

Understanding the indigenous knowledge and information systems of pastoralists in Eritrea



**COMMUNICATION FOR DEVELOPMENT
CASE STUDY**

26

**Understanding
the indigenous knowledge
and information systems
of pastoralists in Eritrea**

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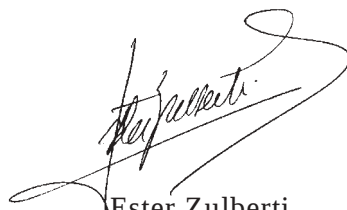
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Foreword

The present study has been developed within the framework of research and field activities related to *knowledge and communication for sustainable natural resource management* carried out by the Extension, Education and Communication Service (SDRE) of the Food and Agriculture Organization of the United Nations (FAO). The paper is the outcome of a desk study analyzing the Indigenous Knowledge and Information Systems (IKIS) of pastoralists in Eritrea, and was prepared in collaboration with the Faculty of Agriculture of University of Perugia, Italy and the Pastoral and Environmental Network in the Horn of Africa (PENHA).

During many centuries indigenous knowledge has been the only source of information for pastoral societies. Such knowledge based on experiential learning, evolves constantly and is shared through local communication processes according to the characteristics of pastoral production practices, the culture and the environment. Nomadic herders' indigenous knowledge has been often neglected by extension and research services which mainly focus on agricultural production. Only recently it has been recognized that to promote suitable development for pastoralists, it is necessary to properly address their knowledge and information needs. The present study intends to contribute to the definition of demand-led communication and advisory services aimed at pastoralists in Eritrea, through a better understanding of their indigenous knowledge on livestock production and natural resources management and their own sources and channels of information, as a prerequisite for future field activities.



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1. Studying pastoral indigenous knowledge and information systems

1.1 Justifications and objectives of the study

Despite the fact that nomadic herders are amongst the most food insecure groups in the area, pastoral systems have received little or no attention from researchers and extension services. In studies on pastoralism in the Horn of Africa, and especially in Eritrea, there has been no systematic review of the past policies and programmes of states and development agencies aiming to improve pastoral livelihoods. Moreover, there has been little in the way of research that examines pastoralists' information systems and indigenous knowledge. These knowledge gaps may sharply reduce the chances of achieving success in pastoral development programmes. Many commentators have noted that considerable investments have been made in pastoral projects in sub-Saharan Africa, with relatively little success measured against the stated aims (Waters-Bayer & Bayer, 1994). Communication is, in fact, a key component in human resource development for pastoral production and improved food security. Communication can facilitate pastoral development that seek to establish sustainable natural resource management involving pastoralists, development workers, researchers, input suppliers, local authorities and national decision makers. This could help to foster acceptance of veterinary development policies and programmes, including vaccination campaigns; mobilizing people for participation and action and conveying information for education and training.

The purpose of the study is therefore to contribute to the conceptual development of demand-led extension and advisory services aimed at nomadic herders in Eritrea, through a better understanding of pastoralists' traditional natural resources management practices and their own sources and channels of information, as a prerequisite for future fieldwork. This study is a follow-up to recent activities carried out jointly in Eritrea by FAO, the Government of Eritrea and DANIDA (Garforth, 2001).

1.2 Outline of methodology

FAO and the World Bank have recently developed a shared vision for an integrated approach to agricultural education, research and extension - the Agricultural Knowledge and Information System (AKIS) (FAO & WB, 2000). An AKIS links people

and institutions to promote mutual learning and generate, share and utilize agriculture-related technology, knowledge and information.

An AKIS relating to pastoralism should include pastoralists, educators, researchers, extensionists, input suppliers, marketing agents and others who have knowledge and information that can be used to improve cattle breeding, to ensure food security and sustainable livelihoods for pastoral people. When assessing an AKIS within the context of traditional ethnic societies (such as those of Eritrean herders) it is essential to have a sound understanding of the nature of pastoralists' Indigenous Knowledge (IK), the way it is shared and the elements that influence its reproduction.

Generally speaking, IK is the knowledge used by local people to make a living in a particular environment (Warren, 1991). Such knowledge evolves *in situ*, so that it is specifically adapted to the requirements of local people and conditions. It is also creative and experimental, constantly incorporating outside influences and inside innovations to meet new conditions. It is therefore a mistake to think of indigenous knowledge as "old-fashioned" or "static" (Emery, 2000; Langill, 1999; IIER, 1996).

Researchers concerned with sustainable development have focused on different categories of pastoral IK, such as: animal production, animal husbandry, ethno-veterinary knowledge and practice, and ethno-botanic knowledge. While research may center its attention on a particular category of IK, any IK under investigation must be viewed in terms of the overall cultural context. IK is embedded in a dynamic system in which spirituality, kinship, local politics and other factors are tied together and influence one another. The interrelation amongst these aspects, the integrality of this system should be taken into account when examining a particular part of the IK system. IK has many positive aspects, and incorporating IK into projects can contribute to local empowerment and provide valuable input for alternative natural resource management strategies. Furthermore, in order to promote sustainable development that is culturally appropriate to traditional societies, it is necessary to enhance the traditional/local knowledge and information systems which allow the survival and renewal of culture, identity and societal wealth, and are important generators of innovation. Given the importance of IK, pastoralists' management of their own knowledge may therefore play a critical role in ensuring food security for the nomads living in the Horn of Africa.

1.3 Overview of pastoralism in the Horn of Africa

The most current definition of pastoralism in the development literature is the one given by Swift (1988): "Pastoral production systems are those in which 50% or more of household gross revenue (i.e. the total value of marketed production plus the estimated value of subsistence production consumed within the household) comes from livestock or livestock-related activities (for example caravan trading), or where more than 15% of household food energy consumption consists of milk or milk products produced by the household. An 'agro-pastoral' production system is one in which more than 50% of

household gross revenue comes from farming, and 10-50% from pastoralism". As highlighted in a recent study (Morton & Meadows, 2000), such a definition has the merit of de-emphasizing the concept of nomadism, long used as a term indicating a particular mobility strategy carried out by some pastoralists for obscure psycho-cultural reasons, which needed to be overcome in the name of civilization.

As anthropologists have pointed out, pastoralism is a "mode of perception" as well as a mode of production (Baxter & Hogg, 1990). In this sense the term "pastoralists" has to be extended to people who have been forced by poverty to depend on non-livestock activities, as well as to wealthy households who have successfully diversified into trade or agriculture, both groups still holding common beliefs about the fundamental importance of livestock to their ways of life and self-perceptions.

The Horn of Africa¹ is home to the largest aggregation of traditional stockbreeders in the world, estimated at 15-20 million people (FAO, 2000a). For all the states of the region, arid and semi-arid lands (ASAL) represent a major portion of the land area.

In such areas, characterized by erratic rainfall and periodic droughts, pastoralism is a well-suited natural resource management system². Nevertheless, pastoralists in the Horn of Africa are now amongst the most marginalized and disadvantaged groups. This is due to a number of elements, historical, social, economic and political in nature, linking and influencing one another. Traditional livestock production is becoming increasingly impracticable because of a greatly reduced access to land and water, as they are turned over to cultivation. This loss has been facilitated by the reluctance of states to acknowledge and respect pastoralists' rights to land (Lane & Moorehead, 1995). Restrictions on the mobility of herders and their cattle have disrupted the process of adjustment that maintains an ecological balance between men, animals and land (Baxter, 1990). Pastoralist society has been negatively affected by state borders that divide ethnic groups, separating people from their kin, pastures, watering places and markets. Colonial and postcolonial arrangements disrupted the social and political cohesion of pastoral societies, and poverty intensified competition for resources, further undermining social organization (Markakis, 1993; Barfield, 1993). The result was conflict, both within pastoralist society and with state authority supporting sedentarised farmers (Maknun, 1986).

State policies throughout the region aim to develop livestock production, rather than to improve the living conditions of pastoralists. They are based on a desire to turn their land over to commercial cultivation through irrigation, or over to meat production in ranching schemes, leaving pastoralists, whose land has remained state domain, as the only social group without any land tenure rights.

¹ Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan and Uganda.

² Although pastoralist-induced damage to rangelands cannot be ruled out, the recently emerging "new ecology" showed how in dryland ecosystems characterized by "non-equilibrium" dynamics, mobility in tracking pasture and the high degree of specialization of pastoral knowledge play a critical role (Ellis & Swift, 1988; Behnke & Scoones, 1993; Scoones, 1995).

In a situation characterized by marginalization, conflict and competition over meagre resources, it is widely recognized that extension and education services have had a limited impact on the status of pastoralist societies. Often provided by governments, these services have failed to achieve their goals. Education programmes have been at odds with and in opposition to nomadic culture at every level, from their principles and goals to their approach to evaluation (Krätli, 2001). Extension services have been undermined by communication gaps between extensionists and pastoralists (Butcher, 1994).

2. Pastoral indigenous knowledge and information systems in Eritrea

2.1 Location, area and population

Eritrea is located in the northeastern part of Africa. It is bounded by the Red Sea in the east, Sudan in the west and north, Ethiopia in the south, and Djibouti at its southeastern extreme. It occupies an area of about 124,500 km² and has a population estimated at 4.2 million, which is growing at about 3.8% per annum. The country consists of six administrative regions (Map 1).

2.2 Modern history

The state of Eritrea came into being during the European colonial period. In 1869, Italian troops set foot on the shores of the Red Sea at Assab, gradually occupying the surrounding areas. In 1890, Italy issued a decree declaring the country to be an Italian colony, the first in Africa, with the name of Eritrea. The Italians governed up to 1941. During this period, substantial economic development took place, largely serving the needs of Italian colonialism. In 1903, a Veterinary Institute was established in Asmara to carry out research on animal disease and to develop vaccines.

During World War II the unified Allied Forces defeated Italy and a British protectorate was established over Eritrea. The British dismantled large parts of Eritrea's physical infrastructure, which were then exported to their own colonies. In 1952, following a United Nations resolution, Eritrea was federated with Ethiopia. Ten years later, in 1962, Ethiopia's Emperor Haile Selassie dissolved the Eritrean parliament and annexed the country. The violation of the federal agreement triggered off armed resistance, initiated by the Eritrean Liberation Front (ELF). By 1970 a small faction of the ELF broke off and established its own movement, the Eritrean People's Liberation Front (EPLF). During the 1970s the ELF and the EPLF engaged in civil war with each other, at the root of which lay their divergent liberation strategies and ideological outlooks. The two revolutionary groups also took divergent attitudes toward pastoralism. During the struggle, the EPLF encouraged nomads to settle while providing for them through the education of children and vaccination of cattle. The ELF, on the other hand, encouraged the nomadic lifestyle, Muslim pastoralist lowlanders being its main support base (Joireman, 1996).

