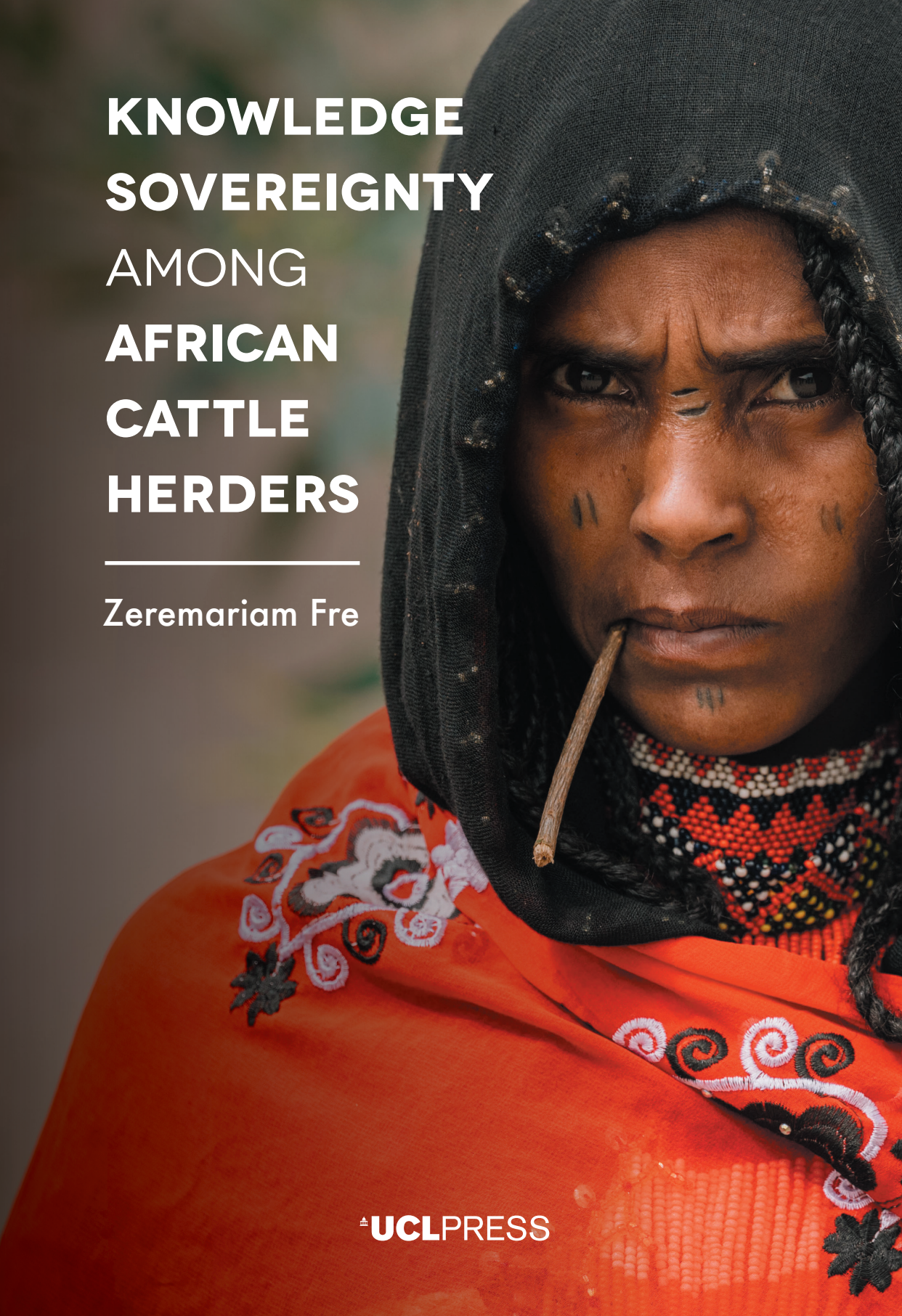
KNOWLEDGE SOVEREIGNTY AMONG AFRICAN CATTLE HERDERS

Zeremariam Fre



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Knowledge Sovereignty among African Cattle Herders

'This book greatly contributes to the limited literature on theoretical discourses and practices on indigenous knowledge of livestock herding communities in the Horn of Africa. It discusses knowledge heritage and sovereignty through the presentation of valid empirical evidence, and its subsequent relevance in nurturing sustainability of knowledge systems to enhance lives of pastoralists in Africa and beyond.'

Samuel Tefera PhD, Assistant Professor and Asian Desk Coordinator at the Centre for African and Oriental Studies, Associate Dean for Research and Technology Transfer, College of Social Sciences, Addis Ababa University

'The author has worked with our Beni-Amer pastoral communities in Eastern Sudan and Western Eritrea for over 30 years and this book is the first of its kind in documenting our practices, knowledge systems, heritage and way of life.'

Mustafa Faid and Mohamed Ali, Leaders of the of the Pastoral and Environmental Association Kassala State (PEAKS)

'A riveting and rare book! Zeremarian Fre guides you along the sandy [dusty] tracks and grassy pastures that the Beni-Amer and their herds have been softly tracing over time all through the Horn of Africa. One of the virtues of the book is that it illustrates vividly and in clear language how their continuous self-built endogenous knowledge on agro-pastoral life is not only at the core of their survival and the survival of their herds, but more importantly a powerful weapon in facing and resisting multiple aggressions . . . Ground-breaking and a huge achievement.'

Yves Cabannes, Emeritus Professor of Development Planning, The Bartlett Development Planning Unit, UCL

'The book underlines the importance of enriching and utilizing the unrecognized, yet valuable scientific knowledge and practices that are deeply rooted in pastoral traditional expertise about their own environment and breeding practices. It is an important publication that reflects Dr Fre's expertise and long term research in the region and thus, it is a significant addition to the African library.'

Hala Alkarib, Director of the Strategic Initiative for Women in the Horn of Africa (SIHA)

'This fascinating book not only gives a unique insight into the knowledge and practice of pastoralists in the Horn of Africa from the author's first-hand experience, it also provides an incisive critique of the multiple dimensions of knowledge, paying tribute to the sovereignty of indigenous knowledge. It has a timely relevance for global sustainability that will appeal to a wider readership.'

Nicole Kenton, International Development Consultant, former long serving senior staff member of the International Institute for Environment and Development (IIED)

'The book covers several intertwined issues relevant to contemporary development policy and practice. It goes beyond the rural-urban and peasant–nomadic livelihoods dichotomy by shedding more light on the inter-linkages within the multiple livelihood systems within the Horn of Africa and globally. A rich evidence-based resource for academics, development partners and social movements for promoting and designing state policies that embrace pastoralist aspirations.'

Bereket Tsegay MA, PhD candidate, Pastoral and Environmental Network in the Horn of Africa (PENHA)

'Dr Zeremariam Fre has done a wonderful job of placing at the centre of this book the Beni-Amer pastoralists, the world they inhabit and the knowledge they use to navigate and thrive in it. The lessons contained in this book go beyond pastoralism; it is a must read for anyone serious about understanding the importance of located knowledge in the innovation and development process.'

Yusuf Dirie, PENHA Research Fellow and PhD researcher at the University of Sussex

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‘A loyal herder leads and defends his cattle but a bad herder follows them from behind.’

Beni-Amer saying.

The book is especially dedicated to my late mother, Letezion Beyed, who implanted in me strong spiritual and moral values that true happiness comes from serving those who are less fortunate than oneself and doing so with great humility.

To my beloved older brother, Fesseha Fre, who died recently and has been a great role model to me all along – seeing this book would have meant the world to him.

To my dearest wife and comrade for life, Biri Tesfaldet, son Samray, daughter Bilena and my mother-in-law, Tzehaitu Asfaha. I couldn't have written this book without their constant moral and emotional support, for which I am eternally grateful.

Preface

This book focuses on the description, elicitation, documentation and analysis of major aspects of *indigenous knowledge systems* (IKS) among the Beni-Amer in the Horn of Africa. My fundamental point of departure is that Beni-Amer cattle owners (*Seb-ahha*) in the western part of the Horn of Africa are not only masters of cattle breeding, but also knowledge-sovereign in terms of owning cattle with productive genes and the cognitive knowledge base which is key to sustainable development.

The strong bonds between the Beni-Amer, their animals and their environment constitute the basis of their ways of knowing, and much of their knowledge system is based on experience and embedded in their cultural practices. Notions that this knowledge is somewhat 'untrustworthy' when compared to western scientific knowledge are explored further in the book. The evidence also shows that the Beni-Amer's knowledge system includes elements of western knowledge; for example, the Beni-Amer incorporate western veterinary knowledge into their practice. The learning is mutual, however, since elements of pastoral technology, such as on animal production and husbandry, make a direct contribution to our scientific knowledge of livestock production. It is this hybridisation and dynamism which are at the core of this indigenous knowledge system.

This premise also affirms that indigenous knowledge can be seen as a stand-alone science, and that a community's rights of ownership should be defended by government officials, development planners and policy makers, making the case for a celebration of the knowledge sovereignty of pastoralist communities. Throughout the book I demonstrate that the hybridisation of 'indigenous' and 'scientific' knowledge is a key factor in the sustainability of the Beni-Amer's pastoral practices.

Pastoral knowledge is embedded in the cultural, spiritual, political and social system of pastoral societies. The cultural aspect is particularly important; the knowledge is often transmitted orally and passed down to each generation through stories, songs and other rituals, where cattle

are revered. Pastoralists around the world have historically praised their cattle in verse; among the drovers in the Highlands of Scotland in the late seventeenth century, the commercial importance of an ability to sing about the good points of a Highland cow drew on long-nourished skills (Cheape 2011).

Sadly, the pastoralist culture is becoming eroded as the practice of pastoralism continues to be under threat from political and environmental stresses. Also, pastoralism itself is subject to many misconceptions. It is still viewed by some policy makers as outdated, 'quaint' or 'backward', and such myths need to be dispelled. Given the wealth of literature produced by decades of research into the environmental and economic advantages of pastoralism, it is important that we see the future of pastoralism not as declining, nor as a linear progression, but as offering many versatile options for dealing with new and emerging challenges in the African drylands and elsewhere. Indigenous pastoral knowledge, as demonstrated by the case of the Beni-Amer, has proved itself to be resilient to change and open to new approaches, offering evidence-based and modern solutions to present and future climatic and other pressures.

Acknowledgements

The agro-pastoralist/pastoralist communities in Sudan, Eritrea, Ethiopia and other parts of Africa have been my main source of information and inspiration in writing this book and so they all deserve the highest acknowledgement. This book is a gift to them and I hope it advances their legitimate claim to be masters of their own knowledge sovereignty and future destiny. Their cause, my admiration for their tenacity and resilience, and my love for humanity, are what have driven me to commit half of my life to them, and I will commit the rest of my life to them also.

Friends, academic colleagues, associates, NGOs and social movements across the globe, with whom I have been associated in so many ways, provided moral, technical and professional support, and it would be impossible to name all of them. I would like to mention the following, including some who have passed away.

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executive secretary of the Intergovernmental Authority for Development (IGAD)), Dr Mohamed Suliman (Institute for African Alternatives (IFAA), Sudan and UK), Abrehet Ghoitom (Eritrea), Emeritus Professor Jan Slikkerveer (Leiden University, the Netherlands) and Diana Bosch (Leiden, the Netherlands).

I thank all my colleagues and trustees (past and present) at the Pastoral and Environmental Network in the Horn of Africa (PENHA), universities in Africa, NGOs, social movements, relevant government ministries and funders, with whom I share the vision of advocating for pastoralist dignity, equality, peace and sustainable development across the African continent. I also acknowledge inputs from Matthew Smith and Tony Stonehouse, PENHA research associates, for helping with additional literature reviews and making useful comments on the first draft. Many thanks also to Cath D'Alton for drawing the maps.

My deepest gratitude goes to my dear friend and colleague Nicole Kenton (former IIED senior staff member and currently PENHA board member) for her constant encouragement and professional support in editing and generously making various valuable suggestions, which have been incorporated into the book.

Among those who have passed away, I would like to honour and remember my dear colleagues and close friends, including Professor Dr Abebayehu Assefa Abebe (Addis Ababa University), Professor Seyoum Ghebreselassie (Addis Ababa University), Mr Kassahun Meskele Cheru (PENHA Ethiopia), Professor Elhadi Abusin, Professor Abbas Musa Shasha (Khartoum University), Dr Ahmed Karadawi (Sudan Refugee Commission), Professor Lionel Cliffe (University of Leeds), Professor Paul Baxter (Manchester University) and Mr Nigel Walsh (Oxfam UK).

Contents

List of figures

List of tables

Chapter One
Introduction

Our perception of knowledge and reality is, in part, culturally, socially and ecologically determined, and that applies to a multitude of indigenous, or *local/empirical*, and exogenous, or *scientific/western*, knowledge systems, including indigenous pastoralist knowledge systems in the African drylands. Knowledge systems, in general, are based on the observation, assumption and interpretation of complex realities. They can be defined as organised structures and dynamic processes of a cluster of understandings, usually locally specific, or both.

In a world in which the sustainability of industrial agriculture is being seriously questioned, there is growing evidence that bio-cultural knowledge systems and practices offer greater opportunities for environmentally and socially just sustainable food production and food sovereignty. I believe that the solution lies in identifying and exploring new epistemic and practical connections between culturally and politically distinct indigenous and exogenous knowledge systems from a complementarity perspective. Thus, the arguments about sustainable food production and food sovereignty need to be strongly anchored in the *knowledge sovereignty* of the so-called *poor and dispossessed*, because the worst dispossession is to not acknowledge such sovereignty.

Indigenous knowledge systems are the strategies communities employ to deal with everyday issues such as food production, health, education and the environment. Kiggundu (2007) distinguishes between indigenous knowledge (IK) and indigenous knowledge systems (IKS). He states that IK is also referred to as folklore, and that IKS refers to the techniques and methods communities use to harness IK.

Indigenous knowledge is notoriously difficult to define; different social scientists choose to frame it slightly differently. '[Indigenous knowledge] is the knowledge that is unique to a given culture and provides a basis for local-level decision making in agriculture, health care, food

preparation, education, natural-resource management, and a host of other activities in rural communities' (Mutandwa 2013). However, in 'Potatoes and Knowledge', van der Ploeg (1993, 209) more colourfully describes indigenous knowledge as a kind of '*art de la localité*'. Like experiential knowledge, which can be defined as 'the power to utilize one's own system of knowledge to evaluate an integral component of another knowledge system and pronounce it worthy or unworthy of incorporation into one's repertoire of knowledge and practice' (Fre 2018), this *art de la localité* is not only couched in metaphor, but also, as the name suggests, closely tied to location. Andean farmers in South America, as van der Ploeg explains, use words such as *dura/suavecita* (hard/soft) in reference to how much the soil has been tilled, and *fria/caliente* (cold/hot) to convey the degree of soil fertility (van der Ploeg 1993). These terms combine with each other and with other terms to create an entire 'network of meaning' (Hesse 1983), one which does not simply add metaphor to the farmers' way of life, but also informs their practical farming activities, such as risk calculation or avoidance and experimentation with cultivars and crossbreeding, thereby allowing them to gain greater control over their environment. This is not to say, however, that indigenous knowledge is entirely of an experiential nature; it does often contain propositional components as well, as will be discussed in later chapters of this book.

For the purpose of this book, I define IK as the sort of knowledge that generally displays the following five aspects:

- it is culturally and regionally embedded, and does not claim to be universal;
- it is interwoven with the labour process;
- it is negotiated and pluralist;
- it is dynamic rather than static; and
- it embodies and employs a number of scientific principles.

Scientific knowledge, while it may not be reliant upon culture or 'locale', is also concerned with the labour process; it may be argued that those processes which lead to scientific knowledge can be negotiated, be dynamic and, of course, employ scientific principles. The general perception is that scientific knowledge is a system of knowledge which, at least ostensibly, is based on the scientific method. In contrast to IK, it purports to be universally applicable. It claims to be produced not through a process of negotiation (though it does often involve debate), but rather through a highly canonised process of observation, hypothesis and

experimentation, and is highly propositional in nature. 'Indeed, wherever it can, it apparently goes beyond third-personal to impersonal propositional knowledge' (Chappell 2011).

Both knowledge systems, however, attempt to systematise and understand the world, although they are rooted in very different grounds. While indigenous knowledge tends to be more relational, being woven through a process of labour and negotiation, scientific knowledge tends towards the absolute and universal sovereignty of knowledge. It is also true that while indigenous knowledge will tend to engage with and utilise scientific knowledge through its process of negotiation, scientific knowledge tends to subsume indigenous knowledge under its own paradigm. Such a relationship will never be equal unless indigenous knowledge claims its own sovereignty from a position of relative strength and scientific knowledge opens itself up to alternative perspectives.

The Beni-Amer cattle herders

By way of paying tribute to the indigenous pastoral knowledge system of the Beni-Amer, and having worked closely with them, I provide an extensive description of cattle production, husbandry and health management (Chapters 5, 6 and 7). This demonstrates that the Beni-Amer take great care to maintain the general wellbeing of their livestock, as well as paying special attention to the particular needs of the animals they have bred to be adapted to their fragile local ecology, which is described in Chapter 3. The combination of management strategies, herding techniques and animal health care practised by the Beni-Amer constitutes a management regime which is complex and ordered, as will be discussed.

The Beni-Amer, which is Arabic for *sons of Amer*, live among or are surrounded by several pastoral, agro-pastoral and mixed farming communities in the arid and semi-arid region that is the Horn of Africa. The Beni-Amer of eastern Sudan and western Eritrea maintain important cross-border livestock-based trade ties and other historic-cultural links, which contribute to this regional occupational diversity. To the west of the study area, the Beni-Amer are in close contact with the *Rashaida*, the *Kawahla*, the *Shukrya* and others around the Kassala State in eastern Sudan. In the Gash-Barka region of Eritrea, the Beni-Amer are in close contact with the *Nara*, *Kunama*, *Hadendowa* and *Tigrinya-speaking* highland Eritreans. They are also in seasonal migratory contact across the Ethiopian border with the *Tigray* and *Begemdr* regions of central Ethiopia. To the north and north-east of Eritrea, the Beni-Amer live among the

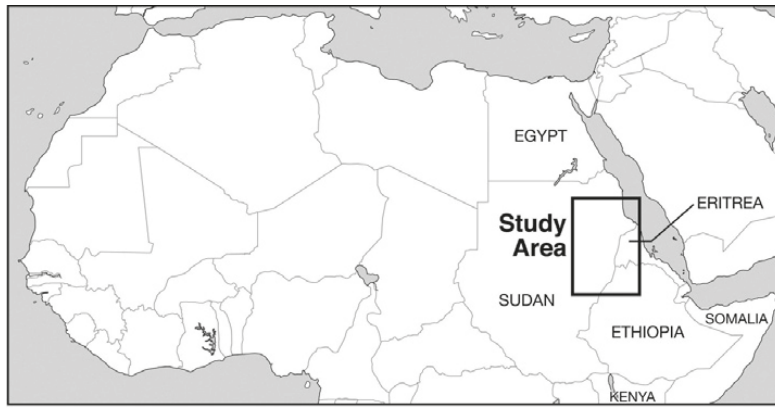

Fig. 1.1 Location of the Beni-Amer in western Eritrea and eastern Sudan with an indication of their grazing territory expansion into north-eastern Ethiopia. Source: Cath D'Alton

Hadendowa, the *Marya* and other groups in north-eastern Sudan and northern Eritrea (Figure 1.1). From the author's field observations in 2016/17, although the territory of the Beni-Amer is geographically well defined, their cattle breeds are known for their productivity and adaptation across the Horn of Africa. So one could argue that the transnationality of Beni-Amer cattle (often called Barca cattle by other communities) across the sovereign political borders in the Horn of Africa could be a fascinating study in the future.

Productive potential of the cattle in the study area and the scientific evidence

The Beni-Amer herders own productive cattle, and so the introduction of exotic breeding does not seem to be among their priorities or to their advantage, as will be explored later. A discussion of different breeds and traditional breeding techniques is particularly important, because much of the livestock development efforts and resources in other arid areas have been spent on exotic breeding (Chambers 1983), rather than on herder-centred integrated programmes. A major assumption was made by planners that traditional breeds and breeding methods were less effective, but these assumptions have been seriously questioned (ILEIA 1987), particularly in relation to the introduction to the tropics of breeds from Europe and other cool climates. I too question the above

assumptions, and I will attempt to prove that the Beni-Amer, under their present conditions, successfully produce and manage productive herds within a fragile ecology which is not entirely under their control.

I argue that poor herd performance is not necessarily genetic, but may have been caused by agricultural encroachment, land and water grabbing, insecurity (war and cattle raiding), lack of animal feed, and lack of institutional support and services. Therefore the factors which may hinder good husbandry among the Beni-Amer are not necessarily the management skills of the pastoralists themselves. Faced with outside pressures, such as land grabs and regional conflicts, ensuring land rights and access to resources may be just as crucial as productive herd management to the development of sustainable pastoralism.

Traditional area of the Bgait/Bulad cattle

Bgait is a collective breed name used to describe the short-horned zebu of the Beni-Amer; these cattle are found across the River Setit in the Eritrean western lowlands, eastern Sudan and along the Ethiopian borders (Mason and Maule 1960). These cattle (the most productive strain of which is known as Bulad) are purpose-bred to fit into the economic and socio-cultural fabric of Beni-Amer society (see Annex 3, 'Customary law of the Beni-Amer'). Breeding good cattle and attending to their wellbeing is part of the Beni-Amer culture.

The traditional home of the Bulad strain of the Bgait is the Gash and Setit areas of the Eritrean lowlands (see Figure 1.2). Decades of conflicts between Ethiopia and Eritrea (1961 to 1991 and 1998 to 2000) have led to the displacement of people and their herds; this has been exacerbated by persistent drought in the area (Fre 2002). Historical land grabbing in eastern Sudan, and recently in some parts of western Eritrea, is another phenomenon denying cattle owners access to fertile grazing areas, because some of these areas have been taken over for commercial horticulture and agriculture (Fre 2009b) in both countries. According to Sudanese experts, 'In Gadarif State . . . [i]n recent decades, pastoralism has been in decline because of threats posed by rapid encroachment of mechanized rain-fed agriculture, human population growth and other human activities that force extensive livestock production to shift to areas of increasing marginal primary productivity (Shazali and Ahmed 1999; Sulieman and Elagib 2012)' (Sulieman and Ahmed 2013, 1).

Non-Beni-Amer groups who refer to the Beni-Amer cattle as Barka (referring to the region in which the cattle live) or Aha-Barka (Barka

Fig. 1.2 Traditional area of the Bgait/Bulad cattle. Source: Cath D'Alton

cattle), or Bgait, recognise the productivity of these cattle and have been buying Bgait cattle for decades, primarily for the purpose of milk production. There are several small dairy businesses around major cities in both Sudan and Eritrea that use the Bgait breed for intensive milk production under improved feeding conditions. Under highland conditions (altitudes above 1500 metres), the Bgait have adapted very well and most small dairies in the Eritrean city of Asmara (altitude 1700 metres) rear crossbred Bgait cattle for milk. A fuller analysis is given in Chapter 5.

Key elements of pastoral knowledge among the Beni-Amer

The current research demonstrates, through empirical evidence, that the Beni-Amer knowledge systems, while locally indigenous in context,

embed several elements of exogenous (western) knowledge, which can be summed up as follows:

- The Beni-Amer are knowledgeable about the genealogy of their cattle, and they have a wide range of knowledge about breeding other types of stock and are aware of their use and adaptation.
- They breed with specific objectives such as milkability, walkability, size, coat, colour and character. In other words, Beni-Amer cattle owners have a holistic approach to breeding, which includes aesthetic, genotypic and phenotypic characteristics (character, productivity, adaptation to environment, disease resistance, etc.). Their IKS is therefore resilient and adaptive.
- They are able to manipulate crossbreeding to produce an animal to their specifications (for example, they have bred cattle with wilder traits by crossing Sudanese Dwehin with Eritrean Bgait).
- They control their breeding by using pedigree herds, and, as discussed in Chapter 6, they give cows *common* breed names, a method that helps them keep a genetic profile. This is a critical practice in non-literate societies where animal profiling is oral, passing from one generation to the other through poetry and storytelling in praise of good breeds.
- The Beni-Amer bull selection is a long process, which involves grooming and virility testing of potentially productive bulls, selecting them for desirable traits while eliminating poor-quality potential bulls. They cull old bulls after about 10 years of service and groom young ones, but they hire out productive bulls to relatives or friends in order to disseminate known productive traits in other herds.
- As part of good management, they limit the number of bulls per herd in the ratio of 1 bull to 60 cows; their herds are composed of approximately 90 per cent females, and may be managed as *milking* and *dry* herds.
- They are conscious of the need for and the importance of oestrus (heat) detection in cattle. Some specialised cattle owners among them even use teaser cows to help the bull identify the cows within the herd that are in oestrus.

The above elements constitute a major part of the Beni-Amer breeding system. There may be other aspects open to further research, but the above information forms an adequate, empirical and scientific basis to pursue the argument that Beni-Amer breeding systems show a high level of sound specialisation and resilience.

The Beni-Amer also have a major understanding of animal production principles, most of which are underutilised but remain major technical and perceptual assets to be used in livestock extension and research. My central argument is that the Beni-Amer cattle owners are knowledge-sovereign, but this does not imply that partnership with conventional science is not necessary or beneficial. For example, many herders appreciate the need for veterinary intervention to treat serious diseases such as anthrax, rinderpest and other diseases, which could not be treated through ethno-veterinary intervention.

Pastoral livestock breeds and indigenous systems of production have underlying production and husbandry principles which support pastoralists in breeding a variety of animals that are suited to arid and semi-arid conditions. Cattle breeding and production are skills for which the Beni-Amer are famous, as evidenced by the Bgait cattle, with their high-quality meat and impressive milk yields.

There are several areas of pastoral production and perceptions within the pastoral system that need to be built upon and integrated, rather than destroyed, if livestock extension is to have any appeal to pastoral people. The case of Beni-Amer cattle herders in the study area is a good example of the ability of pastoralists to make a direct contribution to our knowledge of animal production. The introduction of exotic breeds or knowledge that is genetically or perceptually alien to pastoral groups will have little impact on improving such systems unless the indigenous knowledge is properly understood. It is particularly important to understand the cultural and spiritual relationship the Beni-Amer have with their animals and their environment.

A fuller evaluation of the Beni-Amer breeding systems is given in Chapter 5, together with an analysis of the pastoral capacity to manage and produce healthy cattle for the domestic and regional markets. The chapter also provides further comparison between traditional and 'western' knowledge of breeding, showing the complementarity between the two knowledge systems. The importance of crossbreeding is highlighted, with more detail on how the Beni-Amer manipulate the breeding to achieve specific objectives. A detailed description and analysis of the Beni-Amer herding systems, pastoral technology and management strategies show how the Beni-Amer perceive and practise herding as an important occupation. Herd composition and management, and herding techniques, are described in some detail to show that the Beni-Amer cattle owners indeed have an impressive accumulated knowledge of cattle husbandry.

What motivates the Beni-Amer to move seasonally is discussed in some detail in Chapter 6 to show that their seasonal migration is highly organised and is related to the annual cycle, environmental conditions, animal health and the need to cultivate seasonally. Evidence is also emerging that the traditional patterns of movement may be changing because of more land grabbing, environmental degradation, climate change, sedentarisation and insecurity in some border areas (Fre 2002; Suleiman and Ahmed 2013). Because of the various challenges, many former pastoral communities are adjusting to the new situation by adopting multiple survival strategies. The strategies of this third way (as compared with pure nomadic pastoralism and semi-sedentary pastoralism) are the creation of new livelihood opportunities and the enhancement of household food security, which include creating stronger urban-rural socio-economic linkages. The adaptation mechanisms adopted by these communities have increased rural-urban interaction, enabling former pastoralists to have access to goods and services in nearby towns, as the case study in Kassala demonstrates (Fre and Tsegay 2016, 157–67). For instance, pastoralists are involving themselves in urban and peri-urban agricultural activities, adopting a semi-sedentary form of pastoralism which has fixed homesteads but allows mobility for larger livestock (e.g. camels, cattle) and commercialisation of livestock production. Pastoralists bring livestock, meat, dairy products, hides, artefacts, charcoal, and wood products to sell, and in return they buy a variety of foodstuffs domestic utensils, school materials for their children, farm implements and animal fodder (Fre and Tsegay 2016).

