

Regional experiences in the use of donkeys for transport operations in Ethiopia

by

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Abstract

In Amhara region there are an estimated 1,046,700 equids of which 659,200 are donkeys (Anon., 1990). Donkeys are widely and mainly used as pack animals. They are very reliable and require minimum supervision and management and little food, mostly grazing. In some parts of the region the use of donkeys for pulling cart has become increasingly popular in recent years, especially in North Welo, Kobo, and Shewa Kewet. The use of donkeys for pulling carts not only enables larger quantities of goods to be transported but also allows users to earn extra income through hiring them out. This paper examines experiences with donkeys in transport operations in Amhara region.

Introduction

In Amhara region 90% of travel in rural areas involves transport of goods and is mainly done by pack animals, by head and/or back carrying. Transport is a difficult issue for rural people. A major problem is the maintenance of the road system. In recent times animal-drawn carts (donkeys, horses or oxen) have been demonstrated and adopted in some parts of the region where there are well maintained roads and flat areas on which carts can be easily pulled. Animal drawn carts have ten times the load carrying capacity of pack animals. The crucial problems in adopting these carts are: their high cost compared to rural incomes; the lack of credit facilities to support their purchase; cultural factors; and poor road maintenance. In addition, the quality and performance of the carts limit their adoption. The two Rural Technology Promotion Centres (RTPC's) (at Bahir Dar and Combolcha) have been trying to adapt, improve and demonstrate the multi-purpose animal drawn cart with some success.

The estimated numbers of equids in Amhara region are shown in Table

Table 1: Estimated numbers of equids (1000's) in Amhara region - 1990

<i>Zone</i>	<i>Horses</i>	<i>Mules</i>	<i>Donkeys</i>
East Gojam			
West Gojam			
North Gender			
South Gender			
North Shewa			
North Welo ¹			
South Welo ²			
Total			

Source: Anon. (1990)

¹ *Waghamra zone is included in North Welo zone*

² *Oromyia zone is included in South Welo zone*

Advantages and disadvantages of donkeys

Advantages:

- friendly towards humans
- willing to work
- easy to train and need little supervision in work
- strong relative to size

- can turn in a small space
- live and work more years in good care than other animals
- comparatively cheap to buy
- can utilise poor food well and need relatively little water
- can be managed easily by women and children
- not affected much by external parasites
- can survive well in every climatic condition (Kela, Weynadega and Dega)
- suitable for many types of terrain including hills and dry areas.

Disadvantages:

- friends not easily separated and suffer from being alone
- comparatively small in size
- mature and reproduce slowly
- need shelter from cold and damp.

Donkey-drawn carts in Amhara region

Donkeys are one of the most rewarding animals to train and once trained can be trusted to do many tasks without problems (ie, without human supervision). A donkey will learn quickly both from other donkeys and from humans and has a remarkable memory, especially for paths and routes. Donkeys can pull carts faster than oxen provided the roads are well maintained. Some farmers living on good roads are using donkey-drawn carts for transporting construction materials such as sand, gravel and stone and for transporting their produce from the field to their homes and to the market. Straw and firewood are also transported from the fields to their homes. In some areas blacksmiths are now manufacturing local donkey carts from available scrap material. Table 2 shows a comparison of the local donkey cart and the new multi-purpose cart.

Table 2: Comparison of local donkey cart and multi-purpose animal-drawn cart using donkeys

<i>Parameter</i>	<i>Local donkey cart</i>	<i>Multi-purpose animal drawn cart</i>
Capacity	1.5 - 3 quintal	3 - 5 quintal
Overall size (width, height, length) (m)	1.5 0.6 2.5	1.1 1.06 1.6
Total cost (purchasing)	Birr 700	Birr 1144
Strength of parts	easily broken	stronger
Complexity for manufacturing	simple	more complex
Comfort for donkey	uncomfortable	comfortable
Comfort for loading and unloading	uncomfortable	comfortable

Local donkey cart

Advantages:

- lower cost compared to multi-purpose cart (around 30-35%)
- can be made using local skills and materials (except scrap axle and bearing assembly)
- can be maintained locally.

Disadvantages:

- limited supply of scrap axles and bearings
- have weak parts
- poor availability and lack of standardisation of spare parts
- difficult to load and unload.

Multi-purpose animal-drawn cart

Advantages:

- cart quality and strength of parts is better than of local carts
- easier to load and unload
- can use with different types and sizes of animals (ox, horse, mule and donkey)
- sustainable supply of materials and components for cart
- easy to maintain.

Disadvantages:

- expensive compared to local donkey cart
- needs skill and machinery to manufacture.

