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3. Cattle in Southern Ethiopia: Participatory studies in Wolaita and Konso woredas

Barry Pound and Ejigu Jonfa (eds)

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No. 3

Cattle in Southern Ethiopia:

Participatory studies in Wolaita and Konso woredas

Editors: Barry Pound and Ejigu Jonfa

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About the editors

Barry Pound is a livelihoods and farming systems specialist with the Natural Resources Institute. He is particularly interested in participatory approaches to natural resource management. He has been a consultant and external reviewer to the Farmers' Research Project since 1993.

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Executive summary

This publication draws on four Technical Pamphlets and four Diagnostic Surveys, produced between 1992 and 1999 by the Farmers' Research Project managed by FARM-Africa in southern Ethiopia.

Section 1 describes the Farmers' Research Project, which was a collaborative project with the Bureau of Agriculture, the Awassa College of Agriculture and the Awassa Research Centre (part of the Ethiopian Agricultural Research Organisation), and was supported by the Overseas Development Administration (now DFID) of the UK Government. The main objective of the project was to increase sustainably the incomes of resource-poor farmers in southern Ethiopia, and ultimately in Ethiopia as a whole, using farmer participatory research as a mechanism for generating and disseminating appropriate agricultural technologies for rural men and women. Farmer participatory research is seen as a complement to conventional research and extension processes. It includes a thorough participatory situation analysis, participatory on-farm testing of technologies, collaboration between research and extension staff, and farmer participation in decision-making.

Section 2 looks at the livestock situation in Wolaita zone in the 1990s. It concentrates on cattle, and highlights the problems that occur and the indigenous knowledge that is used in their husbandry. The lowland, mid-altitude and higher altitude environments have distinct characteristics and are therefore treated separately.

Cattle in the lowlands are kept for traction, milk and milk products, manure and as a source of income from the sale of live animals.

Cattle ownership is an indicator of wealth and the poor are those who do not own any large livestock outright. Reproductive rates of cattle in Fagena Mata are satisfactory, with a calving rate of about 18 months. Natural pasture is the main feed source for cattle in Fagena Mata, supplemented by crop residues, weeds and tree leaves.

Disease and drought are the major constraints to livestock production in the lowlands, causing high mortalities and morbidities, minimising the oxen power available and decreasing household income. Trypanosomiasis is endemic in the area, with the existence of both cyclically (T. congolensis) and mechanically (T. vivax) transmitted Trypanosomiasis infections. Tick-born diseases such as Anaplasmosis and Heart Water are common. Though the incidence of Anthrax and Black Leg have been minimised due to vaccinations, the diseases still occur sporadically in the area. Ticks and mange mites are widespread, but control measures are minimal. A range of local remedies is available for the treatment of cattle diseases.

At mid-altitude, cattle are kept for milk, draught and as a source of cash. Milk cows are particularly valued and milk products are being increasingly commercialised. Feeding livestock is primarily the responsibility of the women of the household. Despite decline in the grazing area due to the expansion of cultivation, the major source of feed is grass, most being cut and carried either green or dry to stalled animals (where they are kept during the hot part of the day to avoid Trypanosomiasis). In addition, farmers seek out feed provided by trees and shrubs, particularly in the dry season when other sources of feed are in short supply. The other main category of feed is crop residues and leftovers from human consumption. Among these are: teff straw, sorghum tops, green maize leaves, dry haricot bean pods and sweet potatoes. Animals also eat weeds in the fields after harvest. Farmers maintain that five diseases of cattle are the most important in the mid-altitude belt, namely Shihula (Trypanosomiasis), Dulo (Anthrax), Tilikia (Black leg), Grandwa (English equivalent unknown) and Firtwa (Rinderpest).

Cattle in the highlands are kept for draught, milk and milk products, cash, manure and transportation. As in other ecological zones, shared ownership of cattle is common because it provides a means for poorer farmers to own a live animal. Calving rates of cows in the kebele are low, because of food shortage and poor access to bull services. Livestock are either tethered in a small area of open grazing in front of the house (mainly during the rainy period of the year), given free grazing in the fields or stall fed (particularly during the evenings) on good quality grasses. Teff straw is used for dry season feeding, along with dried stalks of maize and sorghum. From Tir (January) to Ginbot (May), livestock feed is inadequate. Many animals lose weight and even die when the dry period is harsh. Where grass is limited, the leaves of enset and root crops, tree leaves, wheat and barley straws and the haulms of legumes are used to supplement the diet, particularly for lactating dairy cows. Eighteen livestock diseases were recognised in one kebele, where there were indigenous treatments for 55 per cent of them.

Two of the reasons for low productivity of cattle highlighted in Diagnostic Studies from the three agro-ecological zones are poor reproductive performance (except in the lowlands) and Trypanosomiasis (especially in the lowlands and mid-altitudes). These were the subjects of special studies by FARM-Africa.

Discussions with farmers, taken together with the study data, suggested that a critical point for intervention to improve reproductive performance might be during the three months after calving, when good nutrition and the presence of suitable bulls could assist conception leading to shortened calving intervals, although this might reduce overall milk production in Ethiopian zebu cattle.

Trypanosomiasis is a devastating disease of cattle. It was confirmed in Wolaita in 1973, and appears to be spreading through extension of livestock production into Tsetse fly areas, the

transport of Tsetse to new areas by vehicles, animals etc., the adaptation of Tsetse flies to new habitats and hosts, and the re-occupation of original habitat after villagisation or abandonment of lowland settlement areas. In 1993, the use of trypanocidal drugs was practiced in all parts of Wolaita, often administered by non-professionals. The high cost of trypanocide drugs has forced farmers to use local methods to minimise risk of infection, including keeping livestock in the house during the hottest time of day to avoid them being bitten by Tsetse flies, and avoiding grazing on common land where tall grass and trees are abundant. Unfortunately these practices tend to lead to under-exploitation of communal pasture, over-exploitation of pasture near the homestead, accidental damage to crops and under-nutrition. Herbal medicines are also used locally.

Section 3 looks at the cattle situation in Konso, with particular reference to the testing of Tsetse fly control using Deltamethrin. Livestock (mainly cattle) are kept in small barns, constructed near to Farmer's house, and fed on a cut-and-carry basis. Cows are mainly kept for milk for home consumption, while males are sold. Skins and hides are important animal by-products. The principal diseases affecting cattle are Trypanosomiasis, Foot Rot and Black Leg. Trypanosomiasis is at its peak during March, April and September. Cattle numbers have been in decline over the last two decades due to:

- Shortage of feed and grazing land as a consequence of the growth of the population and increased demand for crop land; and,
- Diseases including Trypanosomiasis. The incidence of Trypanosomiasis in lowland areas is high, leading to 16 per cent mortality in cattle being reported in 1994. This means that Trypanosomiasis accounted for 50 per cent of all cattle deaths.

Various control methods were considered and discussed with farmers. The result of these consultations and surveys was that Deltamethrin "Spot-on" insecticide should be tested, because of its low demand for cash, labour or specialist manpower. 643 cattle-owning farmers with 5508 cattle took part in the trial.

The results were dramatic. Trypanosomiasis incidence of the monitored cattle dropped from a high of 16 per cent to zero after a year of treatment with Deltamethrin. The Tsetse fly numbers also dropped dramatically from 3.05 to 0.32 flies per day per trap. The cost of the Deltamethrin treatment was (in 1995) about US$70 per square kilometre per year, compared to US$150 for either ground spraying or trapping. Only dipping is less costly (at US$16 per square kilometre per year). A workshop comprising farmers, veterinarians, government and NGO staff pronounced the trial "a huge success" that should be continued and expanded to other parts of Konso. It was concluded that the Trypanosomiasis control measure using Deltamethrin "Spot-on" to reduce Tsetse fly numbers was effective, quick, simple, relatively cheap and environmentally acceptable. In 1997, the Konso Tsetse control operation expanded

to include farmers from Dera, Sorobo and Jarso kebeles. A revolving fund was established to enable farmers to purchase insecticide and, with support from the UNDP, cattle were treated three to four times a year until 2000.