The conflict between Eritrea and Ethiopia further intensified following the military coup in Ethiopia in 1974, that replaced Haile Selassie by a regime, the Derg, headed by Mengistu Haile-Mariam. The EPLF increasingly gained popular support and, in 1981, expelled the last remnants of the ELF from Eritrean soil, and hence could direct all its efforts against the Derg. In May 1991, the EPLF finally took full control of Eritrea, after a three decade long independence struggle, one of the longest in Africa's history. In May 1993, following a referendum, Eritrea formally gained its independence³. From May 1998 up to December 2000, Eritrea and Ethiopia were embroiled in a new and tragic large-scale conflict⁴.

As mentioned above, animal health institutions were highly developed during the Italian period, but subsequently underwent a gradual deterioration under British and Ethiopian rules, particularly from 1975 to liberation in 1991, when the most important public livestock services institution, the Veterinary Institute of Asmara, ceased to exist. Estimates of the livestock population over the years (FAO, 1996), presented in the table below, clearly show the significant impact that Eritrea's turbulent recent history has had on the national herd:

Estimates of Livestock Population ('000 head)

Year	Cattle	Goats/Sheep	Camels	Equines	Poultry
1928	749	1,897	79	59	-
1938	591	1,491	68	51	-
1946	1,200	2,200	105	83	-
1965	1,300	3,200	180	109	-
1973	2,500	5,000	-	-	-
1987	970	3,001	-	190	456
1992	1,258	4,950	185	168	2,500
1993	1,396	5,100	191	276	2,573
1994	1,335	5,308	196	284	2,653
Source: MoA					

The above figures show that from 1938 to the mid-seventies there was a steady increase in all livestock production, after which there was a deterioration due to the onset of major droughts and an escalation of the war⁵. The cattle population in 1992 was estimated to be nearly half that of 1973.

After independence there was a resumed increase, but the outbreak of a new conflict between Ethiopia and Eritrea, lasting over two years, had critical repercussions.

³ For an effective outline of recent Eritrean history see A. Tesfai (1999).

⁴ On the causes of the recent conflict between Ethiopia and Eritrea, see the article by A. Dinucci (2000a).

⁵ See the article by L. Cliffe (1989).

According to a recent assessment carried out by the Government of Eritrea and the United Nations (2001), the combined effects of war and drought in the Gash-Barka region, which supports about 57% of the nation's cattle and 38% of its sheep and goats (FAO, 2000b), resulted in livestock losses as high as 30-40% across the area.

2.3 National policies towards pastoralism

The Government of Eritrea is committed to the sedentarisation of pastoralists. This settlement policy takes the form of a "villagisation" process, involving the congregation of scattered hamlets within a radius of 10-15 km into larger villages. The Government's aim is to facilitate the provision of road access, drinking water, primary schools, health stations and veterinary services (FAO, 2000b). The Government recognizes that successful sedentarisation requires the full participation of the local population and it is therefore implementing this policy carefully and slowly. Nevertheless, migration with herds has been a crucial survival strategy for the rural communities and the sedentarisation process should take this into account.

2.4 Socio-economic profile of pastoralists

According to the Ministry of Agriculture of Eritrea (Tzeggai, 1996), the nomadic pastoralist system is present in three major agro-ecological zones⁶: the Southwestern Lowland Zone (SWLZ), the Northwestern Lowland Zone (NWLZ), and the Coastal Plains Zone (CPZ) (Map 2). Pastoralists living in these environments belong to the Tigre⁷ (inhabiting Gash-Barka, Anseba and Northern Red Sea regions), Afar (Southern Red Sea) and Hidareb (Gash-Barka) ethnic groups. Variations in their pastoral way of

⁶ The Ministry of Agriculture has defined six agro-ecological zones: the Central Highlands Zone (CHZ) has a cool, semi-arid climate above 1,500 m in altitude, with approximately 400-700 mm of annual rainfall; the Western Escarpment Zone (WEZ) has a warm to hot, semi-arid climate from 600-1,500 m above sea level and 600-700 mm of annual rainfall; the Southwestern Lowland Zone (SWLZ) is 600-700 m in altitude with a hot, semi-arid climate and average rainfall greater than 400 mm per annum; the Green Belt Zone (GBZ) is an eastern escarpment area of the Highlands between 700-2,000+ m in altitude with an average of 700-1,000+ mm annual rainfall and a sub-humid to humid tropical climate; the Coastal Plains Zone (CPZ) ranges in altitude between 600 m to below sea level with a hot desert climate and it receives less than 200 mm of rainfall per year; the Northwestern Lowland Zone (NWLZ) ranges from 400 to 1,500 m altitude and has a hot, arid climate with less than 300 mm of rainfall per year (Tzeggai, 1996).

⁷ The term Tigre has three different meanings: linguistic, ethnic and social in nature. Tigre (Hamitic idiom) is Eritrea's second-most widely spoken language after Tigrinya. Tigre also indicates ethnic groups, including Ad Shaykh, Beni-Amer, Bet Asghede, Marya, Mensa, Sahel and Semhar tribes. Finally, due to the fact that these peoples had a traditional class division between an aristocratic clan of non-Tigre origin (the Shumagulle) and the common people referred to as Tigre, the name has taken on connotations of "serf" (Killion, 1998).

life may be observed, depending on which ecological zone a particular group occupies. The Tigre and Hidareb raise mainly goats, cattle, sheep and camels. In addition to their pasturing they cultivate during the rainy seasons and also trade some livestock. The Afar raise goats and camels. They are involved in a combination of activities such as fishing, livestock trade, salt mining and picking coral from the sea (Tekeste, Tsehay & Dagneu, 1999).

In Eritrea there are no longer any pure nomads who continuously shift their tents, moving with their herds. The majority of pastoralists are semi-sedentary, living in villages and moving seasonally between a dry season camp and a wet season camp situated a few kilometers from each other. Transhumant movements of herds are common (Map 3). However, only households with larger herds are able to send their non-essential animals outside their village in search of better grazing. All stock-owning households need to keep one camel or donkey for transportation and a couple of goats to provide milk for children. Among households involved in transhumance, most family members, especially women, children and old people, remain within the village all year round. Only a small number of men (often paid herders) migrate with the herds (FAO, 2000b).

Among the three ethnic groups, the Tigre have the highest literacy rate (24%) compared to the Afar (21%) and the Hidareb (6%). The alphabetization of the Afar and Hidareb languages is in fact a recent phenomenon introduced during the armed struggle. Both scripts are written with Latin characters. The Tigre language uses the script of Ge'ez, one of the first written languages in the region. Islam is an almost exclusively dominant religion among pastoralists. For this reason, Arabic is read by religious leaders and elders (Tekeste, Tsehay & Dagneu, 1999).

The Beni-Amer⁸ are the most important group within the Tigre-speaking communities of Eritrea and they will be the focus of our research on indigenous pastoral knowledge, presented in paragraph 2.6. The Beni-Amer and the Cushitic-speaking Hidareb⁹ have traditional organizations which consist of clans (*Ghebilet*), sub-clans (*Feriq*), lineages and extended families. They have a patrilineal system - descent, inheritance and succession to authority follows the male line. For centuries, through either subjugation or conquest, the aristocracy of the Beni-Amer (*Shumagulle*) ruled over the majority lower serf class and tribal groups such as the Hidareb (Tekeste, Tsehay & Dagneu, 1999; Fre, 2001). The ruling Beni-Amer aristocracy held authority, social status and a great deal of material wealth, which was mostly livestock-based. The *Nazir* was the highest authority and was supported by the *Omda*, the clan leaders. The aristocracy reaped economic

⁸ The Beni-Amer have twenty-four traditional clans (FAO, 2000b).

⁹ The Hidareb are divided into seven clans. The main ones are: Gereb Kinab, Sinkat Kinab, Melehit Kinab and Sherif (Tekeste, Tsehay & Dagneu, 1999).

benefits from its social status by owning large numbers of animals, keeping slaves, taxing the serfs and observing taboos such as aristocratic women not being allowed to milk animals or grind grain. The aristocracy did not intermarry with the lower classes (Pollera, 1935). The various colonial authorities that ruled Eritrea for over a century favored the aristocratic groups because they enabled the colonial powers to strengthen their hold over the communities¹⁰.

During the 1940s a major rebellion by the serf classes undermined the authority of the aristocracy. From the beginning of the liberation struggle in 1962, the authority of the aristocracy was further undermined by the disruption of the cattle economy due to drought and war. The disruption of the pastoral economy led to the pauperization of the aristocratic groups along with the serf classes. Both groups joined the liberation struggle and this has ultimately led to abolition of the Beni-Amer aristocracy. Since the end of the liberation war, the people's assembly or "*baito*", a political structure organized by the EPLF, coexists alongside the traditional village council, which consists of community leaders and *sheikhs* (FAO, 2000b).

The Cushitic-speaking Afar extend from the Gulf of Zula in the Red Sea to the Somali coast and beyond the Ethiopian border in the south. They are related to the Somali and Oromo people. Their social organization is based on clans with a patrilineal system. Traditionally the Afar are divided into two groups: the Assoimara¹¹ (meaning "red men") and the Adoimara¹² ("white men"). The former were the aristocratic class while the latter were the subordinate class (Pollera, 1935; Piguet, 1998). Only the ruling caste could claim rights to well defined grazing grounds. The serf may own herds, but not the pastures on which to graze them (Nadel, 1944).

2.5 Gender roles among pastoralists

The Government of Eritrea is strongly committed to improving the status of women. This pledge is enhanced by the recognition of women's crucial contribution to the liberation struggle, both as fighters and in collecting savings to finance the war (Gebremedhin, 1996).

¹⁰ For a detailed account of this policy see the article by A. Dinucci (2000b) regarding the Marya tribe during a period (Martini's governance) of the Italian rule of Eritrea.

¹¹ The Assoimara are divided into four groups: 1) Damoheita, the noble caste which rule over the Adoimara groups. They live in the costal villages of Assab, Beylul, Meder, Eddi, Harena, Tio and the island of Nora 2) Assabarcare, living in Beylul and Biru 3) Nassal, living in Beylul 4) Afaro, living in Beylul (Tekeste, Tsehay & Dagnew, 1999).

¹² The Adoimara are divided into twelve groups: 1) Dahimela 2) Hedarmot 3) Bellesua, living in the Sua plain of Denkel 4) Dunna, living around the hills of Dimo 5) Ankala, living in Assab, Beylul, Desset and on the western part of Buri peninsula 6) Hawakil, living on the Hawakil, Aguz and Delgunna islands 7) Ghedimto, living in Biru 8) Dodda, living in the costal regions 9) Barhitto, living in Barasoli 10) Haissamale, living south of Assab 11) Haleita 12) Sheka, living in small groups among other tribes (Tekeste, Tsehay & Dagnew, 1999).

