control. (Normally a piece of sack is used to protect the ear.)

d) *Steering with nose ring and ear control:*

In both systems, the reins pass backwards along the outside of the pair and can be used by a single driver. The animals can be moved to the left or right by pulling the reins in the same direction. To stop the animals, the reins are pulled backwards and to make the animals move forward or speed up, a small whip may be used in moderation.

All movements on the reins are accompanied by the appropriate verbal commands to which well-trained animals will respond without the use of reins or whip. With well-trained animals a single driver can control the oxen as well as guide the equipment. However, in early training and throughout the first ploughing season, two people are required - one to control the plough or other equipment and the other to control the animals.

The system of control now being used in the Northern Province involves up to four people - one guiding from the front with a rope attached to the yoke or horns, one controlling the ploughing and one or two people exhorting or whipping the animals, (Fig 3.15). Such excessive use of labour may even be counter-productive, for experience at Njala and elsewhere shows that oxen walk in straighter lines and achieve better ploughing if they are controlled from behind with reins. Control from behind is particularly important when seeders and weeders are used for accurate row cultivation.



Fig 3.15 Ploughing near Karina with 'Victory' plough. (The use of four people appears to be excessive).



Fig 3.16 Ox yoked for single use.

e) Control of a single animal: The single animal is controlled in the same way as a yoked pair and the reins run on either side. The reins may be attached to a nose ring and pass through loops at the end of the yoke, or they may be attached to the horns and pass round the ears before travelling backwards (Figs 3.10, 3.16). A single man can control a well-trained animal and use the equipment at the same time, although two people may be required in the early stages.

3.3 OPERATIONS PRECEDING TRAINING

3.3.1 Castration

It has been recommended that castration of bulls be carried out between 18 months and

two years (CEEMAT/FAO, 1972). However, as the development of a strong neck is aided by male hormones, castration may be conveniently left until a month before the start of training. In Sierra Leone the time of year for castration is not critical, although farmers in the Koinadugu District generally choose October or April.

By far the best method of castration is the use of a Burdizzo bloodless castrator, if one is available, (Fig 3.17). The spermatic chord may also be broken by traditional crushing and beating methods, although these are not recommended. Nor is the use of a knife or scalpel which can bring the attendant dangers of wound infection.

It is therefore strongly advised that, wherever possible, castration is carried out by a competent, trained member of the Veterinary service.

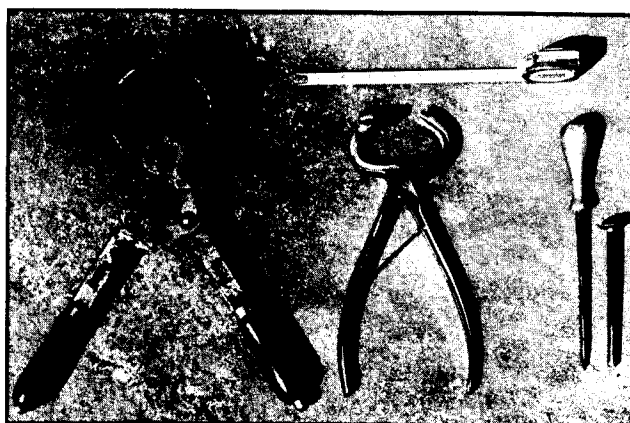


Fig 3.17 Burdizzo castrator, nose punch, trochar and canula.

3.3.2 Removal of horn tips

The sharp points of the horns should be cut off before training in order to reduce the risk of injury to humans or other animals. The tips may be removed easily with a hacksaw, but care should be taken that the lower portions, which contain blood and are warmer to the touch, are not damaged.

3.3.3 Punching a hole in the nose septum

As discussed previously, it is not essential to fit a nose ring or nose rope, but if so, a hole must be punched in the nose septum at least a week before training commences. The hole should be made as far from the front of the nose as convenient to reduce the danger of the nose tearing. Special pliers and punches are available, (Fig 3.17); these may also be used when 'self-piercing' rings are available. In the absence of a special tool the nose may be pierced using a trochar and canular, or any other appropriate sharp instrument or punch.

It is recommended that, wherever possible, the punching of the septum should be carried out by a competent, trained member of the

Veterinary services. A ring, preferably smeared with antiseptic cream, should be inserted in the hole immediately and it should be regularly rotated to ensure free movement. No rope should be attached to the ring for at least a week.

3.4 TRAINING METHODS

3.4.1 Duration

The duration of training will depend on the animals (their age, character and condition) and the trainers (their skill, patience and dedication). However, it is generally possible to achieve controlled ploughing and harrowing within three weeks and, in one instance at Njala, reasonable ploughing was achieved within one week of training.

The more skilled operations such as planting, weeding and cart pulling may be attempted as soon as the animals are thoroughly used to being controlled.

3.4.2 Techniques

It cannot be stressed too strongly that the trainer must be all of the following:

- *Patient*: Training must not be rushed; the oxen need time to adapt to the new way of life; they need much human contact and much routine and repetition.
- *Calm*: Sudden movement and noises should be avoided.
- *Firm*: The animals must understand who is in control.
- *Consistent*: The animals can only learn through routine and repetition and any inconsistencies will slow the process of learning.
- *Sympathetic*: The trainer must really care for his animals, treat them well and be concerned for their well-being.

