

# CHAPTER 5. TRANSPORT AND LAND FORMING

## 5.3 SPECIALIZED OPERATIONS WITH ANIMALS

### 5.3.2. LOGGING WITH DRAUGHT ANIMALS

#### LOGGING WITH ANIMALS

Draught animals can be valuable for extracting timber from forests. They can be used for commercial logging in large-scale forestry plantations or they can help individual farmers and the operators of small-scale plantations. In many countries it has been found that animal logging is more economical than motor-based logging, and causes less damage to the environment. In large-scale plantations, animals and motors may be complementary, with the animals bringing timber to feeder roads, from where motor vehicles complete the extraction.

#### ANIMAL SPECIES

Many species of work animal can be employed for logging: it depends mainly on the tasks required and the local availability of animals. In most regions of the world, individual farmers use oxen for dragging logs - timber extraction is now the main role of work oxen in USA and Canada. In some countries oxen are used systematically for plantation logging, for example in Malawi (Fig.1) and Zambia and in Latin America. Horses are widely used for timber extraction in Scandinavian countries and mules (crosses between horses and donkeys) are used in parts of Europe, South America and in Swaziland. Water buffaloes have been used for timber extraction in Asia and in Brazil, and elephants are used for logging in parts of South East Asia.



*Fig. 1 Oxen extracting logs using a simple chain on the Viphya Plateau, Malawi.  
Photo: Paul Starkey*

## YOKES

Single or double head (horn) yokes or shoulder (withers) yokes can be used for logging, but the double head yokes are generally preferred if there are steep slopes to descend. With double yokes, the logs are not directly behind either animal. Also as animals fitted with a head yoke slow down, they automatically brake the log. With a shoulder yoke, this may be pushed forwards and hit the heads of the animals. Strong and relatively short, ploughing type yokes are used (less than 90 cm between the centres of the animals heads), generally with a ring for easy attachment of a trek chain (see Fig.1 and also Modules 2.1.1 to 2.1.3). Multiple pairs of animals can be hitched together for the extraction of logs.

## HARNESSES

Horses, donkeys and mules can be used for logging with either a breastband harness or a full collar. Collars are considered more efficient for these animals, and are generally preferred in areas where collar technology is already available. However collar technology is more complicated and expensive than breastband harnesses. Breastbands can also be effectively used for logging, but they should be comfortable and strong (see Fig.2 and Module 2.3.1).

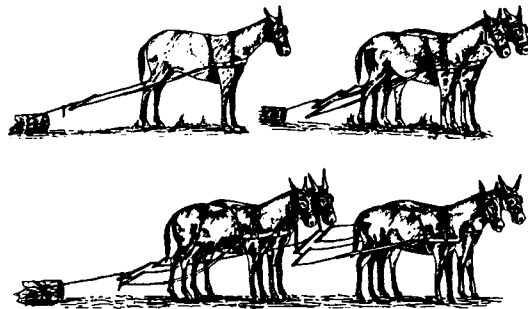


Fig. 2 Breastband harnessing systems used for logging with mules in South Africa and Swaziland.

Source: Zaremba, 1976

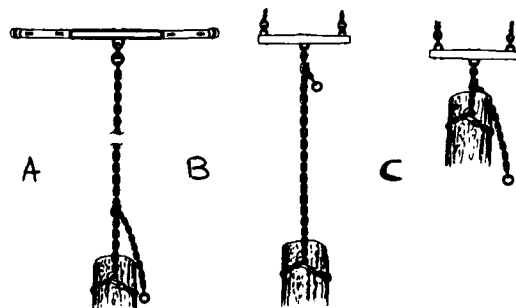
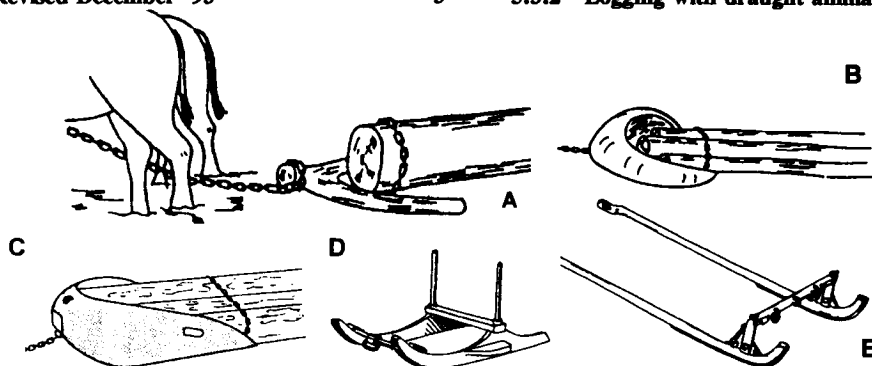


Fig. 3 Simple systems with a trek chain: (A) Long chain attached to yoke; (B) Long chain attached to swingle tree (for single animal); (C) Short chain and swingle tree.