Nevertheless, as mentioned earlier, nomadic society is rooted in patriarchy, which is the basis of family, clan and tribal organizational structures. The institution of patriarchy is further reinforced by the traditional interpretation of the teachings of Islam. As a result, women's standing in the community is very low (Tekeste, Tsehay & Dagnew, 1999). Among pastoralists there are major differences in the working roles of men and women. As a rule, tasks performed by men are controlled by men, and those performed by women are controlled by women. Men control land preparation, crop production, grazing and watering of animals, wage earning and marketing activities. Women control baby animals, donkeys, poultry, milk and milk products, stored grain, water and fuel for domestic use, as well as grain grinding, meal preparation, house cleaning and clothes washing (FAO, 2000b). This intensive female labor is neither recognized nor valued by the community as women are not allowed to attend ceremonies, meetings and even to go to the market (Tekeste, Tsehay & Dagnew, 1999).

2.6 The indigenous knowledge of mobile herders

Research activities carried out in Eritrea (Fre, 1989; 1991), have shown that semi-sedentary Beni-Amer pastoralists have a great deal of technical knowledge about livestock and their management. This body of knowledge may be categorized as: animal production, animal husbandry and ethno-veterinary knowledge.

2.6.1 *Animal production*

The Beni-Amer are experienced in breeding, with sound rationales, for functional and aesthetic characteristics. To the Beni-Amer the Bgait¹³ cow is a product of sound, applied skills and production principles. Every Beni-Amer herder seeks four basic characteristics in his cattle. First, milk ability (*Tthaleb*): the animal should be a high milk yielder. Second, size and coat color (*Ghedaf-Adelwavit*): cattle of Bgait origin must be large-framed and the color preference is for black with white spots. Third, character (*Meb-Iseit*): cattle must be loyal to their owners and hostile to outsiders. Fourth, walking ability (*Kevadit*): the ability to walk long distances over varied terrain. The first two traits are genetic qualities inherited from parents, while the latter are partly genetic and partly phenotypic (acquired by adaptation to environment and by the conditioning of animal behavior). These characteristics are achieved by using pedigree cows of a known genealogy and thoroughly selecting productive bulls with the desired traits.

Pedigree cows always lead the herd and represent its core. Numerically, they are not more than 5% of the total herd among the herds. They are only slaughtered when too

¹³ The Bgait or Barka cattle is one of the two major breeds of cattle (the other is the Arado) raised in Eritrea. The Bgait is produced in almost all of the western lowlands and it has the ability to produce relatively high yields of milk (up to six liters daily) (FAO, 1995).

old and are never sold. From a breeding point of view, pedigree cows are extremely important. “Daughters” of a pedigree cow maintain their mother’s name for several generations, helping the Beni-Amer to keep track of the origin of their cattle.

Bull selection and controlled breeding is a crucial part of good management among the Beni-Amer. Bull selection is seen as a long process that involves good management skills, and keeping a critical eye on the bull’s growth (from birth to maturity) and the merits of its offspring. Sharp-eyed herders notice the calf’s character, live weight gain, all round health and other characteristics around the age of one. This same examination continues up to the age of 2 to 2.5 years, when an important decision is made on the elimination (by sale or slaughter) of the less potentially productive males. The prospective bull is identified at this time and the herders already start to talk about it as “the bull”.

From this phase onwards, the would-be bull should show his virility by teasing heifers/cows and by attempting to mate prematurely at around the age of three. The Beni-Amer do not aim for defensive long-horned bulls, but instead breed for strength, productivity and loyalty. Around the age of four to five years, the bull reaches its prime breeding age. A good bull is seen as a treasure and the pride of their herd. It is seen as evidence of good management that will be noticed by other herders. Good bulls that can sire good cows are sometimes lent to relatives who want to upgrade their herds.

Once the Beni-Amer are certain that they have bred the right type of bull they decide how many bulls they will maintain in a given herd. Observation among dry herds in the area examined, showed a bull to cow ratio of 1:60. A good bull can serve a herd for up to ten years, but herders prefer to raise new bulls before that age is reached.

Beni-Amer herds are composed of dry and milking herds that are herded separately for most of the year. These different units are part of the herders’ survival strategy in a harsh environment where they have to adjust to dry and wet seasons, in both livestock and crop production.

The dry herd mainly consists of heifers, mature cows, older calves, some sterile cows, some castrated oxen and selected bulls. The herd is more than 90% female. However, the milking herd consists entirely of milking cows and young calves. As already stated, the two herds are interrelated because in-calf (pregnant) cows return to home base, whereas “dried-up” cows are sent back to the dry herd further south. A herd is perceived as a cattle management unit of 60-100 animals, managed under one stick or *mora*. Labor needs for such a herd vary from one to three men depending on the season.

2.6.2 Animal husbandry

Good cattle management is recognized by all Beni-Amer as a crucial factor in herd productivity and health. Seasonal migrations, searching for water and grazing, moving to healthier environment and protecting cattle from raiders by group herding, are seen by the Beni-Amer as essential requirements for good husbandry.

Cattle are given names collectively and/or individually among many pastoral and agro-pastoral communities in the Horn of Africa and other parts of the world. Among

the Beni-Amer naming (individually or collectively) is based on aesthetic, genealogical and herd management principles and values. Individual names are given to cattle with matrilineal pedigree or to the nucleus herd within a large herd. In practice a large number of related cows are known by a single name to which they respond. The cattle are trained to respond to particular names and this is important in practical husbandry and genetic management. Such is the level of training of cattle and calves among the Beni-Amer that two young boys can manage up to 50 calves that have been separated from their dams.

The Beni-Amer also talk about herd names to which a given herd responds collectively during night grazing, when fleeing raiders, or when separated from other herds. A herd is trained to recognize its herder's voice and respond collectively to the herder's orders. Old Beni-Amer recall the rhythmic sounds uttered by different herders which made it possible to identify by hearing the particular tribal section that the cattle belonged to.

Marking ownership of cattle is done mainly by branding (hot iron burning) specific parts of the body and sometimes by cutting a small section of the animal's body. Some pastoral groups cut, others burn and some combine both methods. Ownership markings among the different pastoral groups in the Horn may designate pedigree breed, tribal, individual or family property, or a convalescing animal. Branding is of great practical importance. Lost animals can easily be traced by the markings they bear and stealing is made more difficult, as the ownership of the animal can be easily identified wherever it is.

Ownership markings among the Beni-Amer are varied and complex. The branding falls into three main categories: tribal, clan and family brands. Tribal brands are distinct and recognizable by all the other tribes, while clan and family brands are more complex. All the individual brands have names descriptive of the type of branding. For instance, families belonging to the *Ad-Urota* clan have four different brands that involve burning and cutting. *Bershem* is a straight burn on the cow's flank, *Shrabet* is a slightly diagonal burn from the top to the bottom of the neck, *Habrem* is a clip on the upper side of the ear which blunts the ear, and *Metela* is a splitting cut above the base of the ear.

Body nomenclature, naming and branding are management practices of practical as well as cultural importance, so it is important to appreciate their full significance. They express a close man/cow relationship, reflecting the caring attitude of the herder towards his livestock.

The Beni-Amer have a good understanding of the daily and seasonal feeding requirements of their cattle and they adjust their practices and labor resources to suit particular seasons. Important duties during the rainy season include moving to higher ground for health reasons, tending cattle away from cultivated fields and not mixing your herd with other unfamiliar herds. The change in the nature of the tasks required,

the high productivity of cattle in terms of dairy products, availability of water / grazing resources and the fact that the dry herd herders are nearer to their families, make the rainy season comparatively easy.

However, the dry season is very labor intensive and requires much greater inputs in terms of labor and feeding resources. The herders are under much more strain, being away from their families in the dry season camp. Treks to water and pasture sources are long and cattle lose a great deal of weight during the dry season. There is also insecurity caused by cattle raiders to the south of Gash river, as well as in the Ethiopia-Sudan border area. Malnutrition caused by milk and grain shortages is considerable. Annual vaccination takes place during the dry season and cattle have to be driven several kilometers north to the nearest vaccination center. Feeding green fodder during the dry season is greatly appreciated by cattle and the herders lop trees to feed cattle and small stock.

The Beni-Amer see salt provision by directly adding loose coarse salt to drinking water or by taking cattle to salty ground as an essential requirement. The amount given varies greatly because salt provision depends on the availability of coarse salt as well as on herders being able to afford to buy it. The need also varies according to the type of vegetation and saltiness of the earth in a particular area. In much of the traditional home base of the Beni-Amer in Gash-Barka there are several salty plants e.g. *Hamta*, *Kulmut* etc. (unidentified plants) which are natural sources of salt. The ground is also salty and cattle ingest some earth.

Coarse salt in drinking water is regularly provided during the rainy season and very early dry season after which time it is not given. Salt provision requires an accompanying copious water provision that is impossible or prohibitively expensive in the dry season. Salty bushes are particularly useful to the herd as a source of salt because the need for water is greatly reduced by their green foliage. Provision also becomes more regular, which is considered ideal by the Beni-Amer.

Other livestock, particularly camels, are well known for needing a great deal of salt to remain productive and healthy. The amount of loose salt given to camels also depends on the environment (availability of salty bushes). Camels do not eat earth but browse on salty trees.

Night grazing is a crucial part of good feeding management during the dry season when is important to protect cattle from intense daylight heat. As the rains end in September, night grazing or *Ahsay* starts. This involves taking cattle out after midnight to safe places where they are tended, grazing freely till the morning. Working in darkness, the Beni-Amer herder faces great hazards such as the danger of snakebites or attack by cattle raiders.

Dry and milking herds have different night grazing timetables. This is because the dry herds are less attached to the home base for the most part of the year and are therefore more independent. Milking herds have to be milked every evening and their night grazing radius is very limited.

Generally the dry herds finish night grazing around 5 a.m., as the trek towards watering points and shade starts. By midmorning they reach their watering and resting point. Most of the day is spent resting and this is also the time when herders have the chance to rest for a few hours and meet other herders. Around 4 p.m., after the second watering, cattle take off again for late afternoon and early evening grazing. The grazing time from midnight to dawn is known as night grazing.

Milking herds are taken out for night grazing after 10 p.m. and after evening milking till 4 a.m., the next morning. They are then driven back to the settlement for morning milking. Night grazing for milking herds is greatly restricted, especially during the cropping season (July-September), by the heavy crop encroachment in areas such as Gash-Barka.

During the peak of the dry season austerity, the milking cows are given fodder and sometimes grain or other by-products instead of night grazing.