The trainer should be the person responsible for using the animals whatever his status on the farm. He will require an assistant who should also be a person who will continue to be associated with the animals. It is generally helpful if the trainer gives the animals names and uses them when talking to them. He should be prepared to pet them and treat them with both respect and affection. Animals treated in this way are likely to be much more responsible workers than those treated with contempt. In no circumstances should the animals be treated cruelly, although a firm, moderate blow used to enforce obedience may be necessary in the early stages or when they are being troublesome.

Experience at Njala indicates that previous knowledge of animals is not essential, since attitude is far more important than experience. For example, both Mende and Temne youths with no animal husbandry experience whatsoever have

become extremely competent ox-handlers within 4-6 weeks. On the other hand, certain Fulah youths, with years of cattle experience, never achieved the same skills since they lacked the necessary patience and sympathy. Temperament is far more important than previous experience and no tribal group has a monopoly of ox-training skills.

3.4.3 Familiarisation and use of stock

The objective of the first phase is to get the animals used to the trainer and his assistant, to become used to handling and to being close together.

A stock should be constructed using two trees or firm posts about 2 m/2 yd apart. Two horizontal bars of about 10 cm/4" diameter should be securely attached to the uprights, one at the height of the heads of the oxen about 115 cm/45" high and the second about 40 cm/16" lower. The upper is used to tie the horns of the oxen and the lower prevents the oxen passing underneath the bar. The oxen should be tied to the upper bar for about two hours every morning for about five days, during which time they should become used to both the routine and the trainer, (Figs 3.18 3.19).



Fig 3.18 Oxen brought to stock for familiarisation.

The oxen may be encouraged to be tied by the offer of salt or food or water, but the trainer should stay with the animals, speaking to them, stroking their heads and necks and offering them occasional salt. By the time a yoke is fitted, the oxen should not be disturbed or frightened by arms moving over their heads. When placed together, the animal selected as the furrow ox (the taller, stronger or more placid) should be placed on the right hand of the driver.

3.4.4 Yoking and reining

After 4-5 days of familiarisation, the double yoke should be fitted to both animals, (Fig 3.20). To do this, the front of the horns are tied firmly to the bar and the neck yoke is securely tied behind the horns as illustrated in Figs 3.21, 3.22. A chain should

then be attached to the middle of the yoke, passing backwards to a large log. The control reins should be fitted to the nose ring or horn and ear and pass backwards to the trainer. This yoking and reining routine should be repeated several times until both the trainer and the animals are familiar with it.

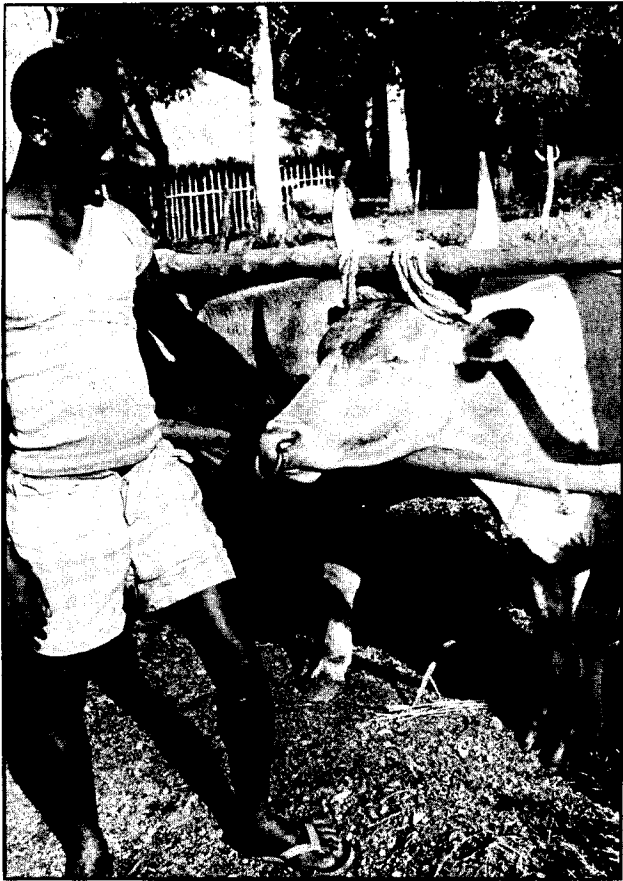


Fig 3.19 Oxen becoming familiar with trainers while tied to stock.



Fig 3.20 Fitting double yoke at stock.