The Beni-Amer herders also have extensive knowledge of endoparasitic diseases, accidentally caused ailments (e.g. injury through infighting or falling), pre- and post-natal disorders, bone fractures and other visible maladies, and their causes and symptoms. Many other diseases are associated with poor husbandry, which is itself caused by poor environment and bad grazing resources. Most diseases are perceived as preventable and only a few are perceived as a 'divine punishment'; those may include rinderpest, anthrax and other virus-borne diseases, as will be discussed in Chapter 7.

The Beni-Amer suggest several curative and preventive measures which are predominantly traditional. These measures primarily involve hot metal branding, incision by means of a knife blade, bone setting, and salt and medicinal plants. Among the traditional curative tools, the firebrand seems to be by far the most widely used. For example, swellings, fractures, bruises, lameness, foot rot and bites by wild animals are all

treated with fire, with varying degrees of success. Fire is also seen as a means of fighting off fleas and mites, especially among small stock. Environmental (ethno-botanic) cures that involve the use of different ecotypes in different seasons are seen as crucial to disease prevention. These include using light and heavy soil areas, higher/lower ground, purgative waters, and salty ground and vegetation. These practices are discussed in more detail in Chapter 4 and analysed further in Chapter 7.

Before we discuss these pastoral practices in more detail, the next chapter, Chapter 2, looks at the case for indigenous knowledge sovereignty, provides some definitions of indigenous knowledge, and outlines the broader context of the indigenous knowledge versus scientific knowledge discourse, setting out its key debates. It highlights the threats to indigenous knowledge and related knowledge systems, and puts forward ways of advancing the cause of indigenous knowledge systems. It makes the case for basing the integration or hybridisation of indigenous and scientific knowledge on a partnership of trust and dialogue between the two communities, and gives an overview of the key arguments for and against indigenous and scientific knowledge in the fields of food procurement, agriculture, food security and knowledge systems, focusing on their weaknesses and strengths.

Note that this study focuses on the Beni-Amer and their pastoral knowledge. Although other pastoral systems are mentioned, particularly in terms of common challenges, as outlined in Chapter 8 and throughout, the study does not have the scope to provide an in-depth description and comparison of other pastoral practices.

Chapter 2 also explores the following key debates around food production:

- Are indigenous knowledge systems sufficient to address modern food needs?
- Do indigenous knowledge systems perpetuate socio-cultural systems of repression and segregation?
- Are indigenous knowledge methods of food production geographically and culturally suitable, while 'cookie-cutter' global scientific methods are not?
- What are the economic and health implications of low-input versus high-input methods?

In the subsequent chapters, I will not only show the potential for cross-fertilisation between knowledge systems, but reveal that, among cattle-owning pastoral people in the Horn of Africa, indigenous knowledge can

also stand alone as a sound science. Comparisons and complementarities between indigenous and scientific knowledge will be described in the context of the practices of the Beni-Amer and other pastoral communities. A central argument throughout will be the feasibility of hybrid knowledge systems.

The concluding chapter (Chapter 10) explores how this hybridisation of knowledge can contribute to food sovereignty and a sustainable future for the Horn of Africa region – environmentally, socially and economically, proposes that policy makers should promote this knowledge through policy, laws and institution building, and highlights the importance of the knowledge sovereignty of herders such as the Beni-Amer.

Chapter Two
The case for indigenous knowledge systems and knowledge sovereignty

The broader context

Since the 1960s, the Green Revolution has inspired so-called modern, high-input high-output agricultural practices that have been pushing small-scale farmers, pastoralists, agro-pastoralists and other traditional food producers to the periphery, and, in some instances, to the point of extinction. This has resulted in unprecedented changes in the lives of those who have had traditional, if not legal, access to the land used and sovereign knowledge they have kept for generations. These changes have also brought the people into direct conflict with modern, commercial agricultural producers and the state itself. In a more philosophical sense, however, this only underlines the deeper battle being waged between IKS and the hegemony of western knowledge. It can also be argued that many elements of *modern* science (modern medicine, agriculture, mathematics, etc.) are partly rooted in indigenous knowledge principles, a historical truism which is often neglected; however, such an argument would be beyond the scope of this analysis.

The main focus of this book is the study of specific aspects of IKS among cattle keepers in the Horn of Africa, the marginalisation of their knowledge system, and its potential use for the sustainable intensification of livestock production. However, it is important to frame the neglect of IKS as a science in a much broader, global, neoliberal, pro-Green Revolution context, and then make a case for its potential use based on empirical evidence.

In the aftermath of World War II, Europe was left devastated, unable to grow enough food to feed its population. Consequently, governments began a concerted effort to boost their food production capacities by

providing favourable conditions to farmers and encouraging efficiency. In Britain, for example, 'the 1947 Agricultural Act guaranteed markets and prices in exchange for increased efficiency, encouraged further in the 1957 Act' (Herman and Kuper 2003, 2). National intensification efforts such as this were also reflected in the 1968 Mansholt Plan in Europe, which further consolidated agricultural land and promoted increased production (Herman and Kuper 2003). This eventually presented a problem as Europe regained its food sovereignty and surpassed its own consumption, which, in turn, raised the question, 'Where does the excess food go?' The only place to sell this surplus was in the newly decolonising nations. With agricultural exports written into the European Common Agricultural Policy (CAP) and a *global free market* beginning to be touted by such organisations as the World Bank and the International Monetary Fund (IMF), agricultural dumping practices became the norm and are still in use today.

In *The Development of Underdevelopment*, Frank (1966) describes how, through the processes of colonialism, mercantilism and capitalism, the economies in the global South were transformed and subjugated by the North, a phenomenon he termed *underdevelopment*.

> We cannot hope to formulate adequate development theory and policy for the majority of the world's population who suffer from underdevelopment without first learning how their past economic and social history gave rise to their present underdevelopment. (Frank 1966, 4)

He goes on to explain that economies in the global South had been transformed into feeder economies to sustain those of the North, providing raw materials for consumption and value-adding manufacture. The finished product would then be sold back to the feeder economy in the South at a substantially higher price than the initial raw materials, thereby perpetuating this underdevelopment. So, the countries in the South experienced a loss of economic freedom as the gap widened between them and the North; this loss of economic balance encouraged a view of the environment simply as a resource to be sold on the market, and this became the dominant view. Also, economic perspective was lost as efforts to escape this underdevelopment became more and more mainstream, following neoliberal economic thinking. All of this was a result of *buying into* this modern, Northern conception of economics and technology transfer.

The increase in food production could not have been achieved without the neoliberal *governmentality* (Foucault 1991), which promoted activities in line with the prevailing dominant economic paradigm (i.e., neoliberalism), which essentially emphasises privatisation and the roll-back of state involvement in the economy. According to Scott (1998, 2), 'efforts at sedentarisation are a state's attempt to make a society legible, to arrange the population in ways that simplify the classic state functions of taxation, conscription, and prevention of rebellion, since common land, although a vitally important subsistence resource for the rural poor, yields no revenue'. In any case, sedentarisation – spontaneous or as part of a resettlement scheme – has produced negative economic, social and ecological effects, as the many attempts to sedentarise pastoralists in the Sudan and elsewhere show (IUCN 2012). It is clear that 'forced sedentarisation is both ethically dubious and unlikely to succeed' (Blench 1999, 50).

The *destruction of the commons* is another theme running through contemporary political and economic policies. Throughout the global South, we see lands which were once recognised as communal now being set aside and sold for private commercial enterprise. This will be discussed in later chapters in connection with landowners in the Horn of Africa forcing pastoralists, agro-pastoralists, small farmers and others out of what was previously regarded as public or communal land.

In the case of eastern Sudan, 'the last generation of pastoralists has seen rangelands shrink by approximately 20 to 50 percent on a national scale, with total losses in some areas' (UNEP 2007, 186). 'A study in Gedaref State, in Eastern Sudan[,] reported that grazing lands reduced from 78.5 percent (28,250 km^2) of the state's total area in 1941 to 18.6 percent (6,700 km^2) in 2002 (Babikir 2011). Conversely, the mechanized farming sector increased by 725 per cent in the same period – from 3,150 km^2 in 1941 to 26,000 km^2 in 2002 (ibid.)' (Krätli, El Dirani and Young 2013, 13).

The marginalisation of indigenous knowledge and its adherent communities in the global South is therefore not a historical accident, and should be analysed in the above context. In short, *economic (neoliberal) governmentality* and the *destruction of the commons* have been at work in agricultural policy practice, driving out indigenous knowledge systems and practices in the global South.

The ambitious enterprise of increasing total food production with little concern for the environment or other destabilising economic and social effects became known in academic circles as *productivism*; its policy prescriptions can be seen in the overall effort to utilise scientific

knowledge in the pursuit of increasing yields, again with little thought for social and environmental factors.

The '*indigenous*' versus the '*scientific*' position

In this section, I discuss what indigenous knowledge is in relation to its *scientific* counterpart, as well as the interplay between these two systems of knowledge over the past several decades. I then explore how this interaction has been playing out in the field of food provision, its impact on national and international food policy, and countermovements that are arising which advance the cause of food self-sufficiency, and food and knowledge sovereignty. I also discuss how and why a *hybridisation of indigenous knowledge and scientific knowledge* may be the best way forward to secure a population's food sovereignty, and the effects a loss of knowledge sovereignty can have on a population.

For the purposes of this chapter, and indeed the rest of the book, knowledge will be divided into two frequently used categories, indigenous or local knowledge and scientific or western knowledge, *a categorisation with which I do not necessarily agree.* It is important to keep in mind that this is simply a cognitive device I am attempting to employ, but such dichotomy is fraught with problems and researchers should have the courage to glimpse other truths and possible actions based upon those truths.

Our perception of knowledge and reality may be culturally, socially and ecologically determined. From an occidental perspective, people tend to think of knowledge as written, read and experimented or tested, or as something that is absolute and concrete. This type of knowledge seems very tangible in the perception of the beholder; it can be referred to as *propositional knowledge*. In general, academics and scientists tend to theorise more than practitioners, and while theorising may lead to further investigation and crucial discoveries, it is not a practical use of time for practitioners, and so this is an area where academics could contribute.

Other forms of knowledge may seem to us to be far less absolute, transmitted orally, more contextual and gained through direct experience of complex and holistic reality; these can be called *experiential knowledge*.

Arguably, both of these forms of knowledge are based on observation, assumption, and interpolation of complex realities. In 'Realizing Justice in Local Food Systems', Allen (2010) explains that all knowledge is situated. It is informed by previous knowledge and experience, and in

turn informs subsequent knowledge and experience. It therefore takes on spatial, cultural, and other such socio-historical components. Gender and class can also greatly influence knowledge and its propagation (Banks 2009; Feldman and Welsh 1995). So, all these *forms of knowledge* are actually much more similar than they are different. In a sense, they are all local; they all derive from a particular time, culture, way of thinking and belief structure.

Advancing the cause of knowledge sovereignty

There is a need to take a step back and view the larger issue at stake, which is knowledge sovereignty. Having reflected on knowledge systems, we need to ask what is *knowledge sovereignty*, and what does it mean to be *knowledge-sovereign*? Warrior (1995) quotes Vine Deloria, Jr, who dramatically describes sovereignty as 'the path to freedom'. However, the freedom to do what? From the local indigenous knowledge perspective, it is the freedom to recapture and utilise indigenous knowledge as a peer to scientific knowledge, to move it from 'invisible to visible[,] . . . to challenge the fundamental dichotomies of scientific thought such as subject/object, rational/irrational and White/Black' (Rigney 2001, 10). So, to be knowledge-sovereign is to have the ability to choose one's knowledge system, and to be able to use it freely to critique dissimilar constructions of knowledge without being subsumed by them.

So, firstly, knowledge sovereignty is about *freedom* and also *identity*. Gegeo (1998) describes a group of native Melanesian people known as the *Kwara'ae*, who through labour migration and international development initiatives have been increasingly exposed to scientific knowledge and discourse. They often refer to this exposure as having altered their lives from *tua lalifu'anga* ('living in rootedness') and *tua 'inoto'a'anga* ('living in dignity') to *tua malafaka'anga* ('living in imitation of life brought by the ships' (Gegeo 1998, 292). However, this exchange of *rootedness* and *dignity* for *imitation* has been countered by the Kwara'ae's reassertion of their knowledge sovereignty and freedom upon returning home to the village.

> One of the key cultural events that returnees to the village need to be able to participate in is the critical group discussions through which Kwara'ae culture and philosophy are rethought and renewed. The Kwara'ae value and regularly practice their tradition of 'critical

> discussion' or 'enlightened dialogue' (*talingisilana ala'anga*) in high rhetoric (*ala'anga lalifu*), the formal and semantically complex register of the language used on all important occasions and for discussions of all significant sociocultural and political topics. (Gegeo 1998, 294)

Secondly, the study of anthropology shows us that when we are trying to understand any cultural or social phenomenon, any one perspective simply is not enough to capture the reality at hand, much less to decide to introduce any change into that social system which would even approach deserving to be called *well informed*. For this reason, both the emic approach (informed by local knowledge, society, etc.) and the etic approach (informed by the scientific method and, arguably, culturally null) are employed as counterbalances to each other. This combination of approaches and appreciation (hybridisation) of both *inside* and *outside* knowledge is exemplified very well in Essén, Binder and Johnsdotter's (2011) work which delves into the issue of caesarean births among Somali women in diaspora. Furthermore, even the more *scientific* discourse today encourages *out-of-the-box* thinking and the use of multiple alternative paradigms as best practice. These range from accounting (Lukka 2010) to nursing science (Monti and Tingen 1999) to theoretical physics (Bjorken 2004).

Lastly, as it is a locally grown phenomenon, an understanding of indigenous knowledge can help us to discover what would otherwise be undiscoverable. In 'Out from the Margins: Centring African-Centred Knowledge in Psychological Discourse', Waldron (2012) relates how indigenous African approaches to psychology can offer unique and valuable insights into mental illnesses faced by Africans living in diaspora. She proposes that the dominant 'Anglo-American psychology', being founded on an 'Anglo-American model of normalcy', may mistakenly diagnose a person not belonging to that model as mentally ill simply because they do not display the 'personality traits [that] most closely resemble those of the White middle-class, urban male, that is, affectless, individualistic, competitive, controlling, and future-oriented' (Waldron 2012, 43). On the other hand, a culturally informed diagnosis based on relevant African psychological insights may discover that the same patient is indeed sane.

The United Nations also seems to recognise the value of indigenous knowledge in discovering the otherwise unknown: the UNESCO Convention on Cultural Diversity recognises the significance of cultural knowledge 'as a source of intangible and material wealth, especially in indigenous communities' (quoted in Payyappallimana and Koike 2010, 168).

Payyappallimana and Koike go on to talk about codified systems of indigenous knowledge in India relating to medicine and the health sector, and 'how maintenance and/or revival of cultural resources can enable communities with endogenous development capabilities while integrating traditional knowledge, customs and practices in a market economy' (Payyappallimana and Koike 2010, 173).

Threats to indigenous knowledge and knowledge sovereignty

There are several possible explanations as to how and why local knowledge sovereignty is being threatened. In this section, we will discuss one of the general, overarching, and perhaps more sinister explanations, followed by a more pragmatic interpretation.

In the late 1970s, the French theorist and philosopher Michel Foucault developed the idea of *governmentality* (Foucault 1991). Governmentality (the art of governing) essentially is the government's attempt to create citizens who are receptive to current government policy and ethos. This can range from direct propaganda to more surreptitious manipulation (for example of interest rates or through subsidies for certain industries in order to influence people's spending habits).

Although only briefly covered here, the concept of governmentality is of vital importance because it showcases a possible explanation of *why* this scientific paradigm is being pursued with such vigour and why it tends to subsume any other system of knowledge it encounters. In this form, we can call it *academic governmentality*. Taking academic institutions in Taiwan as an example, Shih (2010) accuses the global North of 'academic colonialism'. 'Academic colonialism stands for how states occupying the centre where knowledge is produced, transmitted, and ordered, in an unfair academic division-of-labor at the global level[,] have successfully coerced scholars located in the peripheral states to accept their dominated relations in thoughts and ideas by standardising, institutionalising, and socialising academic disciplines' (p. 44).

In essence, the academic system itself forces scholars in the global South either to submit to the methodologies and values of the dominant scientific/propositional knowledge system or to fade into obscurity. Shih goes on to describe this choice in more detail: indigenous people in academia who are not functioning in a teaching or research capacity may function as convenient intermediaries between non-indigenous researchers and indigenous communities, thereby perpetuating a system

which tends to view such communities as objects to be studied rather than consulted. If an indigenous academic is in a teaching or research position, another choice is afforded him or her: he or she may fall in line with current orthodox methodologies and risk being labelled as '"too practical" – read as "lacking theoretical contributions"' (Shih 2010, 46) as scholars of indigenous knowledge.

Beyond governmentality and academic colonialism, there are inherent difficulties in balancing simultaneous plural knowledge systems in an increasingly interconnected world. An observation of market chains and how indigenous knowledge, as well as knowledge sovereignty, is negatively affected in the process is worth reflecting upon (Van der Ploeg 1993). Farmers may grow their produce for the local market, and the local market, along with its sellers and producers, has been in existence alongside the local knowledge system, valuing the growing of many varieties of cultivars, and, perhaps, doing so with very few inputs. So here, there isn't much demand to change the status quo.

However, some of this produce will make its way to the capital city, where it will eventually find its way into the hands of several groups of people, some urban poor, some up and coming middle and upper classes, and some foreign expatriates, to name a few. The produce is now in a very different social space, with different demands being placed on it by different social classes and cultural backgrounds. It is also (largely) being commodified in an area which does not have close contact with the production of much of its food and therefore may have a very different view of what does/can/should go into its production. Furthermore, some of this food may even make its way to the global North, where it will be subjected to further and more varied knowledge systems, values and legalities. The product thus moves along the chain while the knowledge system from which it originated becomes more distant, being subjected to other values and knowledge systems. Which system of knowledge should be given precedence in regard to the product, that of the producer, the seller, the exporter, or the consumer? So, although 'all knowledge is first of all local knowledge' (Okere, Njoku and Devisch 2011), it doesn't seem to stay that way for long.

Key debates

This section provides a brief, yet hopefully balanced, overview of some of the specific debates being waged between proponents of indigenous knowledge and of scientific knowledge in the fields of food

procurement, agriculture, food security and knowledge systems. The battle between *indigenous* and *scientific* knowledge is being played out in food production, namely, in the related areas of food security and food sovereignty.

The *pro-science* proponents or the *evangelists* of the Green Revolution school would stress the insufficiency of indigenous knowledge to address growing food needs, and that indigenous knowledge perpetuates systems of repression. These points not only need to be criticised but rebutted by those who care about the sustainability and resilience of indigenous knowledge and believe in its sovereignty as the power base of the poor and marginalised.

Are indigenous knowledge systems sufficient to address modern food needs?

Indigenous knowledge systems, as discussed earlier, are and have been embedded in specific cultural and regional contexts, and have been formed through a dynamic and negotiated process within labour processes specific to that area. But, in our increasingly integrated global system of commodities trade, have these knowledge systems reached their *sell-by* date? When agricultural practices on one continent affect consumers on another, when global population is expected to increase by 47 per cent, skyrocketing from 6.1 billion in 2000 to 8.9 billion in 2050 (UNDESA, Population Division 2004), when policy makers are fundamentally dissociated from the labour process, and when producers are segregated from the means of production, can such systems of knowledge retain any currency?

To start off, let us eschew issues of economics and politics and concentrate solely on the inevitable population increase. As a result of it, governments across the globe are requiring more and more food to feed their hungry populations, but ways of producing food, which have served these populations well in the past, simply are not up to the task of addressing this new strain. This sentiment is no more clearly elucidated than by Prakash: 'Traditional technologies are reaching their limits and we need to examine the vast potential of new technologies, such as genetic improvement of crop plants, with an open mind' (Prakash 1999, 223–4). However, Prakash was not advocating an outright abandonment of traditional agricultural practices; he was simply asserting that under current population pressures, these traditional practices are becoming strained.

Proponents of indigenous knowledge, however, would be quick to rebut this, because they see IKS as an evolving knowledge system that

adapts. Firstly, they argue that the fact that traditional practices have been used over generations does not mean they are stuck in the past and need to be completely overhauled with drastic measures, such as genetic modification. Traditional pastoralist practices can, for example, be augmented with more modern technology and fill a key role in food security (Fre 2008; Krätli, Huelsebusch, Brooks and Kaufmann 2013) without losing their identity.

Secondly, they would object, in defence of traditional practices, that the problem at hand is not the overall amount of food, but rather lack of access to existing food. There is enough food, supplied either locally or through imports, but people do not have the ability to purchase or otherwise obtain it legally. They would cite study after study, from the World Bank (2012) to the United Nations Food and Agriculture Organization (FAO, WFP and IFAD 2012) to locale-specific research (Brown and Funk 2010), all decrying lack of access, rather than global food supply, as the main culprit of undernutrition and starvation. Therefore, it is an issue of profiteering and manipulating markets rather than insufficient supply.

Before we go into the next critique supporting the scientific paradigm in attempting to obtain and retain food security and sovereignty, let us briefly indulge in a subcategory of this particular dialogue, mentioned by Prakash, that of increasing the quantity of food through genetic modification. This specific sub-debate will be of particular relevance in Chapter 5 regarding the selective genetic manipulation of cattle populations. Being a political, economic, environmental, and for many a moral, hot-button, genetically modified (GM) foods are frequently the subject of debate. Although the subject is far too nuanced and intricate for us to go into in any depth here, we can make several broad strokes about the war of words, just to get a feel for the issue. Almost entirely centring on increasing the amount of food produced, GM advocates extol the advantages of being able to modify crops to grow in inhospitable regions previously unable to support that crop (Islam, Azam, Sharmin et al. 2013) They also praise GM as being quite healthy: when appropriately applied, the genetic modification of crops can lessen the need for chemical inputs such as pesticides, herbicides and fungicides (Pandey, Kamle, Yadava et al. 2010), and can make up shortfalls in diet.

In the context of the Horn of Africa region, Salih (1991, 54) argues:

> Whereas livestock development depends heavily on imported technology, knowledge and infrastructure, [pastoral production cultures are] based on local knowledge with very little use of modern inputs. The contradiction[s] between these two

> cultures of pastoral production are compounded by an interest gap between the pastoralists and the planners. The planners are educated and trained to appreciate modern techniques of production with little or no interest in [...] cultural factors of production. These contradictions also relate to the planners' perception of the methods capable of developing the livestock industry, which are at times incompatible with the pastoralists' objectives and organization of production.

As demonstrated above, there is clearly no shortage of arguments for and against indigenous knowledge systems in regard to their ability to address modern food needs and quantities, ensuring food security from the household level up to the national and regional levels.

Livestock throughout the African drylands will continue to play a major role in the national economy, contributing well beyond the estimated 25 per cent of agricultural GDP. Behnke (2010) calculates that pastoralism represents about 45 per cent of Ethiopia's agricultural GDP, which in turns accounts for 42 per cent of national GDP.

The livestock sector is itself a major source of foreign exchange and industrial raw materials (meat, milk, eggs, hides, skins and fibre) in the Intergovernmental Authority on Development (IGAD) member states. For instance, about 20 per cent of agricultural exports in Sudan are livestock-based, hides and skins are Ethiopia's second biggest export, and in Somalia livestock and livestock products account for 80 per cent of exports in normal years (Fahey 2007; Sandford and Ashley 2008).

Exports have been on the increase since Eritrean independence as a sovereign country in 1993 and, regionally, pastoralists in the Kassala State of eastern Sudan have made significant contributions to the state and regional economies. Reliable data is difficult to get as most of the major livestock trade is conducted informally, but the following data gives a general overview of the sector's recent contributions to the country's economic and food security.

The total value of the livestock sold in Sudan for local consumption or export is 76 million Sudanese pounds (SDG)[1] (equivalent to about US$38 million), and this is as a result of pastoralist production. Revenues from the camel trade are highest, followed by cattle, sheep and goats. The goat contribution to trade is underestimated because most goats are slaughtered for home use and therefore not reported (Fre and Tsegay 2016). Cattle, which are not exported, contribute 23 million SDG (30 per cent); camels for local consumption and export contributed 32 million SDG (42 per cent); sheep contributed an estimated 20 million SDG

(26 per cent); and goats for local consumption and export comprised 1.1 million SDG (2 per cent).

Figures from a 2013 USAID market study of Somaliland 'give an estimate of 2.352 million sheep and goats exported through the Berbera Port, Somaliland, with sheep and goats accounting for 91 per cent of animal exports' (USAID 2013). Based on an average price of US$70, the estimated total value would exceed US$160 million, with tax revenue totalling around US$8.5 million, or approximately a third of the Somaliland government's total revenue. It is important to note that this is the financial contribution of *traditional* mobile pastoralism, not the *modern* livestock industry.

It should also be mentioned that 'a large proportion of Somaliland's livestock exports originate from Ethiopia (an estimated 50 per cent of goats and sheep) (Majid 2010), and the livestock trade is characterised by a high degree of regional integration. Somaliland's herders seasonally make use of important cross-border grazing and water resources' (PENHA 2013).

Do indigenous knowledge systems perpetuate socio-cultural systems of repression and segregation?

A closer look at the second critique by the green revolutionaries of indigenous food production knowledge is quite revealing. The complex debates on segregation of work roles based on race, religion, age, sex, gender or other such distinctions are beyond the scope of this book; our focus will be on livestock-based food production, which has, for the most part, been a segregated practice. As it is particularly relevant to the following chapters, let's take the case of cattle and camel herding in the Horn of Africa: cattle and camel production among pastoral people in sub-Saharan Africa is almost exclusively a male-dominated enterprise, women being excluded in a variety of ways, including, but not only, politically, socially and economically.

Among many pastoralist communities, pastoralist culture excludes women from important roles in herd management and livestock ownership. Women are brought up to respect and submit to the leadership of men, and continue to be subjected to harmful practices such as female genital mutilation (FGM) and forced marriages in order to maximise bride-wealth payments (Kipuri and Ridgewell 2008).

Kipuri and Ridgewell go on to explain how women are excluded socially, economically and politically in pastoralist societies in Ethiopia,

Kenya, Tanzania and Uganda. Advocates of modern, scientific pastoral practices would certainly balk at this obvious inequality.

From the author's long observations, pastoral communities, including the Beni-Amer, are generally marginalised in terms of public policy and political representation, but women among the Beni-Amer are *on the margins of the marginalised* because of the social, cultural and religious attitudes deeply rooted in the patriarchal system among the Beni-Amer. Beni-Amer women do not herd or sell cattle, but manage small stock (sheep, goats, poultry), process animal products ranging from leather to dairy products, produce an array of artefacts for home decoration or sale, and take care of the children and the old folk when the men migrate for several months during the long dry season. So the critical role of women among the pastoral communities, including their IK, deserves a proper study in its own right, but that is beyond the scope of this book.

Given the changing nature of pastoralism and the encroachment on pastoral areas, pastoralist communities are pursuing alternative or complementary means of livelihood, and women are taking on new roles. Diversified livelihood strategies are empowering women and can assist in conserving biodiversity through agricultural practices, as well as providing economic and health advantages.

Are indigenous knowledge methods in food production geographically and culturally suitable, while 'cookie-cutter' global scientific methods are not?

As discussed earlier, indigenous knowledge is a negotiated process, which evolved through the labour process within a certain geographical and cultural context. The argument logically flows that local knowledge systems and the practices built on those systems are most in harmony with the surroundings, and therefore are a more suitable, *tailor-made* method of food provision. It is under such circumstances that a non-indigenous knowledge system which has been imposed on a people and region may not work, and indeed could at times do more harm than good. Let us take Saudi Arabia as an example: with only 1.6 per cent of its land area being arable (figure for 2014; World Bank n.d.), high-intensity agriculture is not something traditionally done there. However, because of the 1970s OPEC embargo, Saudi Arabia began a massive initiative to irrigate its land and produce grain because it had more money to invest in this. By pumping huge amounts of water from its underground aquifers,

it managed to increase its grain harvest from a few thousand tons in the mid-1970s to 5 million tons in 1994 (Postel 1999). However, doing this strained a limited water supply and grain output crashed to less than 2 million tons in 1996. Although bouncing back, Saudi Arabia still suffers from water scarcity today, with the agricultural sector responsible for 86.5 per cent of total water consumption (Alzahrani, Muneer, Taha and Baig 2012).