During this period, farmers were required to contribute increasingly towards the costs of treating cattle and, as a consequence, levels of participation diminished. By 2000, all Tsetse control operations in Konso had ceased.

Recent improvements in the cost-effectiveness of using insecticide-treated cattle to control the Tsetse vector suggest that better control of Trypanosomiasis could be achieved in Konso at less than the recurrent cost of treating cattle with trypanocides. This approach is currently being promoted to stakeholders in Konso and neighbouring woredas by FARM-Africa.

This account demonstrates the need for long-term continuity to follow through interventions that show promise. Furthermore it demonstrates the need to ensure that farmers are kept informed of good practice and supported with good technical advice, along with the materials needed to use that advice effectively.

Sources of information

This publication draws on four Technical Pamphlets and four Diagnostic Surveys, produced between 1992 and 1999 by the Farmers' Research Project managed by FARM-Africa in southern Ethiopia.

The information given in the Technical Pamphlets and Diagnostic Surveys is 6-13 years old, and is presented here because of its historical value. Some situations and practices have changed since the data was recorded. An update on the present Trypanosomiasis control situation is therefore included, using information from Morton (2002) and Torr et al., (2000), and conversations with those in the field.

The Technical Pamphlets and Diagnostic Surveys provide a description of livestock production in the area during the 1990s, as seen through the eyes of local farmers. The constraints to cattle production are highlighted, together with local knowledge and action to address the problems they face.

Trypanosomiasis was identified as one of the farmers' priority constraints, so Technical Pamphlet 16 - which is divided into two parts - describes trials conducted to identify control measures for Trypanosomiasis in cattle, and a participatory evaluation of the social and economic acceptability by farmers of Deltamethrin "Spot-on" insecticide as a **control measure** for the Tsetse flies that transmit the Trypanosomiasis parasite.

For the full list of Technical Pamphlets and Diagnostic Surveys synthesised in this document, please refer to Section 4 - References and further reading - towards the end of this paper.

1. FARM-Africa's Farmers' Research Project

The Farmers' Research Project (FRP)

This publication is based on eight studies conducted by FARM-Africa's Farmers' Research Project (FRP), which was based in North Omo zone[1] and Derashe and Konso Special Woredas[2] of southern Ethiopia between 1991 and 1999. The FRP was a collaborative project with the Bureau of Agriculture, the Awassa College of Agriculture and the Awassa Research Centre (part of the Ethiopian Agricultural Research Organisation), and was supported by the Overseas Development Administration (now DFID) of the UK Government.

The main objective of the Farmers' Research Project was to increase sustainably the incomes of resource-poor farmers in southern Ethiopia, and ultimately in Ethiopia as a whole.

From 1999-2003, a follow-on project, "The Institutionalisation of Farmers' Participatory Research in the Southern Nations, Nationalities and Peoples Regional State" extended participatory research activities into nine zones and five Special Woredas of the Southern Region of Ethiopia. The project facilitated the incorporation of the approaches, methods and tools of farmer participatory research into the regular activities of organisations involved in the generation and dissemination of agricultural technologies in southern Ethiopia. This phase was funded by the European Union.

Farmer participatory research

The Farmers' Research Project promoted farmer participatory research as a mechanism for generating and disseminating appropriate agricultural technologies for rural men and women.

Farmer participatory research was seen as a complement to conventional research processes and the Ethiopian Government's Participatory Demonstration and Training Extension System. Farmer participatory research includes a thorough participatory situation analysis, participatory on-farm testing of technologies, greater collaboration between research and extension staff, and greater farmer participation in decision-making.

The main participatory research tools used in the Farmers' Research Project were as follows.

- **Diagnostic Surveys** which used Participatory Rural Appraisal (PRA) tools to analyse the complex bio-physical and socio-economic situations of communities, and identify priority

[1] North Omo zone has now split into three zones (Wolaita, Gamo Gofa and Dawro zones). Most of the work of the Farmers' Research Project took part in what is now Wolaita zone.

[2] A woreda is an administrative unit equivalent to a district in other countries.

opportunities and constraints of men and women to be addressed through research and support mechanisms

- **Participatory On-Farm Trials** in which researchers, extension staff and farmers work together to find solutions to priority problems
- **Special Studies** of important topics that bring together indigenous knowledge and scientists' knowledge.

The Farmers' Research Project also included training for farmers, extension staff, researchers and policy makers in the approaches and methods of farmer participatory research.

Local knowledge

Farming has been the mainstay of life in southern Ethiopia for centuries and a vast store of local knowledge has developed, despite invasions and natural disasters. The ecological and ethnic variety found in southern Ethiopia has enriched the accumulation of indigenous and locally adapted knowledge. Such knowledge is being increasingly recognised as having particular value where external ("scientific" or "modern") technology is too costly, only sporadically available, or not appropriate to local conditions.

A major bottleneck to the spread of indigenous practices is the reluctance of local healers, herbalists and others to share their knowledge as it might reduce their influence and income. On the other hand, there is a danger of external technologies creating dependence on an external supply of materials that cannot be sustained. However, both types of knowledge have their merits and FARM-Africa promotes the integration of local and external knowledge, materials and practices.

The Diagnostic Surveys and Special Studies that are the main source of information for this document recorded the knowledge of farmers in their own terminology, which is again used in this synthesis. Where possible, local names for plants, pests and diseases have been "translated" into the equivalent western and scientific names. In some cases it has not been possible to identify the equivalent with certainty. In those cases the local name has been left in italics.

2. Livestock studies in Wolaita zone

Introduction

This section looks at the livestock situation in Wolaita zone in the 1990s. It concentrates on cattle, highlighting both the problems that occur and the indigenous knowledge that is used in their husbandry. The lowland, mid-altitude and higher altitude environments have distinct characteristics and are therefore treated separately.

Wolaita zone is located 350-400 km southwest of Addis Ababa, with an altitudinal range from 700–2900 metres. The area is divided into three ecological zones: kola (lowland – below 1500m), woina dega (mid-altitude - 1500-2300m), and dega (highland – above 2300m). Most of the area and population lies within the mid-altitude zone. Rainfall is bi-modal, with an average rainfall of about 1000m (lower in the lowlands and higher in the highlands). Mean monthly temperatures vary from 26^0C in January to 11^0C in August. Soils (mainly Vertisols and Nitosols) vary in pH from 5-6. The primary occupation is farming. Mixed crop-livestock production predominates, but there is some pastoralism in the lowlands.

Livestock production in Wolaita is divided between cattle (oxen, milking cows and young stock), goats and sheep, equines (horses and donkeys), poultry (mostly local chickens, but also some improved breeds) and bees.

Cattle, kept for milk, draught, cash and manure, dominate livestock numerically. At the time of the studies, herd size was reducing due to disease, sale to pay taxes and drought. Veterinary services are available, but constrained by shortage of drugs and the remoteness of many farms. The increase in arable areas due to the needs of an increasing population has also had a negative impact on communal grazing and herd size.

Livestock keeping methods, and the problems encountered, differ between the highland, mid-altitude and lowland zones. In the following account, surveys and studies from Peasant Associations (now called kebeles) in each of the three altitude zones are summarised overleaf.