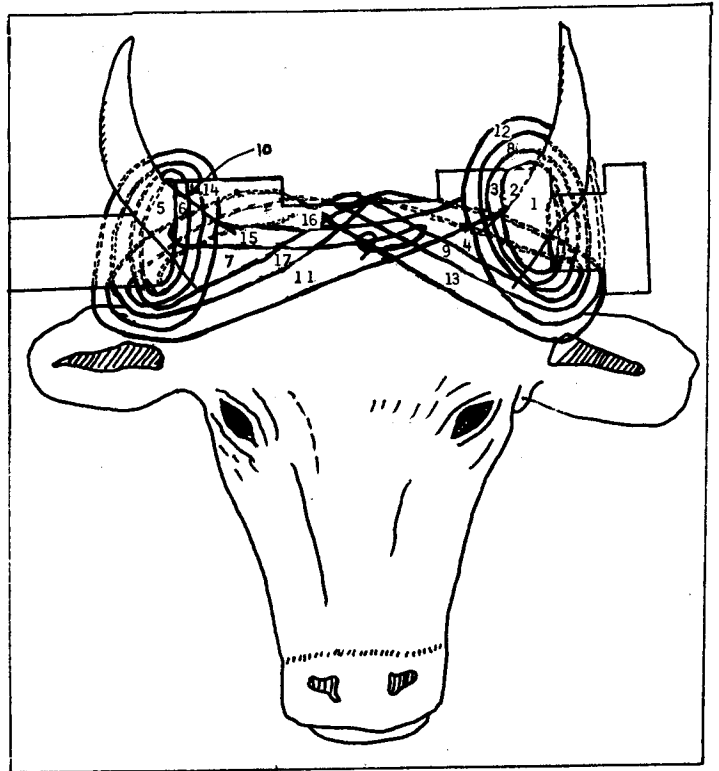


Fig 3.21 Method of tying yoke to horns



Fig 3.22 Ropes securing neck yoke.

3.4.5 Training to walk

After 5-7 days of familiarisation it is possible to start training to walk, but if the animals are docile, walking practice can start as early as the second day. The animals are yoked securely, the log is connected and the trainer takes the reins behind the animals. The assistant should then untie the ropes attached to the bar but remain in front of the animals holding the ropes securely, (Fig 3.23). Unused to walking together, the animals may attempt at first to move quite energetically in all directions. The trainer and his assistant must not panic at this point as the animals will quickly tire and firmness and consistency will be rewarded.

The oxen should be allowed to pull the log, with the assistant pulling from in front (ropes attached to the horns *not* the nose), and the trainer holding the reins from behind the animals, (Fig 3.24).



Fig 3.23 Start of walking practice. Reins and log are attached and ropes to stock are untied.

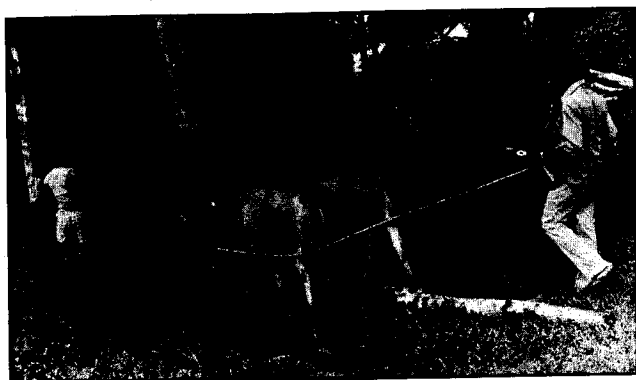


Fig 3.24 Starting to walk with log. Assistant pulls rope attached to horns, while trainer holds reins.

3.4.6 Commands

It is very important that clear, consistent commands are used from the very beginning. The commands should be in the local language, for the use of a foreign language such as French (used by many farmers in the north when the original trainers returned from Guinea) or Chinese (as used at the Chinese rice stations) gives an unnecessary mystique to the simplicity of the commands. Words should be selected that are clearly distinguishable from each other and some examples of commands are given below. The word for 'go forward' should be a short, sharp sound while a long vowel sound should be used to stop the animals. The trainer, shouting clearly from behind, should repeat the command to go forward and the animals may be whipped or slapped gently from behind, while the assistant in front, with his back to the animals, moves forward pulling on the ropes attached to the horns.

Some examples of ox commands:

Mende	Temne	English meaning
Jia	koth	go
lo	tema	stop, stand still
kowo-hun	meroh	left
ngeja-hun	kadioh	right
yama	kal	go back, reverse
lukpe	sekra	come together

To stop the animals, the trainer from behind repeats the command to stop and, at the same time, he pulls back on the reins while his assistant stops in front of the animals facing them, (Fig 3.25).

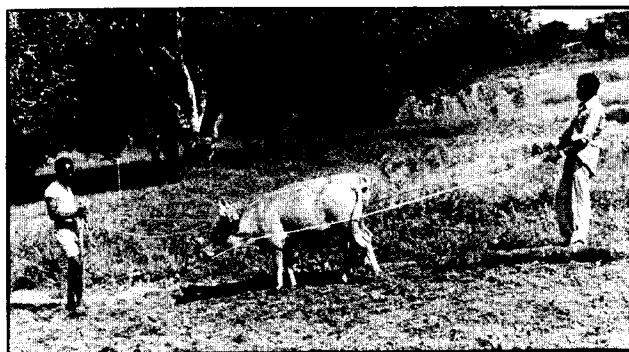


Fig 3.25 Learning to stop. Trainer pulls reins, while assistant faces animals.