The importance of crop fodder, particularly during the dry season, as an alternative source of food is well understood by the Beni-Amer. Depending on availability, crop fodder is a vital but costly feed input. During the early dry season crop stalks and field-aftermath become an immediate source of fodder. The extent of crop fodder feeding shows great regional and local variations among the Beni-Amer and other pastoral groups.

The Beni-Amer in Eritrea use their own fields as a source of fodder during the early dry season in the wet season camp. Some sorghum stalks are harvested, stacked and saved for the late dry season. Some are used for roofing purposes. As the Beni-Amer move south to the large mechanized agricultural schemes in the Tessenay area, they have to compete with other herders in using other farmers' harvested fields.

Post-harvest use of fields is a source of conflict between farmers and pastoralists. The farmers claim that, allowing cattle to graze on their fields after harvest, leads to trampling and the spread of infectious annual weeds such as *Adar* and *Milha* (scientific name not known). Farmers prefer to sell the fodder to cattle owners who then carry the fodder to where the cattle are. Other farmers prefer to burn their fields entirely or sometimes cooperate with the state police to ban the herders from the area. Three decades ago, before serious encroachment began, farmers used to give the fodder away. Now fodder is sold to cattle owners at a price decided by farmers.

The cattle owners acrimoniously complain that the spread of weeds via cattle dung is not as serious as farmers state. They argue that cattle dung enhances the manuring of fields and leads to higher crop yields. The Beni-Amer claim that weed growth is depressed by vigorous crop growth and a farmer only needs to weed the field well to get a better harvest.

Beni-Amer herders attach great importance to clean water sources and try hard to provide healthy water for their cattle. During the rainy season there is no conscious

effort to limit cattle's daily water consumption. The water intake is greatly reduced due to the green forage cattle consume, and the cooler environment and low temperatures during the rainy season.

In the dry season, the Beni-Amer prefer to draw clean water from deep wells near their dry season camp. Because some wells dry up, water shortages can be critical during the late dry season. Immediately after the rains and nearer to their wet season camps, the Beni-Amer use very shallow wells. During the dry season temperatures increase swiftly, yet cattle's water intake has to be restricted despite the high body requirements. The Beni-Amer employ the concept of "thirst" and "drink" days: "*Kbb-Sito*". The purpose behind this practice is partly to economize on scarce water resources and also to avoid conflict with other herders who use the same wells on alternate days. There are also health reasons, as the Beni-Amer do not think it is good for the cattle's bellies to be full of water. The task of drawing water from a deep well is very demanding. Two to four herders may be needed per herd to draw water into large troughs around the edge of the well.

Labor is understood to be a crucial herding input that affects the productivity and well being of a viable herd. The main source of labor is the pastoral household, but extra labor is hired if the herd is too large to be managed by the family. These hired herders are known as "followers of cattle" or *Talay*. They are responsible for the well-being of the herd and are greatly respected for their skills. The daily management of the herd is entirely their responsibility. Among the Beni-Amer, it is very difficult to distinguish between a hired herder and an owner herder by simple physical looks. The hired herder, however, has very limited user rights and cannot sell or exchange cattle or sell butter. He can, however, use the milk as part of his diet in both milking and dry herds. Rainy season labor requirements may diminish in some respects, for example drawing water becomes superfluous. However, new labor needs also arise. Protecting cropped fields from cattle becomes more important. Cattle herds, because of northward movements during the rains, become less isolated and are more likely to mix with other herds during the rainy season. Herders, hired or owner, take great care to ensure that their cattle do not mix with unfamiliar herds. Their main fear is the possibility of disease transfer and unwanted cross breeding. The concept of communal herding in terms of mixing small units of cattle belonging to separate families to form a single herd is new to Beni-Amer. Agricultural encroachment, widespread poverty and the generally hostile environment forced the Beni-Amer to accept the concept of communal herding. For the purpose of using available labor effectively, small cattle units (2-10 heads of cattle) are combined to form a herd of sixty or so. These are all home base milking herds and are herded on a rotating basis. In practice such a herd is managed by rotation, with individual herders sharing tasks on a weekly or daily basis. Sometimes such groups of herders hire a herder on steady basis and jointly pay his monthly wage.

Remuneration of hired herders in cash or kind, and sometimes in both, is a recognized tradition among Beni-Amer stockbreeders. What the Beni-Amer look for in their cows

is high fertility. Constant observation of cattle that may be on heat is, therefore, important. The Beni-Amer herder is always among his cattle and observes any physical and temperamental changes in the herd. There are definite signs when a cow or heifer is on oestrus or on heat. The bull knows first because the cow lows to attract a bull and associates herself with the bull. The eventual outcome of this association is covering. The herder notices changes in the cow's character particularly during night grazing or while the cattle rest under tree shade, when the cow-bull association is very obvious. The herder keeps a mental record of such occasions and can predict when the next calving is going to be. These predictions prove to be accurate in most cases.

The Beni-Amer find it difficult to avoid the mating of closely related animals, e.g. father and daughter, among cattle. Incidents of abortion, sterility of heifers, and the birth of deformed calves are associated with incest among cattle. The birth of deformed calves in particular is seen as a sign of bad times to come and such calves are immediately slaughtered at birth. As the pregnancy proceeds, during the fifth month of gestation the Beni-Amer herder notices certain physical changes on the cow's body. A bulge around the abdominal area indicates the presence of an unborn calf. The cow's udder enlarges slightly during the early stages of pregnancy and to a much greater degree before calving.

The herder must take great care of pregnant cattle within the dry herd. In-calf (pregnant) cows are always kept with the dry herd until the latter stages of pregnancy. While with the dry herds, they need special care. First, the herder has to ensure that in-calf cattle do not walk as fast as dry (non-milking) animals, particularly on the way to watering points and day shade. Dry cows (heifers, yearlings, bulls and older cattle) are fast movers and the herder either slows down the herd, by holding his stick in front of them, or separates the in-calf animals from the rest. The Beni-Amer believe that if in-calf cattle are allowed to move fast this may lead to premature birth. Second, when cattle graze around hilly territory, herders try to ensure that in-calf cattle do not graze on hill tops or uneven ground. They keep them on lower ground in order to avoid stumbling and possible damage to the unborn calf. Third, if the milking herds are, by chance, near the dry herds the cows at a later stage of pregnancy are separated and combined with the milking herd. In most cases the pregnant cows are an integral part of the dry herd and remain with them for the most part of the gestation period.

Some Beni-Amer train pregnant heifers to be good mothers by massaging their udders regularly towards late pregnancy. This massaging, the Beni-Amer say, helps heifers to get used to having their udders touched and to milk letdown at calving. The best sign that the in-calf cow is in the pre-calving stage is a major change in the udders' appearance. Herders say that the udder becomes full of colostrum (first milk) and the cow's body softens and stretches. She moves very slowly because of her weight. The majority of cows give birth naturally without many complications. However, there are incidences of birth complications, some of which the Beni-Amer are able to handle. Calf drop season is carefully managed to coincide with the best grazing and watering

period in the pastoral calendar. Normally, cattle are mated during the early dry season (October-November) when they are in their best physical condition. Minimizing the number of bulls per herd controls off-season mating. Calf drop is expected during early to mid rainy season (July-August). Milk yields are highest during the first three months and lowest in the late dry season (March-April). Cows are dried after about 9 months of lactation.

Attempting to make calving coincide with the wet season is a universally accepted management practice among the Beni-Amer. Off-season calving creates management problems particularly for dry herd managers who are short of labor during the dry season. If off-season calving occurs, unplanned male calves will be slaughtered and the dam is either dried off or used as a milk source by herders, becoming the “mother” of a dead calfskin. If the cow gives birth to a female calf, she and her calf will be taken back to the home base to join the milking herd. Good calf management is seen by the Beni-Amer as a practice of vital importance to herd productivity and breeding.

The first milk is shared between the calf and the herder. The herders say that ideally the colostrum should be left for the calf. This helps the cow to remain strong and in good condition. In practice, the colostrum is used and initially some of it has to be milked out because of its richness. It is also believed that milking it out encourages milk let down. The calf reluctantly starts suckling and is left to suckle for up to about a week. The herders also use some of the colostrum, boiling it in a clay pot and adding salt.

When the calf is born the dam must lick it dry. This is seen as a vital cow-calf adaptation, both physically and psychologically, particularly for heifers that are first mothers. A cow that licks her calf and allows easy suckling is considered very productive and is well liked.

As mentioned earlier, the calf drop is timed towards the rainy season when the calf has the best chance of survival because of the abundance of milk. After the rains, around the age of three months, calves are partially weaned. As water and fodder resources become scarce around the middle of the dry season (January-February), the Beni-Amer completely dry off their milking cattle as a precaution against further body weight loss. It is considered bad management to milk the herd twice a day even under favorable conditions.

Calves are completely weaned around the age of 10-12 months. This involves physical separation of dams from calves when the cows are dried off and sent to the dry herds further south to dry season grazing. The weaned calves that are too young to follow the herd are left in the home base (dry season camp). If the calf is to be weaned while following his mother, the nostrils of the calf are pierced and a small stick inserted which hurts the cow whenever the calf attempts to suckle. A spiky circular mouth cover is used to stop the calf from suckling because the cow kicks the calf back whenever the calf approaches her udder.

Calves must be housed and protected from wild predators. This is the work of young boys who tend them during the day and control them during milking hours. At night the calves are housed in a small fenced compound near the goat/sheep house and only

the uncontrollable few are tied using rope and wooden pegs. Adult cattle rest in the cattle yard near their herder's home.

Raising male calves nowadays has three prime purposes for the Beni-Amer. These are, firstly, to select the best males for breeding, secondly to raise and castrate bulls for use in their supplementary crop cultivation and thirdly to produce bullocks (which involves sale to non Beni-Amer groups as beef or as draft animals). Castrating or *katebot* is, therefore, an important herding technique for non-breeding males. The Beni-Amer still adhere to strict principles governing breeding and castrating all non-breeding males is the best way of controlling unwanted mating.

Semi-nomadic movement is an important survival strategy for the Beni-Amer. These movements may be home bound (milking cattle/small flocks), or may be short to medium range or long range movements in the case of the dry herds of cattle further south, off their home base, during the dry season. Seasonal movement serves specific practical purposes, notwithstanding the connotations of irrationality that surround the word "nomadic" in conventional literature, where mobility is often presented as something pastoralists do for their own sake or for obscure cultural reasons. The term "nomadic" itself, in relation to seasonal movement or animal production systems, does not exist in the Beni-Amer pastoral vocabulary. The term *Sebk-Saghm*, meaning "going and returning to base", is used by hill nomads in the Northern Red Sea region of Eritrea. This description is valid for the uphill and downhill movement of the small stock and hill cattle.