- Lowland (Kola): Fagena Mata[3] and Anka Diguna[4] kebeles
- Mid-altitude (Woina dega): Hanaze[5] and Sura Koyo[6] kebeles
- Highland (Dega): Dache Gofera[7] and Sulla Zakota Mofa[8] kebeles

Cattle husbandry in the lowlands of Wolaita

The following account is taken predominantly from a Diagnostic Survey carried out in Fagena Mata kebele (Kindo Koysha awraja) in 1991-2.

Ownership of cattle

Cattle in the lowlands are kept for traction, milk and milk products, manure and as a source of income from the sales of live animals.

There are three types of livestock ownership.

- Livestock are owned by the household members
- Livestock (and the duties and benefits) are shared between two households
- Cows or young oxen are kept for some relative or wealthy farmer, especially those who live in the highlands where the feed problem is severe. In this case, the household has the right to use the yoghurt and butter, but the calves belong to the owner. The household also provides free labour to plough the land of the ox owner.

Cattle ownership is an indicator of wealth. A wealthy family owns 1 – 2 timad (pair of oxen), 2 – 3 milking cows and 2 – 3 growing stock. The medium-income family typically owns 0.5 – 1

[3] Fagena Mata is one of the kebeles of Kindo Koyisha woreda in Wolaita zone. It lies on the foot slopes of the Tepa, Sere Belka and Gale mountain chains. Its altitude ranges between 700m at the Omo river bridge and 1200m at Bele town, which is the woreda capital. The climate is extremely hot during the day and warm in the evenings. The area is infested by insects like Tsetse fly and malaria mosquitoes. Livestock and human deaths have been very high in the past.

[4] Anka Diguna is a lowland kebele of Damot Weide woreda in Wolaita

[5] Hanaze is one of the kebele in Kindo Koyisha woreda, which is one of the Wolaita woredas. The kebele altitude ranges from 1200 m.a.s.l (which is the altitude of the woreda town, Bele) to 1750 m. However the findings in this report were obtained only in the upper part of the kebele, i.e. Woina Dega area between 1500 and 1700m.

[6] Sura Koyo is a mid-altitude kebele of Damot Weide woreda in Wolaita

[7] Dache Gofere kebele is situated in Boloso Sore woreda of Wolaita, about 20 kms east of Areka town, the woreda capital. Although data on the altitude range is not available in the report, the kebele is located mid to high altitude range representing the highlands of Wolaita.

[8] Sulla Zakota-Mofa is a highland kebele in Chencha woreda of what is now Gamo Gofa zone with approximately 376 persons/sq. km, and an average land holding of 1.3 ha/household

ox, 1 - 2 milking cows and 1 - 2 calves. The poor are those who do not own any large livestock outright.

Only 11 per cent of households in Fagena Mata own a pair of oxen, 29 per cent owned one ox, while the remaining 60 per cent do not exclusively own any ploughing oxen.

Reproduction

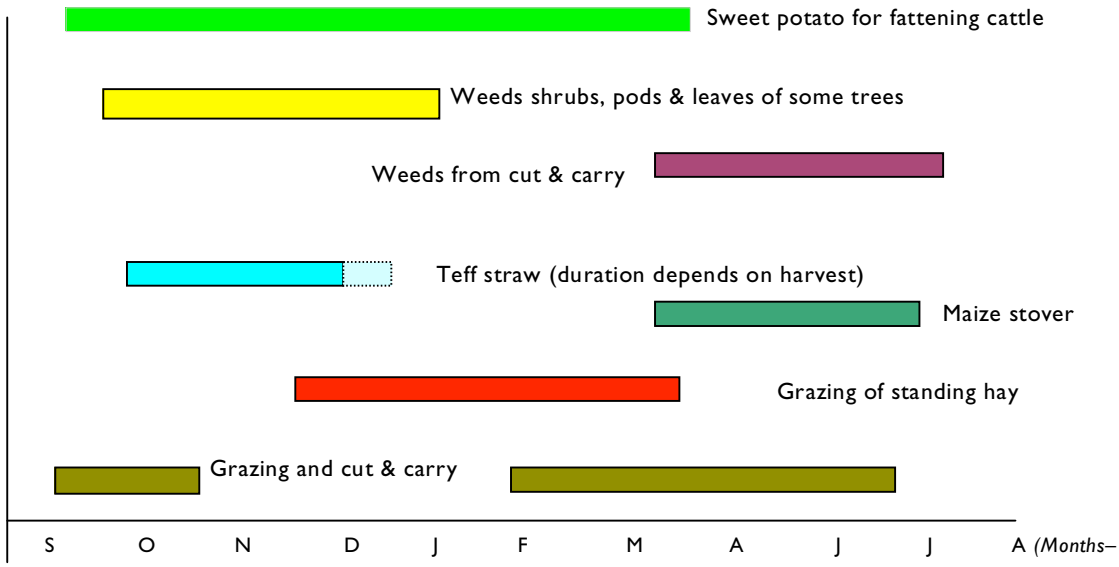
The reproductive rates of cattle in Fagena Mata were described as 'satisfactory'. Abortion is rarely seen in the herd, and a study of 12 cows showed that over 88 reproductive years they produced 60 calves, a calving rate of about 18 months. Women give great attention to cows and young calves, and for the first two-three months keep them at home and feed them green grass, legumes and sweet potato tops. First calving is at around four years.

Feed and feeding

Natural pasture is the main feed source for cattle in Fagena Mata, supplemented by crop residues, weeds and tree leaves. The proportion of grazing land is believed to be 60 per cent of the total area of the kebele. The pasture is composed of indigenous grass and legumes, such as: Hyparrhenia rufa, Brachiaria spp., Panicum spp., Stylosanthes fronticosa, Cassia spp., Eriosema spp., Desmodium spp., Aeschnomene spp., Indigofera spp. and Neonotonia wightii.

Livestock rearing is done in groups in Fagena Mata, a practice known as wudea, whereby households herd their combined livestock for two days in turn. Farmers use the natural pasture communally in every season. This includes lands left fallow due to oxen shortage. It is a source of green grass and legume in the wet season and of standing hay in the dry season. Maize stover, teff (Eragrostis tef) straw, weeds, shrubs, pods and leaves of different trees and sweet potato tops are used to supplement the pasture as shown in Figure 1 overleaf.

Figure 1. Livestock feed calendar, Fagena Mata (lowland kebele)



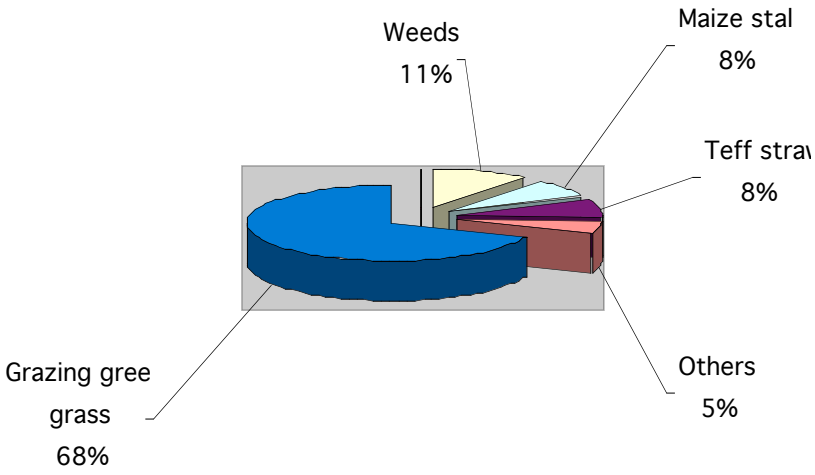
Source: FARM-Africa. 1992. *Report of Diagnostic Survey of Fagena Mata Peasant Association in Kindo Koysha Awraja.* SOS Sahel, Ministry of Agriculture, Environmental Protection and Development. FARM-Africa: Addis Ababa.