The starting, walking, stopping routine should be repeated again and again, with emphasis always on the verbal command and use of reins from behind. As these commands become familiar, commands to turn to the left or to the right may be given, accompanied by a tug of the left or right rein. Initially the assistant should pull the horn ropes of the animals in the appropriate direction as well, but this will become unnecessary when the oxen learns to associate the command and the rein with the appropriate turn.

To make the animals reverse the trainer will pull the reins from behind while constantly repeating the command to move backwards. Initially the assistant may have to move towards the animals from the front. Keeping a careful watch on the animals' horns and their mood, he should hold the nose ropes while pushing the muzzles of the oxen and perhaps administering mild slaps to make the animals reverse. On no account should the animals be beaten or frightened.

3.4.7 Walking programme

The walking programme generally lasts about seven days, although this can be reduced with good animals. The oxen should be trained to walk round a field pulling a log and responding to commands for three hours each morning for about three days. Then a furrow should be dug near the perimeter of the training area (if other oxen are already trained it may be ploughed), and for the following days

training should continue, but with the furrow oxen always walking in the furrow (Figs 3.26, 3.27).

For the subsequent two days it should be possible to continue the training the same way, but without the assistant leading from the front, (Fig 3.28). The oxen should now be able to be controlled and commanded from behind.



Fig 3.26 Furrow practice: the furrow ox is made to walk in the furrow.

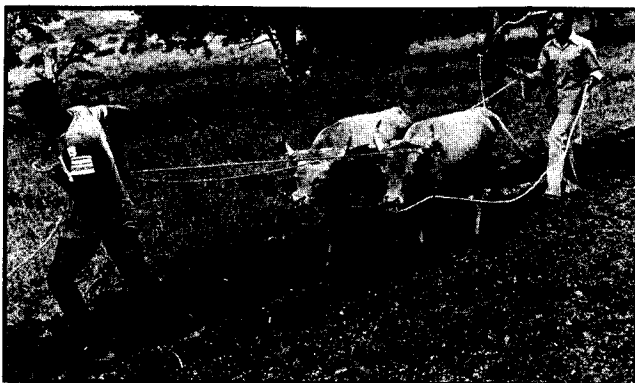


Fig 3.27 Walking and furrow practice using log.

3.4.8 Training to plough

After 5-7 days of familiarisation and 7-9 days pulling a log it should be possible to start training with a plough in place of the log (Fig 3.29). The furrow ox should keep in the furrow and the other ox should walk on the unploughed land. In the early stages the plough need not be adjusted to plough deeply, and in the dry season even a superficial turning of the soil surface is adequate for training purposes. At the end of each furrow the oxen must be trained to continue straight on until the implement reaches the end of the furrow when they are commanded to stop and turn. Reasonable ploughing and animal control should be achieved in one to three weeks, working 3-4 hours each morning.



Fig 3.28 Walking practice controlled only from behind by one man.



Fig 3.29 Training to plough; control from behind.

3.4.9 Other operations

Once basic control has been achieved in upland ploughing, it generally takes a few hours for oxen to be trained to other tasks.

a) *Ploughing & puddling*: The oxen have to become accustomed to walking in water and in loose, muddy soil and to climbing bunds.

b) *Harrowing*: The oxen have to walk on loose ground without a furrow to follow.

c) *Ridging & weeding*: Oxen have to become accustomed to a longer yoke and, being unused to separation, they usually try to draw nearer to each other.

d) *Seeding*: This requires the oxen to walk in straight lines without following any furrow. Before seeding is attempted, the oxen should be able to respond quickly to commands from the trainer, as the accuracy of the parallel rows will determine the effectiveness of subsequent weeding operations.

e) *Weeding & groudnut lifting*: This requires the oxen to walk in straight rows between plants without stepping on or eating the crop. This is generally learned very quickly, but it is advisable to put simple sack muzzles over the mouths of the oxen to ensure they do not eat the crop as they walk along.



Fig 3.31 A single ox used for weeding.

3.4.10 Pulling a cart

Once animals have learned to be responsive to commands, there should be no difficulty in training them to pull an ox-cart. However, an ox-cart once started can be more difficult to stop than cultivation implements. When the cart is introduced it is advisable to have an assistant walking in front of the oxen. Oxen have to become used to the drawbar separating them and to carrying more weight on the yoke; they must also be trained to walk backwards in a controlled manner. When they first back in a cart the hindquarters may go in different directions. The cart should be used empty at first and loads gradually increased as the oxen become more proficient at the job, (Fig 3.30).



Fig 3.30 Well trained oxen pulling cart. The nose ring control system is clearly shown.

3.4.11 Training a single animal

The techniques for training a single animal are similar to those described above. Once an ox-pair has been trained, it is possible to separate the animals for single use for light operations such as seeding or weeding, (Fig 3.31). The animals learn to work alone very quickly, although the furrow oxen will always tend to walk on disturbed soil or any furrow it sees. The advantage of using members of a pair is that one animal can work in the morning and the other in the afternoon, so that more work may be achieved in a single day.

