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"Oasian Agriculture and Camel Harnessed Traction"

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Oasian Agriculture and Camel Harnessed Traction:

A new initiative of the Afar pastoralists of the Awash valley in Ethiopia for complementary food production

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This paper attempts to look into the possibility of integrating pastoral crop production in order to consolidate the traditional system of the Afar. The author describes the two programmes that have been launched without arresting local initiative. The first is the consolidation of a newly emerging agricultural system and its introduction in oasian agriculture. The idea here is the introduction of small irrigated farms that would lead to intensification of production and be a complementary activity to the Afar traditional animal husbandry system. The second is the harnessing of the camel and the introduction of traction in order to facilitate soil tilling. The author, who introduced camel harnessed traction among the Afar, argues that the camel is a good alternative to tractors for two reasons: (1) There is local knowledge on how to take care of camels, and (2) Camels are adapted to the environment.

Introduction

The Afar semi-nomadic pastoralists depend on the semi-arid environment to raise camels, cattle, sheep and goats. Their system of adaptation is highly responsive to seasonal variations in rainfall and range. Hence, they move from one rangeland to another according to the season, searching grass and water. This mobility is necessary to ensure an optimum exploitation of the environment. As a matter of fact, in this semi-arid climatic condition (with a rainfall of about 300–500mm per annum), the extensive rangeland does not provide sufficient pasture to maintain herds for a long period of time. Nor is productivity sufficient to sustain a large number of animals. This mobility is necessary in order to utilize the available resources at the appropriate season, therefore preventing overgrazing and desertification. The Afar who live in the Awash Valley practice some sort of a transhumance (system of resource management) within a radius of 30km between two poles. The parameters of these poles are as follows:

1. The Afar move to the high grounds away from the Awash river during the flood period (July–September and March–April) in order to avoid the environmental hazards such as parasites (malaria or strongiloids, liver fluks, ticks and flies, etc.). The rainy season pole is characterized by extensive and particulary widespread pastures which offer a considerable potential to feed the livestock economically. During the good rains this pole provides sufficient and temporary water points.

2. During the dry season the Afar resort to the dry season pole which is located on the banks of the fertile Awash river and the highland escarpment. The annual flood precipitates a rich fodder stock and permanent water supply. The Afar permanent settlements and at least part of the family are based in this pole.

Notwithstanding the traditional system of adaptation, the Afar have experienced interferences with their environment due to various developmental ventures. In common with most pastoral societies in the world, the Afar have been through decades

of ecological, economical, social and cultural crises. The factors which brought about these imbalances which distorted the subsistence and challenged the survival of the Afar society may be illustrated as follows:

(a) The Afar have lost and are still losing their best dry season pastures on the Awash River basin. In fact, mechanized state farms and farmers from the highlands have already began to cultivate the most fertile soil. The situation is further aggravated by competition over pastures among the pastoralists themselves. This has created fear of raids by other ethnic groups which rendered vast areas unutilized. Furthermore, overgrazing and successive droughts contributed to the desertification of the Afar territory.

(b) The situation is alarming, considering the present rate of population growth, increasing needs and the accelerating decrease of their resource base. Moreover, the development of the market economy has reduced the exchange rate between the pastoralists of the lowland and the farmers of the highland. There is also the deterioration of exchange values, especially during drought whereby the pastoralists sell more and buy less (livestock–grain price ratio).

(c) Certain elements of modern life and the lack of understanding of the Afar pastoralist production system by planners and administrators have contributed to their neglect and the perpetuation of misconceptions which marginalized them and distorted the structure of their society.

The end result of the accumulation of all these factors is represented in the two famines which devastated Afarland during the last fifteen years (1974–75 and 1984–85) and the considerable loss of lives and livestock which they suffered.

The Afar of the Awash Valley are well aware that they have to adapt themselves to the new realities in order to survive and avoid total extinction.

Many Afar settled spontaneously during the last drought (1984–85) on the Awash river banks and began to cultivate small plots. These plots are located adjancent to their traditional settlements on the Awash river where irrigation is possible. Afar pastoralists have cleared land with knives, tilled it with hoes and irrigated farms with buckets. The main crop cultivated in these farms is maize, the staple food during the dry season.

While part of the family moves a few kilometres with the herd, the rest settles down near the plots and cultivates the land. The whole family benefits from these two complementary systems of production, i.e. crop production and pastoralism. This complementary system of crop–livestock production is necessary for their survival when there is a severe drought.

This paper is an attempt to comment on the possibility of integrating pastoral and crop production in order to consolidate the traditional system. In this sense we intend to describe and elucidate the two programmes that we have undertaken without halting the Afar initiative (within Save the Children Federation/USA, "Afar Project"): First, the consolidation of a newly emerging agricultural system and its introduction in oasian agriculture. Second, the harnessing of the camel and the introduction of traction in order to facilitate soil tilling.

The Oasis in the Afar Pastoral System: An Adaptive Approach

Our basic idea is that the introduction of small irrigated farms should be a complementry activity to the Afar traditional animal husbandry system which is based on transhumance. Moreover, it assists in the diversification and an improvement of the ecological and economic environment.