Figure 2 shows the predominance of grass as the main livestock food. The quantity of grass is not a problem, but the quality (especially of standing hay) is poor.

During the main (Meher) wet season (June – September), livestock are allowed to graze in the field from 9am in the morning to 5pm in the evening, where they are supplemented with weeds and grass, cut and carried by women. During the dry season, livestock go for grazing in the early morning and late afternoon to protect them from Tsetse fly bites and heat. Green grass and legumes are given when animals are at home. Teff straw and crop residue are used as feed during the short period after crop harvest. Supplementary feed like sweet potato and grain is only given for stock under special attention such as milking cows or animals fattening for sale.

Water is not a problem in the main wet season, but becomes so during the dry seasons, especially in the months of January and February.

Figure 2. Proportion of livestock feed from different sources



Source: FARM-Africa. 1992. *Report of Diagnostic Survey of Fagena Mata Peasant Association in Kindo Koysha Awraja.* SOS Sahel, Ministry of Agriculture, Environmental Protection and Development. FARM-Africa: Addis Ababa.

Milk production and marketing

The length of the lactation period in Fagena Mata is nearly one year, with milk production normally higher during the first half of the lactation period. Milking is three times per day in the wet season and twice in the dry season. A good cow produces about 2 litres per day in the wet season. Butter is churned, taking the women about one hour each day. Butter production from one cow is nearly half a kilogram per week. Household expenses are covered from the sales of butter and yoghurt.

Cattle sales

Cattle are sold for a variety of reasons, such as the need for cash for repayment of fertiliser credit, the purchase of additional grain (in drought years), payment of taxes, funeral and wedding costs etc. Table 1 shows prices paid in 1991 for different classes of animal.

Table 1. Livestock prices in Bele market, November 1991	
Animal type	**Average price (Birr)**
Fattened ox	500-600
Ploughing ox	350-400
Young bull (2-3 years)	150-220
Heifer (2-3 years)	150-200
Calf (1 year)	80-100

Cattle diseases

Disease and drought are the major constraints of livestock production in the kebele, causing high mortalities and morbidities, minimising the oxen power available and decreasing household income. Farmers were able to give the vernacular names of major diseases, together with clinical symptoms and post-mortem lesions.

Trypanosomiasis is endemic in the area, with the existence of both cyclically (T. congolensis) and mechanically (T. vivax) transmitted Trypanosomiasis infections. Tick-born diseases such as Anaplasmosis and Heart Water are common. Though the incidence of Anthrax and Black Leg have been minimised due to vaccinations, the diseases still occur sporadically in the area. Ticks and mange mites are widespread, but control measures are minimal.

A survey of 60 calves showed that 22 were sold due to different reasons, 21 died and the remaining 17 were still in the herd at the time of interview. This result re-enforces the great loss of livestock due to disease. The causes of mortality in the 21 calves were: four from accidents, and 17 from diseases such as Anaplasmosis, Anthrax, Black Leg, Trypanosomiasis and unknown disease conditions. Trypanosomiasis occurs all the year round, with greater prevalence at the beginning of the short (Belg) rainy season (March and April) and end of the main (Meher) rainy season (September and October). Tick born diseases occur in the wet season (March – September), while Anthrax and Black Leg occur sporadically in the wet season (April to November).

Although Fagena Mata has good access to the veterinary clinic in Bele town, farmers at the time of the Diagnostic Survey complained about shortage of drugs, poor service, lack of basic diagnostic and clinical equipment, and water and electricity supplies. The veterinary staff complained about the gradual decrease of drug supply, and the poor mobility of staff due to vehicle and financial problems.

Local disease control methods

Traditional disease control methods are presented in Table 2.

Table 2. Traditional livestock disease control methods in Fagena Mata kebele

Disease	Traditional method of control
Trypanosomiasis	None
Anaplasmosis (*afrera)*	Root of *chedeu*; root of bitter plant; root of *seritea* with butter
Anthrax	None (disposal of carcass by burying)
Black leg	Branding around the shoulder and incising the wound to put butter inside; burning with a very hot sickle Drenching with lemon juice; root of *temesha*, eucalyptus and neem tree leaves
Ticks	Mixture of salt, butter and naptha (or diesel)

Source: FARM-Africa. 1992. *Report of Diagnostic Survey of Fagena Mata Peasant Association in Kindo Koysha Awraja.* SOS Sahel, Ministry of Agriculture, Environmental Protection and Development. FARM-Africa: Addis Ababa.

Cattle husbandry at mid-altitudes in Wolaita

This account is mainly taken from a Diagnostic Survey carried out in Hanaze kebele (Kindo Koysha woreda) in 1991-2.

Ownership of cattle

Cattle are kept for milk, draught and as a source of cash. Milk cows are particularly valued, and if the farmer cannot afford to buy a cow, he or she will start with chickens or goats and build up numbers until there is sufficient cash to purchase a cow. Alternatively a poor farmer will pool cash with neighbours to buy a cow, which will be kept until there are enough progeny for each partner to have an animal. Farmers commonly report that the household herd size has declined over time (from seven to eight cattle per household in the time of Emperor Haile Selassie to two to three animals per household in 1991), despite purchases from neighbouring woredas.

The contributing factors for this decline are:

- Animal disease, mainly Trypanosomiasis
- Selling of animals to pay tax, fertiliser debt, and other contributions demanded by the government
- Social commitments like funerals, weddings etc.
- Drought.

In the past animal products such as milk and cheese were entirely used for household consumption, but at the time of the survey they were being increasingly commercialised.

Table 3. Age and sex structure of Hanaze cattle herd in 1991

	Mature		**Immature**		**All**
	Oxen	Cows	Males	Heifers	Cattle
Number of animals	68	355	119	173	715
% of all cattle	9	50	17	24	100

Source: FARM-Africa. 1992. Report of Diagnostic Survey of Hanaze Peasant Association in Kindo Koysha Awraja by SOS Sahel, Ministry of Agriculture, Environmental Protection and Development and FARM-Africa, January 1992. FARM-Africa, Addis Ababa.

The stocking rate for the whole kebele is 0.3 head per hectare, but, as much of the lower area is unsuitable for grazing cattle because of Trypanosomiasis, the stocking rate for the Woina Dega land is about 1.36 head per hectare.

Over 20 per cent of male and of female-headed households owned no cattle at all, and no female-headed households owned more than three cattle. Nobody in the kebele owned more than 10 cattle. However, the kebele records do not include shared animals, even though the survey showed that around 50 per cent of cows and their offspring are in shared ownership.

Reproductive performance in cattle

According to farmers, there is no seasonality in calving. The average calving interval for the 13 cows surveyed in Hanaze was 28 months, far worse than that of Fagena Mata. The probable causes of this poor reproductive performance are poor nutrition (thought to be the most likely), the long milking period and the short period during which the zebu cow displays oestrus.

Livestock feed

Feeding livestock is primarily the responsibility of the women of the household and includes going down to the communal parts of the kola zone to cut bush hay there and carry it back, a seven to ten hour return trip.

Despite decline in the grazing area due to the expansion of cultivation, the major source of feed is grass, most being cut and carried either green or dry to stalled animals (where they are kept during the hot part of the day to avoid Trypanosomiasis). In addition, farmers seek out feed provided by trees and shrubs (e.g. Canacasila, Bringa, Humba, Tiglia, Osango, Ladia and Hiwangia). This is particularly so in the dry season when other sources of feed are in short supply. The other main category of feed is crop residues and leftovers from human consumption. Among these are: teff straw, sorghum tops, green maize leaves, dry haricot bean pods and sweet potatoes. Animals also eat weeds in the fields after harvest. Water is not a limiting factor in this kebele.