3.4.12 Other techniques

While the above techniques are based on experience at Njala and elsewhere, other variations may be introduced to suit different circumstances. In the Koinadugu District, for instance, farmers generally train animals by yoking an experienced animal to an inexperienced one; they are then able to start ploughing straight away.

3.5 AFTER TRAINING

Once oxen are trained, a regular routine of work should be maintained, with the animals being controlled by the same person or a limited number of people. The more regular and consistent the work routine, the better the control and the more effective the results.

In the dry season, when cultivation operations are few, the regular use of a cart will keep animals in training and maintain their close contact with the driver. However, oxen are not always used during the dry season and most require a certain amount of re-training before working effectively again. This may take from a single day to a couple of weeks, depending on the length of rest and the previous training standards. In re-training, it is generally possible to omit the early stages and start plough training immediately; in fact farmers generally re-train their animals with actual ploughing, accepting that early work may be of poor quality.

If the oxen are not used during the dry season, as much human contact should be maintained as possible. For example, where family labour and grazing are available, the system of keeping oxen around the village in the dry season (as in the Karina area) is preferable to sending the oxen to mix with a distant grazing herd (as is common in the Koinadugu District).

3.6 HOURS OF WORK

From experience at Njala and consultations with farmers, it may be concluded that oxen can work 4-5 hours a day for five days a week.

in the rainy season, during which time they require only grazing and occasional salt. However, a careful assessment must be made by the farmer to ensure that animals do not become overworked and thus susceptible to disease. It is generally difficult to overwork animals as they usually make it clear by stubborn behaviour when they feel they have had enough. Thus oxen are seldom willing to work more than 3-3½ hours when ploughing in wet swamps; this should be taken as the daily requirement for relatively hard work, or work during the dry season. A close watch should be kept on an animal's body condition and weight and, if condition is being lost, the workload must be reduced or significant supplementary feeds must be given.

The preferred time of work is from 7-11 am or 12 noon, with grazing all the afternoon. This system is used by most farmers in the Bombali and Koinadugu Districts. It is also possible to work from 7 am to 10 am and again from 4-6 pm. Such a system is recommended by a farmer in Falaba who uses young animals which tire easily. However, this involves yoking the animals and travelling to the ploughing site twice in each day.

Studies at Njala and elsewhere in West Africa show that the economic benefits of using work oxen increase in direct proportion to the number of hours worked each year.

In Sierra Leone almost all work is performed in May, June and July at the beginning of the rainy season. Often the number of hours spent ploughing at this time cannot be increased without risking overwork. However, if the range of operations, at present restricted to ploughing, were extended to include seeding, weeding, groundnut lifting and transport, the number of hours worked each year would increase. Not only would this bring economic benefits, but the quality of ploughing operations might be improved if the oxen started the ploughing season well-trained and with well toned muscles.

3.7 HOUSING & HANDLING

3.7.1 Shed

Most farmers using oxen in the Northern Province bring their animals close to their homes at night. While few have a special cattle shed, some allow their oxen to spend the night inside the house. Although the provision of a shed for the oxen is not essential, a simple, well ventilated shelter is useful to protect animals from the sun and rain. The space under the roof may be used to store groundnut straw or rice straw.

The shed should be constructed near the farmer's house on land with a distinct slope, to facilitate the run-off of water and liquid manure. The floor should be hard and impervious to water. To reduce the problem of flies, the site should be kept free from

manure and dung should be removed daily on to a shaded compost heap well away from the house. Local materials should be used in the construction of a thatched roof and 1.2 m/4 ft walls of horizontal bush sticks attached to the vertical roof supports. The floor plan of a simple shed for two oxen is given in Fig 3.32. The oxen should be tied to posts with a rope attached to their horns. The furrow ox should always be on the right.

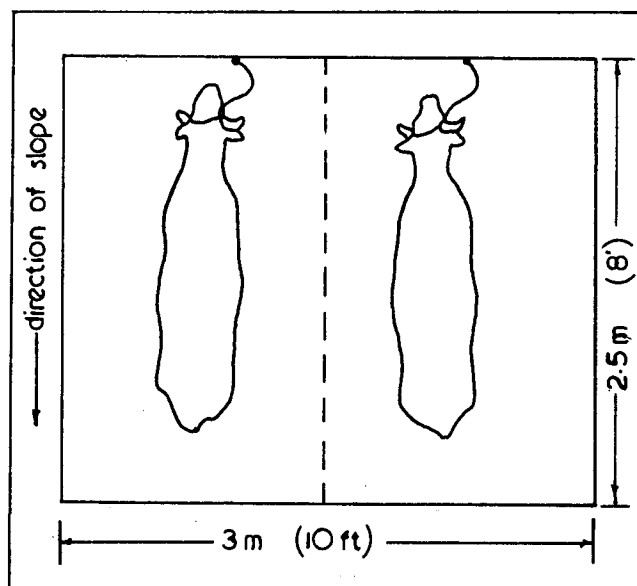


Fig 3.32 Dimensions of a stall for two oxen.

3.7.2 Stock and crush

In order to make routine examinations of the animals and to assist daily in yoking, it is recommended that each farmer builds a simple stock close the animals' quarters. This stock should be similar to the one described under training. In addition, it may be desirable that each village builds a similar crush which can be used for veterinary examinations or vaccinations.