The project takes into consideration the traditional social structure of the Afar pastoralists and their territorial organization. This is meant to avoid a lot of difficulties and facilitate the organisation and the management of the oasis by the local populations themselves.

According to needs and means, the pastoral community of concerned target groups could plant, at the beginning, a small irri-

gated area, which can later be enlarged; a surface of 5ha. already corresponds to a considerable complement for an encampment of 50 families. Step by step approach is necessary to avoid the complications which may result from a large scale experiment.

Our conception of an oasis: In the oasis, date palm trees as well as other fruit trees (banana, citrus, mango, papaya, etc.), fodder trees (leucaena), trees for construction (eucalyptus) are planted. Cereals like maize or amaranthus, vegetables (sweet potatoes, sesame, peanuts, tomatoes, onions, hot pepper, etc.) and forage can be cultivated under the soft shade of palm trees planted in rows (alley farming). A limited number of animals can be raised permanently in the oasis (sheep for fattening, lactating cows, calves). The rest of the animals can continue to graze on the natural pastures.

The advantages of the introduction of oases in the Afar pastoral system can be attributed to the following.

1. Intensification of production due to the introduction of irrigated agriculture (assuming that the human and technical potential is available). This is also necessary because of demographic reasons owing to population growth and the reduction of the surface of exploitable lands.

2. More food security can be attained due to irrigation which will make it possible to produce food without depending on climatic variations. Cereal production, in particular, should reduce food dependence on the highlands farmers or foreign humanitarian aid, especially when the the "grain/livestock" terms of trade are unfavorable to livestock producers.[1]

3. It contributes additional financial resources to the pastoralists, from the sale of fruits (date in particular), vegetables and handicraft products (mats, baskets, etc.).

4. It provides agricultural by-products useful for animal consumption and domestic use.

5. It establishes better bases for human settlement which favours the organisation of services (training, human and animal health, service cooperatives, etc.).

6. It augments the struggle to combat desertification. The oasis creates a favourable micro-climate; often allows the regenaration of the ecological balance lost during the periods of over-exploitation.

7. It marks the beginning of the intensification of animal production. Very soon, the biomass produced in those oases (agricultural by-products in particular) would demonstrate to the pastoralists that it is possible to intensify animal production (reducing the number of animals and improving their productivity). Naturally, the pastoralists can utilize this biomass to feed their animals and hence appreciate its attractive results.

Some Notes on the Date Palm Tree

Its Positive Role in the Oasis [2]

Date palm trees have a cultural meaning for the Afar pastoralists. Dates are said to have been quoted in the Koran. When the Afar grow date palm trees in their land, they follow the traditional tree tenure and the trees are owned by families. The owners take care and harvest their trees as members of their clan. Moreover, they know very well its technical and economical advantages which are described below. During the two last famines the population of a palmgrove located in the Awash River delta (Afambo) were better off in terms of survival.

Date trees are resistant to drought. When cultivated on the banks of the Awash, young date trees need to be irrigated regularly for only about three years, until their roots are long enough to draw water directly from the water table. They tolerate salty waters and salty soils that are not used.

Dates are rich food, which can serve as a dry season reserve (about 1kg. supply enough energy, 1,500-2,700 calories/kg, for a man for one day; it is a good supplement for milk). In Ethiopia, dates can be commercialized at a good price, more than 4 Birr/kg [3] and up to 16 Birr/kg during fasting seasons. Demand is considerably high both on the local and international market. A good palm

tree can produce about 200kg. of dates a year for a period of about 100 years.

The date palm trees have an important role for life in the arid environments:

1. It contributes to combat desertification: a tree can produce 30–40kg of firewood a year, its root system controls erosion, its shade creates a micro-climate favourable to men, livestock and agriculture; and economizes water needed for irrigation and reduces the risk of salinisation.

2. The waste products of dates and their stones constitute good livestock feed (1 kg. of crushed stones is equivalent to 1 kg. of barley in nutrient, 1,300 calories/kg).

3. Date tree trunks can be used for construction; its wood is termite resistant.

4. Palm leaves can be used to make mats, baskets, fences, ceilings, ropes, etc.

The Propagation of Date Palm Trees: The Contribution of a New Bio-Technology[4]

There are 3 methods of propagation for date palm:

(a) Seeds planting method is not advisable since it excludes all selection concerning sex and varieties.

(b) Planting of offshoots weaned from selected trees is the traditional method used in planting intensive palm groves. It allows the selection of good varieties; it has the advantage of making the palm grove independent regarding young plants supplied for its extension. But, the success rate is very low (for the moment 10% in our project) which discourages the farmers especially at the beginning of a new culture. The small number of offshoots available makes the propagation very slow. However, this method is not advisable for the creation of a great number of new palm groves.

(c) Planting of vitroplants. The vitroplants come from vitro-culture (or tissue culture). Since vitroplants have a well developed root system, their success rate is excellent (more than 90%). Vitroplants that come from the best varieties become very productive trees, they are easy to plant and, available in great number at once, they can be propagated at a large scale. This method, although expensive at the beginning, is thoroughly recommended for the implantation of new palm groves (about 100 vitroplants for an hectare planted in lines). Extension of such palm groves can be made by the offshoots technique to assure their autonomy of the palm grove as regards plant supply.