Seasonality in production and sale of milk

Cows produce more milk during the rainy months of Ginbot to Meskerem (May to September). After Meskerem there is a decline in the amount of green grass available. There is a parallel increase in domestic milk consumption during these 'green grass' months. After Meskerem, as the overall supply of milk declines, there is a shift towards sales. The products sold are butter, cheese and araira (yoghurt).

Livestock sales

Very few male cattle are kept to maturity. Oxen are mainly sold during the months of Yekatit and Megabit (February and March) because prices are higher then as farmers buy oxen for the coming cropping season. Meat prices are generally higher in the period Hedar to Megabit (November to March) because the coffee crop gets in to the hands of traders then, and their demand for meat at that time is consequently high. Unlike most other places in Ethiopia raw beef is sold in Wolaita rural markets. There is also a market for specially fattened oxen during the period of the Meskel Festival.

Cattle diseases

Farmers maintain that five diseases of cattle are the most important in the mid-altitude belt (Table 4).

Table 4. Main diseases of cattle in Hanaze kebele		
Welaitigna name	**Amharic name**	**Probable English name**
Shihula	Gendi	Trypanosomiasis
Dulo	Aba senga	Anthrax
Tilikia	Aba Gorba	Black leg
Grandwa	?	?
Firtwa	Desta	Rinderpest

Source: FARM-Africa. 1992. Report of Diagnostic Survey of Hanaze Peasant Association in Kindo Koysha Awraja by SOS Sahel, Ministry of Agriculture, Environmental Protection and Development and FARM-Africa, January 1992. FARM-Africa, Addis Ababa.

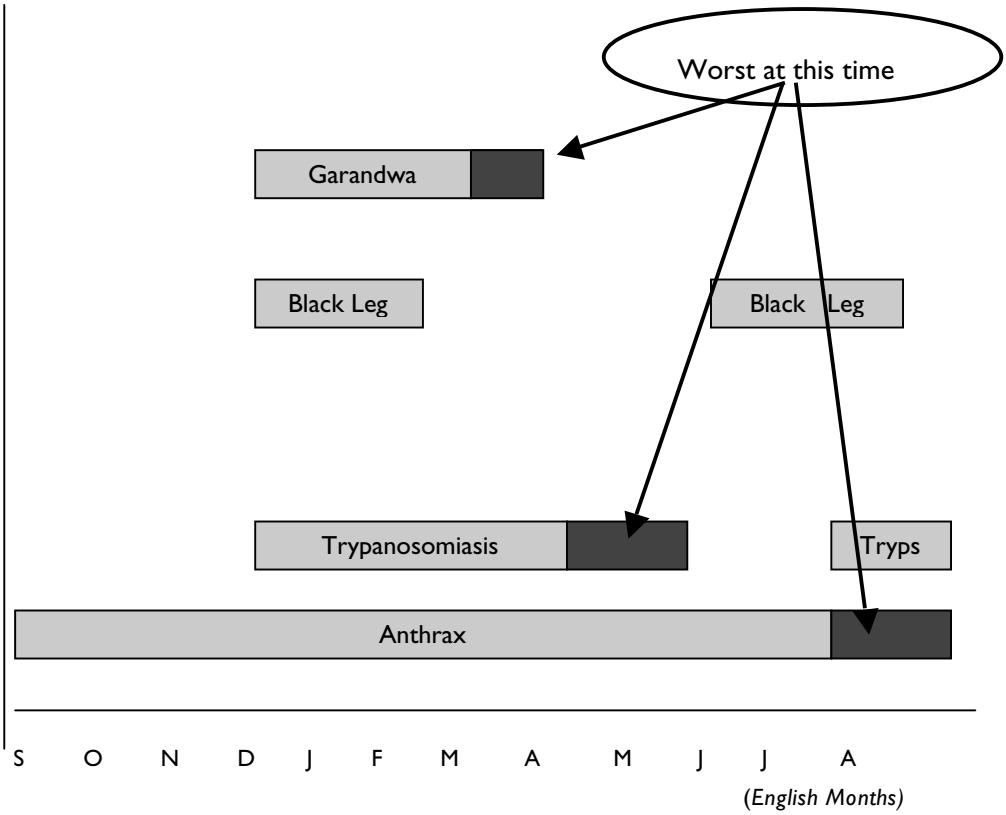
Grandwa is mainly a disease of the lowlands. Trypanosomiasis used to be a lowlands disease but is now serious in the mid-altitudes. This not only kills animals, but also weakens them, making them more susceptible to other diseases. The disease-incidence calendar is illustrated in Figure 3 below.

Farmers complained that the veterinary service does not always have an adequate supply of drugs, especially those for Trypanosomiasis. There is a supply of contraband drugs, but these are often excessively diluted or past their expiry date.

A second kebele was studied in less detail. This was Wareza Gerera (located in Soddo woreda of Wolaita zone[9]). Most of the information contained in the study was obtained from elderly men.

[9] Wareza Gerera has a density of 743 persons/sq. km, and an average land holding of 0.69 ha/household.

Figure 3. Calendar of livestock disease incidence in Hanaze kebele



Source: FARM-Africa. 1992. Report of Diagnostic Survey of Hanaze Peasant Association in Kindo Koysha Awraja by SOS Sahel, Ministry of Agriculture, Environmental Protection and Development and FARM-Africa, January 1992. FARM-Africa, Addis Ababa.

Livestock feed

In Wareza Gerera cattle are given grass in the winter, while in the dry summer hay, straws, haulms and maize bran is provided with Amole salt ('rock salt') sprinkled on to make the dry materials palatable and sweet. Additional feed sources include tree leaves, sugar cane, bamboo, banana and enset leaves, pumpkin, sweet potato and acorns.

Livestock diseases

Eighteen livestock diseases are recognised in Wareza Gerera kebele, as shown in Table 5 on the next page.

Table 5. Local livestock disease control methods in Wareza Gerera	
Probable English name	**Local control methods**
Rinderpest[10]	Dung and urine from cured animal are mixed and given orally to affected animal
Anthrax	*Seretia* leaf is pulverised, mixed with water and given orally
CBPP	Pepper is mixed with water and given orally. Also sour *kocho* made from enset is given as feed
Blackleg/black quarter	Leaves of *Natira* and *Agupia* and buds of *Bisana* tree are pulverised with pepper and garlic, mixed with water and given orally
Wart	Burn or cut diseased part
Anaplasmosis	Scratch tongue with dried dung or a herb (*Damakase*). Fumigate the animal with pepper and bone
Round worm/Ascaris	Local leaves of *Kindicho, Gumariea, Dandireta* and *Danbursa* are crushed, mixed with water and given to the animal to drink
Abscess	Pulverised leaves of *Sogo* plant are applied to the burst abscess
Leeches	*Digita* leaves are crushed and mixed with water for the animal to drink
Trypanosomiasis	Leaves of *Hubona, Arity, Tenadam,* bud of Bisana and pepper are crushed, mixed with water and animal is forced to drink. Human urine also administered orally
Lymphangitis	Leaf of *Hubona* plant is pulverised, mixed with water and given orally

Source: Deribe, T., Tanga, D., and Shola, L. (1999) Indigenous Technical Knowledge (ITK) based on the Peasant Associations of Sulla Zakota and Wareza Gerera of Chencha and Soddo Zuria Woredas of North Omo, FARM-Africa, Addis Ababa.

Cattle husbandry in the highlands of Wolaita

This account is partly derived from a Diagnostic Survey of Dache Gofere kebele (Boloso Sore woreda) in 1993, and partly from Sulla Zakato Mofa (a highland kebele with approximately 376 persons per sq km, located in Chencha woreda of Gamo Gofa zone.