The crush requires two parallel rows of firm upright posts to which are fixed horizontal poles or offcut planks no more than 55-60 cm/21-24" apart so that animals can be packed tightly. (Fig 3.33).

3.8 FEEDING

3.8.1 Grazing

As all farmers in the country appear to bring their oxen close to their houses at night during the ploughing season (which is considered desirable), animals have no opportunity to graze at night; added to which grazing time may be limited during working days. When animals are working long hours it is vital that they obtain sufficient food and that adequate grazing time is given when supplementary feeds are not being provided.

In the Bombali and Koinadugu Districts children generally supervise the grazing of oxen, although one farmer in Falaba tethers his animals to a long rope which is moved three times a day. In the dry season oxen are allowed to forage unsupervised when there are few crops to damage.

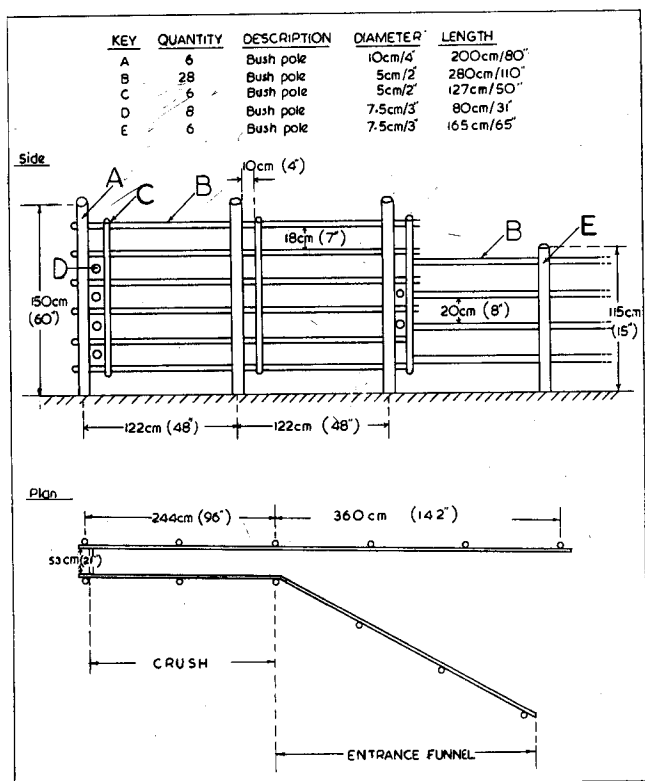


Fig 3.33 Crush for two oxen.

3.8.2 Supplementary Feeding

Studies at Njala show that oxen working for 4-5 hours a day for five days a week could maintain or increase their weight by grazing local grasses. It was also found that oxen in frequent work put on weight faster than oxen doing no work at all. This observation, confirmed by work in Senegal, might be associated with the stimulation of appetite by hard work and the development of heavy muscles. Thus, at Njala it has been found unnecessary to give supplementary feed to animals working the year round, although salt and minerals have been regularly offered. It must be remembered, however, that the bush at Njala is regularly brushed which enables the local grasses to survive.

Farmers in the Bombali and Koinadugu Districts have found their animals can survive on rough grazing only, with salt provided on working days. These farmers also give their animals a mineral mixture every three months comprising salt, termite hill soil and the leaves of a local plant called Tupal, said to be rich in minerals.

The fact that local farmers do not find it necessary to give supplementary feed may be related to the pasture quality at the time of ploughing. Ploughing starts some time after

the flush of new grass growth which contains easily digestible nutrients. Grass quality remains reasonably high during the ploughing months of May, June and July, but declines as the plant fibre content increases. From August to January grass quality gradually decreases and, during the dry months from January to April, the actual quantity of grass may be a limiting factor. However, in the months February-April, bush fires are widespread and often provide a valuable flush of green growth to tide over to the next ploughing season.

With maximum work required at the time of peak grass quality, the need for supplementary feeding is reduced. Even when, as at Njala, oxen are used for additional operations and second crop ploughing, the required workload is generally decreasing at about the same rate of decrease in pasture quality.

However, in most countries feed supplements are recommended for working oxen and Travers (1972) gives the following allowances for working animals in Casamance, an area of Senegal fairly similar to northern Sierra Leone.

For maintenance of each animal:

Grazing plus rice straw *ad lib*.

Salt and minerals 200 g/7 oz per day.

Plus for:

Light work: 1500 g/3½ lb cereals/day

Medium work: 500 g/1 lb cereals/hr of work

Heavy work: 750 g/1½ lb " " " "

The cereal mixture referred to was ground and made from one-third each of maize, rice and millet.

Since farmers have shown they can use oxen in Sierra Leone without feeding grain, it would not be advisable to recommend anything other than salt and a mineral mixture (local or imported). They should, however, be prepared either to give supplementary feeds or reduce workloads when the animals lose condition. While the feeding of supplements may be economically justified, there are likely to be social barriers to the feeding of oxen with rice or cereals destined for human consumption.