Even if the idea of oasian agriculture seems very appropriate to the needs and the means of the Afar of the Awash Valley, we have to take in consideration numerous risks of failure of this programme. These risks include:

(a) The programme's dependence on dates vitroplants and pumps importations. The sustainability of solar pump is not confirmed at present.

(b) At the initial stage conflicts concerning land tenure may interfere with this experience for a long time.

(c) Even if the oasian agriculture system is well developed, it may be considered as a failure if only an elite among the Afar adopts this system and aquires too large lands at the expenses of pure pastoralists who will eventually lose more dry season pastures.

(d) After practicing oasian agriculture successfully, agro-pastoralists may have the temptation to introduce mechanisation in this system; this may have a negative effect on its economical result, its sustainability and also on the fertility of the soil.

We believe that monitoring of this programme will be necessary to reduce these risks.

Camel Traction

The second component of the programme is camel traction. The camel harnessed traction, introduced among the Afar by the author, is a very important component of the integration of livestock and crop production. The camel harnessed traction can perform two sets of operations: first, ploughing, leveling, ridding transporting for agricultural intensification and second, digging and desilting ponds.

The camel is a good alternative to tractors for at least two reasons: First the indig-

enous people know how to take care of camels. Secondly, camels are adapted to the environment.

The Choice of the Camel

The choice of the camel is based on the fact that it has to be already trained for transport and well accustomed to be guided.

It is necessary to choose a powerful male camel capable of performing the task for which it is needed. An appropriate age seems to be about 5 years old or more (400kg. body weight or more).

The harnessed camel must be in a good health condition and calm. Since male camels, during the rutting period, can be agressive, weak, and tend to run away, open castration has been practiced on several males. It has solved the problem. But these male camels could not work before complete cicatrization (about one month). In order to avoid that disadvantage and the risk of any open surgical operation, we have successfully tried castration with Burdizzo which was easy but needed to be well experimented in order not to crush the urethra at the same time as the spermatic canal.

Camels Training and Performance

During training, as early as the first day a camel was able to work and plough for about 30 minutes. The average working time after 15 consecutive days training was 4 hours (2 hours in the morning and 2 hours in the evening in the cool hours).

On clay and silty soils (relatively heavy) a camel can plough 1/5 of an hectare (about 15 cm. deep) within a day and needs one hour to ridge the same surface.

The performance depends on the power of the camel (age, training and physical condition) and on its character (aggressive, docile, well trained, etc.). Supplementary feeding is necessary to maintain a sustainable performance over a long period of time. Therefore a relatively strong camel with good health condition can plough without difficulties one hectare within five days.

Two people are needed in the process of ploughing: a guide (possibly a child) and a second person to handle the plough. One person may be able to handle the whole operation after good training.

The Harness

All the material (leather, buckles, board, nylon rope) used to construct the harness has been bought from the Addis-Abeba market. The price for such a harness including nylon traces (3.5 m. x 2) was about 80 Birr in 1991 (USD 40). This price may be reduced if local material is used.

We have also constructed a one piece harness (harness and traces) of weaved rope and which performed equally satisfactorily during trials. If the agro-pastoralists know how to make ropes, it will be easier and cheaper for them to construct this second type of harness.

A good harness should have the following qualities: first, comfort for the animal (not to hurt it); second, efficiency (well adjusted); third, solidity; and fourth, possibility to be constructed and maintained with local material by the agro-pastoralists themselves. (See design figures 1, 2 and 3).

The Ploughs Utilized

The Ethiopian swing plough "Mofer-Kember" attached with the harness through an intermediate swingle bar was satisfactory in silty soil (no need to turn up the soil); the beam of the plough has been sawed at the length of about 1.30m from the ploughshare in order to be used by a single animal instead of two as usual in Ethiopia.

For proper ploughing the adjustment is made on the length of the traces, on the length of the plough beam and on the angle of the ploughshare.

The imported multibar "Sine" of the Mouzon Company (France) has been satisfactory. (See figures 1, 4 and 8).

The Ridger

We have modified the Ethiopian swing plough according to the ILCA design ("Animal Traction Thrust" in ILCA Annual Report, 1987). (See figure 5).

The Leveller
To make it possible for irrigation it is necessary to level the field. The leveller was constructed according to a single model observed in North Yemen. It is necessary to plough the land before levelling. (See figures 6 and 8).

The Animal Drown Scoop
Used for digging and desilting stock ponds. The ILCA model has been used (ILCA, 1983). (See figure 7).

The advantages of the camel harnessed technique in the semi-arid areas where camels are available are manifold. Here we can outline the following:

1. A camel represents a low investment. In most cases the camel is an already existing property of most Afar pastoralists. For those who do not own any camels there is the possibility of borrowing from close relatives. Camels are easy to feed due to the availability of evergreen bushes (even during the dry season). This is an advantage compared to oxen which need grass (not always available during the dry season which corresponds to ploughing season).

2. Camels are easily trained compared to the Afar's apparently very wild oxen. Camels are easy to work with (provided they are guided); it is a great advantage for the Afar who are new to agriculture. A camel has a considerable working power (comparable of two oxen in the Afar context). After a period of ploughing a camel can easily integrate with the camel herd where it doesn't need special care. Camels usually do not forget what they are trained to perform.