An immediate counterargument, however, invariably springs up, namely that the world is not local any more. What may have been suitable in an isolated environment may not be appropriate in a more globalised system. Suffice it to say that local actions (especially in such politically and economically loaded enterprises as food production) now have global effects. Therefore local knowledge, which may only work in one context, is insufficient, and these global *cookie-cutter* methods, although not without their ill effects, simply reflect the global nature of society now and are the way forward. Anecdotally, Saudi Arabia is now involved in an extremely non-local *solution* to its local resource problems, namely land acquisitions (commonly referred to as *land grabs*) beyond its shores in countries such as other Gulf countries, China, India, South Korea, the United Kingdom and the United States. These land grabs have been getting worse since the global financial and food crises of 2008. Work by Cotula et al. (2013) clearly demonstrates the environmental damage such grabs are causing in some sub-Saharan countries.

What are the economic and health implications of low-input versus high-input methods?

Proponents of indigenous knowledge also champion traditional agricultural, and, likewise, food-provision methods, as they tend to require fewer and lower-cost inputs than *modern* methods (Lwoga, Ngulube and Stilwell 2010). Boxall, Hardy, Beulke et al. (2009) cite various studies (Ascherio, Chen, Weisskopf et al. 2006; López, Hernández, Rodrigo et al. 2007; Stillerman, Mattison, Giudice and Woodruff 2008), drawing links between agricultural pesticides and other chemicals and all sorts of maladies such as Parkinson's disease, cancer, 'respiratory malformation, congenital abnormalities, urogenital and musculoskeletal anomalies, and changes in the male:female sex ratio of offspring' (Boxall et al. 2009).

In *The Death of Ramón González*, Wright (2005) looks critically into the health implications of modern *chemical-based* agriculture. He

laments the high-intensity and high-input agricultural practices which have increasingly been enforced in Mexico since the adoption of the North American Free Trade Agreement (NAFTA). He states that indigenous farming methods have given way to more severe monocropping and high use of toxic chemical inputs such as pesticides, herbicides and fungicides. Coupled with a lack of enforcement of safety standards, such as proper handling and appropriate dosages of inputs, this modernist intervention is having a severe impact on those working in the industry. Wright tells, among other things, how workers in the field are routinely and repeatedly sprayed with hazardous chemicals from crop dusters flying above, and suffer the health consequences from such repeated exposure.

Furthermore, rather than promoting economic and food sovereignty, increased chemical inputs are actually tightening the grip of the producers of these chemicals in the North, as more and newer chemical inputs and machinery are constantly needed as the old ones lose their potency, which leads to a *loss* of sovereignty among the food producers (Neuman and Pollack 2010). Additionally, Fitting (2006) describes the loss of the next generation of potential agriculturalists in Mexico to outmigration. She explains how the current global trade regime and NAFTA have led once thriving agricultural communities to become dependent on remittances from nationals working abroad, which is ravaging the local economy.

As a counter, champions of modernism would consider the above arguments to be an overgeneralisation and point to the work done in the scientific community to reduce inputs in agriculture while keeping outputs high, for example the coating of seeds with fertilizers rather than mass sprayings (Fukuda, Nagumo, Nakamura and Tobita 2012). As for the migration issue, they would explain this as a simple *maximisation of the migrants' own utility* (happiness, opportunities, etc.) and something completely natural.

Hybrid knowledge systems: are they feasible?

As I have discussed in the previous sections, there is certainly no shortage of critiques being fired from both sides of the indigenous knowledge/scientific knowledge debate. Both systems have been shown to have their pros and cons, and this clash of paradigms has been evident in the mixed-policy landscape seen globally. But can these two systems be integrated in a way that is not so combative, and if so, how?

Berkes (2009) certainly seems to think so, and states strongly that 'scholars have wasted (in my view) too much time and effort on a science versus traditional knowledge debate; we should reframe it instead as a science *and* traditional knowledge dialogue and partnership'. He despairs at the scepticism those entrenched in *scientific knowledge* seem to have towards indigenous knowledge and goes on to cite several instances in which the *knowledge partnership* he proposes has manifested as a beneficial 'co-production of knowledge' (Berkes 2009, 151). Qualitative, experiential and process-driven indigenous knowledge contributes by proposing research hypotheses, while science provides the scientific scrutiny and data-driven approach; together they advance the frontiers of knowledge and build links of trust between communities (Moller, Kitson and Downs 2009).

Efforts to combine knowledge systems have been pursued in the areas of land management and climate change adaptation, as they relate to food security. Angassa, Oba and Stenseth (2012) talk about the problem of land degradation due to modern stressors such as population growth and resource exploitation, and their resultant 'inappropriate systems of land use' (Angassa et al. 2012, 71). They go on, however, to cite research carried out in communities in Mali, Botswana and Kenya by the Centre for Ecological and Evolutionary Synthesis (Angassa 2007) in order to explore how this degradation may best be combated. They found great possibilities for a combined indigenous knowledge/scientific methodology, especially in the 'linking [of] indigenous early warning systems [(EWS) for drought] with modern drought management strategies in order to achieve effective drought management in arid regions of Africa' (Angassa et al. 2012, 77). Indigenous communities not only hold the knowledge of how to predict droughts, they also have unique coping strategies. Wireless sensor networks and mobile phones are being used to bridge scientific and indigenous knowledge of weather-forecasting methods, and this means that forecasts – and how they are disseminated – respond to local needs. Frameworks are being established to achieve this integration (Masinde and Bagula 2012). Community-based EWS (CbEWS) based on indigenous knowledge use qualitative indicators which can be linked to the conventional EWS that rely on quantitative and 'scientific' data. These qualitative indicators include environmental factors such as rainfall, pasture and browsing, crops, pests and water availability, livestock factors such as body condition, reproduction, milk production and diseases, and human factors such as disease and conflict (Radice and Tekle 2011).

Knowledge sovereignty: threats, adaptation and merger

The recognition and use of indigenous knowledge (IK), not only as a system in itself but also as a response to other knowledge systems, are under threat from an array of angles: physical, economic, political, and even academic. However, it is in the face of these threats that IK has demonstrated its resilience.

Berkes and Jolly (2001), for instance, have studied a community in the Canadian Western Arctic who, despite stresses brought by climate change, still employ their traditional knowledge system and practices related to hunting and fishing to obtain much of the protein they require in their diet.

Davies and Bennett (2007) document the resilience faced by pastoralists as they cope with both economic and political pressures such as the 'loss of valuable resource patches to agricultural projects, and the growing restriction in access to the natural resource base' (p. 493). They point out that despite, and even in answer to, these new sources of pressure and insecurity, traditional risk management strategies, such as herd management and the maintenance of strong social bonds, remain. The production of butter gives them a source of capital that is not only more liquid than cattle, but also easily stored and sold (Davies and Bennett 2007, 501). Among the Afar communities in Ethiopia, 'the ability to produce butter enables Afar households to benefit from periodic gluts, although this is limited by human capital constraints (labour and also knowledge of new or improved processing techniques)' (Davies and Bennett 2007, 504). Strong social bonds are also created and maintained, partly through a debt system which requires the gifting of anything from services to livestock in times of need. This particular risk management strategy not only helps to ensure a more egalitarian society, but also creates a form of bonding capital within the society (Davies and Bennett 2007, 496).

There is ample evidence that IK responds, and adapts itself, to new situations and imperatives in order to service the community that uses it. It is not in simple adaptation, however, that we see the true strength of IK, but rather in IK's ability and willingness to adopt principles and practices from other systems of knowledge. This ability to extract information and practices from elsewhere and incorporate them into one's own knowledge system, that is, the power to use one's own system of knowledge to evaluate an integral component of another knowledge system and pronounce it worthy or unworthy of incorporation into one's

own repertoire of knowledge and practice, is one of the quintessential expressions of knowledge sovereignty.

It is of great importance to note that implicit in the concept of a merger of knowledge systems is the idea that neither on its own is infallible or complete. In discussing the possibility of combining knowledge systems in some way, or even perhaps the need to do so, one recognises the limitations of each in addressing current needs in a satisfactory manner.

In his 1994 article, DeWalt explains in detail the difficulties of such a merge in knowledge systems, elucidating the deficiencies inherent in each, and the benefit which could be felt if 'more effective and creative interactions between [them]' (p. 123) could be achieved. One of the deficiencies of occidental knowledge construction, according to DeWalt, is that although it is extremely adept at breaking phenomena into researchable pieces, the result of doing this is that 'complex systems and those characterized by myriad interactions are likely to be ignored' (DeWalt 1994, 124). This is a critique mirrored by Scrinis in his 2013 work *Nutritionism*, in which he criticises the modern medical and health establishment for reducing the concept of nutrition to a smattering of individual vitamins, minerals and other elements, resulting in the inference that they act independently rather than working with each other to create on overall nutrition profile. This tendency to ignore the interactions between various studied elements in a complex system, states DeWalt, has facilitated an academic and political environment in which scientists are given licence to 'advocate the change of one part of the system without paying attention to the results for the overall system' (DeWalt 1994, 124). Furthermore, the institutionalisation of occidental knowledge creation has led to a sense of disconnect between its practitioners and those upon whom this knowledge acts, leading to the assertion that this knowledge is 'value-free, disconnected from the ethical, social, or ecological consequences of their research' (DeWalt 1994, 124).

Indigenous knowledge systems (IKS), on the other hand, apart from their proclivity to be too highly (and naively) valorised by some, have the unfortunate shortcoming of being definitively local. Whereas occidental knowledge claims to be universally applicable, IK is very much a product of its surroundings, and the knowledge gained in one geographical region may be wholly useless in another. This is what Latour (1986) called 'mutable immobiles' (p. 7), that is, changeable, relational knowledge which is attuned to one particular location. Given the increasingly global and

interconnected world, such immobile knowledge is certainly facing an existential crisis, despite whatever resilience it may have demonstrated.

In addition to these systemic differences, a true merger of knowledge systems is often considerably hampered by the practicalities of life in many places. Lumu, Katongole, Nambi-Kasozi et al. (2013) explore the choices in feed made by livestock farmers in and near Kampala, Uganda. In this work, they unearth a vast wealth of indigenous knowledge pertaining to nutrition in various feed sources, and the health impacts feed choices will have on livestock. For example, in nutrition surveys conducted among cattle farmers, brewer's waste and elephant grass scored the highest, with smooth coats and firmer faecal droppings being the observed health benefits, while other items, such as sweet potato peels and banana peels, were rated the lowest in terms of nutrition. However, Kampala is a rapidly urbanising environment, and, as a result, 'feed availability is a major limiting factor, and as a response, urban livestock farmers have resorted to using whatever resource is available to them, particularly food/crop wastes (market crop wastes, leftover food, etc.) and forages obtained from open access lands (roadsides, wetlands/swamps, etc.)' (Katongole, Nambi-Kasozi, Lumu et al. 2012, cited in Lumu et al. 2013, 1571). This very real limitation of availability has led to banana peels (widely available from the markets) being reported as the most commonly used source of feed, despite a preference for almost anything else and an awareness 'that the practice compromises nutritional quality' (Lumu et al. 2013, 1577).

All of this being said, we know that such mergers of knowledge, although fraught with difficulty, are possible. Very much contrary to the notion that IK and occidental knowledge are mutually exclusive, Couix (2002) explains how such a merger could take place, through a study of fire prevention operations in France. According to Couix, cognitive and operational synchronisation is necessary for the successful production of a hybrid system of knowledge and its implementation in the world. 'Cognitive synchronisation corresponds to communication processes aiming at establishing a "*context of mutual knowledge*" about the situation between the actors (information on the problem, envisaged solutions, hypotheses retained, etc.) as well as about the field of knowledge under question. Operational synchronisation aims at assuring task distribution among the actors and coordinating the schedule for carrying out the actions (sequence of actions, simultaneousness of certain actions, pace, etc.)' (Couix 2002, 81).

In the study, technical (forestry and farming representatives) and administrative partners were organised into a cohesive unit to co-design

a land rehabilitation plan. As these various stakeholders were brought together, each having its own knowledge background and agendas (forestry representatives wanting increased replanting and fire watching and fighting, and farming representatives desiring the reintroduction of farming activities that facilitate the maintenance of open areas), the conversation moved from a reactive stance against fire to a more proactive one. 'They moved, in fact, from speaking in terms of the struggle against the phenomenon to a formulation in terms of preventing the conditions which fostered the development of the phenomenon. What is more, the resulting land rehabilitation proposals were quite innovative compared to the plans previously implemented (networks of tracks, cisterns, water reserves) which sought only to allow fire to be fought efficiently' (Couix 2002, 82–3).

It was in the implementation of the co-designed project, however, that things began to crumble. There was neither coordination between the various actors nor follow-up on the original design of the plan, which inevitably led to conflict. For example, 'at the site, the forest technician developed a project with four forest owners without taking into account the presence of the shepherd using the plots next to theirs. The shepherd in turn brought in the farm technician in hope of having the forester's project revised according to his own interests. The farm technician intervened, however, too late and could not succeed in renegotiating a project review' (Couix 2002, 85). Such situations demonstrate the difficulty with which combined knowledge systems consisting of various groups (all with their own agendas) actually play out in the real world.

However, all is not in vain and some joint projects combining multiple knowledge systems do work. Aubron, Guérin, Gallion and Moulin (2013), for example, describe in detail how pastoral knowledge is being combined with knowledge from the field of forestry in order to construct a technical support tool for use in silvo-pastoral practices. This participatory modelling practice lies at the forefront of efforts to hybridise knowledge systems. It allows stakeholders, and not just 'knowledge gatekeepers', to mobilise their knowledge 'to replace (or complement) data sets and equations produced through experimental research that often are inadequate in certain research fields' (Aubron et al. 2013, 162). Of more 'real-world' benefit is that such involvement of stakeholders necessarily produces social outputs, which helps this new joint knowledge avoid any claims to being 'value-free' or dissociated from its intended users.

Another programme designed to link indigenous knowledge to occidental knowledge and methodologies is described in Kristjanson et al. (2009). Here, a selection of interrelated research projects was

devised in order to address and improve sustainable livestock practices. One of these projects specifically targeted pastoral groups. Its goal was 'to work closely with largely marginalized pastoral communities and more effectively contribute to scientific evidence-based policies and practices (an outcome) for the sustainable use of their rangelands (a longer-term impact)' (Kristjanson et al. 2009, 5048). From the outset, all actors in the project were encouraged not only to use, but to put forward, their own rubric, by which they measured project success. Such transparency from the outset not only allowed all 'sides' to better understand the measures of success deemed necessary for other actors, but also facilitated joint strategies to achieve these various goals.

By the end of the project, a land use map was produced jointly, whereby 'the local community group was able to catch the attention of the policy makers and have their information and concerns included in a new land policy. . . . The result was Kenya's first ever land-use master plan for a pastoral area' (Kristjanson et al. 2009, 5048, 5049). It is important to note that, unlike in Couix's project, in which lack of communication in the implementation stage caused a breakdown, here the project hired community facilitators as part of the research team. Their duty was to ensure ongoing communication between the community, researchers and policy makers. 'In this case, constant engagement essentially blurred the boundaries between researchers, policy makers and communities, increasing the probability that the information generated would not only be useful, but used' (Kristjanson et al. 2009, 5049).

The final chapter (Chapter 10) of this book will explore ways of moving this debate forward in the realms of research and policy. The next chapter (Chapter 3) sets the scene by putting the pastoralism and pastoral livelihoods in the study area into a broader socio-ecological perspective. It shows how the Beni-Amer have adapted their pastoral practices to fit their changing environment, and describes their power structures and social organisation. This description of the physical environment highlights some of the reasons for mobility, and issues arising from competition and conflict over resources.

Note

1. £1 equals approximately 8.5 SDG (Sudanese pounds) at the time of writing.

Chapter Three
The Horn of Africa: the ecological setting and the position of the pastoralists

This chapter provides an overview of the ecology and social aspects of pastoralism in the Horn of Africa and then gives more detail on the pastoral knowledge and practices of the Beni-Amer. We begin with a definition of pastoralism and agro-pastoralism in the study region (see Figure 3.1).

The Horn of Africa occupies an area of 5.2 million km^2 and supports a population of 200 million people. Arid and semi-arid lands (ASALs) and sub-humid lands constitute 80 per cent of the landmass and contain approximately 90 million Tropical Livestock Units (TLU)[1] that provide livelihoods to pastoralists (IGAD 1990). The pastoralists who survive in these fragile ecosystems are perpetually affected by drought and continually threatened by desertification. Pastoralists have therefore adjusted themselves to these environmental challenges and adapted by evolving a distinct economic and traditional knowledge system in which about 50 per cent of their livelihood is derived from livestock and livestock-related activities. In fact, because of their understanding of the ecosystems, in which resources are scarce and variable, the inhabitants of the ASALs have adopted a mobile and flexible pattern of resource use that has been quite sustainable. Mobility is in itself an important ecological function and may be one of the reasons why some of these pastoral areas have higher productivity of protein per hectare than the European, North and South American and Australian ranches. Inevitably, the ability of livestock to convert low-quality biomass into high-quality products gives it a central position in pastoral economic systems, particularly as regards food security and as a source of income at local and national levels.

Pastoralism and agro-pastoralism are thus major human occupations upon which depends the survival of millions of people in the Horn of

Fig. 3.1 Horn of Africa region. Source: Dr. Zubairul Islam

Africa, where there are few economic alternatives. The populations in the pastoral areas and the high-potential areas in all countries have increased, and it is imperative that pastoral development programmes be developed to deal with the increased pressure, which manifests itself as poverty and destitution. Indeed, pastoral development is an issue at the nexus of environment and development dynamics, where poverty alleviation is the core issue. These permanent pastures, in which biomass productivity varies greatly, include several ecological zones that have traditionally allowed free seasonal movement of livestock from one area to another.

Research results in some of the countries indicate that, with proper interventions, the livestock production of the ASALs could increase threefold. Pastoral areas are therefore not wastelands but have big potential for food productivity provided some basic interventions, such as infrastructure and mechanisms for maintenance of peace and security, are put in place. In Kenya, 50 per cent of meat and other animal products comes from the ASALs. The contribution of livestock to the agricultural gross domestic product (AGDP) of Eritrea, Ethiopia, Somalia and Sudan ranges from 40 per cent in Ethiopia to 72 per cent in Somalia (Fre 2008; IGAD 1990).

Somalia, for instance, in 2014 exported over five million livestock, worth an estimated $360 million, to countries such as Saudi Arabia, Yemen, Oman, the United Arab Emirates and other Gulf of Arabia countries, thus making a significant contribution to its GDP (FAO 2015).

Throughout the Horn of Africa, the pastoralists in the ASALs have been major suppliers of meat, milk, hides and skins for domestic consumption as well as for international markets. Despite this contribution, pastoralists are marginalised from the mainstream of policy and decision making. Most pastoralists reside in remote areas far from the capital cities where the policies and decisions that impact them are made. Although the importance of pastoralism is officially recognised by governments in Africa, the potential and actual extent to which the pastoral livestock sector contributes to the local, national and regional economies and its implications for food security and environmental protection remain in the realm of estimates. Over the last fifty years, interventions have increasingly focused more on people-centred development than on the relation between people, livestock and the state of resources in ASALs. However, this may be changing, as the FAO, with funding from the European Union and the UK government, has worked with the Somali government to invest in improving several areas of the country's livestock industry, including livestock infrastructure, fodder production, and vaccination and treatment services (FAO 2015).

The ecological setting

Rainfall and climate

The pattern of rainfall in the western plains is basically unimodal: that is, there is one continuous rainy season from June to September. The annual rainfall averages 600 mm in the savannah-type regions of eastern Sudan and western Eritrea and about 200 mm in northern, more arid regions, but rainfall varies greatly from season to season.

In recent years there has been a general decline in the rainfall, which has led to serious droughts, continuing the trend over the past four decades. The recurrent droughts have forced many pastoral groups further south to agricultural settlements, and this has led to serious, and sometimes violent, herder–farmer conflicts. The drought has also had a disastrous impact on herd productivity, and cattle have failed to reproduce because of a lack of fodder, water and labour. It is important to emphasise, however, that the whole region is climatically unstable and is prone to further droughts, and a long-term conservation strategy has to be introduced.

Water resources

The whole region is a water-deficit environment with high temperatures (20–35°C) and very high rates of evaporation (Halcrow Water 1984). The only water sources for livestock and humans during the long dry season are the wells, or *awelii*, both shallow and deep, and the sand beds or *shakat* along the river system, where the water table is higher. The main rivers are the Setit, the Gash, the Barka, the Atbara, the Rahad and the Dinder, along with several other small rivers in the region. Much of the pastoral agriculture is practised along the river valleys in the more arid north immediately following the end of the wet season, which runs from July to September. Along the River Setit (known as the Tekeze in Ethiopia and the Atbara in Sudan), however, water resources are more abundant because of the intermittent flow over the four months following the rainy season. After the end of the main rainy season (October onwards), grazing is more intense along the river banks where water is also available (see Figure 1.2 and Table A1.1). Large reservoirs, known as *hafirs*, are also used in south-east Sudan for watering livestock during the long dry season.

Range resources and vegetation

Vegetation of the study region ranges widely, from tall savannah grass (3 per cent) to scattered desert scrub (13.5 per cent) and riparian vegetation (3 per cent). There are tree and grass categories of vegetation well known to the Beni-Amer as fodder resources (see Annex 1 for details).

Seeking a broad definition of pastoralism and agro-pastoralism in the Horn of Africa

Given the ecological diversity of the Horn of Africa as well as the diversity of pastoral production systems, it is difficult to find a standard definition acceptable to all concerned, and any definition should be treated with caution. Over the last 50 years, the Horn of Africa has had its share of political and ecological turbulence, which has negatively impacted on pastoralist livelihoods and economies as we know them. Pastoralism as a specialised and livestock-oriented production system

has evolved greatly due to internal and external factors which will be discussed later.

For the purposes of this publication, we will use two definitions, from Wilson (1986) and from me. We both define pastoralism from socio-economic and ecological perspectives. According to Wilson,

> A system in which more than 50 per cent of gross revenue (the value of subsistence plus marketed production) or more than 20 per cent of household food energy was directly derived from livestock or livestock-related activities was classified as a pastoral system. One which derived between 10 and 50 per cent of gross revenue from livestock, in other words 50 per cent or more from agriculture, was classed as an agropastoral system. A third system, in which less than 10% of revenue was derived from livestock, might [be] classified as 'agricultural'. (Wilson 1986, 15)

I, on the other hand, provide a broader socio-ecological perspective on pastoralism and pastoralist livelihoods. I argue that, at the socio-economic level, livestock are basic forms of wealth and play a vital role in the creation and maintenance of social relations – bride wealth, funeral sacrifice, feasts, social obligations, and so on – whether the production system is pastoral, agro-pastoral or agricultural.

In very broad terms, there are two major pastoral production systems in the Horn of Africa, but within those two broad categories there are subsystems or species-based systems, such as camel or cattle breeding. In the majority of cases, pastoralism in the Horn of Africa is characterised by multi-species herding (keeping a variety of animals within the household).

The first of the two major systems is traditional pastoralism (nomadism, semi-nomadism, transhumance), a dominant form of production in the agriculturally marginal areas or the so-called low-rainfall, arid or semi-arid environments. This system is characterised by long-range or short-range nomadic mobility in search of grazing and water for the livestock. Among such pastoral groups, the management and well-being of the breeding herds and the continuity of milk production are the core of their profession, and the herds are predominantly female. The system is not totally exclusive because some family members in such pastoral groups are also involved in crop production, seasonal wage labour and other forms of labour to supplement family incomes. Seasonal wage labour is, in fact, a growing trend among pastoral peoples.

The second of the two major systems among the so-called agricultural and agro-pastoral groups, that is, mixed farming or multi-species herding or both, is predominant in many of the highland regions in Ethiopia, Eritrea and Sudan (Fre 2008). In the Ethiopian and Eritrean highlands, the management of draught animals (oxen) among such groups is so important that as much as 30 to 40 per cent of herds is composed of castrated male work animals used for ploughing and domestic transport. There is also widespread use of animal manure as fertiliser (and also for fuel), and animal labour is used for cereal threshing. Livestock is very significant in the agricultural and agro-pastoral system, and sadly researchers tend to neglect, or not to appreciate, the critical interdependence between the cereal crop and farming under the different ecological systems across the Horn of Africa. Also, it is crucially important to note that all the systems described above are not mutually exclusive. For example, in Ethiopia and Eritrea the pastoralists tend to dispose of male livestock by selling them off to highland agro-pastoralists as well as to meat consumers through domestic or export-marketing chains. Similarly, pastoral nomads buy grain from agriculturalists to satisfy their domestic needs. Such interdependence between peoples and systems is very common in the Horn of Africa, but goes largely unnoticed.

There are, however, negative aspects to such relationships. For example, agro-pastoralists and agriculturalists from densely populated and overgrazed highland areas in some countries in the region (Ethiopia and Eritrea, for example) may be forced to move seasonally or permanently in search of grazing land and agricultural land and so intrude into traditional pastoral grazing areas. In some cases, such intrusions into pastoral areas have led to violent conflicts between agriculturalists and pastoralists in high-potential lowland areas which are predominantly inhabited by pastoral communities. In some cases, the state itself, the national army, foreign companies and commercial farmers are also involved in grabbing high-potential traditional grazing lands, further marginalising pastoral peoples. This is compounded by landmines making some traditional grazing areas *no-go areas* in contested areas or zones which have formerly been scenes of war, either between rebels and the state, or between states. Studies by Fre (2002) clearly show how the 1998–2000 Ethiopia–Eritrea border conflict made large areas on both side of the border no-go areas because of landmines.

In the last 50 years, rural means of earning a livelihood, including pastoralism in Africa, have been changing, for better or for worse, because of intensive urbanisation, semi-urbanisation, the extension of arable agriculture, forced or voluntary sedentarisation, military conflicts

and ecological degradation, which are impacting upon traditional livelihood systems. Pastoralists displaced by the droughts of the 1980s and 1990s in Sudan responded in various ways to the crisis; those with small herds began to practise sedentary pastoralism in larger villages and at the fringes of urban centres.

Studies by Fre (2009b) in Kassala State, eastern Sudan, where the majority of the Beni-Amer are located, show that rural–urban socio-economic interactions are fairly well established and that there is no doubt such interactions are to the benefit of the rural and urban poor, including the Beni-Amer communities. Milk, livestock sales, animal fodder and sorghum trading are the crucial connections in such interactions, which could also be described as symbiotic and non-exploitative, thus enhancing rural–urban economic and social interactions. Particularly in terms of the milk trade, the linkage is very simple and does not have middlemen.

Defining pastoralism in Beni-Amer terms

In the present research context, *pure* pastoralism (a system fully dependent on livestock) and *pure* agriculture (fully dependent on crops) may be seen as two logical extremes (Brandström, Hultin and Lindström 1979). In the case of the present Beni-Amer, their mode of subsistence falls somewhere in between, as will be discussed later.

The Beni-Amer themselves do not see the need for a strict definition of their occupation; they prefer to use more descriptive or occupational/professional categories. Nomadism as a concept does not exist in the Beni-Amer vocabulary; the nearest term used is *mer-aa* or *rearing livestock*. There are other related concepts, such as *reyet-nwai* or tending livestock, *metbeghas* or following animals to pasture and water, *sebk-saghm* (in Eritrea) meaning ascenders/descenders (seasonal movement between upland and lowland areas), and so on. Occupational specialisation is more important among the Beni-Amer, and cattle production is only one important part of a *whole* pastoral system. In very broad terms, the following categorisation reflects the situation on the ground: 'There is an emerging agro-pastoral interface of new evidence to suggest that an increasing number of agro-pastoral Beni-Amer are permanently settled in villages and are involved in cultivation, urban employment, migrant labour and petty trade. This new trend can be called *urban settled agro-pastoralism*' (Fre and Tsegay 2016).