[10] Rinderpest is no longer present in Ethiopia. The last outbreak was in 1994 in Afar.

Ownership

Cattle in Dache Gofere kebele are kept for draught, milk and milk products, cash, manure and transportation. Farmers had previously adopted sheep and goat rearing due to the devastating effects of Rinderpest (now no longer present in Ethiopia) on cattle, and horses due to the prestige bestowed by them. They also keep chickens and bees. As in other ecological zones, shared ownership of cattle is common because it provides a means for poorer farmers to own a live animal.

Reproduction

Calving rates of cows in the kebele are low, because of food shortage and poor access to bull services. Bulls are borrowed from neighbours, or random mating takes place in the mixed herds. Where cattle are kept inside for much of the day, mating is more controlled. Women maintain that they can easily recognise oestrous.

Feeds and feeding

Livestock are fed in three ways in Dache Gofere kebele.

1. Tethered: a small area of open grazing is left in front of the house, where cattle and small ruminants are fastened with a long rope to a tree or fence. This type of feeding is mainly used during rainfall or keremt season. Free movement is controlled, but the fields are overgrazed, poorly managed and bare. Supplementary feed is provided to animals from the crop fields. Households cut and carry weeds and thinnings of maize plants for the tethered animals. Some farmers feed their livestock with tree leaves and pods.

2. Open grazing: Animals graze in open fields for part of the day. For the remaining part of the day, they are stall-fed at home. The grasses grown on open common grazing fields are very poor, and short. In this case, livestock enjoy free movement but do not get a nutritious diet.

3. Stall feeding: during the evenings, all livestock are kept inside the house with people. The bulk of feeding is done at this time. Livestock owners cut and carry good quality grasses for evening feeds. Farmers add mineral salt to the grass while feeding. Teff straw is used for dry season feeding, along with dried stalks of maize and sorghum.

Swampy areas along the streams and main rivers, roadsides, open spaces in front of the house and crop stubbles are the main areas for open grazing. Swampy areas provide more grass for dry season grazing. For home feeding, farmers use fresh grass, tree leaves, crop residues (e.g. teff straw, sweet potato leaves, sugar cane leaves and the core, stems and leaves of enset).

From Tir (January) to Ginbot (May), livestock feed is inadequate. Many animals lose weight and even die when the dry period is harsh. In Sulla Zakato Mofa there are no tall grasses for a cut

and carry system, so cattle, horses, mules and sheep are grazed as long as possible before returning home to supplementary feed of the leaves of enset and root crops. In the dry season, grass is replaced with the green leaves of a range of trees, barley and wheat straws and the haulms of peas and beans. Special attention is given to lactating cows. Calves are weaned so that milk is available to the household, and milk is substituted by crushed Halilo tree leaves mixed with water.

Livestock diseases

Table 6 on the next page shows the major livestock diseases in Dache Gofere kebele, and traditional ways of dealing with them. Eighteen livestock diseases are recognised in Sulla Zakota Mafo kebele; there were indigenous treatments for 55 per cent of the diseases.

Several interesting practices were identified during the study that could be further investigated – in particular the action and efficacy of the different plant ingredients mentioned in Table 7 on page 18.

Table 6. Livestock diseases and traditional treatments in Dache Gofere kebele				
Disease			**Local treatment**	**Livestock species affected**
Vernacular	**Probable Amharic**	**Probable English**		
Furtwa	Desta	Rinderpest[11]	Treat with cattle urine	Bovine
Tilkia	Aba gorba	Black leg	Open the muscle & add butter , branding, pumping air in	Bovine
Dulula	Aba senga	Anthrax	No treatment	Bovine & Caprine
Ahera	Shinfila diket	Constipation	Mix milk, butter and *borde* and feed	Bovine, equine & Caprine
Sombia	Sanba	CBPP	No treatment	Bovine
Shulula	Gendi	Trypanosomiasis	No treatment	Bovine, equine & Caprine
Tusa	Gub Gub	Lymphangitis	No treatment	Bovine & equine
Odua	Choke	Foot rot	No treatment	Bovine & Caprine
Bonchua	Yaf kusel	Stomatities	Washing, add pepper	Bovine & Caprine
Muria	Gubet til	Liver fluke	No treatment	Bovine & Caprine
Kotuwa	Fengel	Coccidiosis	Butter, lemon, pepper	Poultry
Shegela	Tekmat	Sheglosis	Butter	_
Oshinchyha	Gunfan	Mites	No treatment	_
Chucha	Kimal	?	No treatment	_

Source: FARM-Africa. 1993. Report of Diagnostic Survey of Dache Gofera Peasant Association in Boloso Sore Awraja Redd Barna by Ministry of Agriculture and FARM-Africa, April 1993. FARM Africa, Addis Ababa.

[11] Rinderpest is no longer present in Ethiopia. The last outbreak was in 1994 in Afar.

Table 7. Local livestock disease control methods in Sulla Zakota Mafo		
Local disease name	**Probable English name**	**Local control methods**
Tilkia/Karishua	Blackleg	Cut the ear and brand it with soot, cut the area near the tail, cut foreleg, pin the tail up with a needle, cut nose and bleed it and brand areas cut with a hot iron using butter as a lubricant. Then pulverise *Feto* and *Kirka* leaves, mix them with water and garlic and pour into the nose of the animal
Wose	Abscess	Cut the swelling and brand with hot iron. Wash the wound with the *Sogo* leaf
Shenia	Round worm/Ascaris	Crushed leaf of *Grawa* mixed with water. Force animal to drink the mixture
Wlo	Leeches	Root of *Kacota* and garlic are crushed with tobacco and animal is forced to drink
Gandia	Trypanosomiasis/ African Horse sickness	Brand the area round the swelling with fire (still trying to work out what this swelling is)
Lakama	Anaplasmosis	Cut the "black nerve"[12] in the animals tongue and bleed it

Source: Deribe T, Tanga D and Shola L. 1999. Indigenous Technical Knowledge (ITK) based on the Peasant Associations of Sulla Zakota and Wareza Gerera of Chencha and Soddo Zuria woredas of North Omo. Farmers' Research Project Technical Pamphlet No.19. FARM-Africa: Addis Ababa.

Special studies on priority cattle problems in Wolaita, and some indigenous solutions

Two of the reasons for low productivity of cattle highlighted in Diagnostic Studies from the three agro-ecological zones are poor reproductive performance (except in the lowlands) and Trypanosomiasis (especially in the lowlands and mid-altitudes). These were the subjects of special studies by FARM-Africa, and the results of their surveys are summarised below.

[12] This is the term used in the study report, but could mean a blood vessel

Cattle fertility situation in Wolaita

A study was carried out in 1993/4 to establish levels of cattle fertility in different parts of Wolaita zone, and to establish the reasons for any particularly low levels of fertility encountered. The study was conducted in Fagena Mata and Hanaze kebeles of Kindo Koysha woreda, and Anka Diguna and Sura Koyo kebeles of Damot Weide woreda. Fagena Mata and Anka Diguna are lowland (kola) kebeles, while Hanaze and Sura Koyo are mainly mid-altitude (woina dega) kebeles.

About 100 cows were investigated at each of two sites in each of the four kebeles using questionnaires covering reproductive performance and management.

Mean age at first calving was 54 months across all samples, but was shorter (48 months) in the lowlands than at mid-altitude (60 months). Mean calving rate was 57 per cent across all sites, with a higher rate in the lowlands (60 per cent) compared to the mid-altitude (55 per cent) kebeles. Mean first calving interval over all kebeles was 21.7 months, with the lowlands showing a considerably shorter calving interval (17.3 months) than at mid-altitude (25.7 months). This trend is continued in subsequent calving intervals. It should be noted that the average age of the cows kept in the study areas was 9-10 years.