The Afar pastoralists showed an interest in camel ploughing despite a taboo wich present the camel as a noble animal which cannot be harnessed. Some groups started to accept these new technique as a means of survival.

The main questions for the sustainability of this programme include: First, the resistance to the technology by educated elites, and by modern-inclined administrators who, too often, consider animal traction, especially camels, as backward. Secondly, the possibility of the Afar themselves constructing the harness.

Notes

[1] Indirectly, access to a certain food security should encourage the breeders to orient their production system towards commercialisation and thus to intensify their animal production.
[2] Some think that this tree starts producing its first fruits too late after planting which can discourage the farmers. Is this a reason to abandon the idea ? Under good conditions, a palm tree can start producing in no more than 6 years. Is this too long when we know that the tree can then produce for 100 years? For two or three generations, on the other hand, until the young trees start to produce dates, the farmers may harvest crops cultivated between the palm-trees. In short, the best solution is to start planting these trees without delay.
[3] 1 USD = 2.07 Eth.Birr.
[4] This new biotechnology (in vitro propagation) has been researched and developed by the French Research Group on Date-Palm trees (GRFP).

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Denis Gérard is an agronomist involved in the last 16 years with Afar pastoralists of Ethiopia in several comprehensive rural development programmes. At present he is working as a consultant of the NGO Save the Children Federation/USA and he is extending his activities to other pastoralists of Ethiopia, the Somali and the Borana.

Figure 1.