There is also evidence that feeding cereals may actually reduce rumenal efficiency and decrease the value of what grazing is available (van Niekerk, 1975).

3.8.3 Crop by-products

It is generally accepted that efforts to conserve forage artificially by making hay or silage in the wet humid conditions of Sierra Leone would only lead to material of dubious quality with doubtful economic returns. In the circumstances, advice to farmers might be to retain such crop by-products as are available such as rice straw and nutritious groundnut straw for feeding in the cattle shed at night. Secondly, farmers might plant browse trees to provide a year round supplement.

For this purpose *Leucaena leucocephala* is known internationally to be an excellent multi-purpose shrub (NAS, 1977) and it has been shown to grow well at Njala and other locations in Sierra Leone (Fig 3.34). The leaves are very nutritious to animals and contain a high percentage of protein. They may be eaten fresh from the shrub, from cut branches carried into the cattle shed, or as dried leaves which can be easily stored. The shrub is resistant to pruning and grazing; it can be used for fuel wood and fencing as well as a component of the diets of other farm animals. *Leucaena* seeds may be obtained from Njala or collected on Tower Hill in Freetown where it grows wild.

It is essential that oxen receive adequate water, particularly during periods of hard work.



Fig 3.34 *Leucaena* growing at Njala.

3.9 ANIMAL HEALTH

3.9.1 General

It is recommended that farmers using work oxen should become familiar with the service provided by the Veterinary Department of the Ministry of Natural Resources. A good relationship with the local Veterinary Officer, Instructor or Assistant is likely to be of benefit and the veterinary services should first be consulted for general advice and for assistance with routine and emergency animal health measures.

Adult Ndama cattle are extremely hardy and are generally able to survive well in an environment containing numerous diseases and parasites. As calves they will have built up a reasonable resistance to blood parasites, worms and flukes. However, many of these parasites and diseases remain in a delicate balance with the host animal so that if it is stressed by overwork or under-feeding, the balance may break down. A good farmer will be able to develop a sympathetic feeling for his animals, so that he can sense a disruption of the balance and take steps to reduce any of the stress. Illness and death are not common among adult Ndama in Sierra Leone, despite the presence of numerous pathogenic organisms in these animals. It is reasonable to expect that the incidence of illness in work oxen may be greater than in other cattle due to the stress of work. With careful observation and care, however, the farmer should be able to reduce the risk of an illness which leads to mortality.

3.9.2 Vaccination

The vast majority of cattle in the country survive without any vaccinations but if these are readily available they may provide valuable protection against certain dangerous diseases. The Veterinary Department should be consulted in this respect. When available the useful vaccines are those against anthrax, black quarter, contagious bovine pleurc pneumonia (CBPP), haemorrhagic septicaemia and tetanus.

3.9.3 Worms and flukes

Adult stock are generally tolerant of roundworms, but regular drenching with a broad spectrum anthelmintic is advisable. Heavy liver fluke infestation has been noted in some cattle and drenching to reduce this is also advisable. Fluke larvae are eaten by cattle grazing in swampy areas where small snails are found and this should be avoided. Drenching is a simple method of applying diluted medicines from a small bottle such as those used for beer and soft drinks. The animal's head should be held slightly up, but not too high, and the liquid slowly poured in through the space between the front teeth and the back teeth. If the head is too high or if too much liquid is poured at once, it could go down the windpipe and cause problems. The dilution and administration rates of drugs for drenching are often critical so that farmers should receive adequate instruction from the Veterinary services before administering their own drenches.

3.9.4 Tick and fly control

It is recommended that work oxen should not be subjected to a heavy tick burden, nor should they be annoyed by large numbers of flies. Advice on tick and fly control may

be obtained from the Veterinary services, but the following information may be helpful.

Both flies and ticks can be controlled with special 'dip' solutions such as 'Supona' or 'Gamatox', available through the Veterinary Department or from commercial suppliers such as the Shell shops and agencies. The dips come in the form of concentrated chemicals which are diluted in a small amount of water to make a white liquid (emulsion) which is then further diluted with a lot of water and applied to the animals' coats. The dilution rate is important and instructions must be followed carefully. A useful measure found in most villages is the small 5g 'Mentholum' tin which holds 5ml of concentrate when full. Three beer bottles of water contain about 1000 ml/1 litre, and a bucket can be calibrated with litre marks using this information. For a dilution rate of 400:1 for 'Supona 20', 5ml or one mentholatum tin of concentrate is added to each 2 litres or 6 beer bottles full of water.

For the spraying of one animal, around 3-10 litres or 1-2 gal of dip are needed. While knapsack or bucket sprays are useful, the dip can be applied with a bucket, scoop and sponge and a 'flit' spray may be used for the underparts and ears. The tail should be pulled over the back for treatment so that the dip is not wasted. Treatment once a month should be adequate and it may be reduced if ticks do not appear to be a problem.

If flies are troubling the animals, the dip solution may be applied every week, although attempts should also be made to stop the flies breeding by removing manure heaps from the cattle quarters. Household fly sprays such as "Shelltox" should NOT be used on animals. Concentrated dip solutions and the dip itself are poisonous to humans, so that the concentrate should be kept locked away. If the concentrate gets on a person's skin, it should be washed off at once. After treating animals the farmer should wash off any of the dip that has got on to his skin.