The Beni-Amer pastoral calendar integrates herding, farming and environmental adjustment strategies responsive to the technical requirements of livestock raising. *Khaym* is a period between October and January following the rainy season. It is a period of live-weight gain by cattle, high milk yields and mating. By early October, green forage disappears quickly except along the riverbanks and the Beni-Amer plan their major move from their wet season camps in north Gash-Barka and Anseba further south to dry season camp in Gash-Barka.

The first phase of the major move in October involves the dry herds, which migrate to the Gash-Barka area for a few months and migrate further south to Tigray and Beghemdr in Northern Ethiopia. Because of increasing encroachment by crop cultivation, the period from August to December is a period of great conflict between farmers and herders. The areas south of Gash River - including Setit River, parts of lowland western Tigray and Beghemdr - are known as the *Sai-d* by the Beni-Amer. These are heavy rainfall areas (600+ mm annually) covered by open grass shrubs and bushes. The Beni-Amer herders send investigators or *Tawray* ahead to the dry season grazing areas where the dry herds will be going. The investigators are sent to investigate pasture/water availability and the general security situation. When they return (2-4 weeks later) their information provides the basis upon which the movement of several herds is planned. Once the herders reach the *Sai-d* (March onwards), they make their own local investigations within the area. The move from the wet season camp to dry season camp in western Eritrea also takes place around November-December when the

milking herds, small stock and herders' families migrate south. The small stock and the herders' families spend the period between November to June in the base.

Most of the milking cows whose main base is in Gash-Barka from November to February are driven to southern Gash-Barka and the *Sai-d* to join the dry herds for the rest of the dry season. The *Khaym* is a very hot season and towards the middle of the season milk yields drop and the condition of the cattle deteriorates. Night grazing starts replacing the more relaxed daytime grazing of the wet season.

Hagay is the period between January and April. It means the dry season in the Tigre language. It is a period of hardship and intense movement for cattle. Night grazing continues as long as possible during the night. Milk yields are very low, while commodity prices are high (e.g. for salt and sugar). Available water is economized by means of water and thirst days, and labor demand is at its highest. Temperatures can rise above 40°C during this season.

Deep wells are the main source of water during this season and drawing water is arduous and labor intensive. Because of the lack of grass, herders have to lop fodder trees for fodder. The *Hagay* is also, for the many herders outside their home base, a period of great insecurity caused by raiders.

Hetcha, also known as the *Etebit*, includes part of April, all of May and part of June. It is the most difficult of all the seasons: cattle are exhausted, herders tired and fodder and water resources very scarce. The dry herds are still in the *Sai-d* and towards early June the long move northwards towards rainy season camps starts. The herders want to ensure that they leave dry season rangeland in good time and before the rivers are flooded. Strong winds and high temperatures are a major hazard to people and cattle during this period. The only consolation for the Beni-Amer during this season, is the knowledge that the season is short and rains will follow in the coming months.

Kerem, meaning rainy season, is the period from mid June to mid September. This is the second most important season as it involves a major move north. Grass regenerates, coinciding with calf drop, and milk production is considerably high.

Segregation of cattle into milking and dry groups, and herding them separately becomes an important part of animal husbandry. The rainy season does not always mean reduced labor demand for the Beni-Amer, who have to cater to dry and milking herds as well as crop cultivation in their wet season camps. In relative terms, it is a period characterized by an abundance of dairy products, reduced mobility and a certain degree of calm. Socially, it is also an important time for herders of dry herds, who get the chance to meet their families and friends after about six months of separation.

As emphasized in the above discussion, the Beni-Amer have dry season and wet season camps or *Dammar* (Figure 1). They refer to their wet season camps in northern Gash-Barka and Anseba as *Dammar Kerem* and to the dry season camps in southern Gash-Barka in Western Eritrea as *Dammar Hagay*. This camping system is designed by the

Beni-Amer to integrate livestock production with crop cultivation. The *Dammar* are two basic dry season and wet season settlements separated by varying distances, around 40 Km in the south and around 150 Km in the north. The *Dammar* can be a large (50 or more households) or a small (20-25 households) settlement. Wet season and dry season camps vary to some degree in terms of the kinds of structures used, and these are built to seasonal specifications appropriate for weather conditions. Dry season camp houses are built of palm mats supported by wooden frames and are known as *Bet-Tekayib*. These tents are known as *Aghnet* by non Beni-Amer and are universal throughout the region where pastoralism is the main mode of subsistence. They are light structures, easily dismantled and suitable for dry season habitation. During the rainy season in the north, houses with much stronger structures are built. They are called *Bet-Teklib*, also known as *Tukul* in other parts of Africa.

In the rainy season (June-September), families with small stock and camels move away from their dry season base in the Gash-Barka area to northern Gash-Barka and Anseba to cultivate in and around the valleys with better water catchments and riverbanks. This is higher ground with much lighter soils, but poorer vegetation. This move northwards takes place in June at the onset of the rainy season. Around the same time the dry cattle herds in the far south start to move northwards, escaping biting flies, wet clays, cultivated fields and flooding by Gash and Setit rivers. The main activity during the rains is crop cultivation. Plowing is carried out using castrated oxen and/or camels as draft animals, with simple one furrow, iron-tipped ploughs. The main crops cultivated include red and white sorghum, millet and sesame. If the rains are good and forage is available this is the time of the year when dry and milking herds are managed near each other.

In recent years, dry herds have been forced to stay halfway between the dry season and wet season camps (between Gash and Setit rivers) due to the intense degradation in the north of Eritrea. In normal years the move to dry season camps and grazing areas begins in October starting with the dry herds. As mentioned earlier, the herders' families, small stock and milk cows move to their dry season base during November after crop harvest and grazing the crop aftermath. The dry herds remain near dry season camp as long as pasture and water resources allow. By early January the period of austerity (*Self-Hagay*) begins and dry herds have to move further south to the *Sai-d* zone and across the border to northern Ethiopia.

The populations of dry season camps have a distinct sex-age-role composition, which reflects traditional Beni-Amer social organization. A typical dry season camp or *Dammar Hagay* has a population of older people, young children and women. Most of the adults over seventeen years of age herd dry cattle in the distant grazing areas. The herd, as already stated, is the most important productive asset of the family and the best labor resources are allocated to their well being. The elders within the families are responsible for the well being of their own families as well as those of their herding sons or kin. They are responsible for going to markets to buy grain, sell animals and gather information on herds and conditions in the *Sai-d*. Youngsters under the age of seventeen herd small flocks and milking cows. They also fetch water from the nearest

wells. Women are confined to domestic work. The camp was traditionally administered by the village elders. Over the last three decades, village elders have been replaced by elected village councils or *Lgnet*, whose members could include village *sheikhs*.

The *Dammar* system is very widespread among the Beni-Amer, most of whom have two seasonal camps. Very few Beni-Amer take their families outside the two camps. Some Beni-Amer, however, stay in their dry season camps to cultivate, despite fly infestation and wetter ground in the south during the rainy season.

2.6.3 Ethno-veterinary knowledge

Comparative field research among five other ethnic groups, living in Eritrea (Saho and Tigrinya) and/or Sudan (Beja, Shukrya, and Rashaida), revealed that they share many disease identifications with the Beni-Amer and sometimes even have the same names for a given disease and use the same ethno-veterinary techniques.

The Beni-Amer possess a rich, mostly unwritten, veterinary vocabulary (in the Tigre language) which covers a wide range of diseases, causes and miscellaneous ailments affecting a wide range of multi-species and single species livestock. These include internal parasites (worms, etc.), ecto-parasites (ticks and fleas), contagious diseases, ailments caused by accidents, diseases caused by malnutrition and exhaustion, environmental ailments and so on.

In the Beni-Amer vocabulary, the term “ethno-veterinary” does not exist: they use the term “*Nay-Berana*”, which means “our rural practice”. They therefore refer to the practice rather than the knowledge. This doesn’t mean that a “cause-effect” accidental veterinary approach may be sufficient to grasp pastoral perceptions of a given disease. For example rinderpest is believed to cause *Gulhay* or cattle plague. Metaphorically this disease is known as “shaver”, indicating the extent of the economic and social damage it causes. It is also associated with cattle grazing in low-lying areas. A veterinary term such as this one is, therefore, descriptive (the nature of the disease), definitive (on cattle), metaphoric (“shaver”) and locale-specific (low lying areas).

The Beni-Amer describe four categories of animal ills. First, diseases that cause sudden death are explained in terms of destiny or *Agel* and they are seen as being of a supernatural will. Man can do very little to prevent such occurrences. The following are among the most important in this category: *Gulhay* (rinderpest), *Ansa* (foot and mouth), *Fahmia* (anthrax), *Hmam-Saar* (heifer killer disease), *Abeg* (sarcoptic mange) and birth deformities (a sign of bad times to come).

Second, diseases and parasites perceived as transferable from herd to herd. These include rinderpest, coughs, seasonal mange, fleas, ticks, and mites. Cross infection is believed to occur in the following instances: when certain species of stock mix with certain wild animals, e.g. cattle mixing with kudus or gazelles, or when flocks belonging to different owners are grouped, infected donkeys and goats are mixed, housing conditions are poor, grazing is restricted or when the environment is clayish and wet.

Third, chronic diseases. These are believed to remain inside the animal and weaken it. *Sambu* (pneumonia), *Abar* (emaciation), and *Gresh* (mastitis) fall into this category.

Fourth, many diseases are believed to be curable and preventable by good husbandry. These include, to name but a few, abortion, water-borne diseases, mange on goats/camels and bone fractures. Several diseases are linked to malnutrition, to long distance travel as well as to wet or dry seasons.

To the Beni-Amer, management practices such as the provision of additional salt, not mixing herds/flocks with unfamiliar herds, seasonal movement to upper or lower ground, hay fodder provision during dry season and housing animals well, are ideal methods for enhancing livestock health and productivity.

The Beni-Amer have two curative options - "traditional" (*Nay-Berana*) and "western" (*Beteri*) veterinary practice. A third option that is now out of fashion was the use of sorcery and magic. Clan *sheikhs* also used to bless herds and pray for their good health before their seasonal migration to distant grazing areas.

Nowadays curative practices primarily depend on traditional methods that have been passed down from father to son. The Beni-Amer also believe that there are certain diseases which cannot be cured by traditional means and have to be treated with western veterinary medicine. Among such diseases are rinderpest (*Gulhay*), foot and mouth (*Ansa*), pneumonia (*Sambu*) and biting flies (*Cincay*). This positive attitude toward western medicine may be a consequence of widespread exposure to modern veterinary services since 1920.