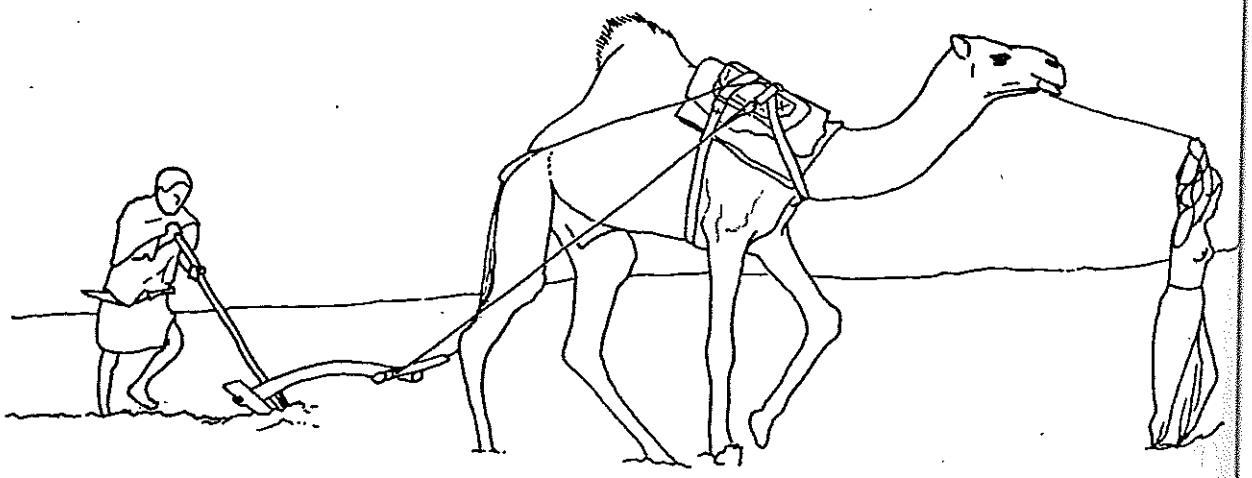


Figure 2. *Harness for camel*

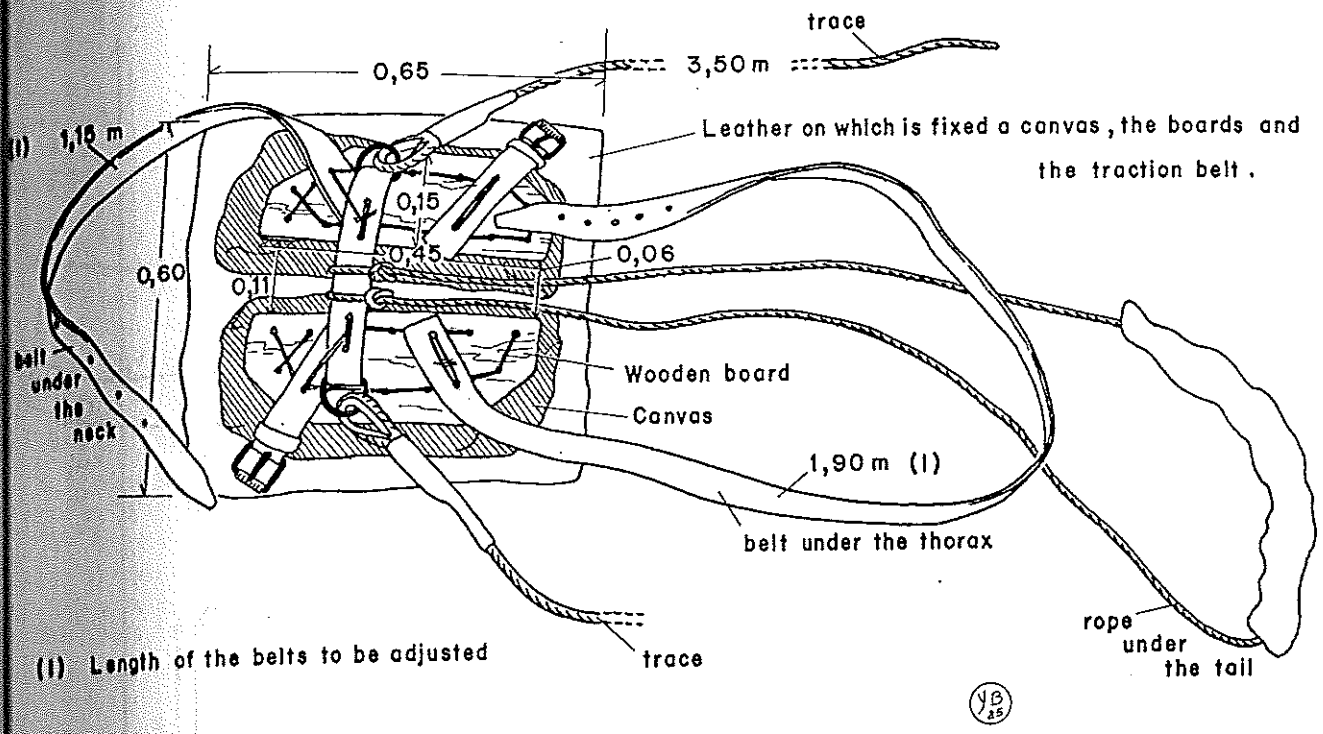


Figure 3. *Harness fixing on the camel*