There is also another trend of settlement within the rural and peri-urban interface of voluntary sedentarisation and urbanisation, where

part of the family gets permanently settled in the rural or peri-urban areas, while other family members herd cattle semi-nomadically in the proximity of towns or large settlements where they are able to sell milk for cash, as shown by studies in the Kassala State (Fre 2008; Fre and Tsegay 2016). Such new trends are hugely significant and worth further investigation, but are beyond the scope of this book.

The Beni-Amer of Eritrea refer to themselves as *Seb-Aha* ('men of cattle'), and in terms of knowledge and skill in breeding and animal care they are masters, even though they may not all own cattle. They are also known and respected among neighbouring groups for their skills in animal breeding.

Cattle production among the Beni-Amer is defined here as a major specialisation and economic occupation, which will remain their domain for the foreseeable future and through which the Beni-Amer can make a major contribution to modern livestock knowledge.

Pastoral specialisation versus diversification

The general description of movement patterns of the Beni-Amer gives an indication of the herd/flock compositions that may be determined by the ecological conditions which they inhabit. The Beni-Amer in the hilly regions of northern Eritrea and the Red Sea hills of eastern Sudan are predominantly herders of sheep and goats, followed by cattle and camels. The composition of herds among the Beni-Amer as a whole is not fully known, but camels seem dominant, followed by goats and some sheep, as in the case of the *Ad-Okud* in northern Eritrea.

The Beni-Amer livestock production system consists of several pastoral categories, ranging from multiple- to single-species herding. In terms of specialisation, camel and cattle herding can be considered as two major specialisations, with small livestock (e.g. goats, sheep) herding in between. Multi-species herding and diversification have increased in importance during recent decades, most certainly because of drought and expanding agriculture in the fertile savannah regions of western Eritrea and eastern Sudan. Multi-species herding among pastoral groups has become a norm as a response to the probability of drought and in order to exploit fully the often mixed grassland, shrubland and woodland environment (Fre 2008).

In the case of the cattle-owning Beni-Amer, there is a gradual shift from monocultural cattle production to multi-species herding, especially among the semi-settled Beni-Amer. Reasons for herd diversification are

Table 3.1 Maturity age and calving interval for different herds

Animal type	Breeding age	Calving interval
Camel	5–6 years	2 years
Cattle	5–6 years	1–2 years
Sheep	4.5 years	1 year
Goat	10–28 months	6–7 months

Source: Gedamu et al. 1984 (confirmed by author in 2016)

common to many pastoral groups; they include consideration of the natural resource base, sensitivity to recurrent droughts, security and the need for regular supplies of dairy products. According to the Beni-Amer in the study area, herd diversification (i.e., keeping small stock such as sheep, goats and poultry) is the result of the necessity to settle their families permanently since there is growing insecurity in the traditional wetland grazing areas. Continuous expansion of commercial agriculture along wetland riverine areas, which are the safe haven for pastoral people during the dry season, is a major threat to livestock survival. Such intrusion by commercial farmers creates conditions of insecurity and conflict between the two groups (Sulieman and Ahmed 2013; Fre 1992, 2009b).

The rationale of herd diversification, according to Gedamu, Berhanu and Bisrat (1984), is to allow pastoralists to close the production gap that results from owning large stocks. Sheep and goats, for instance, will reach their breeding age faster and have shorter lambing/kidding intervals than camels and cattle (Table 3.1).

Diversification of species may have been a recent necessity for the Beni-Amer to which they are trying to adjust given the ecological and political crisis in the area. However, the ordinary Beni-Amer considers small-flock herding as menial and cattle herding and production as an ideal. The class system, cultural ideology, economics and regional reputation of the Beni-Amer are based on specialised cattle herding and dominated by general principles of cattle husbandry, health and production.

Social organisation, power structure and the socio-economic/cultural role of livestock among Beni-Amer cattle owners

Given the ongoing socio-economic transformation in Beni-Amer society in the study area, one has to ask, among other questions, how decisions are made at camp level, and who sanctions the customary law. Traditionally,

the village council of elders and *sheikhs* constituted what the Beni-Amer call the *mahber*. The *mahber* consisted of 10 to 15 men, or sometimes more, depending on the nature of the problem to be settled. Members of the *mahber* had to be community elders known for their integrity and sound judgement. *Mahber* members might or might not be village *sheikhs* (the use of the term *sheikh* among the Beni-Amer may mean either a man learned in religious matters who is the religious leader, or simply someone who is highly respected by the community). The head *sheikh* of a village or settlement called upon the *mahber* to adjudicate on major issues affecting the community. Traditionally, disputes over grazing territory, conflicts over agricultural land, blood feuds and so on were settled by the council of elders. The Beni-Amer customary law guided the *mahber*, and they were in a position to implement or interpret the law (see Annex 3).

Pastoral development planners and politicians in the region debate the merits of supporting or transforming the social structures traditional among the Beni-Amer and other pastoral or agro-pastoral groups. There are two ideologically divergent development experiments among the Beni-Amer in the study area: one school of thought is for the revival of traditional structures (as in Sudan), while the other is for revolutionary social transformation (as in Eritrea). In both cases, the village *sheikh* will remain an important conduit between the pastoral community and the outside world. Until strong rurally based social structures responsive to pastoralist needs are created, the role of the *sheikh* and the *mahber/lgnet* 'local association') at camp level will remain crucial to pastoral development, research and livestock extension.

From a socio-economic point of view, the Beni-Amer attach a great deal of importance to cattle, and unlike other property (such as agricultural land, clothes, houses) cattle continue to produce and generate income throughout their lives, as they produce milk and calves while alive, and meat, hides and bones afterwards. The Beni-Amer compare cattle to permanent teeth or *nibet-ib* ('broad teeth'); as gold or silver teeth can never replace natural teeth, cattle likewise cannot be replaced. Socially, the Beni-Amer see cattle as a source of joy and pride for their owners and relatives and a practical means of assistance to needy friends and kinsmen. The Beni-Amer claim that their cattle dominate regional and national markets and, in turn, benefit their nations (Fre and Tsegay 2016). Although they are the proud owners and herders of such cattle, they know that benefits from cattle are widely shared with non-Beni-Amer groups.

The Beni-Amer society is predominantly patriarchal and cattle management is entirely a man's domain, with the woman's role being

confined to dairy product processing, leatherwork, domestic work and some management of small calves and small ruminants; tradition dictates that women are not allowed to milk cows. Pastoral technology is thus created and maintained by men while women have little to do with the production and management of large stock (e.g. camels, cattle).

It is worth mentioning that in recent years, pastoralists and agro-pastoralists have been facing a major threat to their ecology from the invasive South American plant, *Prosopis juliflora*, introduced into the Horn region by governments and NGOs with the aim of combating desertification. Prosopis was first planted in the Greater Horn of Africa in the early 1900s and first documented in 1917 in Sudan (Pasiecznik, Felker, Harris et al. 2001) as a drought-tolerant tree, good for shade, fuel and fodder. It proved to be very well adapted to local conditions, but was left unmanaged and little used, as was the case in many other countries.

According to Fre et al. (2011), *Prosopis juliflora*, known locally as *Muskit* in northern Sudan, *Tamar musa* in Eritrea, *Norad thorn* in Turkana, Kenya, and other names elsewhere in the ASALS, is a member of a species of fast-growing, evergreen and drought-resistant shrub which grows in semi-arid areas all over the world, including Sudan, Eritrea, Kenya, and other arid and semi-arid countries in Africa. The seed pods are highly nutritive and palatable to local animals, particularly ruminants such as sheep and goats, while the leaves are not, because of the tannin content. However, in Sudan and elsewhere, Prosopis has caused considerable problems because of its rapid growth and damage to farmland, pasture and especially irrigated agricultural schemes. The shrub is dispersed in a number of ways, most commonly via the faeces of the goats and sheep that eat the seedpods. The government has made a concerted, but unsuccessful, attempt at its removal (Fre and Tsegay 2016).

Competition and conflict over resources

Scarcity of natural fodder or water resources, prevalence of disease, recently expanding agriculture, and in some areas a lack of security, make seasonal migration a necessity. Traditionally, under more stable ecological and political conditions, the patterns of movement of the Beni-Amer were more predictable and regular.

Their movement can broadly be described as oscillatory (moving up and down a valley system with limited amplitude) and horizontally (a movement which follows horizontal variations depending on the availability of pasture and water).

Gedamu, Berhanu and Bisrat (1984) suggest the main reason for the northward movement before the rainy season is the need of the Beni-Amer to cultivate their land in the north. They also move north to higher ground to avoid such hazards as biting flies and muddy soils. In eastern Sudan, the northward movement is also seen as a way of avoiding possible conflict with farmers during the rainy season in the Gedaref region south of Kassala State, an important commercial farming area and the main breadbasket for the whole of Sudan.

The movement patterns of the Beni-Amer can be described in a broader regional context because there are several other livestock-owning groups who compete with them for the same range and water resources in what was previously Beni-Amer dry season pastureland. Land encroachment by ever-expanding farmers, horticulturalists and charcoal makers are major problems for the Beni-Amer in Kassala State and the Gash-Barka region in Eritrea, while cattle raiding by armed, mainly non-Beni-Amer groups has also been a major concern for the Beni-Amer and other pastoral peoples, especially in some of the border areas; a study by Fre (2002) provides evidence of raiding for Eritrean cattle by the Ethiopian army along the Ethiopia–Eritrea border (this will be elaborated in Chapter 6).

Pastoralist societies have always been vulnerable to losing their livelihoods because of erratic rainfall, but a combination of social, economic, political and environmental factors has propelled many pastoralists into a negative spiral of poverty, displacement and, in the worst cases, conflict. A study of pastoralists in Sudan cites a range of coping strategies, including: abandoning pastoralism as a livelihood in favour of sedentary agriculture or displacement to cities; increasing or varying the extent of annual herd movements where possible, with a general trend towards a permanently more southerly migration; maximising herd sizes as an insurance measure (assisted by the provision of water points and veterinary services); changing herd composition by replacing camels with small animals, mainly sheep, in response to the curtailment of long-distance migration; competing directly with other grazers for preferred areas of higher productivity (*entailing a conflict risk*); moving and grazing livestock on cropland without consent (*entailing a conflict risk*); and reducing competition by forcing other pastoralists and agriculturalists off previously shared land '(*as a last resort – the proactive conflict scenario*)' (UNEP 2007, 86). This demonstrates that pastoralists are masters of coping with and adapting to changing situations and environments, and that conflicts and risks are part of that reality.

In the next chapter, I provide an overview of the Beni-Amer pastoral knowledge system and their cattle specialisation, showing the importance of crossbreeding practices.

Note

1. TLU is a livestock unit measurement: a cow is one unit, seven goats or sheep comprise one unit, and a camel is 1.2 units.

Chapter Four
Overview of the key elements of the pastoral knowledge systems of the Beni-Amer

The importance of crossbreeding practices

Pedigree herding and careful bull selection are vital components of any breeding system and the Beni-Amer confidently understand them. In this section, a brief evaluation of Beni-Amer crossbreeding concepts will show how they manipulate breeding to achieve specific objectives. Pedigree herding and crossbreeding for such reasons as adaptation, productivity, security and aesthetic qualities have always been part of the Beni-Amer breeding system. Crossbreeding with other, non Beni-Amer, cattle breeds has had increased importance in recent decades. Most of the Beni-Amer interviewed spoke of *introducing* a new bull and new blood to a herd in order to describe the crossbreeding practice, or what is known as *kryet-uhr*. Table 4.1 summarises the rationale behind the present crossbreeding in relation to the two breeds involved: the Dwehin of Sudan and the Bulad/Bgait of Eritrea.

Table 4.1 clearly indicates that the Beni-Amer cattle owners have a holistic, resilient and pluralistic approach to breeding, which includes aesthetic, genotypic and phenotypic characteristics, all of which were mentioned earlier. Docility and a cool heart relate to the animal's favourable character and its ability to obey its owner, so this would be in the realm of animal behaviour. Coat colour reflects the Beni-Amer's preference for black-and-white spotted animals, and polled (trimmed) or short horns also reflect their aesthetic sensibility. Traditionally, the Beni-Amer preferred high-milking breeds (genotype), but since the 1960s they have sacrificed this trait by breeding less productive animals with ones that possess a high sensitivity to outsiders (in order to deter cattle raiders and other intruders). From the Beni-Amer perspective, crossbreeding with

Table 4.1 Characteristics of two indigenous breeds

Dwehin bull (Sudanese)	Bulad cow (Eritrean)
Aggressive, wild character	Comparatively docile
Lower milk yield	High milking potential
Comparatively small	Large-framed and good walkability
Warm-hearted	Cool, slow heart
Short horns	Short horns
High disease resistance (phenotypic advantage)	Lowland type unsuited for heavy clay soils (phenotypic disadvantage)
Less colour dominance but generally black	Predominantly black-white spots with some brown-red

Source: Information from Beni-Amer in the study area, reported in Fre and Tsegay 2016

Dwehin bulls has resulted in less than ideal offspring, but is a necessary adaptation for them to survive in hostile conditions (phenotype).

The Beni-Amer, like any good breeder, would like the offspring to possess a combination of the best characteristics from both breeds. After crossing their cattle with the Sudanese Dwehin bulls for about three decades, the Beni-Amer claim they have achieved their prime objective of breeding less productive animals with high sensitivity to cattle raiders and other intruders (Fre 1991). One can assume, therefore, that the Bulad/Bgait were more productive, much aspired to and preferred by Beni-Amer herders, and in an ideal situation (no conflict, no risk of intruders), they would breed Bgait bulls with Bgait cows to maximise productivity and ensure characteristic cool-heartedness (docile with less fight and flight behaviour).

Another landmark in the evolution of Beni-Amer breeding practices is the crossbreeding (in the early 1970s and the 1980s) of the Dwehin bull of Sudan with the Eritrean Bulad/Bgait cow for a deliberate *hybrid vigour*. The Beni-Amer speak metaphorically of *cool heart* (meaning slow and less aggressive) and *fast heart* (meaning aggressive), and they have opted for the latter because of the vulnerability of their cattle to raiders and aggressive commercial farmers. They have employed this genetic breed manipulation by crossing a homozygous recessive Bgait cow with a Dwehin bull to obtain first generation (F1) heifers with genetic or hybrid vigour, which they refer to as fight and flight or *aggressive*, and a tendency to fight off intruders. Having this particular attribute among their cattle

is becoming increasingly important in the light of mounting pressure on land and resources, and the resultant conflicts, such as land grabbing and cattle raiding.

The Beni-Amer cattle are traditionally black-and-white spotted, whereas Dwehin are predominantly black, but because of the Dwehin influence, the Beni-Amer cattle have become blacker. After decades of crossbreeding in a new environment, the Beni-Amer are herding a second generation of cattle bred with objective precision, and this is likely to continue as cattle numbers increase. Genetically, however, the productive characteristics of the Bgait will eventually be suppressed.

This new breeding practice (Dwehin × Bgait) has emerged out of necessity as the cattle herders were forced by hostile circumstances (cattle raiders) to breed new blood. The experiment has worked for more than three decades, clearly demonstrating the ability of the Beni-Amer to manipulate traits in cattle through selective breeding. The Beni-Amer's awareness of the techno-social implications of their new breeding strategies was also assessed during the research.

Firstly, they said that Dwehin × Bulad crosses have *fight and flight* tendencies as intended, but are less productive than the original Bgait cattle. In other words, they see the recent crossbreeding exercise as a genetic degradation, and, in order to emphasise the new Sudanese blood, they call the present crossbreeds *Aha-Dwehin* (Dwehin cattle) instead of the more traditional name, *Aha-Bgait* (Bgait cattle).

Secondly, the Dwehin crosses are difficult to handle because of their wilder tendencies, and they require a larger labour force for herding. They prefer to have the same herder or herders all the time, they are sensitive to and violent towards outsiders, and they are difficult to handle in marketplaces.

Thirdly, the new crossbreeding has socio-cultural implications. Beni-Amer culture adores the Bgait as productive, gentle, docile, and truly *born and bred* Beni-Amer, but the Dwehin × Bgait crosses of the present generation are seen as *alien blood*, as they do not fit into the traditional cattle cultural context.

Fourthly, decades of drought in the region and displacement (due to past wars) of pastoralists from their homes, ranging from western Eritrea to eastern Sudan, have made some Beni-Amer less specialised in cattle production. So, rather than crossing Dwehin with Bgait, they have opted for multi-species herding (for example goats, sheep and camels); this deviation from tradition is by necessity rather than by choice.

Genetics, in general, is a very complicated subject and what has been evaluated in this chapter is open to further research, but in terms

of the resilience of indigenous knowledge, the evaluation shows that the Beni-Amer know the benefits of crossbreeding and are aware of the technical and socio-cultural implications of their actions. They are clearly able to manipulate animal character through careful bull selection and crossbreeding to suit their situation, and this encourages hybrid vigour.

Herd composition and managing productive herds

The discussion in the earlier part of this chapter has shown that cattle bred by the Beni-Amer have good genetic qualities in terms of milk production and environmental adaptation, but the Beni-Amer traditional breeding objective is primarily to produce a productive *female herd*. I observed that herds are 90 per cent composed of productive or potentially productive females; this has also been seen by Gedamu et al. (1984), who report that 93 per cent of Beni-Amer herds observed consisted of females. The Ethiopian Institute of Agricultural Research (EIAR), which can be called a hybrid institution, states that the Beni-Amer are much better at keeping productive cattle than other pastoral groups in East Africa.

Beni-Amer herds are composed of separate milking or *Hlb* and non-milking or *Nesuf* herds. A typical Beni-Amer herd consists of 60 to 100 adult animals, but the age and composition of dry and milking herds vary greatly. The cattle in both cases have to be productive or potentially productive, and there is no evidence to suggest that the Beni-Amer keep unproductive animals.

In my observation of more than 100 dry herds in the study area, I noticed striking similarities in terms of herd composition and structure. A typical dry Beni-Amer herd consists mostly (60 per cent) of heifers or *felayit*, which are categorised within the herd as *nu-ush ighra* or light-footed. Slightly more than 35 per cent within the herd are *bu-krt* or adult cows (after 2 or 3 calvings) and the leader cow or *merahit* is selected from this group (such a cow will have a bell hanging from her neck and she leads the herd). In terms of male–female ratio, it is common to find only two or three bulls per herd of 100 animals. The herds also consist of a very small number (less than 5 per cent) of old cows categorised as *ghedob*, which are kept mainly for sentimental reasons, such as being of the pedigree. According to tradition, such cattle will not be slaughtered, but will be the first to be sold in times of need or crisis.

The culling of males stems from the management objective of the Beni-Amer, who perceive the herds as female and bred to produce milk,

but there are new trends among settled Beni-Amer and more male calves are being reared for the local and regional markets.

Since the 1960s, faced with environmental degradation, agricultural encroachment, cattle raiders and civil conflict in some parts of the Horn region, the Beni-Amer have opted for multi-species herding, a phenomenon which is not yet well studied (Fre 2008). This is also a clear indication that the pastoral system is resilient and can adapt to the prevailing conditions, whatever they may be.

The degree to which the Beni-Amer are moving away from cattle herding to other means of subsistence, such as multi-species herding and wage labour, may be significant, but observations of their herd composition show that the Beni-Amer are still pastoral and cattle-oriented at heart. The Beni-Amer continue to be renowned for their cattle specialisation and, as mentioned, consider themselves to be *Seb-Aha*, or 'men of cattle' (Fre 2009a).

The Beni-Amer attach great importance to ruminal adaptation and they breed a variety of animals whose digestive systems are suited to different environments. Such specific breed traits are not confined to

Table 4.2 Herd structure among settled cattle owners in eastern Sudan

Herd composition	%
Milking cows	70
Heifers	18
In-calf cows/heifers	5
Male calves (11 months +)	2
Female calves (9 months +)	5
Total	100

Source: Author's fieldwork 2011

Table 4.3 Herd structure among migrant herds in dry-season grazing areas along the River Tekeze on the Sudan–Ethiopia border

Herd composition	%
Adult heifers	60
Adult cows	35
Old cows	5
Total	100

Source: Author's fieldwork 2011

the Beni-Amer, as they are adapted through crossbreeding with stock belonging to other ethnic groups or tribes, both in the Ethiopia–Eritrea highlands and in lowland habitats. Several other non-Beni-Amer ethnic groups have used the Bgait as pedigree or sometimes crossbred them with their own hill-type or *Arado* animals. As mentioned before, dairy units in major towns in Eritrea, as well as in eastern Sudan, use better-fed Bgait breeds or crosses for intensive milk production for the urban and peri-urban population.

Further analysis of the Beni-Amer management systems shows that calf drop is seasonally controlled and geared to coincide with the rainy and harvest seasons when grass, water and fodder are in good supply. The basic principle is that if animals were calved during the dry season, their body condition would deteriorate because of physiological stress. Thus, dry-season calf drop is unwelcome because the scarcity of water and forage coupled with milking pressure can lead to weight loss and other physical stress. Calf drop also coincides with the movement of pastoralists northward. From the wet clays and fly-infested areas in the south to higher, drier ground in the north, herders move closer to their home base after being away for about six months.

The Beni-Amer consciously encourage milk let-down through udder massage, chanting the cow's name during milking, having the same milker, and night milking when temperatures are cooler. In the case of a dead calf, dried skin or a dummy calf smeared with milk is given to the cow to lick. All of these actions reflect the belief that a cow will only fully release her milk when she is relaxed and not tense. The same concept is applied in European dairy units, where music is played during milking and concentrated feed cake is supplied in order to encourage more milk let-down. During the 1980s, I worked in British commercial dairy farms as a trainee agriculturalist and witnessed music being played in the milking parlour.

The Beni-Amer ensure good husbandry by providing coarse salt, or grazing land with higher salt content, salty browse, night grazing to reduce animal stress caused by excessive daytime heat, and crop fodder, and avoiding dirty or swampy water as far as possible. The timing, amount and frequency of salt provision very much depend on salt availability and the season. The Beni-Amer believe that salt has nutritive and curative values and increases appetite, as well as being an essential dietary requirement, while dairy herders in western Europe and the United States see salt as an essential mineral, with only nutritive rather than curative value. Rock salt is often put in the field to supply supplementary sodium and chlorine; other minerals such as calcium,

phosphorus, iron, potassium and sulphur are blended as mineral mixtures for different classes of livestock (Boatfield 1979).

Night grazing (6 pm–5 am) during the dry season is another tradition well established among the Beni-Amer as an essential husbandry practice; it is perceived by the Beni-Amer as a way of escaping the intense daytime heat of up to 40° C in the dry season. Animals are likely to lose less energy by grazing at night (when the temperature is lower) as their body temperature varies according to the atmospheric temperature. Night grazing also reduces the amount of water needed by the animal and the loss of water through perspiration, and so a lot of energy is saved, which in turn, positively affects body weight, this being the prime concern of the Beni-Amer, particularly during the dry season.

At the height of the dry season (March–June), cattle rest under trees for most of the day and graze at night. The timing and frequency of night grazing is very much influenced by the season, the nature of the herd (milking or dry), the extent of agricultural encroachment and security from cattle raiders.

In high-potential farming areas, where agricultural encroachment is intense, milking herds are confined to the hilly areas and homesteads. During the rainy season, low-lying clay areas become infested with biting flies, which irritate cattle during day grazing; as a result, herders practice night grazing to mitigate the fly hazard, since biting flies are less active at night. Ideally, there should be less need for night grazing during the rainy season because of the abundance of grass and cooler daytime temperatures, but in practice night grazing has become a year-round activity.

Over the last five decades, the dependence of livestock on crop fodder as a subsistence ration has become crucial to good husbandry, especially in eastern Sudan. Crop fodder, particularly sorghum, has become a source of cooperation between herders and farmers, as well as one of conflict. In the study area over the last decades, farmer–herder conflicts have escalated and sorghum fodder has become a source of conflict rather than cooperation, particularly in the Gedaref district of eastern Sudan and the Gash-Setit area of western Eritrea (Sulieman and Ahmed 2013; Fre 1991). These are agriculturally and pastorally the most important areas for which competition is intense (Fre and Musa 1993). Half of Sudan's sorghum crop and charcoal supply is produced in the Gedaref district. Table 4.4 indicates the importance of crop fodder, not only as a grazing supplement, but also as a substitute for grazing, particularly during the dry season.

Table 4.4 The scale of forage production in Gedaref district, eastern Sudan

Scheme	Area (feddans)*	Total production (tonnes)
1. Planned mechanised schemes (MFS)	1,211,350	2,422,700
2. Unplanned MFS	1,669,270	3,338,540
3. African Co. Scheme	13,000	26,000
4. Abuseca Scheme	6,000	12,000
5. State farms	12,667	25,334
6. Canadian Scheme	3,800	7,600
7. Qala-en-Nahal**	40,000	75,000
Total	2,956,087	5,907,174

Sources: MFS (mechanised farming schemes) Khartoum 1992, quoted in El Tayeb (1985); Sulieman and Ahmed (2013).
Notes:
* 1 feddan = 1.04 acres
** Additions by present author

It has to be pointed out, however, that these amounts of forage are not always available to the livestock owners, because of remoteness, lack of a water source for the animals or lack of transhumance routes. There is also a big demand for crop fodder in the urban and peri-urban settlements, where a growing peri-urban livestock population needs fodder.

Over the last decades, traditional patterns of movement and the availability of seasonal resources have been greatly disrupted by factors beyond the control of pastoralists; encroachment, cattle raiding, desertification and conflict have become major constraints on good husbandry in the region. Research by Sulieman and Ahmed (2013|), Fre (2009b) and Morton (1998) among the neighbouring pastoralists, in eastern Sudan and elsewhere, illustrates the vulnerability of pastoralists in the wider region because their regular dry-season grazing lands and the routes to their rainy-season pastures are being taken by tractorised schemes.

The case of the Beni-Amer is, in fact, very similar to the above, and there is good reason to argue that it is the factors mentioned earlier which limit good husbandry and not the management skills of the pastoralists themselves, as is normally assumed by policy makers. In this case, ensuring land rights and access to pastoralists may be more crucial to pastoralists than other husbandry interventions for *developing* sustainable pastoralism.

The case for *indigenous pastoral knowledge and practice* (IPKP) and the relevance of that concept to pastoral development were highlighted in the first chapter. The research on IPKP among the Beni-Amer in this section will focus on specific areas of knowledge and production that have emerged as deserving more detailed explanation. As already stated, the main focus is on pastoral technology that has the following characteristics:

- There are things that can be called common livestock knowledge and practices. Examples are disease nomenclature and symptoms, ethno-botany, the importance of good husbandry, and so on. These are referred to as *kulna-lanaamru*, or *that which we all know*.
- There are specialised knowledge and practices that are possessed by a minority of pastoral or agro-pastoral people within a large community or communities. Such people are referred to as *Seb-lalaamro*, or *people with specialist knowledge*. They perform special duties such as treating fractured and dislocated bones, assisting complicated births (breech presentation), and so on. They can offer services or advice out of the ordinary (i.e., outside common knowledge or practice).
- There are specialised tasks and skills performed and accepted widely by members of the same tribal grouping. In this case, the whole tribe refers to itself by the animal it specialises in. The Beni-Amer, for instance, consider their cattle specialisation as something they have in common and consider themselves as *Seb-Aha*, and such specialisation is recognised and appreciated by neighbouring non-Beni-Amer groups.

It is important to stress, however, that Beni-Amer specialisation is not uniform in terms of management ability and the productivity of various herds. Individual or group management ability influences production, but among the Beni-Amer the herd is perceived as family capital and property, the products of which can be shared with others. Fre (2008) and others argue that the management practices of individual owners are one of the most important factors affecting productivity.

Among the Beni-Amer, however, keeping and managing good, productive and healthy herds is part of tradition, and pastoral knowledge is thus widely shared. But the Beni-Amer may be exposed to different grazing opportunities and risks (e.g. cattle raiders, encroachment by farmers) which are bound to have an effect on herd productivity.

During the field research, pastoralists and agro-pastoralists never complained about the quality and productivity of their cattle breeds. They argued that their breeds were producing less milk because of poor husbandry forced on them by lack of grazing resources. As a move towards improving this situation, the Beni-Amer have proposed and prioritised the following supportive institutional interventions:

- official demarcation and allocation of their grazing lands;
- provision of wells nearer to settlements;
- more access to agricultural land after harvest, limiting the expansion of agriculture to reduce encroachment; and
- severe punishment for cattle raiders and thieves.