Among the various curative practices used by the Beni-Amer, firing and branding are favorite treatments, especially for swellings, fractures, bruises, lameness, and bites from wild animals. There is also a large pharmacopoeia of multi-purpose household cures, which are very widely used by pastoralists, on their own initiative and at their own discretion. Used for a wide range of ailments, from bloat through retained placenta to insect bites, these include: feeding salt, salty water, milk, sorghum soap, sesame oil, flax seed, fenugreek, cooled coffee with sugar, malted grain or tobacco drinks; applying ointments of salt and sesame oil; dousing animals with cold water; smearing swellings with hot dung and soil. Kerosene, salt or ground *Balanites aegyptiaca* bark are used as dressings. When more complex treatments are indicated, these are prepared and administered by traditional veterinarians known as *Seb-Lalamro*, literally "men of knowledge". These individuals are older people, always male and in most cases are themselves animal herders. They are mostly illiterate and live among the community in the rural setting. In the past, and under conditions of greater politico and ecological stability, their numbers were greater. In recent years the effects of war in Eritrea, the decimation of herds by drought and famine in the region, the reductions in the availability of medicinal plant material and the pauperization of pastoral groups, have led to a decline in the numbers of *Seb-Lalamro*. To take one example of their skills, they treat sarcoptic mange by debriding, followed with a tarry application of boiled *Caparis decidua* branches. Widely known to be effective, this preparation is also sold in village markets. If it is unavailable, an alternative is engine oil or a mixture of red soap and

cattle urine to which salt and /or geomycin may be added. *Seb-Lalamro* also set fractures and dislocations, deal with difficult births, do “precision” firing, and perform various surgical operations and vivisections. Nowadays, virtually all traditional vets also employ modern drugs. When the Beni-Amer know no other solution, they resort to *Tegribat*, which loosely translates as “try anything”. Examples include using DDT against ticks and mange; injecting penicillin against one form of heifer disease; and giving geomycin and streptomycin for pneumonia. (see table).

Major Diseases

Disease Name	Cause	Description and Symptoms	Animals Affected	Locality/ Season	Curative Measure
<i>Abeg</i> (Sarcoptic Mange)	Overcrowding, poor housing and mixing with other flocks	The disease starts on the muzzle and nose, than spreads to the forehead and other parts of the body	Sheep, goats, camels. Cows are not affected seriously	Everywhere Rainy season	The animal is cleaned thoroughly by scraping the affected skin. Then Gelwed, a thick substance produced by boiling branches of <i>Caparis decidua</i> , is applied
<i>Ansa</i> (Foot and Mouth)	Not known (believed to be destiny)	Killer disease spread by wind. It leads to the cracking of the hoofs, also affects cattle's muzzles	Cattle	Everywhere Any season	None
<i>Awer-Lali</i> (Night Blindness)	Lack of green fodder	Cattle's night vision deteriorates. Depression, high temperature, falling over	Cattle	Widespread Dry season	Confinement, pouring cold water on the back of the animal, providing green forage. Ground <i>Balanites aegyptiaca</i> powder is dropped on the affected eye
<i>Balee</i> (Mites and Lice)	Mites and lice	Goats particularly suffer from these diseases. The animal becomes restless.	Goats	Low lying wet clay areas Harvest season, wet and dry seasons	Sesame oil is given as a laxative against parasites. Kerosene is used as a dressing. Clean housing can prevent these parasites. Fumigation of goat-houses (by burning special tree species) clears parasites
<i>Cincay</i> (Biting Flies)	Biting flies	Poor condition of body, falling milk yields, losing hair	Cattle, sheep and goats	Low lying areas Wet season	A mixture of linseed and salty water is given to the animal. Salt and sesame oil is mixed as an ointment against bites. The best cure is Abunini, a manufactured drug. Prevention consists of avoiding wet-clay and forest areas during the rainy season
<i>Fahmia</i> (Anthrax)	Not known (believed to be destiny)	Sudden death	Cattle, sheep, goats	Everywhere Any season	None

<i>Gohor</i> (Blindness)	Bruising, flies, lack of shade	When animals are exposed to too much heat, fat secretions from their heads cover their eyes. Bruising of the eye can also lead to blindness	Cattle	Areas without a shade Any season	The animals are rested. For bruised eyes, ground bark of the tree <i>Balanites aegyptiaca</i> is put on the eye. This hot powder is effective
<i>Gulhay</i> (Cattle Plague)	Rinderpest. Wild animals (Kudus or gazelles) transmit it to cattle	This disease is dangerous and transmittable through grazing	Cattle	Everywhere Any season	None. Only annual vaccination can prevent the plague
<i>Habil</i> (Donkey Disease, Epizootic Lymphangitis)	Cross infection	Disease manifested by a chest wound and hair falling. It kills the animal within six months	Donkeys	Heavy clays and wet soils areas Rainy and dry seasons	The affected part is treated with a hot iron. Infected animals are isolated. Dung and smell transmit the disease
<i>Hbat</i> (Swelling)	Several	Animal fighting, biting insects (flies, ticks, fleas) may cause swelling	Cattle and donkeys	Everywhere Any season	Hot iron burning. The swelling of joints caused by biting flies is treated smearing by the affected area with hot dung and soil
<i>Hmam-Saar or Agel</i> (Heifer Killer Disease)	Not known (believed to be destiny)	Killer disease that causes death in two days	Heifer	Everywhere Rainy season	Onions, Usher sap (<i>Calotropis procera</i>) and soured milk are mixed together and kept for three days in a container. The mixture is well fermented by the 4th day. It is then applied to the joints of unaffected heifers as preventive measure. When first signs of the disease are apparent, all the other heifers must be protected in this way. Some pastoralists said Usher-sap should be mixed and fermented with unqualified butter to the same effect. Others said traditional medics cut an incision to remove the puss and then apply Usher sap on the wound. Nowadays they are

					using veterinary drugs instead because of their inability to buy or obtain plant material to produce such medicine
<i>Hnkus or Engane-fit</i> (Lameness)	Long trekking	Disease of the hoof that leads to lameness. Animal's feet are hardened and cattle are unable to walk	Cattle	Clay soils, cracking during the dry season Dry season	<i>See Mahkes</i> (Foot Rot)
<i>Idr-May or Wed-May</i> (Water Disease)	Standing water	Caused by animals drinking standing water. It may kill and also lead to swollen feet	Cattle	River areas Dry season	<i>Kulmt</i> leaves (unidentified tree) are crushed and mixed with water and orally given to cattle
<i>Intihab or Ghrer</i> (Stress)	Physical stress	Disease caused by intensive traveling. It leads to Gherir, disease of the joints. The joints become swollen.	Cattle	Widespread Dry season	The swollen part is burnt with a hot iron. Sometimes an incision is used to remove the abscess inside the swelling. The wound is then dressed with salt
<i>Karad or Ouarad</i> (Ticks)	Ticks and over-crowding	It affects udders and teats. In serious cases milk production ceases. Ticks get inside the animal's ears	Cattle, goats, sheep	Everywhere Especially during the rainy season	No traditional medicine. Tick removal by hand is common. Black ticks can be removed by burning. Desperate measure: DDT, water and oil mixed together and used as an ointment
<i>Krh</i> (Diarrhea)	Excessive milk at birth or biting flies	It affects suckling animals as well as old one. It may follow rinderpest vaccinations when a calf suckles a vaccinated dam. It may lead to death	Young animals, kids and calves	Everywhere Rainy season	Starving the animal for two days, giving it salty water. Burning with hot iron to activate the animal is also common
<i>Krkb</i> (Heifer Disease)	Not known	The affected animal cannot walk. High body temperature	Heifers (2-4 years of age)	Everywhere End of wet season	The animal should be rested and cold water should be poured onto its back for two days
<i>Kul-la</i> (Abortion or Premature Birth)	Mosquito bite, mist, excessive sunlight, flies, ticks, dusty conditions	Herders believe mosquito bites (due to tethering near fields in one area and to mist) cause abortion.	Goats	Everywhere Kidding season (rainy and harvest season)	None

		Sometimes the kid is still born and this leads to sterility. Some believe mosquito bites may cause swelling under the belly that weakens the animal and leads to abortion. Having too many ticks can also lead to abortion. A bad abortion can lead to death. Encroachment, with insufficient grazing territory promotes mis-carriage			
<i>Mahkes</i> (Foot Rot)	Wet clay soils	Animals tread on wet clay soils and get foot rot. This leads to lameness for up to one year, restricting their grazing ability	Goats and sheep	Wet clay areas Rainy season	A knife is used to make a cut on the infected part of the hoof, which is then washed with salty water and soap. If the infection doesn't heal, kerosene is used to wash the wound. Then, the bark of <i>Balanites aegyptiaca</i> (Qug) is ground finely and dressed over the infected part of the foot
<i>Mnfah</i> (Bloat)	New grass or crop husks on threshing yard	The animal's stomach becomes bloated and a lethal diarrhea follows	Sheep, goats, cattle	Everywhere Wet and dry season (crop remains)	Ground coffee is prepared and kept cool over night. In the morning this drink is given to stock to wash out their stomachs
<i>Nfret-tb</i> or <i>Gresh</i> (Mastitis)	Ticks and flies	The udder swells and becomes painful. Later, blood comes out instead of milk and the teats shrink	Cows and goats	Widespread Lactation period	Hamta leaves (scientific name not known) or Hosia leaves (<i>Ziziphus spina-christi</i>) are crushed and then spread over the udder. The animal is also encouraged to smell these crushed leaves
<i>Sambu</i> (Pneumonia)	Cross infection by mixing with unfamiliar herds as well as stress caused by long trekking	Lung disease. Animals produce snot and watery discharge from the nose. Affected animals	Cattle, goats and sheep	Everywhere Any season, but especially during wet and colder seasons	Western veterinary drugs sometimes injected by herders

		present thorny-raised hair and pale coat color. They become weaker and weaker until they die			
<i>Selvat Keree</i> (Non Expulsion of the Afterbirth)	Natural causes	It is regularly frequented during birth. The placenta fails to come out following birth	Cattle, goats and sheep	Everywhere Calving, lambing and kidding seasons	Pounded Bamia (Ladyfinger) is pushed through the cow's vulva as a lubricant. Other lubricants used: liquid soap, Awhe (<i>Cordia abyssinica</i>), Senselie (scientific name not known). Sorghum soup, Shinfafa (Fenugreek seed), malted grain, Debina (scientific name not known) and tobacco powder mixed with water are given orally as a lubricant. Hot iron burning is used on the cow's barrel to help removal of the afterbirth

2.7 Communication processes and information systems among pastoralists

During the liberation struggle the *baito* (Peoples' Assembly) emerged as a new political structure aimed at bringing about radical changes in Eritrean society, representing the various social forces present in the country. The *baito* helped guide and organize political agitation among the people, effecting land reform, promoting collective works and mutual aid and settling disputes among community members. Since liberation, the *baito* has shifted its focus towards developmental issues and it is the main instrument through which the communities can voice their problems to the Eritrean authorities. Additional functions of the *baito* include:

- Acting as agents of change (e.g. encouraging villagers to send their children to school or to use medical facilities)
- Promoting the emancipation of rural women
- Mediating between the administration and the people (e.g. organizing meetings in which farmers or pastoralists can articulate their needs)

Major limitations of the *baito* are illiteracy and the limited representation of women (who account for only 15% of leadership members).