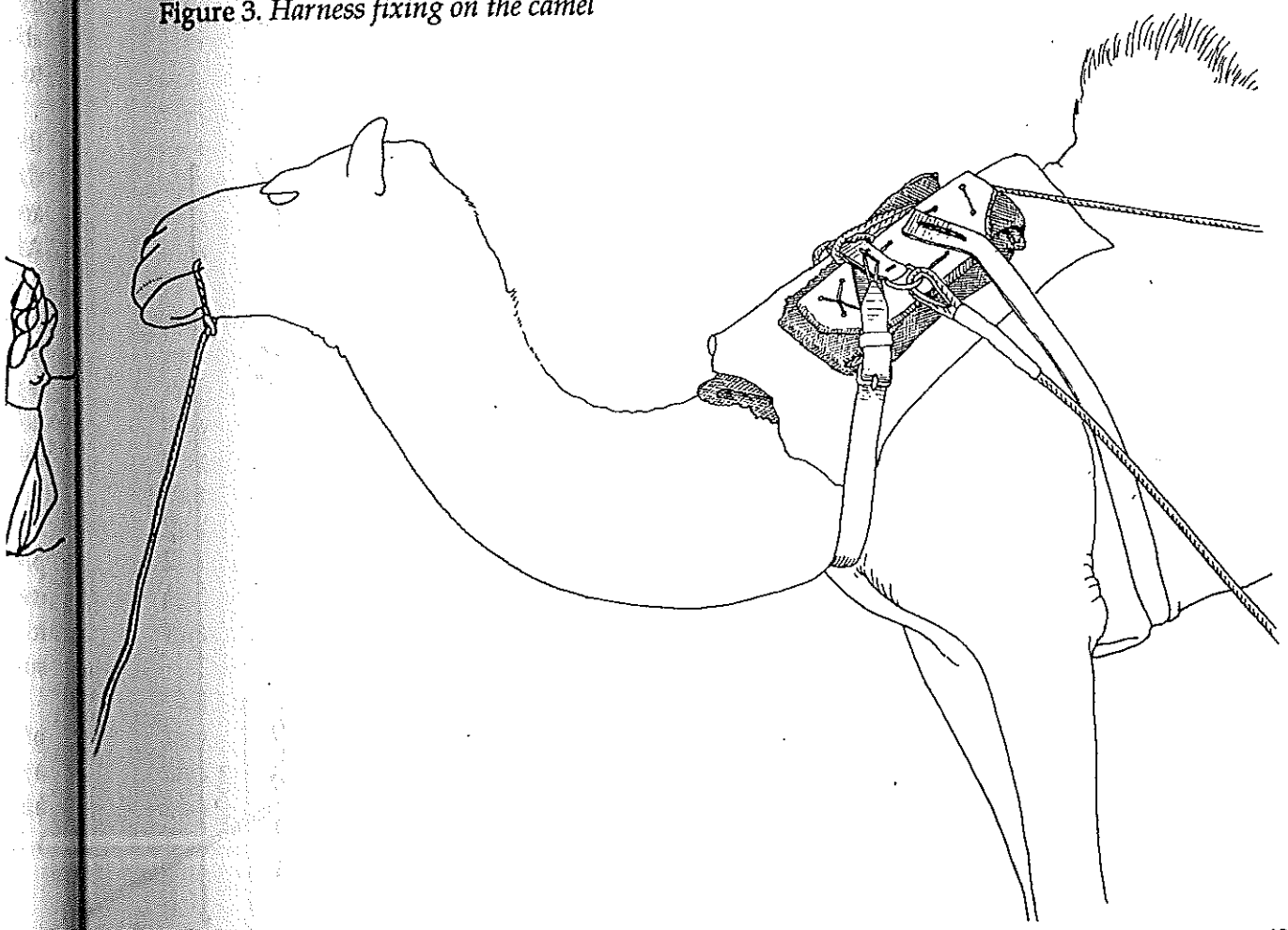


Figure 4. *The Ethiopian swing plough "Mofer-Kember"*

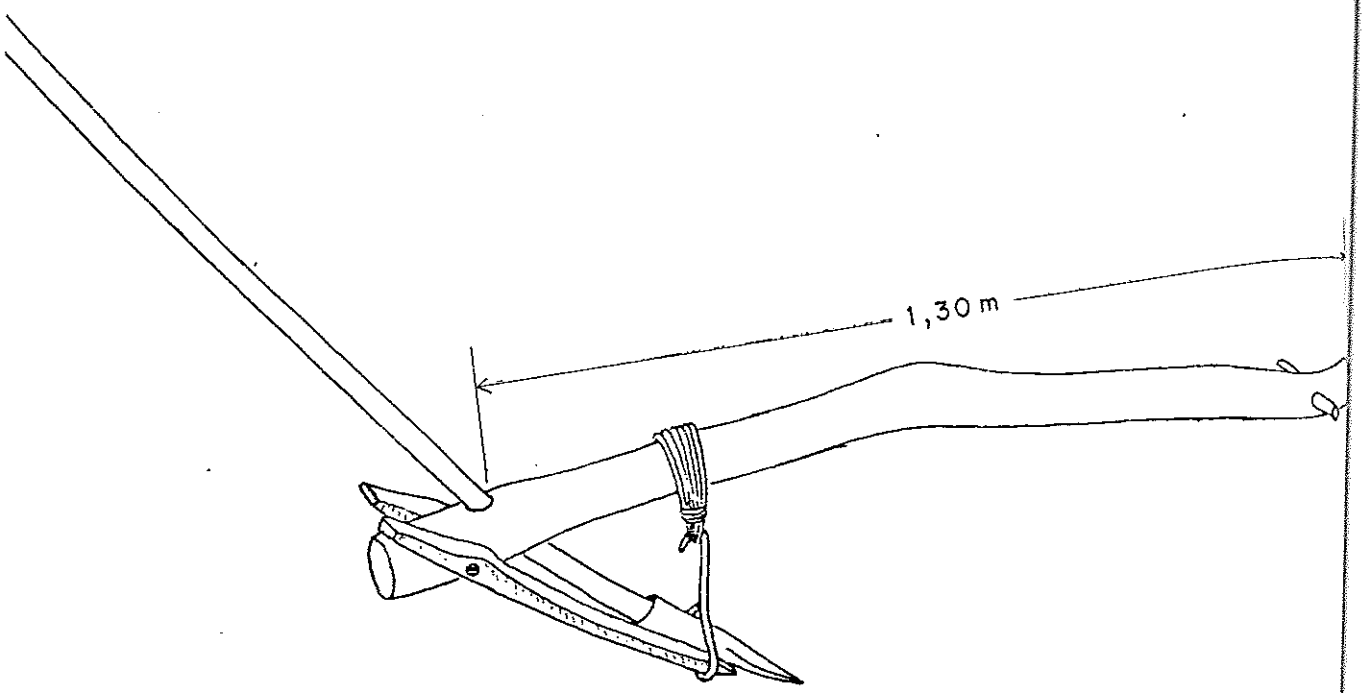