Multi-purpose animal drawn cart - design and manufacture

The two-wheeled multi-purpose animal-drawn cart was designed in the RTPC's. A hollow steel shaft is used for the axle with pneumatic wheels and roller-ball bearings. Angle iron is used for the framework with sheet metal and/or wood for strengthening. The side walls are made from locally available timber. These are all raw materials which are essential for manufacturing the carts.

Frame and Body

The size of the cart body should be compatible with its capacity. Making the body too large is wasteful in terms of increasing the cost and the dead-weight of the cart. It also encourages overloading. The width, height and length of the carts should be within a range of dimensions according to the draft animal to be used. For example, when using a single donkey the range should be 1.0 - 1.2 m wide and 1.4 - 1.6 m long. For an ox the range should be 1.0 - 1.3 m wide and 1.8 - 2.2 m long. For a multi-purpose cart capable of being drawn by any species, donkey, ox, horse or mule, the dimensions should be 1.1 m wide and 1.6 m long. The frame layout is illustrated in Figure 1.

Figure 1: Layout of a cart frame

The left and right sides of the frame are made from angle iron and the other parts of the frame from square pipe which minimises the dead-weight of the cart. The platform of the cart is made from sheet metal or wood according to the farmer's needs. The sheet metal platform is more durable than a wooden platform although the costs at current prices are almost equal.

Axle and wheel

For manufacturing multi-purpose animal-drawn carts axles and bearings are imported with full assembly. The two pneumatic wheels are size 7.50 X 16. For sustainable production of carts most parts should be manufactured in RTPC's. An attempt was therefore made to design an axle from round bar with a diameter of 40 mm and from a three inch hollow shaft. The bearing, housing and rim are manufactured and suitable ball bearing selected according to the load carrying capacity. This new axle and wheel assembly are currently on trial.

Suspension

The suspension is connected to the platform and axle by bolts. It is made from angle iron which can safely carry the expected load.

Drawpoles and Harness

The two drawpoles or shafts are made of wood. Careful selection of the material and preparation of the drawpoles is essential for the comfort of the animals. With donkeys, most farmers use local saddles. The attachment of the drawpoles and harness is illustrated below.

(Photographs)

Transporting farm produce to the market with animal drawn cart in North Shewa Zone Jeweba area.

Profitability analysis:

To determine the profitability of the carts a study was carried out in North Welo zone, Kobo area, and Oromiya zone, Kemisia area. Owners obtained income by hiring out their carts but the amount of incomes differed from season to season. To determine the annual profit of a cart owner the following data were considered:

Total cost (purchasing cost) of cart	1144.13 Birr
Annual depreciation cost	228.8 Birr/year
Annual cart maintenance cost	180.0 Birr/year
Purchasing cost for donkey	240.0 Birr/year
Annual depreciation cost	48.0 Birr/year
Annual feeding cost (average)	730.0 Birr/year
Total annual labour cost	450.0 Birr/year

Total working days in a year	150 days
Average daily income (by hiring)	30 Birr/year
Total risk and maintenance cost for initial money	180.0 Birr/year

Total annual expenditure

$$TAE = 180 + 730 + 450 + 48 + 180 + 228 = 1816.0 \text{ Birr/year}$$

Total annual income

$$TAI = 30 * 150 = 4500 \text{ Birr/year}$$

$$\text{Net Income (profit)} = TAE - TAI$$

$$NI (p) = 4500 - 1816 = 2684 \text{ Birr/year}$$

Net income (profit) per year is around Birr 2684. This amount of money per farmer shows that the donkey cart is one of the most important farm implements in income generating activities.

Farmer suggestions and comments

Most farmers who live on maintained roads accept the advantages of the cart with appreciation. Some farmers commented that the carts should be made and maintained locally, the parts of the cart should be durable, and the carts should be light in weight. The farmers also suggested that credit facilities should be available.

Constraints to the adoption of multi-purpose animal-drawn carts are as follows:

- lack of co-ordination between government and non-government organisations involved in development, manufacture, distribution and promotion
- limited purchasing power of farmers
- structural problems between Rural Technology Promotion Centres and agricultural extension officers (Zonal and woredas)
- shortage of transport to distribute and promote
- lack of maintained road facilities
- lack of technical skilled man power.

Suggested solutions:

- government organisations and NGO's involved in development, manufacture, distribution and promotion should co-operate and collaborate
- credit should be facilitated
- linkages between RTPC and agricultural officers should be arranged
- transport should be facilitated
- priority should be given for road facility improvement especially in rural areas
- adequate training should be given to farmers and extension staff.

Conclusions

In Amhara region there is plenty of animal traction force which is not yet properly utilised. Manufacturing, demonstrating and adapting the RTPC donkey-cart is a part of the solution to transport problems in the rural areas.

Reference

Anon., 1990. Ethiopian Statistical Abstract 1990., Government of Ethiopia, Addis Ababa, Ethiopia.