The annual calving patterns in lowland and mid-altitude sites all show a bimodal pattern, which is linked to seasons. Conception peaked in the months of Tahsas (December) and Miazia (April). The data did not support a clear link between conception and better nutrition, although there was some evidence that nutritional quality (rather than quantity) was better during the periods of peak conception. Conception was better in households owning their own bulls, during periods when the cows run with mixed herds, and when the bulls are not actively ploughing. There was no clear proof that long suckling periods were lengthening calving intervals.

Recommendations

Discussions with farmers, taken together with the findings above, suggest that a critical point for intervention to improve reproductive performance might be during the three months after calving, when good nutrition and the presence of suitable bulls could assist conception leading to shortened calving intervals. An argument against this is that by significantly shortening calving intervals one might also reduce overall milk production in Ethiopian zebu cattle. Farmers therefore need to decide between optimising either milk production or calf production.

Trypanosomiasis in Wolaita

Trypanosomiasis is a devastating disease of cattle, equines and small ruminants, caused by the Trypanosome Protozoan Parasite spread by Tsetse flies. It was confirmed in Wolaita in 1973, and appears to be spreading through extension of livestock production into Tsetse fly areas, the transport of Tsetse to new areas by vehicles, animals etc, the adaptation of Tsetse flies to new habitats and hosts and the re-occupation of original habitat after villagisation or abandonment of lowland settlement areas.

While Trypanosomiasis has been a serious problem in the lowlands of Wolaita, it exerted a catastrophic effect on livestock production in mid-altitude areas in 1991, with enormous loss of cattle (20,000 in 1991), equines and goats during the drier months. Loss of draught oxen seriously affected crop production and food security. During 1992/3 the situation improved, possibly due to adaptation of livestock to strains of trypanosomes, better grazing conditions (due to lower stocking rates thanks to previous mortalities), better farmers' knowledge of the disease and how to avoid it, and improved availability of trypanocide drugs.

Surveys in 1992/3 found a 26.6 per cent incidence of Trypanosomiasis in Fagena Mata kebele at 1000 metres altitude, 18.6 per cent at Abella Foricho at 1500m and 9.3 per cent at Humbolarena at 1800m. No infected cattle (apart from recently introduced cattle) were found at Kokate at 2100m. These rates have increased from almost nothing in the early 1970s, and have increased in line with growing settlement in the area.

Use of drugs against Trypanosomiasis

In 1993, the use of trypanocidal drugs was practiced in all parts of Wolaita, mostly (85 per cent) on cattle due to their value and the severity of the disease for cattle. Of the cattle treated, 59 per cent were adult stock, 31 per cent young stock and 10 per cent calves. Four drugs were used at that time (Berenil, Ethidium, Trypamidium and Novidium). They were administered by injection to the thigh muscle, mostly by non-professionals leading to side effects including drug resistance, and under-dosing leading to repeat infection by the parasite within a few days of treatment.

Indigenous practices to control Trypanosomiasis

The high cost of trypanocide drugs has forced farmers to use local methods to minimise risk of infection. These include:

- Keeping livestock in the house during the hottest time of day to avoid them being bitten by Tsetse flies which are active at high temperatures, thereby reducing the transmission of the disease

- Avoiding grazing on common land where tall grass and trees are abundant, and there is a concentration of cattle which attracts flies
- Unfortunately these practices tend to lead to under-exploitation of communal pasture, over-exploitation of pasture near the homestead, accidental damage to crops and under-nutrition.

Herbal medicines are also used locally, including drenching with temusha, godareuta, dachi marachia, chaltia, bosha and mimia. This practice, however, often leads to drenching pneumonia.

3. The use of Deltamethrin insecticide as a control measure for Trypanosomiasis in Konso Special Woreda

Introduction

This section describes the Trypanosomiasis situation in Konso Special Woreda of southern Ethiopia in the mid-1990s. It looks at the different options for controlling the disease, and then describes successful research with farmers and cattle kept under local conditions into the use of Deltamethrin "Spot-on" insecticide to reduce Tsetse fly numbers.

A Diagnostic Study of Gaho kebele in 1993 found that cattle are an important component of the farming system in that mid-altitude area. Livestock (mainly cattle) are kept in small barns, constructed near to the living house and fed on a cut-and-carry basis. Cows are mainly kept for milking, while males are sold - as farmers in this kebele do not use oxen for traction. Milk yield is extremely low. It is mainly used for home consumption and to feed infants, with practically no sale of milk and milk products. Skins and hides are important animal by-products which play a significant part in the economy of the farmer, and are used for making household objects.

Some farmers with large livestock numbers, give a cow to their relatives or others who are poor, to rear on their behalf. This is called Malota. The recipient can use its manure for his land, while the milk and milk products are given back to the owner.

During the wet season livestock feed is abundant, being at its maximum in July. Conversely, in the dry season, in which there is little rainfall, the farmers face shortage of feed, especially from January to April. The local names for the tree and shrub fodders used at that time are: Otayata, Tolekata, Tayeta, Kawreata, Kanda, Neybeta, Aleko, Serdo, Elgnba and Demeta. In addition, crop residues of maize and sorghum are fed.

The principal diseases affecting cattle are Trypanosomiasis, Foot Rot and Black Leg, as shown in Table 8. Trypanosomiasis is at its peak during March, April and September.

Table 8. Scoring for morbidity and mortality for cattle diseases in Gaho kebele				
Type of disease	**Animals at risk**	**Morbidity**	**Mortality**	**Remarks**
Trypanosomiasis (Gendi)	Cattle	Low risk	Low risk	Since the area is semi-high land the effect of Trypanosomiasis is not as bad as in the lowland
Foot Rot (Hoyaleta)	Cattle Sheep Goat	Low risk Low risk Low risk	Low risk	The farmer practices quarantine methods whereby the infected animals are isolated and kept separately
Black Leg (Harka)	Cattle	Very high risk	High risk	Affected animals are branded with a hot iron

Source: FARM-Africa. 1993. Report of Diagnostic Survey of Gaho Peasant Association in Konso Woreda by FARM-Africa, June 1993. FARM-Africa, Addis Ababa.

Cattle numbers in the kebele have been in decline over the last two decades due to:

- Shortage of feed and grazing land as a consequence of the growth of the population and increased demand for crop land; and,
- Diseases including Trypanosomiasis.

The incidence of Trypanosomiasis in Konso

The incidence of Trypanosomiasis in lowland areas is high, leading to 16 per cent mortality in cattle being reported in 1994. This means that Trypanosomiasis accounted for 50 per cent of all cattle deaths. Farmers spent 34 birr per head of cattle per year on trypanocidal drugs at that time, and rated the problem among the worst of all farming constraints.

Box 1 Options available for controlling Trypanosomiasis (in 1994)

Trypanocide drugs. The disease can be treated using Berenil, Ethidium, Trypamidium or Novidium. They are administered by injection to the thigh muscle, mostly by non-professionals leading to side effects, drug resistance and repeat infection by the parasite within a few days of treatment.

Disease tolerant breeds such as the N'dama cattle of West Africa. This is not practical because the numbers and productivity of these cattle are low, and crossbred animals do not appear to have the same level of tolerance as the purebred.