Animal production and husbandry

As far as cattle specialisation is concerned, the Beni-Amer who own dry (non-milking) and milking herds possess, as a group, highly specialised skills and underlying perceptions. For instance, breed selection is done purposely to suit given conditions, such as topography, ecology and security. The best bulls are selected from a mother of known genealogy; characteristics such as milk yield, character, colour and mothering ability were traditionally the main criteria for bull selection. At present, they are sacrificing milk yield characteristics by crossing *Bgait* with the more aggressive *Dwehin* bull from the Sudan as a deterrent to cattle raiders.

Knowledge of the different breeds of animals is fairly well spread. For example, the origin of the animal, its milking and kidding characteristics, and its adaptability to and suitability for the present environment are known by most herders, and Beni-Amer pastoralists breed for specific purposes such as milking or continued breeding. They keep productive females, which sometimes comprise as much as 90 per cent of a herd, which illustrates this point.

The Beni-Amer thus try to produce productive animals and to enhance the productivity of their cattle by manipulating their physiological capacity and animal behaviour. They encourage milk let-down and yields by massaging the udders of their cattle, chanting the cow's name, praising the cow during milking, and so on. They provide good management and care by taking cows out for night grazing (when it is cooler, to avoid the day temperature, which is 30–45° C), by seasonal provision of salt, by crop fodder provision, by limiting water consumption during the dry season, and so on. This area of knowledge of pastoral

technology is where the Beni-Amer can make a direct contribution to our scientific knowledge of livestock production.

Ethno-veterinary knowledge and practice

The various diseases that affect livestock have local names that range from universally descriptive names, such as cattle plague or *gulhay* ('shaver', or rinderpest), to little-known diseases, such as swellings or *hbat*. The seasonal characteristics of certain diseases caused by biting flies are fairly well known, and in one area I identified more than 30 commonly known livestock diseases. Disease nomenclature in some cases is detailed and some of the causes and symptoms of disease and the general effect on animal health are known. Animal diseases are also placed in four main categories:

- **killer diseases,** referred to as *ajel* (the predestined day of death), that cannot be stopped, e.g. rinderpest;
- **contagious diseases** (those which are known to be so), or *lalhalf*, can partly be prevented from spreading, for example by isolation or slaughter;
- **chronic diseases**, or *la-ad-ef*, that are hard to cure, e.g. caprine pleuropneumonia (CPP); and
- **curable diseases**, or *lt-dawe*.

Most diseases are not perceived as heavenly punishment, but said to originate from lack of good husbandry. The Beni-Amer attach great importance to good husbandry (*mera-senni*) as the best protection against diseases; for example, mixing of flocks or herds (*hber*) is seen as a predisposing factor to disease and a bad husbandry practice.

The distribution of knowledge is even among older people, but is less detailed among younger people, who may or may not be involved in direct herding. However, traditional veterinary practice, unlike common disease knowledge, seems to be confined to a much smaller group of people, described as *Seb-lalaamro* or *people with specialist knowledge*, who perform specialised duties. One of their main specialisations is identifying the ailment properly and suggesting a cure or performing on-the-spot treatment; such people are highly respected by the community and are always in demand. In their absence, ordinary pastoralists try to perform the duties themselves, with only partial success. Such traditional medics resent the fact that their work is not recognised by

government veterinarians, who rarely visit them. The traditional medics approve of modern veterinary medicine for dealing with certain diseases such as rinderpest (*gulhay*) and anthrax (*ansa*), but they think some of their own methods of treatment (such as fractured bone treatment) are better, and they emphasise the complementarity (or synthesis) of the two practices in improving veterinary care for their animals. The argument in the discussion on ethno-veterinary knowledge and practice will develop in two ways.

Firstly, the several medical and nutritional practices in the systems will be described by close comparison to western veterinary medicine. Such areas include the straightening of fractured bones, the provision of laxatives to bloating animals, the provision of salt, and the treatment of mange by using medicinal plant saps. It will be argued that in such cases intervention should be for the improvement and upgrading, not the replacement, of sound practices.

There are inherent weaknesses in disease prevention and perception even among the knowledgeable traditional medics; the diseases described as unknown (caused by divine act) or put down to *ajel* (the day of destiny) are simply unidentified. In such areas, traditional medics, if trained, can be the best medium for reaching the pastoral communities.

Ethno-botanic knowledge and traditional land use

Generally, the territory of the Beni-Amer in Eritrea, eastern Sudan and northern Ethiopia consists of mountains and foothills (*adbr*), coastal areas (*sewahil*) and vast savannah plains (*saiid*) in the south. These environments are sufficiently varied to influence the mode of livelihood of the Beni-Amer.

What the Beni-Amer call *saiid* is an environment characterised by heavy black soils, and these plains are suited to the rearing of the heavy, high-yielding, lowland-type cattle for which the Beni-Amer are well known. In terms of land use, the southern part of the study region becomes heavily infested by biting flies and too muddy for grazing from June until September, so the Beni-Amer take their cattle north to higher ground, which is free of flies and has lighter soils.

The knowledge of ethno-botany among the Beni-Amer pastoralists is not simply botanic, and it contains detailed elements of oral taxonomy. The botanic knowledge is extensive but somewhat localised; such knowledge is closely associated with animal nutrition (utilitarian) and animal health (medicinal) and is used to classify livestock breeds by the ruminal

flora they consume. Much of the ethno-botanic information in this book was collected during the field research and subsequent visits, but it is by no means comprehensive. The ethno-botanic knowledge of the Beni-Amer is to a large extent undocumented, but it may be studied through the lens of disciplines such as geography, ecology and agricultural anthropology. In the present context, ethno-botany is treated superficially and only in relation to animal production and health. Most of the ethno-botanic data is in Annex 1, because the primary focus of the present research is animal production, husbandry and health; *pastoral* ethno-botany is mentioned in general terms.

The older Beni-Amer, the *Fellata Sudanese* (Sudanese of West African origin) and the *Beja* have shown great skill in classifying the vegetation and providing a historical account of some extinct vegetation. In one case study, a Fellata Sudanese agro-pastoralist was able to provide a full description (location, habitat, use, nutritive value, etc.) of 25 tree and grass species. An old Beni-Amer pastoralist identified 50 tree and grass species within a 45-kilometre-long riverbank.

For plants whose Latin names are not known, their local names will be used in this section, which analyses their growing environment and range use (see Annex 2).

Plant knowledge among the Beni-Amer extends to animal breeds as a means of general ruminal classification and the Beja refer to their camel breeds as *Hib-qualot* or tree eaters, *Aliab-qualot* or grass eaters, and *Shallagait* or eaters of salt marshes along the coast of the Red Sea. The Beni-Amer group their camels into white and red; the white breeds are known as *Abet* (browsers of salty plants) and the red camels as *Radyet* (browsers of sweeter plants).

According to the Beni-Amer, the *Abet* are hardy and better survivors; during the decades of drought, they were better able to survive because they were able to graze on a variety of sweet and salty plants. These plants are *Ubel*, *Kulmt-Hamta* (unidentified trees with a salty taste) and *serob* (*Capparis decidua*) as well as *ksla (Ziziphus spina-Christi)*. The *Radyet*, on the other hand, were more accustomed to sweeter plants, which were very few in drought years, and therefore suffered greater death rates.

Beni-Amer ethno-botany consists of botanical ethno-semantics (tree, grass and herb names, including extinct species), utilitarian and medicinal use of plants, ruminal and floral knowledge, and knowledge of range preferences (see Annex 2). The Beni-Amer ethno-botany is detailed enough to form some basis for range improvement and extension work, but there are also inherent weaknesses in the system which should be noted:

- the perception that environmental resources, such as trees and grasses, are unlimited; and
- the fact that the consequences of a degraded environment for future pastoralists are not fully realised.

This is worsened by ever-increasing agricultural encroachment on traditional grazing territories, which has led to lack of access and control by pastoral groups, including the Beni-Amer. In other words, pastoral groups in the study region may have detailed botanic knowledge but an ever-decreasing land resource base, as mentioned in the previous section, which will be elaborated in Chapter 7.

Beni-Amer traditional range resource control mechanisms are not particularly strong and have been put under external pressure (farming encroachment, insecurity, etc.), and cutting trees for making charcoal and for grazing has become more frequent. According to Beni-Amer custom, grazing land is common to all Beni-Amer, but land use systems are varied and complex and the focus in this book is on the utilitarian and medicinal aspects of traditional ethno-botany among the present study group.

The purpose of this chapter has been to introduce the major components of the present research (animal production, animal husbandry and ethno-veterinary knowledge); ethno-botanic knowledge is treated in a more general *pastoral* context. The following chapters will deal extensively with three major thematic areas:

- animal production;
- livestock management;
- animal health; and
- the implications for people-oriented technological intervention among the Beni-Amer and other pastoralist communities in Africa.

In the next chapter, I begin with an exploration of the technical aspects of the Beni-Amer's methods of animal production. From their informal knowledge of pastoral genetics to their intimate knowledge of the breeds themselves and their skill at breed manipulation, it will be shown that the Beni-Amer's indigenous knowledge and methods are much more systematic and *scientific* than the scientific community would have you believe.

Chapter Five
Animal production among the Beni-Amer

This chapter presents the major aspects of the Beni-Amer cattle production systems by examining key production concepts such as the Beni-Amer's knowledge of genealogy, selective breeding, crossbreeding, bull selection, pedigree herding, oestrus detection, calving, milk let-down, and herd structure and composition.

As there have been no previous studies, it is difficult to say that the present research is an exhaustive investigation of the Beni-Amer cattle production systems. However, the description and elicitation of the *indigenous pastoral knowledge and practice* (IPKP) of cattle production contained within this book form an adequate basis from which to argue that the present production principles and practices, although unknown to outsiders, are sound.

The field data show that there is a pastoral genetic base (cattle breeds) and production information which could be integrated into livestock research and community knowledge-based extension services. Very little evidence has emerged to suggest that the current production principles are primitive in any way.

Knowledge of breeds and the origins of Bgait cattle

The field data also clearly show that the Beni-Amer and other pastoral groups in the study area have detailed knowledge about the multiple breeds of livestock they rear under a variety of ecological conditions. This knowledge includes the breeds' origins, their adaptation to local grazing and browsing conditions, their productivity, and their specific uses (riding, haulage, milking, etc.). Table 5.1 shows their knowledge of using and adapting camels.

Table 5.1 Camel owners, with use and adaptation of camels

Region/ country	Camel type	Owning tribe	Breed description	Usage	Environmental adaptation
Eastern Sudan	Rashaida strain	Rashaida	Short-legged, pink colour	Pack camel	Savannah, semi-desert and coastal areas
Eritrea	Zbedi	Rashaida	Small size	Pack camel	Hills and coastal areas
Eastern Sudan	Anafi	Shukrya	Pale colour, small hump	Extreme form of riding	Semi-desert and savannah
Eritrea	Anafi-Shukrya	Beni-Amer	White, small head	Riding	Semi-desert
Eastern Sudan	Bishari	Beja	Strong and sturdy, better conformations than Anafi. Finest breed of riding camel	Riding	Montane areas
Eritrea	Bishari	Beni-Amer	120–200 cm withers height	Riding	Savannah and plains
Eritrea	a) Grain (tawny)	Beni-Amer	Stout legs, smaller than Bishari	Pack and milk	Savannah, foothills and plains
	b) Cayh (red)	Beni-Amer	Intermediate between Grain and Bishari	Pack	Montane and savannah
	c) Abyet	Marya	White, small-sized, hill-type, prolific	Pack and milk	Browse on sweet and salty plants
	d) Radyet	Marya	Red camels, medium-sized	Pack and haulage	Browse mainly on sweet plants
Eastern Sudan	a) Aririt	Beja	Small hill-type	Pack and milk	Montane browse as well as foothills and coastal areas
	b) Matiat	Beja	Medium-sized hill type	Pack and milk	Browse along riverbanks and in hilly areas
	c) Shalleget	Beja	Heavy camel	Pack and milk	Coastal areas and browse in salty vegetation. A coastal camel

Source: Fre 2009a; Hjort and Dahl 1984; Mason and Maule 1960

In other parts of the world, research has shown that pastoralists possess wide-ranging knowledge about the animals they keep. While most breeds have local names, the Beni-Amer also choose to name their individual animals. Pastoralists have an extensive knowledge of the genealogy of their animals, which is reflected in how they name their animals, and this is also an important aspect of the continuation of an oral tradition. Additionally, pastoralists are well versed in their animals' management needs and where they fit into their socio-cultural milieu. For example, the WoDaaBe in West Africa are extremely fond of animals of *Bororo* stock (red cattle); such attachment may be for emotional, culturally informed aesthetic, economic or technical reasons (Fre 1991; Hendy 1981; Katushabe 2014; Maliki, White, Loutan and Swift 1984; McCorkle 1986; Wilson 1986).

Among the Beni-Amer, the *nu-u* or genes of the Bgait cattle, the origin or *making of the animal*, offer the possibility for an interesting genetic discussion. However, the genetic mechanism and chemistry of cattle inheritance are not topics for discussion here; the main considerations are the physio-social and environmental cattle characteristics that are deliberately enhanced by the Beni-Amer to meet certain production, cultural and adaptational requirements.

The perception of the historic origin of the Bgait cattle and the transformation of the hill-type cattle to large-framed lowland cattle are well understood:

> Our forefathers brought with them from the Northern Barka and Sahil mountainous parts of Eritrea, the long-horned red cattle, or Aha-Cayh, to the savannah lowlands in western Eritrea, namely the Southern Barka region. These were crossed with the lowland Bulad in Southern Barka which transformed them from Bulad to Adelway (black and white coats or red and black spots'. (Beni-Amer)

Historical records also provide a similar description and, according to Mason and Maule (1960, 53), the Bgait have a 'convex facial profile' and are 'red pied or black pied' in colour.

To avoid confusion, the term *Bgait*, a general name widely accepted by the Beni-Amer themselves, will be used to refer to the cattle in the study area in eastern Sudan, western Eritrea and northern Ethiopia. The Beni-Amer also use the general term *Aha-Barka* ('Barka cattle', indicating the geographic location), which means the same thing, or sometimes *Dwehin* to indicate cattle crossbred with other Sudanese breeds. *Bulad* is a specific strain name understood by the Beni-Amer, as will be described in the following sections.

However, some authors, such as Gedamu et al. (1984), Fre (2009b) and FAO/UNEP (1982), use the term *Bgait/Barka* when they actually mean *Bulad*. The Bulad cattle they call Bgait/Barka are the highly productive, short-horned zebu, spotted (black-and-white, predominantly), large-framed cattle of the Gash and Setit river areas of western Eritrea, eastern Sudan and parts of northern Ethiopia.

According to Mason and Maule (1960, 53), an adult Bgait cow is 111–28 cm in height and 294 kg in weight, and an adult bull is 121–36 cm in height with a withers height of 130–5 cm. From my field observations, a mature bull weighs between 300 and 350 kg.

For the purposes of this book, I will not be dwelling too much on the specific strains of the Bgait cattle, but more on the knowledge systems of the Beni-Amer.

Since the Beni-Amer cattle herders have a cultural identity that is inextricably intertwined with the Bgait cattle they care for, they know their breeds well, and they are able to manipulate their genetic characteristics to meet certain objectives. Traditionally, they bred heavier, more docile, more productive cattle, but in recent decades they have been breeding wilder cattle that are less productive and more sensitive to strangers, specifically cattle raiders. The theme of genetic breed manipulation among the Beni-Amer is fascinating and will be discussed in the following sections.

Pastoral genetics: breeding with purpose

Pastoral genetics in its widest sense is used here to argue that the Beni-Amer, like many other specialised groups, are skilled in breeding for functional (yield, character) and aesthetic (coat colour, size, etc.) characteristics. Their pastoral genetic vocabulary is rich and they sometimes use scientific terms comparable to western animal production phraseology. Traditionally, all Beni-Amer are supposed to adhere to good production principles and aim for the best consistent breed of cattle – the Bgait – which are perceived to be the pride of all Beni-Amer.

To the Beni-Amer, their cattle are not the result of historic accident, but a product of sound, applied skills and production principles, and they believe that uniformity in colour, high milk yield, size, character and adaptability in a herd are common goals all good herders aim to achieve. Despite their openness to several pastoral and agro-pastoral groups via commercial contacts and seasonal movements, they are determined to maintain the Bgait breed, which is, in their opinion, still the ideal in terms of milk yield, coat colour, temperament and loyalty. As evidence of

the cultural importance of the breed, cattle and herders alike are praised through the reciting of poems and singing of songs when standards are exceptionally high.

Because of ecological, political and security problems, traditional breeding standards may be difficult to maintain fully, but it is evident that many Beni-Amer still breed their animals with the objective that they will have the following characteristics.

High milking ability, size and coat colour

The best bull must be selected from a mother of known and good genealogy and the mother should be a high milk yielder, able to mother well, and docile. Bulls are carefully selected and therefore their numbers per herd are limited (roughly 5 to 10 per cent, the remaining 90 per cent being female). On top of the milking qualities, the bull is also selected for its short horns, even coat colour pattern and good character, all characteristics that are inherited from the mother.

Cattle of Bgait origin must be large-framed and colour preference is *adelway* (black with white spots); such coat colour patterns throughout the herd were observed during my long experience of working with the Beni-Amer herders.

Loyalty to the herder and a good fighter against intruders

Extreme loyalty to their owners and a hostile reaction to outsiders are believed to be partly inherited, and cattle are trained to attack strangers and never follow or be herded by them. The loyalty of cattle to their owners is impressive and it is not uncommon for lost Beni-Amer cattle to return to their owners by smelling and following their owners' footprints. The Beni-Amer claim their stolen cattle come back to them by themselves even after being gone for as long as a year. During the field research I was able to observe how aggressive such cattle can be unless you are accompanied by the herder as you approach them. When the cattle are approached by strangers they instantly raise their tails and ears to warn the intruders and this is followed instantly by an attack.

Walking ability

Some of the Beni-Amer practise long-range semi-nomadism (up to 600 km in one direction), which takes them as far as the central Ethiopia highlands (Gonder and Tigray regions in particular), so the ability

of cattle to walk long distances across varied terrain is crucial. Such characteristics are perceived to be partly inherited and partly learnt through good herd management.

Comparison with western breeding systems

In order to provide some comparison between *traditional* and *western* knowledge of breeding, Tables 5.2 and 5.3 show how Beni-Amer knowledge and practices compare with UK knowledge and practice. These

Table 5.2 Comparison of two breeding systems

Beni-Amer system	UK system
Breeding primarily for milk, but also for beef and draught animals. Dual-purpose animals. Market considerations secondary.	Breeding for milk and beef separately. Bred strictly with market requirements in mind (e.g. carcass and milk qualities).
Qualities desired in the bull (matrilineally). They include productive ability, coat, colour, size, character, virility, walkability and vigour. The real objective is producing productive cows that can survive under austere conditions.	Matrilineal qualities desired in a bull, including productive ability, growth rate, live-weight gain, disease resistance, food conversion ratio. Producing for dairy or beef also influences choice.
Breeding age of productive bull 2–2.5 years, but effective mating starts at three years. Maximum serving age of a bull is 10–12 years.	Breeding age of a bull 12–16 months. Bull starts regular service by two years. Maximum serving age of a bull is about eight years.
Bull–cow ratio is about one bull for sixty cows (1:60) under semi-nomadic conditions. No artificial insemination (AI) or hand service available to herders.	Bull–cow ratio is about 1:20 if natural service is used. If it is hand service, the ratio is 1:60. If AI is used the ratio is not known.
Culling age for milking cows is after 10 lactations or more. Pedigree cows or *Ghedob* may be kept for longer.	Culling age is not definite, but no more than eight lactations. Unproductive cows can be culled at any time.
Gestation period for cows is about 10 months.	Gestation period for cows is about 9.5 months.
Longer calving interval.	Shorter calving interval.
Use of pedigree cows and crossbreeds.	Use of foundation stock but mainly uses crosses (breeds).

Table 5.3 Signs of oestrus (heat) in cattle

Beni-Amer system	UK system
1. Restlessness among cows (e.g. jumping with a raised tail).	1. The heifer or cow becomes more excitable.
2. Heifers or cows trying to mate with other cows and tempt the bull.	2. She allows herself to be mounted by other cows.
3. Teasing other cows by licking and suckling.	3. Her temperature rises for a time.
4. Initiating a bull by smelling and tasting other cows' urine.	4. Milk yield drops slightly.
	5. There is sometimes a clear discharge from the vulva.

Source: Beni-Amer comparison based on present fieldwork and on researcher's work experience in UK farms. Information for Western systems quoted directly from Boatfield (1979)

are based on the author's work experience on farms in the UK. The comparison, while not comprehensive, does give an idea of the potential complementarity of the two knowledge systems with respect to breeding. Traditionally, natural selection (as opposed to artificial insemination (AI) in more commercialised systems) is the only breeding method open to the Beni-Amer. However, as the tables indicate, their present system compares favourably with UK practices, as observed during the author's work experience in UK farms.

An example of manipulating breeding

Beni-Amer cattle herders are responsive to prevailing socio-political and eco-climatic pressures, and through long experience they have learnt to manipulate breeding practices to produce crossbreeds with strong *fight or flight instincts*, so that when cattle raiders venture to steal them, the herd will attack the intruder fiercely. This is still the case to date and demonstrates the Beni-Amer's sophisticated skills in animal behaviour manipulation.

Some of the Beni-Amer in eastern Sudan (pastoral refugees fleeing the liberation war in Eritrea during the late 1960s and early 1970s) brought a nucleus cattle herd with them, while a small number of others brought large herds into the new environment (Fre 1984). They soon found that the breeds they brought from Eritrea were good

milkers, but had less fight or flight instinct and so became vulnerable to cattle raiders and aggressive farmers in the unfamiliar surroundings of eastern Sudan. Most Beni-Amer were affected by circumstances of greater insecurity and were thus forced to breed a more aggressive, *wilder* breed. They chose the Sudanese Dwehin bull, which is a short-horned zebu and a distant relative of the Bgait, to cross with Bgait herds in the hope that the offspring would maintain Bgait productivity traits and inherit the wild temperament of the Dwehin. Such an offspring would be extremely hostile to cattle raiders and uncontrollable by aggressive farmers attempting to encamp them and impose fines for entering mechanised farms or damaging crops. At one time this type of cattle-breeding exercise would have been seen as risky and experimental, but it is now widely adopted by the security-conscious Beni-Amer. Even though the Beni-Amer believe that the present Bgait–Dwehin crosses are inferior in terms of milk production to pure Bgait, the crosses have achieved the desired level of wildness to deter cattle raiders and hostile farmers.

The introduction of alien blood to Beni-Amer herds is known to lead to inferior milking characteristics, unpredictable coat colours, and wildness – traditionally qualities not preferred by the Beni-Amer. The Beni-Amer have adopted the new breeding practice out of necessity; they acknowledge that it is a genetic degradation that has several implications for their breeding and management systems. Older Beni-Amer have accused the younger herders of gradually abandoning the practices associated with the high standards of traditional Bgait management (for example, giving individual and herd names to cattle, and herd training), thus allowing the herds to become Dwehin-dominated.

Breed selection among the Beni-Amer

The basic characteristics every Beni-Amer cattle owner desires from his cattle are milkability, coat colour and size, character (loyalty to owners in particular), and walkability. The first two qualities (milkability, and coat colour and size) are genetic qualities inherited from parents and the latter two (character and walkability) are partly genetic, partly phenotypic (acquired through adaptation to the environment and through manipulation of animal behaviour). The overall goal of the Beni-Amer is to ensure, through good herd management techniques, that the above qualities are combined in offspring.

In order to achieve the four main breeding objectives mentioned above, the Beni-Amer use purebred cows of known genealogy and carefully select productive bulls with the desired traits. Pedigree cows are called *emat-aha* ('mother of cows'), indicating that they are the *nucleus* of the herd; a pedigree cow with a bell hanging from its neck always leads the herd. In terms of numbers, these purebred cows do not comprise more than 5 per cent of the total herd; the rest of the herd is composed of heifers, yearlings, cows and less than 10 per cent males, including breeding bulls. When these purebred cows are old, they are called *ghedob* ('old cows'), but even as cows well beyond their productive age (on average ten calvings) they are highly respected as the origin of the herd and as leaders of the herd. They are only slaughtered when they become too old and feeble and are never sold, perhaps as a traditional mark of respect for motherhood.

From a breeding point of view, pedigree cows are extremely important for the Beni-Amer; a female calf of a pedigree cow maintains her mother's name for several generations as this helps the Beni-Amer trace the origin of their cattle. For example, if a pedigree cow is called *Kdr* ('good milker'), her daughters, granddaughters and great-granddaughters maintain the name *Kdr*; thus one can easily find one or more cows with the same name. This is an important genetic record that is maintained through oral tradition. During milking, cows respond to their matrilineal pedigree *common name*, and among the Beni-Amer common breed names are more important than individual names. In some cases, the Beni-Amer also give their cows individual names. Among neighbouring agro-pastoral groups in the study area, yearlings are given individual names from an early age and pedigree tracing is not as crucial (Frezghi 1985).

To date, pedigree breeding is widely practised among the Beni-Amer in the study area and every herd visited during the fieldwork maintained a small number of pedigree cows and bulls. Male calves not selected for breeding purposes are castrated around the age of three years and sold to farmers as plough animals or fattened for the market; this is one way in which the Beni-Amer are able to control the breeding and the quality of their herds.

The process of bull selection

As among the WoDaaBe (Maliki et al. 1984), bull selection and controlled breeding are an essential part of good management among the Beni-Amer. The Beni-Amer say, 'A good bull produces good heifers and good

bulls come from productive mothers', since the bull is carefully selected from the mother's side. The mother should be of good character (loyalty and docility in particular), a good milker, with good maternal instincts, of a good size, short-horned, with a broad face and frame, consistent coat colour and a long dewlap.

Bull selection among the Beni-Amer is seen as a long process that requires good management skills, and a critical eye to observe the animal's progress from birth to maturity and witness the merits of its offspring. They say you groom a bull after you have selected the potential bull-calf at birth; at birth, size, build and colour conformation in relation to the dam are observed and the potential bull-calf starts scoring good points. Male calves are weaned early (within six to eight months), but potential bull calves receive the same attention as female calves and are left to suckle as much as they like during milking. It is important to note that suckling in most cases is allowed during milking.

Sharp-eyed herders notice the calf's character, live-weight gain and overall health, and around the age of two to two-and-a-half years an important decision is made on the elimination (by sale or slaughter) of less potentially productive males. The potential bull or bulls are by now identified and the herders start to talk about the *wuhr*, or bull.

From this stage onwards, the potential bull should indicate its virility by teasing cows and by attempting to mate prematurely, 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 or five years, the bull reaches its prime breeding age; many Beni-Amer consider this stage a major accomplishment in their breeding system, since a good bull is seen as a treasure and the pride of their herd. Furthermore, 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 and such bulls are referred to as *wuhr-kray*, meaning 'hired bulls'.

Once the Beni-Amer are certain they have bred the right type of bull, they decide how many bulls they will put in a herd; this practice is known as *mkray-wuhr*, which translates as 'introducing a bull to a herd', from within or from without. The Beni-Amer have become an important source of bull calves to other semi-nomadic as well as farming-cum-agro-pastoral groups within Eritrea, Ethiopia and eastern Sudan. Among dry herds in the study area, a bull distribution of two bulls to every 60 cows was observed, but there will be variations depending on herd conditions. A good bull can serve a herd for up to ten years, but Beni-Amer herders prefer to introduce new bulls to the herd before that age is reached.

Bull numbers per herd are very restricted among the Beni-Amer, but they have not complained about in-breeding. This may be due to the current practice of crossbreeding Bgait cows with Dwehin bulls, which are distantly related to the Bgait, but pose no threat of in-breeding among their cattle.

Sensitivity to heat (oestrus) detection

When the cows are on heat the Beni-Amer describe it as *merses* or *ghre* ('burning with sexual desire'), but more important to the Beni-Amer than the period of fertility itself is the frequency of oestrus, since this is seen as a healthy sign. A cow on heat gives certain signs that are important to the herder for predicting the season of calf drop; among these are signs of restlessness such as jumping with a raised tail, trying to mate with other cows or tempting or teasing a bull, teasing other cows by licking and suckling, and imitating a bull by smelling and tasting other cows' urine.