Figure 5. *Adaptation of a ridger on a "Mofer-Kember" according to ILCA model*

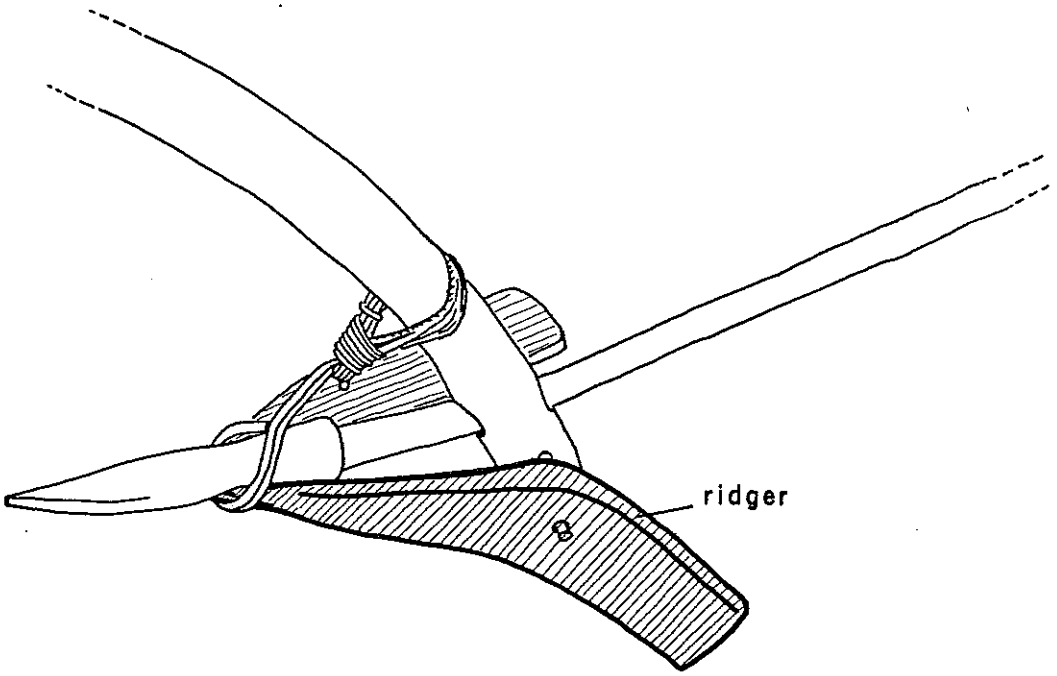
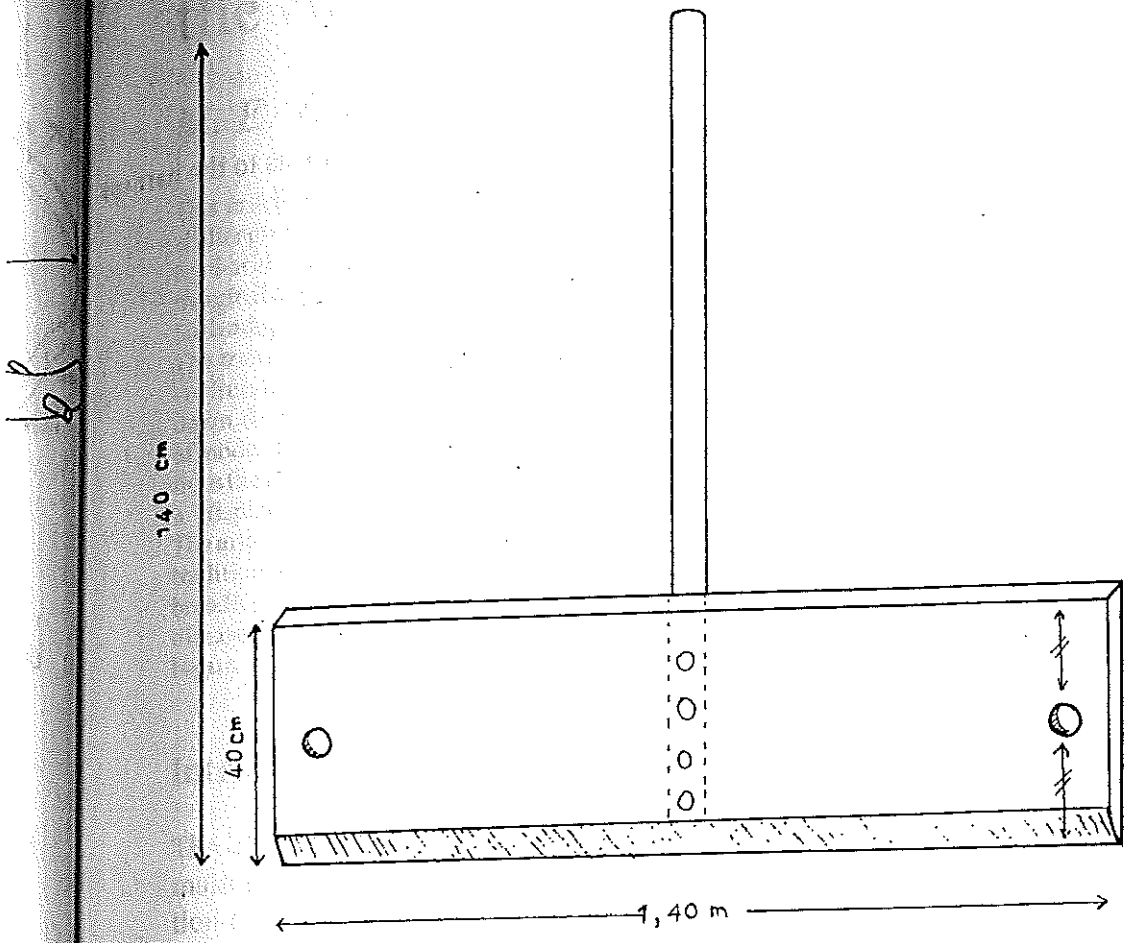