Insecticides to kill the Tsetse flies by spraying their habitat can be environmentally destructive

Trapping of the Tsetse fly vector. This is a good tool for reducing Tsetse fly populations and the spread of the disease. It requires training and the collaboration of the whole community to work well. The technique is particularly applicable to areas of low cattle population

"Pour-on" or "Spot-on" insecticides such as Deltamethrin applied to the backs of cattle at periods of one to two months. This is cheaper and less polluting than spraying the whole area, but still requires insecticides which normally have to be imported. It works quickly, and is particularly effective where cattle populations are high.

A community-based strategy for managing the disease

The strategy adopted by FARM-Africa was to identify areas where Trypanosomiasis is perceived to be a major problem for communities, and then to work with all sectors of the communities and their neighbours to help them to select the most appropriate and acceptable control option on a trial basis. Some of the considerations discussed with communities are listed below.

- Who owns cattle, and who would benefit from the control of Trypanosomiasis?
- What potential conflict might arise within and between communities as a result of control operations?
- Are cattle areas accessible or remote?
- Are cattle densities high or low?
- What resource constraints (cost, labour, knowledge, security) need to be taken into account?

Five lowland (1000-1100 m) parishes (kebeles) in Konso special woreda were selected for pilot studies. These were Baide, Durite, Fuchucha, Teshmele and Lulto. Farmers mapped the hot-spot areas of disease incidence, and noted at what time of year the disease was worst, while technicians from FARM-Africa, the Bureau of Agriculture and the Soddo Regional Veterinary Laboratory carried out surveys of the incidence of Tsetse flies and of Trypanosomiasis. When

the community-based Tsetse fly control was initiated in Konso, farmers were taken for experience sharing to Ghibe valley in the western part of the country, where ILCA (the International Livestock Centre for Africa) was conducting community-based control of Tsetse flies to control Trypanosomiasis. The Konso programme was based on that experience and advice from the ILCA project in Ghibe.

The result of these consultations and surveys was that Deltamethrin "Spot-on" insecticide should be tested, because of its low demand for cash, labour or specialist manpower. It is suitable because the cattle are very mobile, and it was advantageous that the control measure moved with them. Lastly, there was (at that time) a supply of the chemical and support from the importer.

643 cattle-owning farmers with 5508 cattle took part in the trial. The density of cattle was about 18 per square kilometre. The farmers were organised into small groups (Foramen Associations) who traditionally work together to manage the cattle when they are grazing away from home, reducing labour and sharing resources and knowledge.

The insecticide (Deltamethrin) was applied as a 20ml oil emulsion strip along the back of the animal from shoulder to hip. This was done monthly for the first 3 months and thereafter bi-monthly (a total of 7 applications per year). As it is a simple operation, it is possible for one unskilled person to treat about 1000 cattle per day. This contrasts with the large numbers of skilled and unskilled people necessary to make and maintain Tsetse traps.

About 50 per cent of the 5508 cattle were treated (excluding cattle under two years old that need to be challenged by ticks and tick-borne diseases). Of these 200 were ear tagged and monitored for diseases and productivity. Tsetse numbers were also monitored using a trap.

Results of treatment using Deltamethrin

The results were dramatic. Trypanosomiasis incidence of the monitored cattle dropped from a high of 16 per cent to zero after a year of treatment with Deltamethrin. The Tsetse fly numbers also dropped dramatically from 3.05 to 0.32 flies per day per trap. The body condition score of treated animals increased by 46 per cent, draught power efficiency rose and calf mortality decreased from 58 per cent to 7.5 per cent. However, it is reported that milk yield only increased marginally during the measurement period.

The cost of the Deltamethrin treatment was (in 1995) about US$70 per square kilometre per year, compared to US$150 for either ground spraying or trapping. Only dipping is less costly (at US$16 per square kilometre per year).

In addition to the direct benefits to cattle, there were side benefits, such as improved health of goats and donkeys, and reduced amount of biting flies and ticks. Non-cattle owners have benefited by improved access to draught animals, and by the reduced risk of buying cattle to own.

A workshop of farmers, veterinarians, government and NGO staff pronounced the trial "a huge success" that should be continued and expanded to other parts of Konso with coordination by the Tsetse Control Committee chaired by Konso Bureau of Agriculture. As evidence of their interest, farmers collected Birr 18,000 for the purchase of Deltamethrin to continue treatment of their cattle.

It was concluded that the Trypanosomiasis control measure using Deltamethrin "Spot-on" to reduce Tsetse fly numbers was effective, quick, simple, relatively cheap and environmentally acceptable. All of these are attributes that favour the acceptability of the technology among farmers and government staff. The only problem is the danger inherent in relying on a single technology that could develop problems over time. Ideally an integrated control strategy with several complementary components should be used to spread that risk. Farmers also felt that decreased mortality and increased vigour associated with a decline in Trypanosomiasis could lead to an increase in cattle numbers and some overgrazing problems.

At the time of publication of the Technical Pamphlets on which this synthesis is based, there was no clear arrangement for the continued supply of Deltamethrin, even though farmers had expressed a willingness to pay for the chemical (especially if credit is available).

What went wrong?

In 1997, the Konso Tsetse control operation expanded to include farmers from Dera, Sorobo and Jarso kebeles. A revolving fund was established to enable farmers to purchase insecticide and, with support from the UNDP, cattle were treated three-four times a year until 2000. During this period, farmers were required to contribute increasingly towards the costs of treating cattle and, as a consequence, levels of participation diminished.

By 2000, all Tsetse control operations in Konso had ceased. However, following requests from local livestock owners, the Konso Capacity Building Project (KCBP) and the Konso Development Association (KDA) re-established a community-based schemes to control Tsetse over an area of ~900km^2 in eastern Konso.

KCBP and KDA helped eight kebeles establish Kebele Fora Associations with associated governing byelaws and an executive body. Each association was expected to manage a revolving fund to buy insecticides for Tsetse control within the kebele. Each association was also provided with training in the management of funds and in the safe and effective application of insecticide. The purchase of insecticide from the veterinary retailer, and woreda-level management of the project and revolving fund, was undertaken by KDA, with support from KCBP. Ultimately however, the project aimed to establish a woreda-level committee to manage Tsetse control.

Unfortunately even at the beginning of the operation, only ~5 per cent of the cattle were treated and the proportion subsequently re-treated diminished with time. Moreover, while the insecticide is only effective for 1-3 weeks, the planned re-treatment interval was 16 weeks. Consequently, it seems likely that the density of insecticide-treated cattle would have been too low to have had any significant effect on Tsetse populations or the incidence of Trypanosomiasis. The use of pour-ons to control Tsetse was abandoned after the first or second application in Baidi, Birbirsa and Jarso but sporadic treatment continued in Fuchucha until at least 2004.

No entomological or veterinary surveys were undertaken between 1997 and the present to assess the impact of the Tsetse control interventions on animal health or productivity. Morton (2001) undertook a brief socio-economic study of livestock keepers in Konso in December 2001, and reported that the relatively high price of Tsetse control (~25 Birr per animal per year) and lack of technical information deterred livestock keepers from participating in the Tsetse control schemes. Morton's survey indicated that farmers were, on average, losing ~20 Birr/animal/year due to Trypanosomiasis-related decreases in animal productivity despite the widespread use of trypanocides to treat the disease.

Hope for the future

Recent improvements in the cost-effectiveness of using insecticide-treated cattle to control the Tsetse vector suggest that better control of Trypanosomiasis could be achieved in Konso at less than the recurrent cost of treating cattle with trypanocides. This approach is currently being promoted to stakeholders in Konso and neighbouring woredas by FARM-Africa.

This account demonstrates the need for long-term continuity to follow through interventions that show promise. It further demonstrates the need to ensure that farmers are kept informed of good practice, and supported with good technical advice and the materials needed to use that advice effectively.

4. References and further reading

Further information on Trypanosomiasis in southern Ethiopia can be obtained from the following references.

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