Among some Beni-Amer, the methods for detecting oestrus in cows is quite sophisticated, as in the case of the Beni-Amer in the Kassala of eastern Sudan, along the Rahad rangeland, who use sterile cows as a means of oestrus detection. It was observed in the study area that long-horned, large, sterile cows were used for herd protection and oestrus detection among the herds. These cows, known locally as *sobib*, are partly used as *teaser cows* which help the bull to properly identify and mate with the cows on heat. The *sobib* cattle are extremely hostile to outsiders and are very defensive, using their strength and height to protect the herd.

Maliki et al. (1984) make a similar observation among WoDaaBe herds in West Africa, although they do not say whether such sterile animals are used for heat detection as well. 'A particularly valued animal is the female bull, or *nagge ngaarye*. This is a cow whose body is developed like a bull's and which remains sterile. The WoDaaBe are especially proud to have a *ngaarye* in their herd as she is beautiful, docile, huge and stands out among the other animals. She always leads the herd' (Maliki et al. 1984, 270).

The duration of the oestrus cycle is said to be about two weeks, but its frequency is totally dependent upon good management and the availability of grazing. The herders link oestrus frequency to good body condition as well as to the overall health of the animal; they believe that the timing of the calf drop (delivery) should be as close as possible to the rainy and harvest seasons (July–October) so that the milking herd has

enough grass and water to consume. The gestation period (from conception to birth) among the Beni-Amer cattle is about ten months.

Calving, milk let-down and yields

There is little information on calving rates, but mortality rates among calves are generally high, partly because of inadequate post-natal care and feeding. However, it is considered good management to allow the newborn calves, especially females and potential bull calves, to suckle as much colostrum as possible. I do not have information on the process of calf delivery and how the herders know when the cows or heifers are going to give birth. During late pregnancy, though, the herders watch the pregnant animals around the clock, waiting for them to go into labour and help with the delivery.

Proper milking starts one week after the heifer gives birth; from then on the calf shares 10–40 per cent of the milk at each milking, depending on the cow's condition, age, milk let-down and the intended purpose of the calf (for example potential bull or heifer).

Derir, or *milk let-down*, is of great importance for milk production among dry and milking herds; the Beni-Amer encourage milk let-down through good feeding, milking once a day, calling the cow by her name, chanting during milking, and massaging the udder. The calf is allowed to suckle first in order to encourage milk let-down before the herder starts milking. These are established and widely practised techniques among the Beni-Amer to encourage milk let-down.

Urination before and during milking is seen as a positive sign in cattle, leading to better milk let-down. Beni-Amer cattle, being so well trained, do not give much trouble to the herder during milking, but in the event of an odd cow or a first-time heifer refusing her calf or refusing to let down milk, unusual force may be used to encourage let-down. In these circumstances, the herder may use a technique called *habsot*, whereby he blows air through the cow's uterus and into her stomach. The air is let out after a few seconds and this is believed to encourage milk let-down. Some herders also, to encourage let-down, inflict pain on the cow by raising and slightly twisting her tail from the base, but these are desperate measures that are rarely used by the Beni-Amer and are not perceived as good practice.

The Beni-Amer rarely talk about general or average milk yields among their cattle; they see milking ability and milk let-down as highly individual genetic characteristics. Cows are grouped into productive

and less productive categories within a herd and the best milking cows are known as *kdr* ('heavy milkers'). *Kdr* produce about two gallons or more per milking, which fills one *amur-abay* ('large gourd'), while the less productive cows are expected to fill an *amur-nuush* ('small gourd'). Measuring the amount in the two gourds and spreading them throughout the lactation period can give one a realistic measurement of traditional herd yields. According to my observation, the proportions of heavy milkers and lighter milkers can be worked out by averaging milk production across the entire herd (i.e., by multiplying the amount of milk in the two containers by half the number of head of cattle in the herd).

Considerations of 10–40 per cent milk intake by calves and seasonal variations must be taken into account. From observation, the milk yields vary considerably over the seasons. The peak milking season for settled herds is the rainy season (July–August) and the few months following the rainy season (September–December), but yields are at their lowest from January to June, which is the height of the dry season.

Under mobile dry-herd conditions, milk is consumed fresh, or boiled immediately after milking; the Beni-Amer also consume *halib-hawet* ('soured milk'), which is kept cool in a calfskin bag. Among the dry herds, no young calves are kept; such herders cannot afford calf labourers, so herders keep only three to five milking cows per herd of 80 to 100 dry cows. Of these, most are heifers, which are trained to milk without being suckled first, since the remaining young calves are slaughtered or sold. The small group of milking cows within the dry herd are known as *mnhit-seb-nway* ('cows for herders') or *aha-arem* ('cows trained to milk while licking dead calfskin'). Each cow is individually known as *em-arem* or *ghirja*, metaphorically 'the mother of a skin' (a dead calf). She is trained to respond to the herder, who holds the skin and shouts her name, encouraging her to smell and lick the skin. In some cases the milking cows are trained to lick a single calfskin, while in other cases each cow licks the skin of her own calf; the purpose of the practice is to encourage milk let-down. In the instance of a calf dying prematurely, the dead calf's skin is given to the cow by the herder, who then massages the udder and feeds the cow in the hope of stimulating milk let-down. Orphaned calves are cross-mothered, or rather adopted, by other cows in the herd, and in cases where a calf has died shortly after birth, dummy calves (the skins of dead calves stuffed with straw) are used.

According to some Beni-Amer, cows should only be milked once a day, because they believe that more frequent milking leads to poor health and is bad cattle management. Milking of cows among the settled Beni-Amer in the study area ranges from late evening to early morning.

Milk production is important to migrant herders from a subsistence and nutritional point of view, but to the settled Beni-Amer within the urban and peri-urban interface, maximisation and commercialisation of milk production is crucial to their economy (Fre 2008). Among milking herds kept around pastoral settlements, calves are reared for breeding, sale and slaughter. Under such conditions milk is consumed after boiling, while a greater amount of milk is churned to produce unclarified butter that will be purified and sold in nearby towns and big settlements.

In the past, the Beni-Amer sold butter rather than milk in order to buy grain; at present, however, among the settled Beni-Amer in the study area, selling milk in urban centres throughout the year has become an important source of income. Traditionally the Beni-Amer perceived the sale of milk as shameful, though this is no longer the case.

Similarly, rearing male calves for the market is a relatively new commercial practice for the Beni-Amer; many of the male calves are sold for fattening or slaughter in urban centres, or as plough animals to farming groups. Some urban-based Beni-Amer are absentee herders, who own dry and milking herds that are maintained by hired labour. This group (locally known as *delalen*, 'merchants') is a fairly commercialised group and is involved in large-scale buying and selling of male and female stock in major towns in eastern Sudan, Eritrea and Ethiopia. The group comprises Beni-Amer and non-Beni-Amer merchants (Fre 2008).

Herd composition, size and structure

Beni-Amer herds are subdivided into *dry* and *milking* herds that are herded separately for most of the year for management reasons. The milking herds graze closer to the settlements because they need to be close to markets for the sale of milk and butter, while the non-milking herds must migrate to faraway grazing areas because there is insufficient grazing closer to the homesteads. The *sel-f* ('herd', referring to both milking and dry herds) is a management unit and is part of the herders' strategy for survival in harsh environments where it is necessary for livestock to adjust to dry and wet season conditions. Every Beni-Amer herder prefers to keep his two herds close to each other, but how far apart the two groups become is dictated by the prevailing environmental (grazing, water) conditions.

The dry herd primarily consists of heifers, mature cows and older calves, with some sterile cows, castrated oxen and selected bulls; the overall herd composition is more than 90 per cent female. The *hlb* ('milking herd') consists entirely of milking cows and young calves.

Herd sizes vary considerably, and although the Beni-Amer speak of large, small and combination herds, a herd is perceived as a cattle management unit of 60–100 managed under a *mora* ('one stick'); labour needs for such a herd range from one to three herders, depending on the season. Dry season conditions mean, among other things, that stipends are needed for migrant herders in cash and kind, that animal feed must be bought, that family labour cannot be used around the pastoral settlement, and that there are security concerns (raiders, etc.). The situation during the rainy season is much more favourable.

The Beni-Amer categorise their cattle by age and sex, as shown in Table 5.4.

Pastoral literature shows considerable variation in sex and age among the herds of the *nomadic* pastoralist communities (Hjort and Dahl 1976). The Beni-Amer, however, are distinct in terms of keeping the most productive females and having different herd compositions within dry and milking herds. Gedamu et al. (1984) estimate the number of females in a Beni-Amer herd as 93 per cent, though they do not say whether such calculations were for dry or milking herds (Table 5.5), and nor do they say at what age they consider bulls and cows to be adults.

The milking herds primarily consist of milking cows of varying ages and productivity, categorised as *aha-bukrt* ('calved cows'). Some heifers and a limited number of selected breeding bulls are kept in this category of herd.

Despite changes in herd structure (rearing more male calves for the market), and a reduced level of cattle specialisation (rearing more small stock), the majority of the Beni-Amer contacted during the study

Table 5.4 Cattle categories

Age (months)	Sex	Category (local name)	Category (in English)	Number of calvings
0–18	Male	Legha	Calf	None
2–18	Female	Askalala	Older female calf	None
24–36	Male	Wuhr	Bullock	None
24–30	Female	Reba-h	Heifer	None
36+	Male	Beray-wuhr	Mature bull	None
30+	Female	Flit	Older heifer	None
36+	Female	Wa-at (bukrt)	Cow	2 or 3
10 years+	Female	Ghedob	Older cow	More than 8

Source: Field data (Fre 2008)

Table 5.5 Herd age–sex structure in two pastoral communities

Livestock	Pastoral community	
	Beni-Amer (%)	Afar (%)
Adult cows	68	56.3
Adult bulls	2	–
Young heifers	12	37.4
Young bulls	2	–
Heifer calves	13	–
Bull calves	3	–
Total	100	93.7

Source: Gedamu et al. 1984

perceived the herd as *female* and bred to *produce milk and milk products*. In conclusion, this chapter has demonstrated the *scientific* significance of key Beni-Amer cattle production concepts, knowledge of genealogy, selective breeding, crossbreeding, bull selection, pedigree herding, oestrus detection, calving, milk let-down, and herd structure and composition. I have also explained in some depth that the Beni-Amer possess a wealth of technical skills and knowledge in animal production and other cattle management areas, in addition to their knowledge and practice of a variety of adaptation techniques, proving the resilience and adaptability of their production system. I believe this description and elicitation of the IPKP of cattle production form an important basis from which to argue that the present production principles and practices, although unknown to outsiders, are mostly scientifically sound.

This chapter has dealt with the very technical and *scientific* aspects of cattle breeding and production. The next chapter looks at the day-to-day work and practices of cattle husbandry. I will explore the cultural relationship between the Beni-Amer and their animals, how they manage their herds, how they feed and water them, and how they move them, both seasonally and regionally.

Chapter Six
Cattle husbandry among the Beni-Amer

This chapter examines some of the herding systems and practical skills that may form the basis for livestock extension and pastoral development intervention. The main concern of this chapter is to describe and demonstrate the importance of the Beni-Amer herding systems.

The herds are very much at the centre of the Beni-Amer life: cattle are representative of employment, food, prestige and pride, and therefore deserve proper care. Economically, the herd is the productive capital of the family for domestic use and a vital means of exchange for obtaining consumer goods such as grain, sugar, salt, clothes and other necessities. Cattle also create and consolidate social relations, bonds and obligations; cattle are a social asset: families share and exchange their products of milk, meat and skin. However, a herd is essentially the private property of a family since there are no communal herds per se among the Beni-Amer.

The management ability and skills of the herders ensure the well-being of the herd in an unstable physical environment. Traditionally, the Beni-Amer have viewed herding as their primary job; they believe they cannot exist economically, occupationally, socially or with dignity without a herd. Many of today's Beni-Amer, however, can no longer hold on to such beliefs, so they have partly shifted to other means of subsistence, such as agro-pastoralism, mechanised agriculture, camel haulage, small-scale business, and wage labour. When the region's ecological conditions allow, this new generation of Beni-Amer are inclined to resort to more commercially oriented cattle herding, such as absentee herdism, peri-urban agriculture and mixed farming.

The Beni-Amer herding system, in the broadest sense of the term, combines strategic, technical and cultural elements that interact with each other to create a complex herding mechanism, which is only fully understood by the Beni-Amer herders themselves.

Cattle husbandry and management form the second major area of traditional knowledge in which the Beni-Amer can make a major cognitive and skilful contribution to livestock research and pastoral development. Good cattle management is perceived by all Beni-Amer as a crucial factor in herd productivity and health and as an ultimate aim to which good herders aspire, individually and collectively. Individual herd owners may differ in achieving these lofty goals of good husbandry, but herders, whether owners or hired labour, must know their herds and their needs, and they must be dedicated to the protection of cattle above all else. The Beni-Amer see as essential for good husbandry the following practices: seasonal migration, whether long or short range, searching for water sources and grazing lands, moving to healthier environments, and group herding to protect cattle from raiders.

The Beni-Amer believe the cause of low milk productivity and poor animal health is lack of animal feed rather than the genetic predispositions of the type of cattle they keep. These problems are exacerbated by encroachment from expanding agriculture as well as inhospitable environments (for example wet clays, lack of salty plants and salty earth or ground to lick as a source of calcium, and unhealthy standing water), all of which are considered to lead to poor animal condition.

Knowing your animal, according to the Beni-Amer

Beni-Amer herders have a detailed knowledge of the *besher* ('body parts') of the animal, and their nomenclature is comparable to that of any other language. They also have a collection of terms that refer to the interior physiology, since all parts of the body must be known and named in order to diagnose and treat the animals. According to the Beni-Amer, every herder must have a thorough knowledge of this very rich vocabulary from an early age.

Naming animals

Among the Beni-Amer, naming has aesthetic, genealogical and herd management values. Naming cattle individually and herds collectively is an important part of Beni-Amer husbandry, but the individual names are actually given to the matrilineal pedigree or members of the nucleus herd within the larger herd (like family names in western cultures). In other words, daughters of a pedigree cow maintain their mother's name for

generations, and this allows the Beni-Amer to trace the origins of their cattle. In practice, a large number of related cows are known by a single name to which they respond when called, and thus cattle naming among the Beni-Amer has a husbandry as well as a genetic significance. Such is the level of training of cattle and calves among the Beni-Amer that two young boys can manage up to 50 calves, separated from their dams, that respond only to a call from the milker during milking. The actual calling of cattle during milking is known as *alelot*, which means shouting a cow's name.

A herd is trained to recognise its herder's voice, or *krn,* and to respond collectively to his orders or signals in times of danger (cattle raids, attacks by wild animals, etc.). From the rhythmic vocal sounds uttered by the different herders, one can tell whose tribal section the cattle belong to. I witnessed the dispersal of a huge herd (1,000 cattle) into mini-herds (70–100 head of cattle) in response to different herd names being repeated by each herder. The importance of herd names has lessened in importance because of decreasing cattle populations, and the younger Beni-Amer herders adhere less to the tradition, although they still maintain the individual names of the nucleus herds mentioned earlier.

According to the Beni-Amer tradition, herders should lead their herds and never follow them, which is perhaps a sign of their ultimate dedication to the herd.

Signs of property (tribal branding)

Signs of property are done mainly by branding (burning the hide with a hot iron) parts of the body and sometimes by cutting a small section of the animal's body. Some pastoral groups cut, others burn and some do a combination of the two. Signs of property among the several pastoral groups in the Horn may signify pedigree breed, tribal, individual or family property, or a convalescing animal. Property signs have outstanding practical importance, since lost animals can be traced by their branding, and these visible signs on the animal's body make stealing difficult as the ownership of the animal is apparent wherever it is taken.

What are known by the Beni-Amer as *elamet* ('signs of property') are varied, numerous and very complex. There are three main categories of branding: tribal brands, clan brands and family brands. Clan and family brands are numerous and more complex and are known as *ad-flan* (family/clan of X) and all the individual brands have names descriptive

of the type of branding. For example, *Almeda* is a major section of the Beni-Amer tribe, and has a subsection known as *Tsawra* that is divided into several clans, such as *ad-urota*, and so on. 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 top to 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 of cattle and herds, and signs of property are practical management practices that hold cultural significance as well. It is imperative that these practices be interpreted in the right context, since they are expressions of the close relationship between pastoralists and their animals, the manifestation of a caring attitude of the herder towards his livestock.

Herd management

The Beni-Amer have a good understanding of the daily and seasonal feeding requirements of their cattle and they adjust their practices and labour resources to suit the particular season (dry or wet).

Critical duties during the rainy season include moving the herd to higher ground to avoid foot rot and other wet-soil-borne diseases, tending cattle away from cultivated fields, and not mixing with strange herds. The variety of tasks, the high milk productivity of the cattle, the ready availability of water and grazing resources and the placement of dry herders nearer to their families make the rainy season look easy compared to dry season herding.

The dry season is very labour-intensive and requires much greater inputs in terms of labour and feeding resources, and the herders are under much more strain as they are away from their family for an extended period of up to eight months. Travelling long distances (up to 200 kilometres, or even more) to water and pasture sources, cattle lose a great deal of body weight during the dry season, and even the herders suffer from malnutrition due to milk and grain shortages.

There is also the burden of insecurity caused by cattle raiders in the southern part of the study region near the Gash, Setit and Tekeze rivers and in the Ethiopia–Sudan–Eritrea border territories (see Figure 6.1). During the dry season, the herders lop trees to feed cattle and small stock; feeding green fodder to cattle during the dry periods not only improves their nutrition, but keeps them hydrated as well.

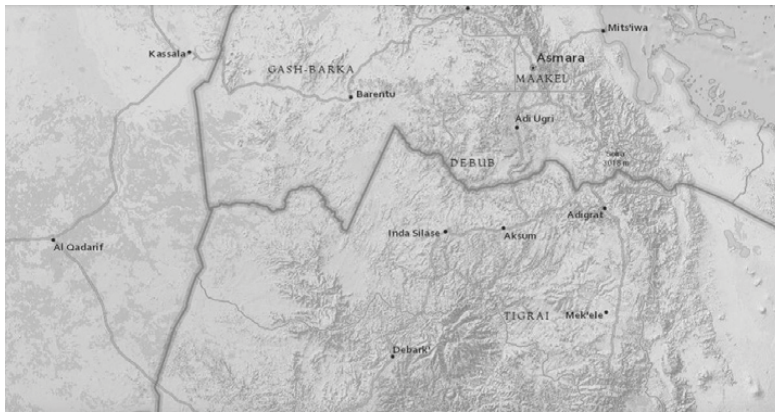

Fig. 6.1 Sudan–Eritrea–Ethiopia border region. Source: GoogleEarth

Salt provision

The Beni-Amer think salt provision is an essential part of good herd management, so they add loose coarse salt directly to the drinking water or take their cattle to areas that have soils with high levels of salt and alkalinity. Coarse salt in drinking water is regularly provided throughout the rainy season and very early in the dry season, after which time it is not given at all. Salt provision is closely associated with an abundant supply of water, which, of course, is a luxury in the dry season. Certain bushes are particularly useful to the herd as a source of salt, but they also reduce the need for water since their green foliage hydrates as well, and this is considered ideal by the Beni-Amer herders.

Since the ground in Eritrea and some parts of eastern Sudan has high levels of salt, and the cattle eat some of the earth as they graze, provision of salt is less crucial to the herds in Eritrea than in eastern Sudan, where salty plants are less available because of desertification. Other livestock, particularly camels, are well known for needing a great deal of salt to remain productive and healthy, but the amount of loose salt given to camels also depends on the environment (the availability of salty bushes). The Beni-Amer who keep camels cannot rely on finding salt-rich soils, since camels do not eat earth but browse on salty trees. In much of the traditional home base of the Beni-Amer and other pastoral groups in south-west and north-eastern Sudan, there are several plants, such as the *hamta* and the *kulmut*, which are natural sources of salt. In the absence of salty or alkaline areas or plants, the herders must buy several sacks of salt every year for their herds.

The Beni-Amer in the study area of south-east Sudan say that the clay soil of the area does not provide natural salt sources and the herder must buy coarse salt for the cattle. The amount of salt given to the cattle by the herders cannot generally be estimated, because salt provision depends on the availability of coarse salt as well as on the herder's financial ability to buy it.

Night grazing and grazing patterns

Night grazing is a crucial part of good feeding management, especially during the dry season when protecting cattle from the intense daytime heat is critical. As the rains end in September, *mahsey* ('night grazing') starts. This involves taking cattle out after midnight to secure places where they are free to graze till the morning. Beni-Amer herders continue this important tradition at great personal risk to themselves, hoping to avoid hazards such as working in darkness, snakebites and the threat of cattle raiders.

Dry and milking herds have different night-grazing regimes. The milking herds have to be milked every evening, and in some cases every morning, so their night-grazing radius is very limited, while the dry herds are less attached to the home base for most of the year and are therefore more independent and free-ranging. During the height of dry-season austerity, the milking cows are given fodder and sometimes grain or other by-products instead of being grazed at night.

Generally, the dry herds finish night grazing around 5 am, after which they trek to the watering and resting point, which is usually along dry riverbanks, arriving by mid-morning. Here, herders have the chance to rest for a few hours and meet other herders; this is where most of the day is spent. After 4 pm, and after the second watering, cattle leave again for what is known as *mahlew* ('after-water grazing'), the period of late afternoon and early evening grazing. The grazing time from midnight until dawn is known as *mahsey* ('night grazing'). During this period, the herders are not able to sleep in the bush; I spent several long nights with the herders under these conditions and it can only be described as difficult, stressful and dangerous.

Milking herds or settlement-based herds have different night-grazing routines. Beginning after 10 pm and after the evening milking, the herds are taken out for night grazing till 4 am, then driven back to the settlement for morning milking. However, night grazing is severely confined for milking herds, especially during the cropping

season (July–September), because of heavy encroachment by nearby farmers.

Night grazing is universally accepted as a good herd management practice by the Beni-Amer, but the degree to which they put it into practice is influenced by several variables, such as seasonality, the environment and its carrying capacity, security and the availability of labour. The Beni-Amer also argue that night grazing is the best way to protect cattle from intense daytime heat, which leads to fatigue and loss of body weight. Owners of milking herds find it very difficult to continue the night-grazing tradition in any season because of the limited grazing opportunities in populated areas.

Crop fodder provision

Depending on availability, crop fodder is a vital but costly nutritional input to which the Beni-Amer attach great importance. During the early dry season (October to December), crop stalks and other agricultural waste become immediate sources of fodder; the intensity of crop fodder feeding differs greatly among the Beni-Amer and other pastoral groups, with large regional and local variations.

Among the sedentary Beni-Amer in the study area who are involved in crop production, some of the sorghum stalks are harvested, stacked and saved as animal feed for sedentary herds (for the late dry season), while others are used for roofing.

As the migrant herds move southwards to the large mechanised agricultural schemes in the Gedaref area, they have to compete for fodder with other, non-Beni-Amer herders who use the harvested fields of commercial farms (see Figure 6.2).

Post-harvest conflict between farmers and pastoralists in the irrigated and rain-fed commercial agricultural areas has been an issue of major concern to both communities and local governments over many decades. The farmers claim that allowing cattle to graze their fields after harvest leads to trampling and the spread of infectious annual weeds such as *Adar* (*Eragrostis hermontica*) and other species. Some farmers prefer to sell the fodder to cattle owners who transport it to their herds, while others prefer to burn their fields, including the agricultural waste used as fodder. In other cases, the farmers cooperate with state police to ban the herders from the area completely. During the dry season, fodder is an expensive commodity which is sold to cattle owners at the price determined by commercial farmers, who are strongly supported by

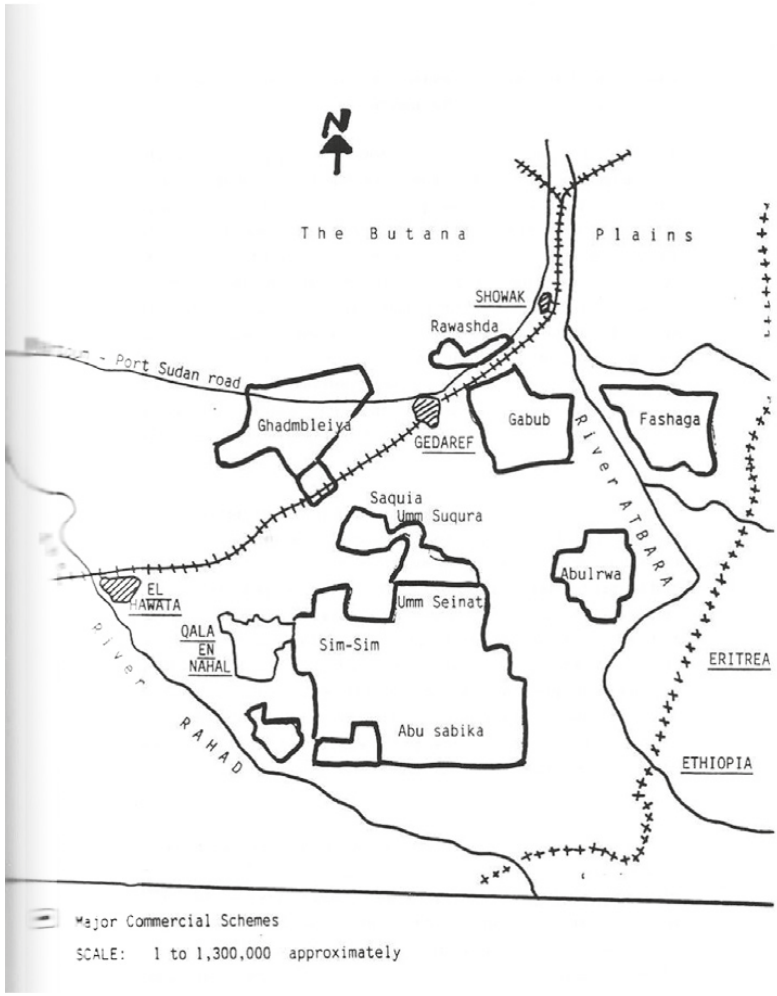

Fig. 6.2 Areas of intense agricultural encroachment. Source: author

government credit and the state in eastern Sudan, but not in Eritrea. The price of fodder is much higher (four times its normal price) during the late dry season (January to May).

Watering

Beni-Amer herders attach great importance to clean drinking water and work hard to provide it for their cattle. Standing water and very cold

water are perceived as unhealthy, whereas water from wells and running spring water are said to be healthy.

During the rainy season, there are no restrictions on cattle consuming water daily since their water intake is greatly reduced. They are hydrating through the green forage they consume, and do not dehydrate as easily because of the cooler environment and lower temperatures during the rainy season.

In the dry season, the Beni-Amer prefer to draw clean water from deep wells near their camps, but as some of the wells dry up, water shortages can be an issue during the late dry season.

When the intensity of the heat increases so rapidly during the dry season, water intake by cattle has to be restricted, despite their high body requirement. The Beni-Amer practise the concept of *kbb-sito* ('thirst/drink days'), and the purpose behind this practice is partly to conserve scarce water resources and also to avoid conflict with other herders who use the same wells on alternate days. Also, the Beni-Amer believe that having no food and only water in their stomachs poses a significant threat to their animals' wellbeing.

The task of drawing water from a deep well is a carefully orchestrated, arduous and laborious process involving two to four herders per herd who draw the water into large troughs (0.5 to 1.5 metres in diameter) around the edge of the well. A herder with a cross-handled skin bucket descends into the well, fills the bucket, then signals to a herder standing at the edge of the well, who raises the full bucket, fills the troughs, and throws the bucket back to the herder in the well.

The leader of the watering team must be strong and cheerful; he must continuously chant about cattle during watering to keep his team happy. These chants are in praise of cattle and, while primarily intended to divert the herders' attention from their tedious work, they are believed to calm the cattle while they drink. The Beni-Amer believe cattle are relaxed while they are drinking and the chanting helps them to be happy and orderly as well.