3.9.5 Care of wounds

With commonsense and careful observation, farmers can deal with minor problems of scratching or bruising of the skin or injuries to the body or feet. Wounds may be washed in clean water that is slightly warm and to which a little salt or antiseptic is added. If flies trouble a wound, a little dip solution should be placed around the area. A useful 'healing oil', with fly repellent properties, can be bought through Shell shops and agencies, although it is not cheap. A healing ointment can also be made by crushing 7.5g sulphadimidine (15 tablets of 500mg) and mixing with a 250g pot of vaseline.

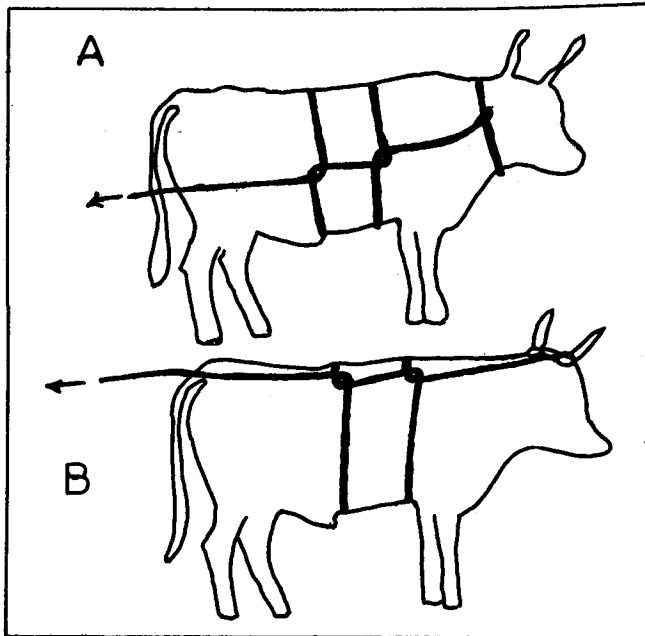
Bruised or strained legs should be rested and an injured foot should be examined for signs of infection. An abscess in the foot, as elsewhere, may be brought to a head by

repeated application of fairly warm water containing salt or antiseptic. The pus should be drained off and, if possible, the cavity should be flushed out with the warm salty water or antiseptic. If an animal has been injured or has an abscess and appears to look unwell and loses condition, the advice of the Veterinary services should be sought. Again, if an animal collapses and will not get up, Veterinary advice should be sought as soon as possible. In the mean time the stricken animal should be propped up on its chest with its head up and its legs folded underneath its body. Failure to do this may lead to gases being unable to escape from the rumen - a condition known as 'bloat'.

3.9.6 Bloat

Bloat is not very common in Sierra Leone and generally only occurs when an already sick animal has lain on its side or has a throat obstruction, or when cattle eat too much young grass at the beginning of the rains. However, it is one of the few circumstances when farmers may be able to save the life of an animal while Veterinary help is being sought. A typically bloated animal will appear swollen on the left side and the swelling will produce a hollow drum-like sound when tapped. The animal will show obvious signs of distress and may salivate a great deal.

If bloat is not treated quickly, the animal will probably die, so that Veterinary assistance should be urgently sought. If this is not speedily available and if an animal is severely bloated, it may be necessary for the farmer to release the build up of gases by carefully puncturing the skin muscle and rumen. This operation, in the absence of Veterinary personnel, should be regarded as a last resort. Ideally a trochar and canular should be used (Fig 3.17), but in emergencies, a clean knife may be used to make a small hole around the middle of the swelling, a few finger widths below the side processes of the backbone and midway between the end of the last rib and the hip bone. The hole must be held open to allow gas to escape. Frothing may be reduced by the addition of about 500 ml/1 pt of palm oil. This may need Veterinary administration as drenching a blown animal is difficult, and applying oil by tube into the rumen requires great care. If a very small quantity (15ml) of domestic detergent is inserted into the rumen, it may have a similar effect. The animal should be encouraged to get up and walk around, but otherwise a simple shade should be constructed while waiting for Veterinary assistance. If bloat has been relieved, the danger of a secondary infection is high and Veterinary advice should still be sought. A farmer might well be advised to dispose of an ox that has suffered from bloat, that is if the condition of the animal is such that it would be acceptable for meat consumption.



3.9.7 Casting an ox

If an animal has an injured foot or wound, it is sometimes necessary to restrain the ox in order to make the examination. Generally, well trained oxen will allow this to be done in a stock or in a crush, but it is occasionally necessary to immobilise the animal. In this case it is easy to bring an animal down by roping it. A long rope may be attached to the horns or tied around the neck (but NOT in a slip knot). The rope is looped around the animal twice: once around the chest by the front legs and once just in front of the sheath, (Fig 3.35). If the head of the animal is restrained by one person and a second person pulls backwards to tighten the ropes, the animal will sink to the ground. One person can then hold the head while another ties the legs.

Fig 3.35 Two methods of casting an ox.