At village level, modern political leadership has been superimposed on traditional leadership, but this does not mean that the latter has no role. For instance, among the Beni-Amer, traditional leaders coordinate migratory movements.

All administrative villages have a Village Administrator and a Deputy Administrator appointed by Government as well as a traditional Council of Elders. The number of elders is usually one per hamlet. The post is not hereditary. Elders are elected and can be replaced if villagers are unsatisfied with their performance.

In semi-sedentary villages of pastoralists, the role of elders may be summarized as follows:

- Reconciling families who may be in conflict
- Mobilizing assistance for needy families
- Organizing communal work for poor families
- Providing assistance with burial and bereavement
- Organizing the loaning of grain to poor families

In addition to this *baito* institutional level, a number of formal and informal groups exist in every village. Each group represents a source as well as a channel of information.

Formal groups are the National Union of Eritrean Women (NUEW), which functions as a non-governmental organization aiming to empower women through the provision of credit and skills training, and the National Union of Eritrean Youth and Students (NUEYS) which provides youth with information, education and services.

Informal groups handle the organization of communal herding, when small numbers of stock held by families are combined to form a large herd, which is then herded by a member of the clan. Strong collaboration is also present during marketing (FAO, 2000b). Key actors who may potentially become important instruments in future pastoral development projects belong, therefore, to three levels of social organization: institutional, formal and informal.

When discussing communication processes and information systems, the diffusion and utilization of modern media are clearly critical issues. According to a recent survey conducted by the Ministry of Information (Steele, 2001), 78% of households in Eritrea have a radio receiver. The national radio station, "Voice of the Masses", covers the whole country. Programming consists mainly of news, commentary, educational and development information, and entertainment. Twice a week there are short programs dedicated to agricultural and environmental issues. The national television station, ERI-TV, reaches only urban areas. Internet connectivity, recently established in Eritrea, opens up relevant possibilities for the Ministry of Agriculture to link their headquarters, research centers and offices with each other and the world.

3. Reconsidering pastoral indigenous knowledge and information systems

In Eritrea, agricultural extension services are provided primarily by the public sector, through officers of the Ministry of Agriculture. The main points of contact between the Ministry and farmers are sub-zoba offices. Technical specialists are based in the sub-zoba headquarter town and meet farmers when they visit the villages or when farmers come to the HQ. Though extension services are free, farmers bear costs in using the service - the travel expenses necessary to reach the extension center and the time used to attend meetings and visits (Garforth, 2001).

The Government of Eritrea is committed to moving towards a new approach to extension called the “Farmers’ Advisory Service” (FAS). The FAS is intended to be participatory, grassroots and focused on demand generated by farmers. The general aim of the approach is to facilitate the better use of Eritrea’s natural resources and enhance farmers’ potential for improved agricultural production by empowering them to take an active role in decision making processes for the long-term sustainable development of agriculture (Steele, 2001).

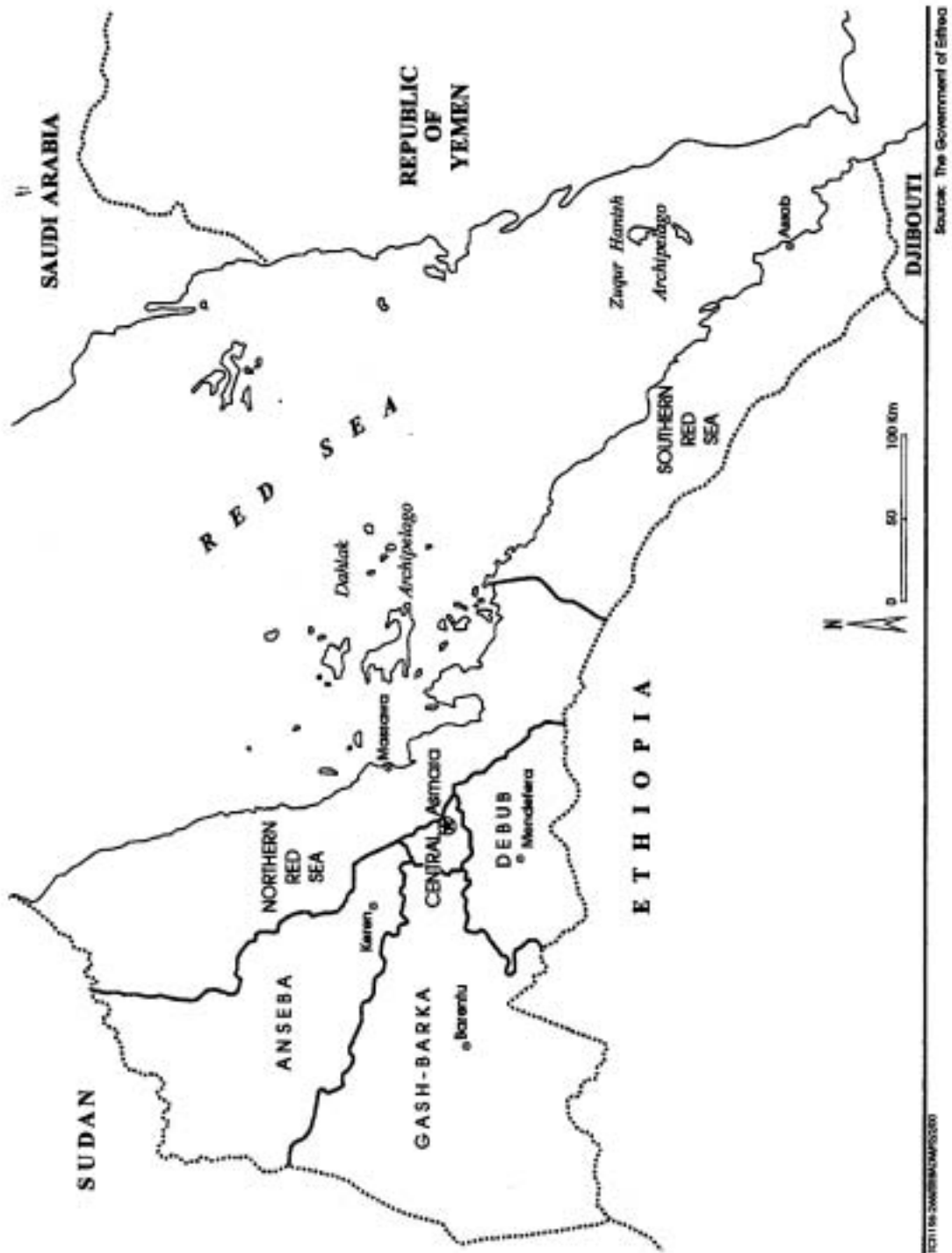
Within this framework, a reconsideration of pastoral indigenous knowledge and information systems could be helpful in tailoring new extension services aimed at pastoralists to their special circumstances. As shown in the previous chapter, the Beni-Amer, and presumably the other pastoral groups of Eritrea (the Hidareb and Afar), in fact possess sound and effective indigenous knowledge about the management of their herds. This knowledge could provide a basis for further livestock research and could serve future livestock extension programmes. The extensive use of pastoralist images, concepts and vocabulary may be used in designing and communicating effective extension messages. To deliver these messages, radio is probably the most appropriate medium, given its wide diffusion and utilization in rural areas.

Using indigenous knowledge could also lead to increased participation of pastoralists in pastoral development projects and could be a starting point for supporting grassroots institutions (such as herders’ associations and groups) that can back up technical and social interventions (Fre, 1992). An example could be the integration of traditional ethno-veterinary knowledge, through the direct involvement of *Seb-Lalamro*, traditional veterinarians, into animal health service programmes. As has been shown, many

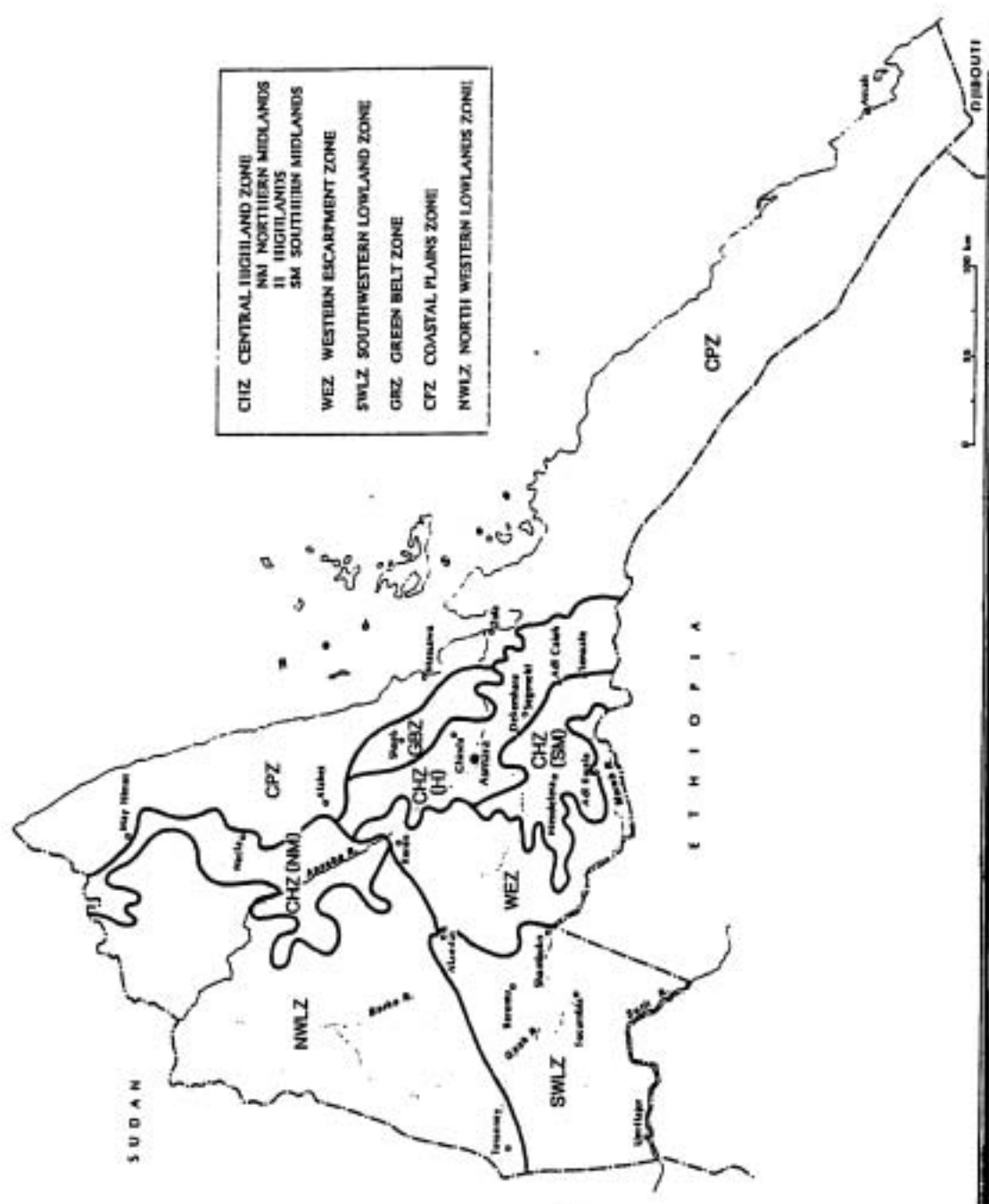
traditional remedies appear to be just as, or more, effective than their western commercial equivalents and they are also much more accessible. Unfortunately, much of this information is in danger of being lost with the advent of modernization. There is the risk that the erosion of this knowledge in favour of western technologies and commercial drugs, could leave many stockbreeders with neither traditional nor modern remedies, the latter being too expensive or unavailable, to combat disease. This is just one example, but it indicates the need for further research aimed at recording and using the rich indigenous knowledge of Eritrean pastoralists.