Labour

The pastoral household is the main source of labour among the Beni-Amer and they are proud to be called owner-herders of cattle. Labour is seen as a crucial herding input that affects the productivity and wellbeing of a herd, so if a herd is too large and family labour is inadequate, herders

can be hired. Such hired herders are responsible for the wellbeing of the herd and are greatly respected for their skills; the day-to-day management of the herd is entirely their responsibility. Among the Beni-Amer, it is difficult to distinguish who is a hired herder and who is an owner-herder simply by looking at them. But despite the respect given to them, hired herders do not have unlimited rights regarding the cattle. A hired herder is not allowed to sell or exchange cattle, or any of their products, such as milk or butter (he is allowed to use the milk from both milking and dry herds as part of his diet).

Traditionally, only men are hired as cattle and camel herders; women are only allowed to herd and manage small stock (sheep, goat and poultry) around settled homesteads. However, women are heavily involved in the processing of animal products, including making butter and ghee and processing leather.

Rainy-season labour requirements may be different but can be equally cumbersome; for example, drawing water from deep wells becomes less critical during the rainy season (green pasture and water are more abundant), and cattle protection from cropped fields becomes more important. Because of the northward movement of multiple herds to higher ground during the rains, herds become less isolated and are likely to mix with other cattle. Mixing of herds is seen as bad management by the Beni-Amer; owner-herders and hired herders alike take great care to ensure that their cattle do not mix with unfamiliar herds so as to avoid disease transfer and unwanted crossbreeding.

The concept of communal herding, that is, mixing small units of cattle belonging to separate families to form a single herd, is new to the Beni-Amer. Agricultural encroachment, general poverty (fewer herds) and environmental degradation limit the opportunities to have large herds. For the purpose of using the available labour effectively, several small cattle units (2–10 head of cattle) are combined to form a composite herd of around 60 head of cattle. In some cases, small herds are managed alternately by individual herders who share labour on a weekly or daily basis; sometimes they even hire another herder on a permanent basis and jointly pay his monthly wage. This is a common practice among poorer Beni-Amer throughout the study area. Remuneration of hired herders in cash or kind, and sometimes both, has been an tradition among the Beni-Amer cattle owners for over a century.

Herding techniques

Oestrus detection and mating

Female animals are highly valued by the Beni-Amer; they expect high fertility from their cows, so heat detection as a production principle is critical. They believe that good management enhances cattle productivity and that poor cattle do not come on heat. Constant observation of the herd is important to identify any cattle that may be on heat, which is why the Beni-Amer herder is always among his cattle and pays close attention to any physical or temperamental changes in the herd. There are definite signs, described earlier, when a cow or heifer is on heat. She associates herself with a bull and after such an association mating takes place. The herder may notice changes in the cattle's behaviour, particularly during night grazing or while they are resting in the shade; the cow–bull association is very obvious in these instances. The herder keeps a mental record of such occasions and can predict when the next calving will be; although this is only a guess, it proves right in most cases.

As a pregnancy progresses, the Beni-Amer herder will notice certain physical changes in the cow's body, around the fifth month of gestation. A projection of the abdominal area indicates the presence of an unborn calf, and the cow's udder enlarges slightly during the early stages of pregnancy and much more before calving.

The Beni-Amer find it difficult to prevent mating of close relatives, such as father and daughter. As a result, there are incidents of miscarriage, of sterility in heifers, and of the births of deformed calves. The birth of deformed calves, in particular, is seen as a sign of bad times to come, and such calves are slaughtered immediately after birth.

Heifer and pregnant cow management

The herder must take great care of pregnant cattle, so cows in calf are always kept with the dry herd until the later stages of pregnancy.

The Beni-Amer are forced to keep the in-calf cows with the dry herd, because during the long dry season (January to June) there is very little grass or water around their homesteads. In-calf cows have to migrate to faraway places where they can find grass and water. At the end of the dry season (June) migrant herds move northwards towards their permanent homesteads, where in-calf cows will deliver.

As part of good management, the herder must ensure that pregnant cattle do not run as fast as the dry animals, especially on the way

to watering points and day shade. Since dry cows (such as heifers), yearlings, bulls and older cattle move quickly, the herder must slow the herd down by holding his stick in front of them, or separate the pregnant cows from the rest of the herd. It is believed by the Beni-Amer that if pregnant cows are allowed to run fast this may lead to premature birth.

When cattle graze on hilly terrain, herders try to ensure that pregnant cattle do not graze on hilltops or uneven ground; they keep them on lower ground to avoid falls, which could damage the unborn calf.

Some Beni-Amer train pregnant heifers to be good mothers by massaging their udders regularly during late pregnancy; they believe that this massage helps heifers get used to their udders being touched, as well as encouraging milk let-down at calving, which all results in the cows becoming good mothers.

The herder's best sign that a pregnant cow is in a pre-calving stage is a major change in the udder's appearance: the udder becomes filled with colostrum and the cow's body softens and stretches, and she moves very slowly because of her weight. The majority of cows give birth naturally with few, if any, complications. However, there are incidents of birth complications, such as breech presentation or non-expulsion of the afterbirth, but many of these are easily solved by the Beni-Amer.

Calf-drop season is carefully managed to fit into the best grazing and watering period during the pastoral calendar, around early to mid rainy season (July–August), so most cattle are mated during the early dry season (October–November) when they are in their best physical condition. Milk yields are highest during the first three months of calf drop and lowest in the late dry season (March till June), and it is considered good herd management practice if cows are dried after about nine months of lactation.

Trying to coincide calving with the wet season is a universally accepted management practice among the Beni-Amer, so off-season calving, understandably, creates management problems, particularly for dry-herd managers who are short of labour during the dry season. If off-season calving happens, unplanned male calves will be slaughtered and the dam is either dried off or used as a milk source by herders, through the use of an *arem*, or calfskin. However, 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.

Calf management and care

Good calf management is seen by the Beni-Amer as a practice of vital importance to herd productivity and breeding. Female calves, in

particular, get the best attention and are fed extra milk at milking; they say today's female calf is tomorrow's cow, but potential bull calves also get preferential treatment because of the Beni-Amer bull-grooming concept.

When the calf is born, the dam must lick it completely dry. This establishes cow-to-calf bonding, both physically and psychologically, particularly for heifers that are first-time mothers. This bonding encourages milk let-down and allows easy suckling, thus making a more productive cow and a healthier calf, both of which are preferred by the herders.

The first milk (colostrum) is shared by the calf and the herder, but they say that ideally the colostrum should be given entirely to the calf. The first colostrum is too thick and initially some of it has to be milked out because of its richness.

Some cows, particularly heifers, refuse their calves, or a cow may die, leaving the calf an orphan. If the calf is female it will be cross-mothered by another milking cow; the practice of cross-mothering is very common, not only among cattle, but among sheep and goats as well. Male calves do not get the same attention: they are either weaned early or slaughtered.

For a cow to refuse her calf is a very unfavourable situation for the Beni-Amer. In order to force such cows to accept their calves, the Beni-Amer chop and crush plants called *Senselie* and *Berot* (both unidentified) and insert the acidic liquid produced into the cow's vagina. The calf is then held in front of the cow; she reluctantly accepts it after several hours because of the irritation caused by the acidic plant material in her vagina. The cow finds being suckled by the calf comforting and that it relieves the discomfort.

Some cows are stubborn and still refuse the calf even after such inducement, so the herders will tie ropes or leather straps around the cow's forehead and hind legs and force the cow to be suckled until she finally accepts the calf. Such methods are practised by the Beni-Amer only as a last resort, and they claim that most of their cattle are good mothers and readily accept their calves at birth.

A properly planned calf has the best chance of survival, since there is an abundance of milk during and after the rains. Around the age of three months, calves are partially weaned. As water and fodder resources become scarce during mid-dry season (January–May), the Beni-Amer completely dry off their milking cattle as a safety measure against further bodyweight loss. It is considered bad management to milk the herd twice a day even under favourable conditions.

Calves are completely weaned around the age of 10 to 12 months by physically separating the calves from their dams once they have been

dried off. The dams are sent to the dry herds further south to dry-season grazing areas and the weaning calves that are too young to follow are left in the home base (dry-season camp). If the calf to be weaned follows its mother, its nostrils are pierced and a small stick is inserted as a deterrent, since it hurts the cow whenever the calf attempts to suckle. Another similar deterrent is a spiky circular mouth cover known as a *wsb*, which, when the calf attempts to suckle, causes the cow to kick the calf back whenever it gets close to the udder.

Calves must be housed and protected from wild predators. This is the job of young boys, who tend them during the day and control them during milking hours. During the night, the calves are housed in a small fenced compound near the goat or sheep house; only the few uncontrollable ones are tied to pegged wood. Adult cattle rest in the yard near their herder's home: traditionally, putting cattle in a fenced camp is uncharacteristic of Beni-Amer herd management.

Raising male calves currently has three primary purposes for the Beni-Amer:

- to select the best males for breeding;
- to raise and castrate bulls for their own limited cultivation purposes; and
- to produce bullocks to sell to non-Beni-Amer groups as beef or plough animals.

Castration, therefore, is an important herd management technique for the Beni-Amer, who adhere to strict breeding concepts and thus see castrating all non-breeding males as the best way to control unwanted mating.

A final herding technique used by the Beni-Amer is the timing and practice of branding cattle with tribal and family marks, but this practice is gradually dying out. Traditionally, all calves under the age of one to one-and-a-half years must be branded before they join the dry herds; a branded animal is no longer considered a calf and becomes an important, valued and identifiable animal within the herd.

The Beni-Amer pastoral calendar

The meaning and motives of mobility

Semi-nomadic movement is an important survival strategy among the Beni-Amer, seen by herders as a prime requirement of good husbandry,

but little is known about the practice. Such movement can be categorised as short- to medium-range or home-bound, consisting of tending milking cattle, goats and sheep, or as long-range in the case of dry herds of cattle which are driven further south far from their home base during the long dry season.

Seasonal movement exists as an important practice and has no *nomadic* connotations, as it is presented in conventional literature as a choice of pastoralists. The term *nomadic*, in relation to seasonal movement or animal production systems, does not exist in the Beni-Amer pastoral vocabulary. The herders' pastoral calendar integrates herding, farming and environmental adjustment strategies, including movement of herds, in response to the technical requirements of livestock.

Mobility and the annual cycle

During the rainy season, the Gash and Setit rivers get severely flooded and become infested with biting flies, including mosquitoes. Many areas are also heavily encroached by expanding agriculture, and grazing in such areas becomes impossible.

During the dry season, livestock concentration is high, particularly along riverbanks, and Gedamu et al. confirm the increasing agricultural encroachment of grazing lands in western Eritrea and eastern Sudan (Fre 1992, 2009a, 2009b; Krätli, El Dirani and Young 2013). They describe the Beni-Amer seasonal movement (Figure 6.3) as follows:

> The mobility of the pastoralists is seasonal; in the dry season they migrate with their livestock to the south across Tekeze River into the interior of Gonder lowlands and some to the fringes of the Eritrean highland and river basins. They stay in these areas until the next rainy season comes and cultivation begins. They then return to the wet season grazing grounds up north before the water level of the rivers is high. This migratory pattern is a continuous process from year to year but, however, the coverage varies according to the length of the dry season. In the east and north where the climate is hostile and the range resource is very limited the livestock scan over larger areas covering great distance and these are mostly browsers which would survive under this condition. (Gedamu et al. 1984)

Such a generalisation is valid in the case of the Beni-Amer cattle owners, but essentially movement is an individual strategy of the household or

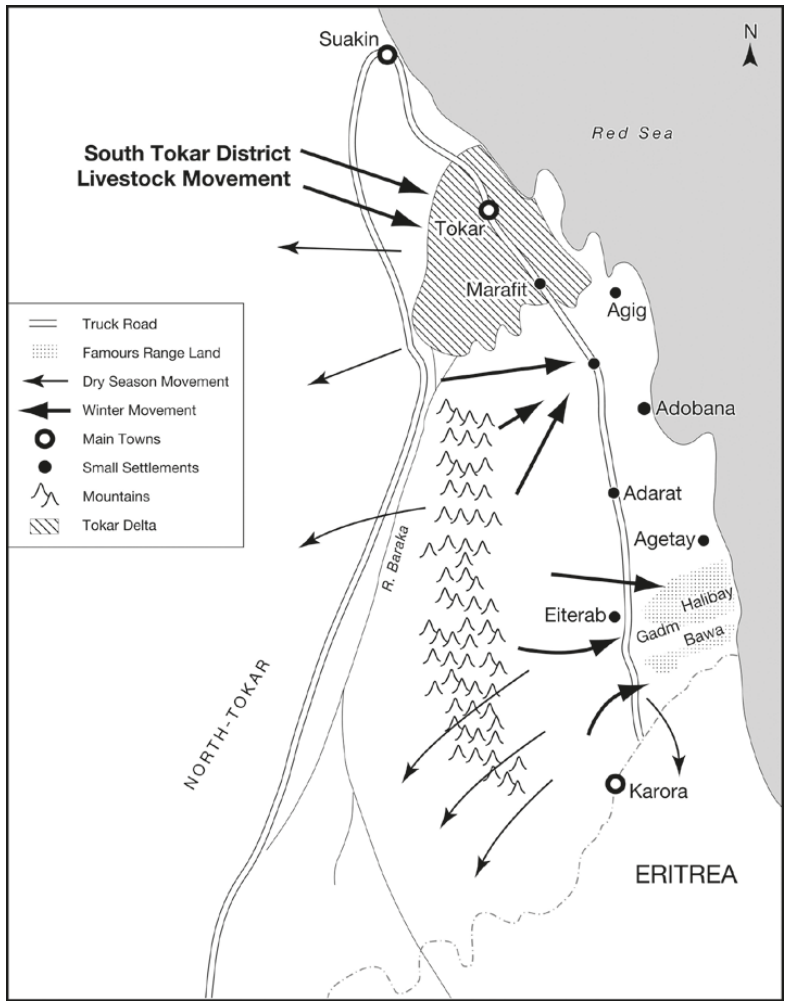

Fig. 6.3 Traditional seasonal patterns of movement of the Beni-Amer in north-eastern Sudan. Source: Cath D'Alton

related households, who decide who should migrate with the cattle, and how far.

Fre (2008) provides some insights into the complexity of how resources are seasonally exploited along riverbanks by looking at the *damering system* in the western lowlands of Eritrea (Figure 6.4).

The Beni-Amer have dry- and wet-season camps in western Eritrea and eastern Sudan which they refer to generically as *damer*; they call their wet-season camps *damer-kerem* and their dry-season

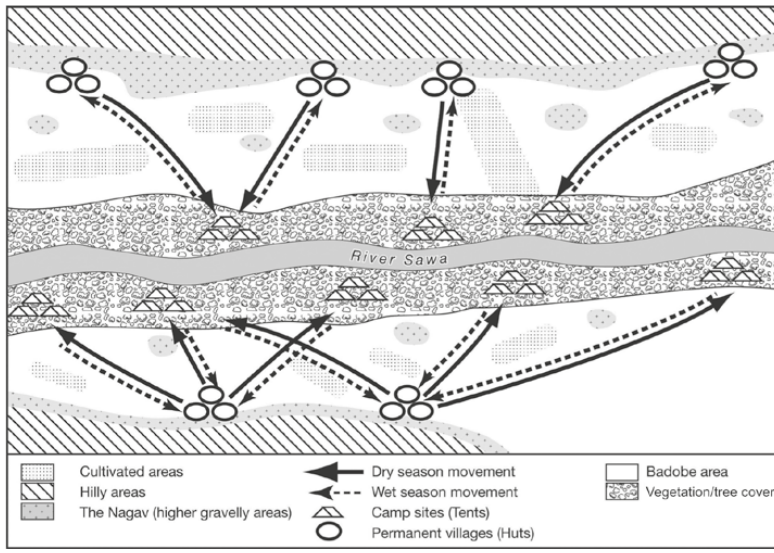

Fig. 6.4 Diagram of *damering* system, western lowlands of Eritrea. Source: Fre and Musa 1994

camps *damer-haghay*. This camping system has been organised by the Beni-Amer to integrate livestock production with agro-pastoralism, while at the same time ensuring the availability of water and grass. The *damer* is the socio-political and cultural base of the Beni-Amer herding community and their families, but, more importantly for this research, it is the overall management base for the dry and milking herds.

Most of the inhabitants in the dry season camp have a distinct sex–age-role composition, which reflects the Beni-Amer social organisation. A typical dry-season camp has a population of older people, women and young children. The elders are responsible for the wellbeing of their own families and for those of their herding sons or kinsmen. They are responsible for going to market to buy grain, selling animals, gathering information on herds and herders' conditions, and generally protecting the families. Young people under the age of 17 herd small flocks and milking cows and fetch water from the nearest wells. Women are confined to domestic work, childcare and looking after small flocks. Traditionally, the camp is administered politically by the village elders.

Most male adults over 17 years old herd dry cattle in the distant grazing areas, and since the herd is the most important productive asset of the family, it is entrusted to the most reliable and able-bodied labour pool available within the camp.

A large-sized *damer* consists of 50 or more households, with distances between the camps ranging from 40 to 150 kilometres, but much smaller *damers* consist of 20 to 25 households. Wet- and dry-season camps vary slightly in structure, but not much, and they are built to seasonal specifications according to weather conditions. Dry-season camp houses are built of palm mats supported by wooden frames and are known as *bet-tekayib* ('house of mats'); these camp houses are known as *aghnet* by non-Beni-Amer, and are universal throughout the region where pastoralism is the main mode of subsistence. The tents are light structures, easily dismantled and suitable for dry-season habitation. During the rainy season, the camp houses are built to be more durable, from stronger materials, and are known as *bet-teklib*, or *tukul*, in other parts of Africa. These are one-room huts built mainly of wood and straw with a cone-shaped roof of thatch that withstands wind and rain, keeping the family warm during the wet and cold season. Families prefer to have a varied housing structure that corresponds to the seasons, but they cannot always afford to do so, and some have to settle for the palm-leaf tent all year round.

The *damering* system is still widespread among the cattle-owning Beni-Amer, most of whom have two seasonal camps. However, with current trends of urbanisation and sedentarisation, and as insecurity is on the increase, the traditional wet–dry camp arrangements may be under threat.

The four major seasons according to the Beni-Amer

Khaym (October to January)

This is possibly the most important of the four Beni-Amer seasons, because it is the period of substantial live-weight gain, high milk yields and mating of cattle. By early October, green forage is disappearing quickly, except along the riverbanks, and the Beni-Amer plan the major move from their wet-season camps near their homesteads to their dry-season camps on the banks of the Gash, Setit and Tekeze rivers (see Figure 1.2).

The first phase of the move in October is made by the dry herds that migrate to the Gash area in south-west Eritrea for a few months, then further south to Setit (Tekeze) and Tigray, and Beghemdr in northern Ethiopia. Because of the increasing encroachment, the period between August and December is marked by great conflict between farmers and herders in the Gash area in Eritrea and the Gedaref area in eastern

Sudan. The areas south of the River Gash, including the River Setit, parts of lowland western Tigray, and Beghemdr, are covered by open grass, shrubs and bushes, and thus attract large herds from Sudan, Eritrea and Ethiopia.

The Beni-Amer herders send *tawray* ('investigators') to the dry-season grazing areas where the dry herds will be going, to assess pasture and water availability and the general security situation.

Depending on the distance, the investigators are away for two to four weeks, during which time they look for the best areas, where there have been good rains. Upon the investigators' return, the information they have gathered forms the basic guidance for the movement of several herds, but there are local variations in migration and families and herds can be split.

In the case of western Eritrea, the move from the wet-season camp to the dry-season camp takes place around November/December, when the milking herds, small-stock herds, and herders' families, including older members, migrate to nearby riverbanks. The small stock and the herders' families spend the period from November until June at the home base in their nomadic tents, while large livestock (dry herds) and able-bodied men migrate up to 600 kilometres south from December till January.

The *Khaym* is very hot, and towards the middle of the season milk yields drop and cattle conditions deteriorate. This necessitates night grazing to protect the cattle from heat exhaustion, dehydration and weight loss.

Haghay (January to April)

The period between January and April is a time of hardship and intense movement for cattle. This period sees very low milk yields, high prices of commodities such as salt and sugar, high demand for labour, and the need for drinking water, all of which problems are compounded by high temperatures of 40° Celsius or more. The herders adapt their practices by extending the night-grazing hours as far as possible and conserving the available water by practising water/thirst days. This season is physically very demanding on the herders, since they must perform the arduous and labour-intensive task of drawing water from deep wells, the main source of water during this time. Because of the lack of grass during this period, the herders have to lop trees for fodder. The *haghay* is also a period of great insecurity, as gangs of cattle raiders from surrounding non-pastoral

areas in the adjacent regions steal Beni-Amer cattle and sometimes kill the herders or force them to provide them with free milk or meat.

Hetcha or etebit (May to June)

The *Hetcha*, or *etebit*, towards the end of the dry season, is the most difficult of all the seasons, because cattle and herders are exhausted, and fodder and water resources are very scarce. Towards early June, at the onset of the rains, the long move northwards to the rainy-season camps begins. The herders want to ensure that they leave dry-season rangeland in good time and before the major rivers (the Tekeze, the Gash and the Setit) flood. Strong winds and high temperatures before the start of the rains are a major hazard to people and cattle during this period. The only consolation the Beni-Amer have during this season is the knowledge that the season is short and the rains will come in the following months (July, August, September).

Kerem (late June to September)

Kerem is one of the most important seasons as it involves major short- and long-term movements, grass regenerates, and the season coincides with calf drop. Milk production is relatively high, cattle are segregated into milking and dry groups, and herding them separately becomes important. The rainy season does not always mean less labour for the Beni-Amer, who must cater to dry and milking herds as well as cultivating crops and fodder in their wet-season camps. It is a relatively calm period, with abundance of dairy products and less mobility. This period is socially important for herders of dry herds as they have the chance to meet their families and friends after about six months of separation.

During the rainy season families with small stock and camels move away from their dry-season camps in the Gash area to northern Barka in Eritrea to cultivate in and around the valleys, which have better water catchments and riverbanks. The families move away from the riverbanks, which get flooded and mosquito-infested. Around the same time, the dry herds in the far south start to move northwards to join their families in the wet-season camps, escaping biting flies, wet clays, cultivated fields and the flooding of the Rivers Gash and Setit. During the rains, some of the herders will be involved in crop cultivation, by using castrated oxen or camels as draught animals, and simple one-furrow iron-tipped ploughs. The main crops include red and white sorghum, millet and sesame. If the

rains are good and forage is available, this is the time of year when dry and milking herds are managed closer to each other.

In recent years, dry herds have been forced to stay halfway between the dry- and wet-season camps (between the Rivers Gash and Setit) because of the intense environmental degradation and agricultural encroachment of high-potential areas in western Eritrea, eastern Sudan and parts of Ethiopia. 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, the small stock and the milking cows move to their dry-season camps (riverbeds) during November, after the crop harvest and the grazing of the field waste. The dry herds remain near dry-season camps as long as pasture and water resources allow, but by early January the period of austerity begins and dry herds have to move further south, across the border to northern Ethiopia.

Major limitations to good herding

Since hunger adversely affects conception and productivity, the Beni-Amer in both Eritrea and eastern Sudan who own milking and dry herds employ varied risk-management strategies, such as long-range movement, herd splitting and night grazing.

According to the Beni-Amer, the use of isolated, but richer, dry-season pastures and the practice of night grazing are curtailed by the fear imposed upon them by cattle raiders and big farmers, who are supported by the governments of both Eritrea and Sudan.

The Beni-Amer, the *Beja*, the *Lahawin* and the *Rashaida* pastoral groups in eastern Sudan have all agreed that encroachment by ever-increasing agricultural land and cattle raiders are the biggest enemies of pastoralists in the region (Morton 1988; Sulieman and Ahmed 2013; Fre 1992).

Encroachment on traditional grazing territory by agriculture has been worsening in the traditional homeland of the Beni-Amer in the southern Barka in Eritrea and eastern Sudan (Fre 2009b) Also, according to Gedamu et al.:

> The intermittent cultivation of sorghum, sesame and corn that has disrupted the traditional dry season grazing has aggravated the overstocking problem. The steadily increasing farming activity in the region now reaches about 19 per cent of the total landmass. (Gedamu et al. 1984)

In Eritrea, the situation is made worse by the build-up of migrant herds from the highland parts of the country (where grazing is scarce), high concentrations of Eritrean farmers from other areas, the expansion of commercial agriculture and horticulture along riverine areas, and charcoal making and other forest harvesting activities, which undermine the traditional rangeland uses and watering opportunities of all herders, including the Beni-Amer.

In the Gedaref district of eastern Sudan, encroachment and conflict over range and land resources is intense. According to El-Moula (1985), nomadic groups are prevented from using crop waste from the large agricultural schemes as farmers prefer to sell or even burn the sorghum stalks. At times, the pastoral people (sometimes including the Beni-Amer) have invaded these farms, and as a result conflicts have arisen between the herders and the farmers. 'Tensions over rangeland and rain-fed agricultural land are primarily local, but have the potential to escalate and exacerbate other sources of conflict to the extent of becoming national-scale issues' (UNEP 2007, 78).

Pastoralists in eastern Sudan have claimed that the big farmers harass and arrest them, and fine them, in cash or kind, on the spot, often enlisting the help of the police and the army, with whom the big farmers are associated (Fre and Tsegay 2016).

Cattle raiding, as a traditional means of herd increase or subjugation, is not unheard of among other pastoral groups in Africa or elsewhere. For example, inside Eritrea, Nara and Kunama tribes traditionally raided Beni-Amer cattle and this led to serious intertribal conflict. Such cattle raiding was also common among other ethnic groups in Eritrea, but this tradition has long ceased.

The nature of raiding over the last five decades has completely changed and has very little tribal dimension, but now livestock raiding is more a work of bandits who set out to make money by raiding and selling other people's livestock. According to pastoralists interviewed, the raiders most commonly known as the *haramies* ('criminals') are armed bands from various ethnic groups in the study region who set out to raid cattle, hold herders to ransom, and may kill herders during raids.

This chapter has described and demonstrated many important aspects of the Beni-Amer herding systems that are inextricably linked to the productive genes of their animals. The Beni-Amer do not believe the cause of low productivity and poor animal health is lack of animal feed, but rather the genetic predispositions of the type of cattle they keep.

The herds are at the centre of the pastoralists' lives, aesthetically, economically, cognitively and psychologically, as their herd management systems have revealed. The Beni-Amer herders have management abilities as well as skills and they are able to ensure the wellbeing of the herd in an unstable physical environment. Their herding system, in the broadest sense of the term, combines strategic, technical and cultural elements that interact with each other to create a complex herding mechanism, as described in this chapter.

I have demonstrated that cattle husbandry and management form the second area of traditional knowledge in which the Beni-Amer can make a major cognitive and skilful contribution to livestock research and pastoral development, as will be discussed in the final chapter. However, herders in the study area clearly stated that agricultural encroachment, cattle raiding and desertification are by far the most important factors which limit good herding and cause major economic losses for pastoralists in the whole of the study area.

The next chapter provides an understanding of the Beni-Amer's ethno-veterinary knowledge and practice. It looks at some of the inherent strengths and weaknesses which could be addressed by integrating or introducing western knowledge, something the Beni-Amer would welcome.

Chapter Seven
Ethno-veterinary knowledge and practice among the Beni-Amer

Ethno-veterinary knowledge and practices are directly related to pastoral development, since most Sahelian pastoralists store a wealth of ethno-veterinary knowledge, are able to treat some diseases, and can prevent others. It has been pointed out that the Beni-Amer cattle owners think most diseases are preventable, but, along with other pastoralists in the Sahel region, they have a positive and open attitude towards *western* veterinary practices and medicine.

The intention to practise good management as a preventive tool against poor animal health is what is most important to Beni-Amer pastoralists. In essence, they believe livestock health can be enhanced by good feeding, creating healthy conditions for animals (ranging from clean cattle camping – newly built encampments to keep the animals safe from hyenas, thieves and other predators – to seasonal movement to avoid biting flies), and not mixing herds (especially unknown herds or flocks, for fear of cross-infection). Failure to adhere to these management practices may lead to poor condition, and hence to poor health and productivity.