Figure 6. *Animal drown leveller*



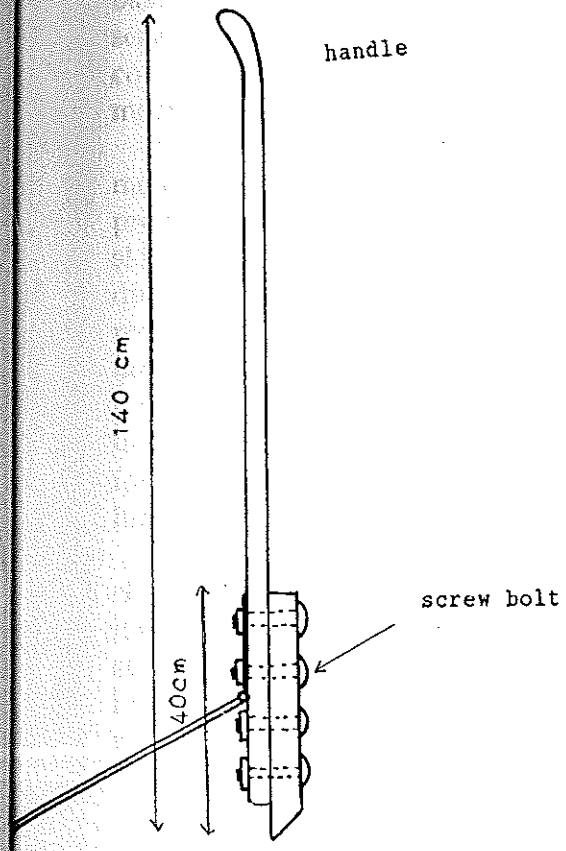
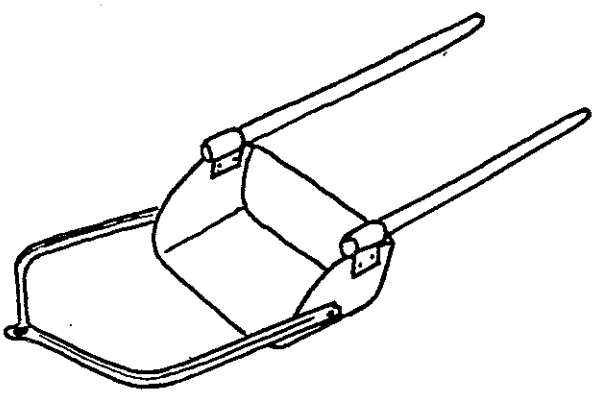
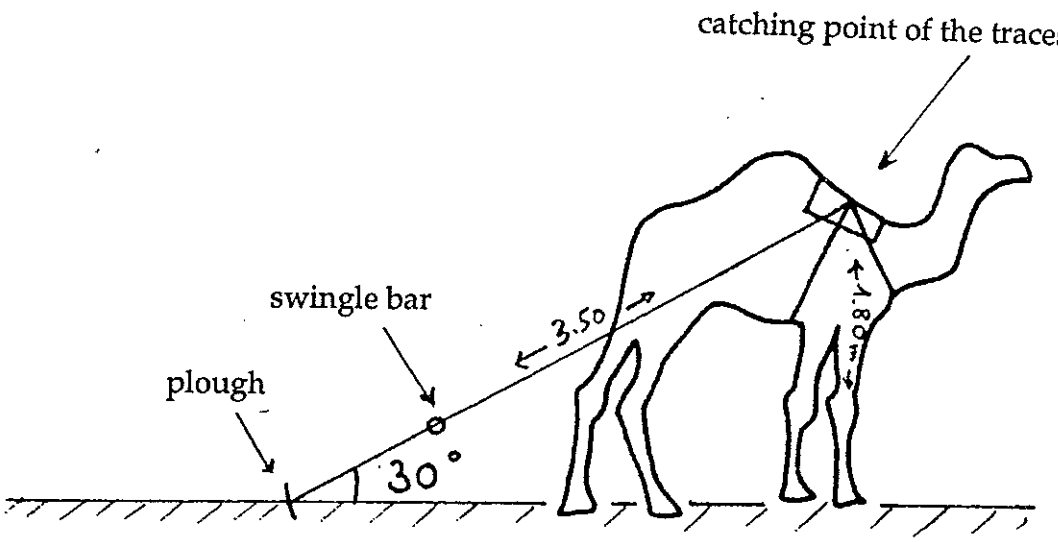


Figure 7. *Animal drown scoop*

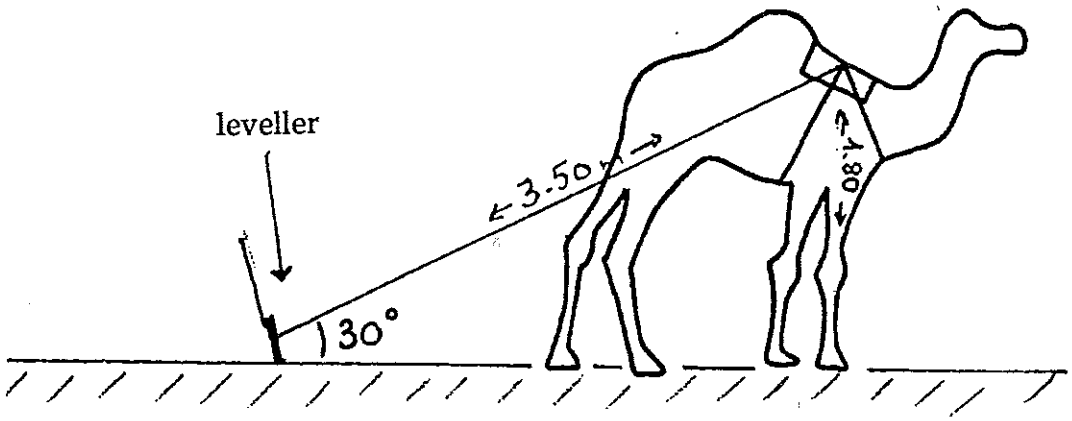


Source: ILCA

Figure 8.



Adjustment of the length of the traces for ploughing



Adjustment of the length of the traces for levelling