Maps

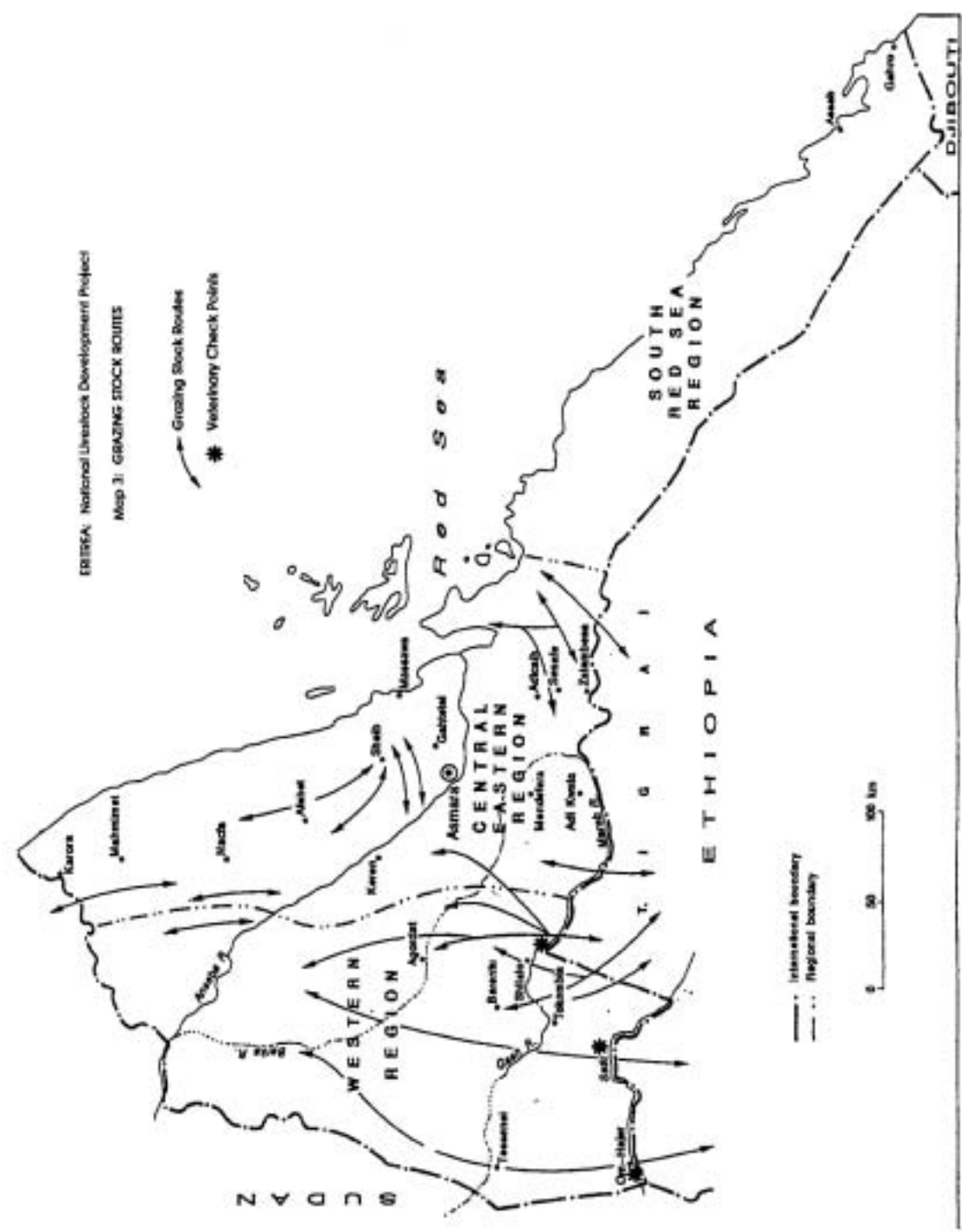
Map 1: Administrative regions (zobas) of Eritrea



Map 2: Agro-ecological zones of Eritrea



Map 3 and Table: Grazing stock routes of Eritrea

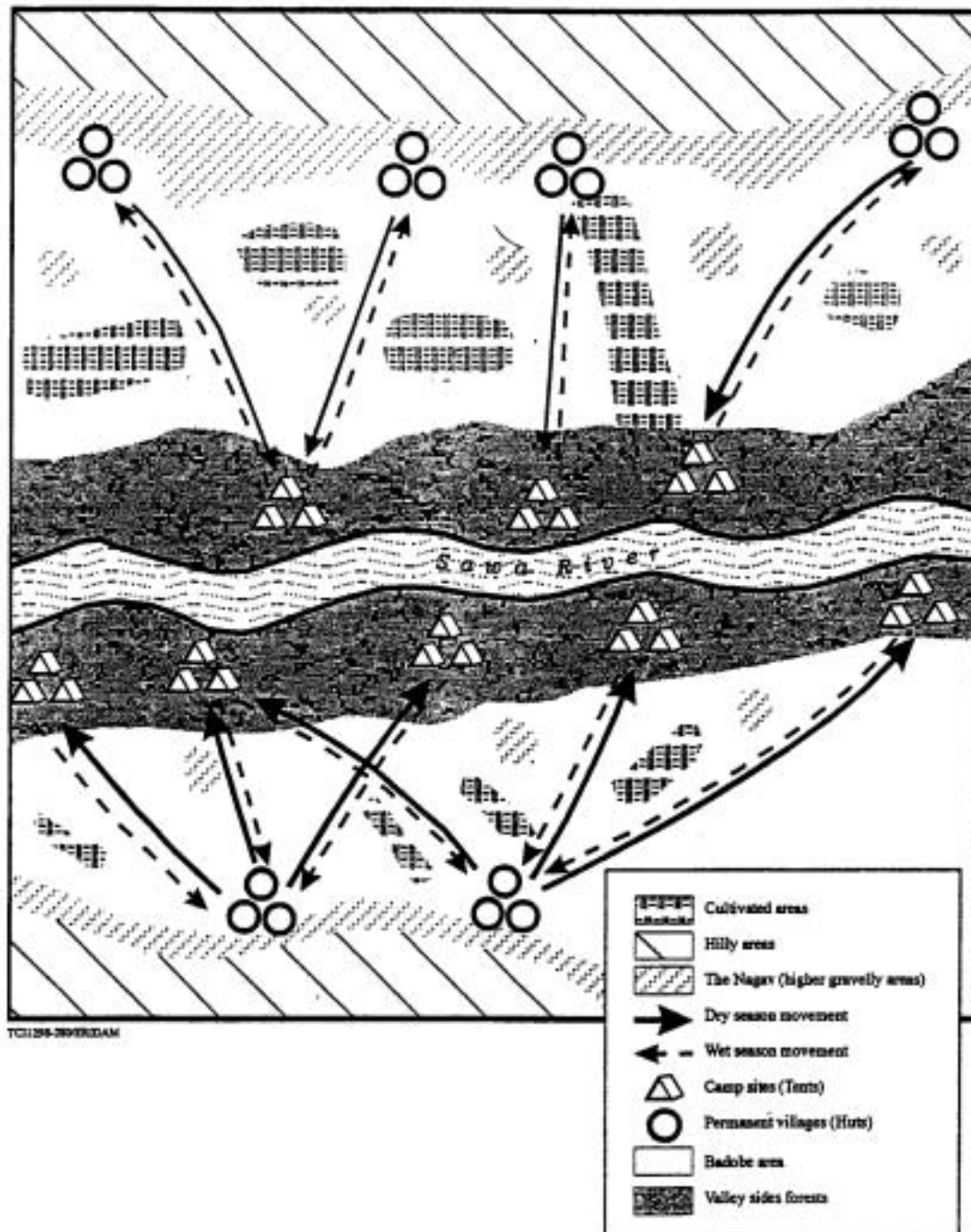


Seasonal Migration in Southern Red Sea Region

Sub-District	Village	Type of Animals	Months of Migration	Areas of Migration
Rahaita	Beylul	Cattle & Goats	June-September	Ade Da'ar
	Gehare	"	April-September	"
	Suduh Ila	"	May-September	"
	Muri	"	"	"
Afambo	Afambo	"	June-October	Ethiopia
	Abi	"	"	"
	Belube	"	"	"
	Halhal	"	"	"
Tio	Me'der	"	May-October	Gela'lu
	Adai'lu	"	"	"
Ila	Ila Deben	"	"	"
	Egdole	"	May-September	Ethiopia
	Asagala	"	"	"
	Ayumen	"	"	"
Bori	Bardale	"	June-November	"
	Aiyyta	"	"	"
	Munka'lilo	"	"	"
	Duluh	"	"	"
	Asa Ila	"	"	"
Kuatumama	Le'embada	Cattle	"	"
	Bolole	"	"	"
	Eremele	"	"	"
	Adaito	"	"	"
	Olole	"	"	"

Figures

Figure 1: Dammar Hagay/Dammar Kerem Systems (Forto Area)



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