Source: Zaremba, 1976

## TREK CHAINS

The simplest, cheapest and most common means of logging is with a simple trek chain. The chain is hitched around the log or logs and the other end attached to the yoke ring or swingletree (Fig.3).



**Fig.4** Sledges to assist logging. (A) Simple sledge made from a forked branch; (B) and (C) Cone type sledges which can be made from metal, old tyres or dug-out logs; (D) and (E) Runner-type sledges. Note (E) has shafts for a single animal.

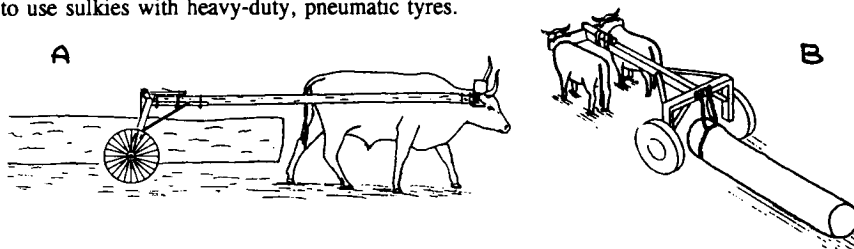
Sources: after Kantola and Harstela, 1988; Hedman, 1991; Sidbäck, 1992.

### SLEDGES

The draught resistance of logs can be reduced by raising their ends and placing them on a simple sledge. The sledge can be made of wood, and models include a simple forked branch or even the end of a dug-out log (Fig.4). For commercial operations, metal sledges can be manufactured. The effort of loading logs onto a sledge is most likely justified if the logs are big, the distance to be walked is long, or if the logging is not entirely down the hill.

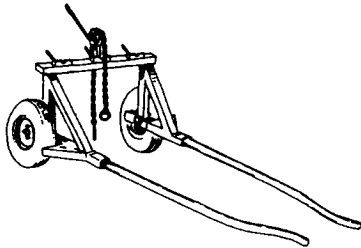
### SULKY

A sulky or logging arch is a two-wheeled device with high clearance for reducing the draught resistance of logs (Figs. 5, 6 and 7). They are more expensive than sledges, and slightly more complicated to use, but they allow the animals to drag larger logs for longer distances. Sulkies with large wheels are better able to roll over tree stumps and rocks, and if solid metal or wooden wheels are used, they do not suffer from punctures. Commercial logging operations tend to use sulkies with heavy-duty, pneumatic tyres.



**Fig. 5** Sulkies in use. (A) Metal-wheeled prototype used in Malawi (near ox not shown); (B) Sulky with pneumatic tyres in Costa Rica.

Sources: Hawkes, 1989; Cordero, 1988



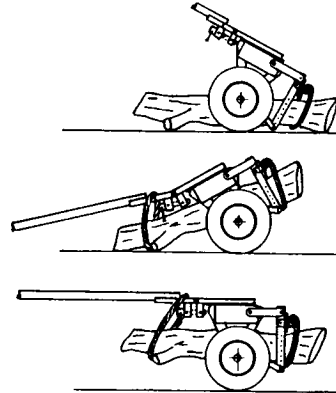
**Fig. 6** Sulky with pneumatic tyres for a single animal (note guards in front of tyres).  
Source: Sidbäck, 1992

**PACK SADDLES**

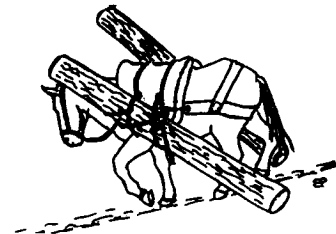
If horses, donkeys or mules are used for logging, the logs may be carried or dragged using a pack saddle (Fig.8).

**MANAGEMENT SYSTEMS**

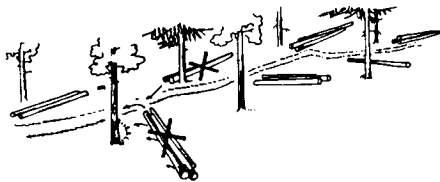
Training and management of animals for logging requires similar processes to those already described for other tasks (see Chapters 1 and 2). Animals can log easily with trek chains provided they pull down the slope. Logging on the flat is much more difficult, unless sledges or sulkies are employed. Uphill logging should be avoided wherever possible. Careful planning of logging runs and felling systems can reduce the problems for animals and operators (Fig.9). Output is very dependent on local circumstances (runs can vary from 50 to 800 metres), but pairs of oxen and one operator can move 4-8 cubic metres of timber per day over runs of 150 - 200 metres, and similar or even greater outputs can be obtained from mules.



**Fig. 7** System of using a multipurpose wheeled toolcarrier as a sulky.  
Source: after Nolle, 1986



**Fig. 8** Logging pack saddle suitable for horses and mules (note the breaching strap which is most important).  
Source: Poirineau, 1988



**Fig. 9** Careful planning of felled tree angles and road layout to reduce the work the of animals during timber extraction.  
Source: Sidbäck, 1992