Many authors believe that a sound veterinary health programme should make extensive use of veterinary ethno-semantics and concepts, and build upon existing veterinary knowledge and folk practice. Much of the research in veterinary ethno-semantics concentrates on matching up traditional terminology with its scientific equivalents; this has helped to identify the positive aspects of the traditional practice. For example, Maliki (1981) lists 64 diseases as described by the WoDaaBe in Niger, along with their scientific names. Likewise, Wolfgang (1983) uses Fulani ethno-semantics in disease epidemiology, description and incidence of symptoms, and curative measures. Ethno-veterinary research by Ibrahim,

Nwude, Aliu and Ogunsusi (1983) has shown that among the Nigerian Fulani 'concepts of animal disease and treatment traditionally held by the herdsmen are often startlingly close to the orthodox'.

Western veterinarians working in West Africa in the 1920s were aware of the challenges of undertaking breed selection in the tropics; they turned their attention to improving animal nutrition in order to increase livestock productivity. This was in fact the strategy being followed by pastoralists, like the WoDaaBe in Niger, who specialise in optimising herd nutrition through mobility and by fostering feeding selectivity in their animals. Coming from a European tradition, however, the veterinarians' notion of improving animal nutrition was locked onto the single-path 'fodder cultivation'. In Niger, they embarked on a long line of frustrating attempts to cultivate alfalfa, unable to see the solution under their eyes in the strategies of the WoDaaBe (Krätli 2015).

Understanding of veterinary ethno-semantics and concepts is said to be crucial to veterinary science, research and extension (McCorkle 1986). The same is true of the Beni-Amer, because many aspects of their ethno-veterinary knowledge and practice have similar methods of diagnosis, treatment and taxonomy to their western counterparts'.

It is precisely the questions of *in what way* and *how* traditional veterinary knowledge and practices can be incorporated into pastoral development which has not been fully addressed. Conventional approaches to veterinary healthcare have been piecemeal, and animal health services have only focused on the treatment and vaccinations of animals, in most cases ignoring the herders' depth of animal health knowledge.

Veterinary services in many pastoral areas consist of diagnostic work in laboratories and annual animal vaccination programmes to manage major diseases (Sollod, Wolfgang and Knight 1984). There is therefore very limited evidence to suggest that veterinary ethno-semantics, concepts and skills have been incorporated to provide wider animal healthcare.

A good example is the eastern Sudan study area, where the service is associated with primarily urban diagnostic laboratories, animal vaccination campaigns, and teams of veterinarians and veterinary assistants who practise western veterinary medicine. According to a study in Sudan (Fre 2006), most of the veterinary and animal production services in the rural, pastoral areas have totally collapsed or become dysfunctional because of poor management and lack of financial resources.

On the current empirical evidence of ethno-veterinary knowledge among the Beni-Amer, there is a strong case for a much broader-based veterinary health service which incorporates some of the traditional

concepts of disease control and prevention as well as positive aspects of livestock management. The rich ethno-veterinary vocabulary, ethno-taxonomy, the belief that most diseases can be prevented by good husbandry, good knowledge of pharmacology, surgical and bone-setting skills, and the admission by pastoralists that certain diseases can only be treated or prevented by western veterinary medicine, show the potential of ethno-veterinary knowledge in the development and willingness of pastoralists to accept and use other knowledge systems.

A closer analysis of the 14 major *diseases* or *causes* shows an interesting combination of categories (see Annex 2). Included in these are contagious diseases caused by viruses or bacteria, diseases borne by insects (vectors and parasites), environmental causes, natural causes, nutritional deficiency, and diseases caused by the *unknown*. The last category is of a very general nature, and some of the diseases could be contagious and chronic and may overlap, or one could predispose to the other. In Annex 2, diseases are organised alphabetically but the nearest translation to English is maintained; the description includes the cause, the pastoral description, the type of animal affected, and the locality if known.

There is ample scientific evidence for arguing that the Bgait is an indigenous breed with great genetic potential for breeding and milk production. Basically, the indigenous genetic source is there to be improved. The key to increased production is improved management through better feeding, improved healthcare and the use of traditional skills and concepts, along with *western* concepts and practices.

The evaluation of the curative and preventive practice common among the Beni-Amer has shown that the herders have a very positive attitude towards western veterinary medicine, especially for those diseases which cannot be controlled or cured by traditional means, and in some cases they emphasise the possibility of combining the two systems.

The evaluation, in general, shows that the traditional ethno-veterinary concepts and practices of the Beni-Amer have significant limitations in the diagnosis and treatment of diseases, particularly diseases caused by bacteria and viruses.

In non-disease-related health problems (bone fractures, physiological problems and environmental illnesses), the evaluation has shown that the traditional practice has many merits. On the basis of evidence provided in this and the previous chapters, preventive practices that adopt good management skills enhance animal health and productivity.

Efforts to tap ethno-veterinary knowledge and practices and incorporate them into livestock development programmes have been initiated

in some arid and semi-arid pastoral environments, but primarily such efforts have concentrated on using the skills of traditional veterinary medics within their communities.

According to Halpin (1981), S. Sandford (1982), Maliki (1981), Fre (1988, 2008) and other authors, efforts are being made by governments and NGOs to extend the role of traditional veterinarians and upgrade their skills. In some parts of Africa it has been established that Sahelian pastoralists such as the FulBe, Fulani, Tuareg and WoDaaBe practise branding, vivisection, bone setting, wound treatment and so on, an indication that ethno-veterinary knowledge may be more widespread among many pastoral groups than previously thought. Works by Schwabe and Kuojok (1981), Wolfgang (1983), Sollod et al. (1984), Ohta (1984) and McCorkle (1986) confirm the wider use of ethno-veterinary practices among pastoral groups.

In the present study area of eastern Sudan and western Eritrea, several ethnic groups were interviewed during the field research in order to assess the relevance of ethno-veterinary knowledge and practices and to test the universality of their use among such groups. The groups included not only the Beni-Amer, but other groups such as the Beja, Shukrya and Rashaida groups in eastern Sudan, and among all these groups there seem to be similarities in the way diseases are identified, treated and prevented. For example, the causes and impact of rinderpest on cattle are perceived and described in the same way among many of the groups, and they even use the same term, *gulhay* ('cattle plague', meaning rinderpest), to describe the condition. There are also similarities in the way certain diseases, such as *abeg* (mange), are treated; all ethnic groups use serob (*Capparis decidua*) barks or similar plant material to treat mange in camels and goats.

The ethno-veterinary vocabulary has a name for almost every disease and condition, and there are also clear categories of major and minor diseases that affect different types of livestock. For example, most groups in the study area perceive rinderpest and anthrax in cattle and mange in goats and sheep as major diseases, while ticks are usually considered to be the cause of physical damage to animals rather than carriers of disease.

All groups adduce a variety of supernatural causes for certain livestock diseases, and there is a belief among herders that contagious diseases in general, and killer diseases in particular, cannot be controlled. Such diseases, which cannot be controlled by traditional methods, are seen as *ajel*, meaning 'death by destiny'. Most diseases, however, are seen as preventable by good husbandry, which includes provision of salt, not

mixing livestock with unfamiliar herds, seasonal movement to higher and lower grounds, and proper fodder provision during the dry season.

Ethno-veterinary knowledge and practices for large stock (cattle and camels) are considered the domain of men among most of these pastoral and agro-pastoral groups, as was evident from the interviews conducted in the study area: all the traditional veterinarians I interviewed were older men. Women are less involved with the management of large stock, but may be more significant in small-stock management (sheep, goats, and in some cases poultry) and animal products activities, such as leather processing and ghee or butter making. In these traditional societies, men have the opportunity to acquire broader ethno-veterinary knowledge and learn some practical skills from childhood onward, being apprenticed, as it were, to their herding fathers and older male relatives, but girls have been restricted by these same traditions. It has to be emphasised that, to date, very little research has been carried out on ethno-veterinary systems among pastoral groups in the study area, so a comparative analysis of ethno-veterinary knowledge systems would not be possible at this stage.

The Beni-Amer are well placed, both geographically and culturally, to be the focus of research on ethno-veterinary knowledge and practices. The fact that they share veterinary knowledge with other pastoralist groups in the study area shows that they have an interest in improving the ways in which they care for their livestock and are open to other methods and techniques. They also have specialised health management skills, which will be discussed and which are unique to them as professional herders. An attempt will be made to assess the diagnostic, curative and epidemiological knowledge of the Beni-Amer on the basis of the empirical data gathered for this book.

It has been established earlier in this chapter that the Beni-Amer have a greater mastery of animal production and herd management than of animal health, and that their lack of control of certain diseases is a clear indication of an inherent weakness in their IKS. However, the Beni-Amer understand the close relationship between livestock production, herd management and animal health, and their awareness of how these three factors influence each other is what makes Beni-Amer successful professional herders; it is seen as the best means of prevention of animal diseases.

The term 'ethno-veterinary' does not exist in the Beni-Amer vocabulary; they use instead the term *nay-berana*, meaning 'our rural practice'. It refers to practices and techniques rather than knowledge. Most diseases have descriptive, sometimes metaphorical, names specific to the

livestock species they affect. The majority of the causative agents of these diseases (polluted water, mixing of herds, poor accommodation, etc.) are known and will be discussed in later sections.

Veterinary ethno-semantics

The technical vocabulary of a given pastoral group is a useful indicator of the breadth or quality of veterinary knowledge and practice at its disposal (Dinucci and Fre 2003). Veterinary ethno-semantics among pastoral groups form the foundation of ethno-veterinary research and may lead to a better understanding of veterinary research, as illustrated in the following excerpt from McCorkle:

> Simple semantic and taxonomic investigations can help to pinpoint where stockowners could most benefit from increased etiological and epidemiological information, more astute diagnoses, and new treatment, prevention and control options. . . . [A]ll such research is critical for effective communication between stockowners and development/extension workers. (McCorkle 1986, 133, 134)

The Beni-Amer in the study area possess a rich, but unwritten, vernacular veterinary vocabulary (Tigre language), which covers a wide range of ailments and diseases that affect a variety of livestock species. These include internal (e.g. worms) and external (e.g. ticks, fleas) parasites, contagious diseases, ailments caused by accidents, diseases caused by malnutrition and exhaustion, and environmental ailments. The work by Littmann and Höfner (1962) on the Tigre language gives some indication of the importance of ethno-veterinary terminology to the Beni-Amer and other Tigre speakers in the study area (Fre 2009b).

Western veterinary science categorises diseases 'according to the etiological information afforded by sophisticated laboratory analysis' (McCorkle 1986, 133), but Beni-Amer ethno-veterinary knowledge is folk-based, use-oriented, and orally transmitted. It is important to point out that a cause-and-effect, 'western' veterinary approach may not be sufficient to grasp pastoral perceptions of a given disease. For example, rinderpest (*gulhay*, or cattle plague) is metaphorically known as 'shaver' because it *shaves away* (animal resources), which indicates the extent of the economic and social damage it causes. Rinderpest is also associated with cattle grazing in low-lying areas, indicating conducive conditions for the disease.

In their attempt to provide an etiological explanation, the Beni-Amer believe that rinderpest infects cattle in forest areas where kudus or gazelles graze, and they see a clear link between some wild animals and grass-fed cattle, so they warn each other to avoid these areas, thus protecting their herds and others' herds from cross-infection. Similarly, the Maasai base their disease diagnosis on known vectors, as in the case of wildebeest and malignant catarrhal fever (MCF). Using their indigenous knowledge that wildebeest are silent carriers of MCF vectors, they keep their cattle away from them during the calving season (Jacob, Farah and Ekaya 2004).

In the following sections, Beni-Amer veterinary ethno-semantics will be used, but because of the lack of previous research in the study area, a descriptive approach is followed and diseases will be described as they are perceived, identified, prevented and cured by the Beni-Amer cattle herders.

Disease perception and categories

According to the present empirical data, the majority of the Beni-Amer interviewed during the research consider 23 animal diseases, described in the following sections, as major. A major disease is defined by the Beni-Amer as one which causes greater than usual livestock losses, leading to poverty and shame; such losses are also seen as an indication of poor herd management.

A closer analysis of the major diseases or causes shows an interesting combination of categories. The Beni-Amer use the terms *mered* and *kaba* to mean 'ailment'; this is a broad term that encompasses a variety of diseases in a variety of animals. Ailments may be subdivided into the following: causing death by destiny, transferable, chronic, communicable, curable and preventable diseases.

Death by destiny, or *ajel*

Diseases and epidemics that cause sudden death are explained in terms of a supernatural will; herders can do little to prevent such occurrences. The following diseases, which cause death by *ajel* or destiny, are the most dreaded: *Ghulhay* (rinderpest), *Ansa* (foot and mouth), *Jan* (anthrax or fahmia), *Leghed* (heifer disease), epidemic mange, pneumonia, epizootic lymphangitis and birth deformities (a sign of bad times to come).

The Beni-Amer are unclear about the symptoms, or only half-read the symptoms at an acute stage of the disease or condition. They have some idea about disease incidence and transmission; for example, they know that foot and mouth and anthrax are spread by cattle grazing on the same pasture, but believe that they are also spread by the wind. There is a belief that infected herds should be isolated from healthy herds. The field data (Table 7.1) shows the perception and impact of some of the major diseases.

For these diseases, the Beni-Amer's diagnostic and curative measures may not be as effective as conventional practices, so they are asking for the intervention of western veterinary medicine. Table 7.2 gives a description of cattle disease in western/veterinary terms.

Table 7.1 Cattle disease descriptions in traditional/pastoral terms

Name of disease	Symptoms	Cause	Cure
Rinderpest (*gulhay*)	Sudden death	Not really known, but wild animals can be carriers	No traditional cure available
Foot and mouth (*ansa*)	Cracked hoofs and swollen muzzle	Not known, but spread by pasture and water	No traditional cure available
Anthrax (*fahmia*)	Sudden death	Not fully known, but can be caused by pasture and poisonous plants	No traditional cure available

Source: Fieldwork, 2010

Table 7.2 Cattle disease descriptions in western/veterinary terms

Name of disease	Symptoms	Cause	Cure
Rinderpest (*gulhay*)	Nasal inflammation, lacrimation, diarrhoea, dehydration, mouth and intestinal lesions	Contagious virus	Rinderpest antiserum vaccination
Foot and mouth (*ansa*)	High temperature, dullness, appetite loss, hoof and mouth pain	Virus	Destruction of infected animals
Anthrax (*fahmia*)	High temperature, sudden illness, nasal bleeding, sudden death	Infectious bacteria, transferable to humans	Antibiotics (used also for prevention)

Source: Fieldwork, 2010

However, it should be acknowledged that pastoralists recognise the presence of most of these diseases, but often at too late a stage of infection. The challenge for the Beni-Amer, and most pastoralists, is that some diseases may be without symptoms until it is too late, and for others, laboratory-based etiological information may be necessary to identify the disease.

Transferable diseases and parasites

The Beni-Amer consider several diseases to be transferable through wind, inhalation, water, skin contact, over-crowding, infected pasture, wild animals, and some of the disease carriers or agents such as ticks, lice, fleas and mites. These are ailments perceived to be transferred from herd to herd; they include coughs and mange.

Cross-infection is believed to occur when:

- certain species of stock, e.g. cattle, mix with kudus or gazelles;
- flocks belonging to different owners are grouped together;
- infected donkeys and goats are mixed; and
- housing conditions are poor, grazing is restricted and the environment is clayish and wet.

Communicable diseases and insects

According to Ibrahim et al. (1983), the Fulani pastoralists in Nigeria are able to treat infectious diseases among cattle, and in some instances appear to know the route of infection. The Fulani also have a deep knowledge of the vectors associated with the diseases. According to the Beni-Amer in the study area, mixing of herds is the single most important factor predisposing animals to diseases, while poor housing for small stock, malnutrition, wet clays, and poor animal management generally, are believed to create favourable conditions for the spread of disease and infection. The avoidance of such animal husbandry and management practices is indeed positive and reduces the risk of infection.

Ticks and mites are rightly seen by the Beni-Amer as parasites that cause extensive skin damage to animals, which may lead to infection. The Beni-Amer do not perceive these parasites as carriers of dangerous micro-organisms; the fact is, however, that ticks and mites are dangerous

carriers of disease. Parasites may cause livestock losses by blood sucking and can transmit bacterial, viral and protozoan infections and other diseases from one animal to another.

The causes of most of the ailments mentioned in this category are not associated with the supernatural (*ajel* or death by destiny), but are perceived as preventable, if not curable, by a combination of *traditional* and *western* veterinary medicine. The current study, however, shows serious gaps in knowledge of diagnosis, the life cycles of vectors and organisms, cross-infection from livestock to humans, and taxonomy, among other things.

Chronic diseases

These diseases are believed to remain inside the animal and weaken it. They include bovine and caprine pleuro-pneumonia (BPP and CPP), *Shanmbu* (emaciation), *Abar* (starvation) and *Gresh* (mastitis).

Lameness (caused by long treks) and mastitis (caused by tick damage) are correctly described, but the Beni-Amer do not know that tick-borne mastitis is cross-infectious and that lack of hygiene can also cause mastitis. The symptoms of mastitis *(streptococcus* strain) are often read too late, after the condition has become acute (that is, when the udder has become completely sterile).

According to the Beni-Amer, pneumonia *spoils* the lungs, but the condition is much more complex, since pneumonia can be acute or chronic and may be triggered by heat or fatigue. Hall (1985) confirms that the Beni-Amer version is correct for some forms of pasteurellosis (a type of pneumonia), but he points out that other symptoms include high fever, depression, respiratory distress, anorexia and coughing.

Epizootic lymphangitis, commonly known as *donkey disease* or *habil*, is a contagious killer disease, the cause of which is not known to the Beni-Amer but well known to western-trained veterinarians. Donkeys in the study area do a lot of haulage work, and because of excessive loads and poorly designed harnesses they get back, neck and abdominal wounds which allow the fungal infection (*Histoplasma farciminosum*) that causes epizootic lymphangitis.

Chronic diseases caused by viral, bacterial and fungal micro-organisms are little known among cattle owners, and symptoms are often detected when it is too late.

Curable and preventable ailments

These are conditions believed to be preventable and treatable through the practice of good husbandry: miscarriage, water disease, mange in goats and camels, and bone fractures. Several diseases are linked to malnutrition, long-distance travel, wet and dry seasons, and conditions in which veterinary drugs or medicinal plant sources are unavailable.

Some diseases are only manageable by veterinary medication; there is no traditional cure. They include rinderpest, anthrax, foot and mouth, *haemorrhagic septicaemia* and other contagious diseases. Hence there is growing demand for and use of veterinary medication among pastoralists.

Vectors include lice, mites, biting flies and ticks. These are problems which can be prevented by good animal husbandry practices, such as good feeding, salt provision, resting, seasonal movement and non-mixing of herds, and through traditional curative practices, such as herbal medicine, fumigation, hand tick removal, branding and pin firing.

Miscellaneous conditions

Other diseases or conditions consist of nutritional deficiencies, environmentally caused illnesses, natural physiological disorders, night blindness, water-borne diseases, miscarriage, diarrhoea, bloating, foot rot and the non-removal of the placenta.

A form of night blindness (*awer-lali*) the Beni-Amer refer to is *hypovitaminosis* A (a condition caused by vitamin A deficiency); they associate it with the lack of green forage during the long dry season, and the present field research confirmed such cases in some parts of the study area. A different type of *hemeralopia*, or day blindness, present in the area is caused by excessive sunlight; this is categorised separately as *johor*.

It is not certain whether night blindness is caused by a combination of lack of green fodder, stress and excessive heat (sunlight), or whether there are other types of hemeralopia, as the Beni-Amer suggest.

Environmental stress seems to be mainly a dry-season problem, and, in particular, the consumption of very cold water when body temperature is high is perceived as dangerous, leading to disease of the joints or even death. Although this is difficult to verify on a scientific basis, the Beni-Amer try to minimise such risks by practising night grazing and

early-morning watering routines that are intended to reduce heat-related stress on the animals.

During the rainy season the herders face different environmentally related stresses, including heavy mud, wet clay, and other environmental hazards that may cause injuries and infections to their animals.

Contagious miscarriage (caused by *brucellosis*) is more of a problem among goats than among cattle, according to the Beni-Amer. They speak metaphorically of *storms* of miscarriages to highlight epidemics; I observed such epidemics during my time in the study area. According to the Beni-Amer, ticks, mosquitoes, fly bites, dust storms, wet conditions, mist and sunlight cause miscarriages. The Beni-Amer do not consider miscarriage to be contagious, but believe that it can be caused by bad management (poor feeding and mixing with unknown flocks).

Diarrhoea is perceived as an affliction only of young animals (calves, kids and lambs) and it is believed to be caused by an intake of too much colostrum after birth. The Beni-Amer also believe that milk consumption from vaccinated animals can cause diarrhoea in calves, but I did not find evidence to support this claim. In veterinary terms, diarrhoea is caused by a bacterium and triggered by poor management, chills and excessive travelling, which increase the chances of exposure to the bacterium.

Bloating is believed to be caused by grazing on lush grass, and sometimes feeding on husky crop fodder (which can be difficult to digest), and is understood to be a physiological problem. These are correct observations by the herders, because lush grass, if heavily consumed on its own, can be the main cause of bloating (the rumen is blown up with gases). Husky fodder can also cause bloating and indigestion in livestock.

Foot rot is correctly diagnosed by the Beni-Amer and believed to be caused by wet clay soil and to affect mainly small stock; however, they are not aware that it can also be cross-infectious. In veterinary terms, the bacterium which causes foot rot gets into the cracks of animals' feet and leads to hoof inflammation and lameness. The bacterial cross-infection is transmitted mainly through common pastures.

Non-expulsion of the placenta is seen as a naturally caused complication, which the Beni-Amer have no difficulty in understanding and treating with traditional medicine.

The Beni-Amer disease categories and perception of diseases, and the veterinary ethno-semantics they entail, are relevant to livestock healthcare management, though the knowledge system is obviously weak in understanding bacterial, viral and fungal causes of disease and their diagnosis. There is therefore a need for veterinary research that

could make use of traditional concepts while filling knowledge gaps. The Beni-Amer herders, however, have a good understanding of prophylactic measures against insect-borne diseases, diseases caused by nutritional deficiencies, physiological disorders, and other management-related health problems.

Preventive practices

The preceding chapter gave a partial description of Beni-Amer herd management strategies. Among the most important are salt provision, night grazing, watering, and herding labour.

The combination of such management practices is believed to enhance animal health, and the Beni-Amer see a strong link between good management, good health and a productive animal. Productivity and health are very closely related: biting flies and ticks, for example, are believed to lead to lower milk yields, since irritant agents may depress the animal. Also, if animals are in poor condition, they will not be interested in mating and may fail to conceive. If they do conceive, their parturition period may be unpredictable, and they may abort or have a difficult delivery; parturition, therefore, depends on good feeding and good health.

According to the Beni-Amer, migrant flocks and herds have a better chance of grazing more diverse and healthier environments than settlement-based ones. Despite the home and migrant herds being the same genetically, migrant flocks produce twice a year because they are healthier, and better fed because of more grazing opportunities and less risk of overgrazing.

By contrast, home flocks and herds are more affected by encroachment by agricultural land, and are more susceptible to heavy disease infestation (ticks, biting flies, etc.), and, because of the lack of seasonal movement, are less productive. Wet clays lead to foot rot as they provide an environment for ticks and biting flies, and both the wet clays and the vectors they harbour are believed to lead to chronic diseases in cattle. Diseases caused by biting flies, mosquitoes, fleas and ticks are often associated with the rainy season. The majority of the Beni-Amer say that if an animal is infected during the rainy season the disease remains in its body, and it is very difficult for it to recover in the dry season. Sedentary pastoralists must therefore provide their animals with crop fodder, hay, grain, and sometimes sesame by-products, to help them recover.

Rearing the right breed for a given environment

Many pastoral groups in the Horn of Africa rear livestock particularly suited to their environment; the Beni-Amer are well known for producing lowland-type cattle such as the Bgait (short-horned zebu) and goat and sheep breeds suited to central clay soil conditions, rather than the hill-type *Arado*, which is less suited to the savannah environment. In the case of goats, they rear the heavy lowland-type *Hasani*, rather than the hill-type *Gumsawi*, *Lange* or *Kassalawi*. They see the Hasani among goats, and the Bgait among cattle, as best suited to this environment because of their effective use of range and fodder. Apart from disease resistance, such breeds are also used to dry fodder feeding, grain feeding and sesame cake feeding, but hill-type animals tend to be grazers and browsers.

In the context of animal health, producing the right breed is seen as a preventive measure against certain diseases and low productivity.

Good housing and mixing of herds or flocks

Protecting small stock, by means of good housing, from rain, predators and wet soil is strongly emphasised, because sarcoptic mange, ticks and fleas are closely associated with bad housing.

Mixing of animals should be avoided as much as possible, for fear of cross-infection, particularly if the animals' owners are not known. Other attempts at prevention include the regular exploitation of diverse ecosystems, both horizontally and vertically. For example, if goats are taken from lower to higher ground, fly and tick infestations are greatly reduced, but if they are kept in wet, crowded, low-lying areas, they will be affected by mange, ticks and foot rot.

The use of different ecosystems means a change of diet, and sweet and sour plants are very important for health. Spring water is preferred to standing water as it is believed to have a purgative effect on the animals and to increase appetite.

The Beni-Amer are familiar with preventive veterinary practices, both traditional and western, and their biggest problem seems to be lack of access to veterinary drugs, which are either unobtainable or simply beyond their means. In maintaining good animal health, Beni-Amer pastoralists combine good management with the use of traditional preventive skills.

Curative practices and the options

The way the Beni-Amer perceive livestock diseases influences the methods they employ to try to cure them; the two prevalent curative options are the traditional, or *nay-berana*, and the western veterinary practice they call *beteri*. Since veterinary services were introduced to Sudan and Eritrea during the colonisation of the 1920s, it must also be pointed out that some of the ethno-veterinary knowledge and practices may combine indigenous and exogenous (western) veterinary concepts. This synthesis of traditional and western practices has enriched the veterinary knowledge base of the Beni-Amer and other pastoral groups more widely.

Another option, which would fall under *nay-berana* and is now out of fashion, is the use of magic, which traditionally involved the tying of *teshbih* (a small leather bundle with holy writing inside) on the neck of cattle to protect them from the evil eye, diseases and raiders. Clan sheikhs also used to bless herds and pray for their good health before their seasonal migration to distant grazing areas. However, this is no longer widely practised and is only seen in more remote areas.

Most of the herders' curative practices primarily depend on traditional methods that have been passed down orally from generation to generation.

The Beni-Amer also realise that there are certain diseases which cannot be cured by traditional means and have to be treated with western veterinary medicine. Western curative and prophylactic methods for dealing with diseases such as rinderpest (*gulhay*), foot and mouth (*ansa*) and pneumonia (*sambu*) are appreciated and accepted by the Beni-Amer as a better alternative to veterinary traditional medicine.

Most Beni-Amer contacted during the field research are eager to vaccinate their herds annually, and some even take their herds to the nearest veterinary clinic for treatment. Most of those interviewed see their traditional methods and western veterinary practices as mutually supportive in enhancing general animal health; their exposure to veterinary services since 1920 may have partly contributed to such a positive attitude to western veterinary medicine.

Traditional curative practices

The use of the term 'curative', or *dawa* (medicine), is used in its broadest sense to mean an attempt to cure fully or partly, but the following important distinctions are made.

Firstly, the Beni-Amer have what they call multi-purpose cures, which are supposed to enhance health partly by providing the animals with additional nutrients to supplement fodder or forage. Examples of these include salt in the form of salt licks, sorghum soup, sesame oil, flax-seed, fenugreek and lady's fingers (okra). These are used mostly to treat a wide range of diseases, ranging from bloating to insect bites. The use of such cures appears to be common practice and pastoralists use them at their own discretion and without much involvement from traditional medics or trained veterinarians.

Secondly, there are specific cures for specific diseases, but these, and other, more specialised curative aspects, involve using the skills of traditional veterinarians. Important among these are: *Capparis decidua* or *serob* extracts to treat sarcoptic mange among camels and goats; finely ground bark of *Balanites aegyptiaca* or *qogh* to cure eye diseases; manual setting of dislocated or fractured bones; and dealing with breech-presentation and otherwise complicated births.

Thirdly, when the Beni-Amer are unsure about the effectiveness of a traditional curative practice they practise trial and error, which is called *tejribat*, literally 'trial'. In practice, this is a desperate measure used only in the absence of an effective traditional curative medicine; it can be dangerous, but the Beni-Amer may not understand it to be so.

Examples of these desperate measures include the use of DDT to treat against ticks and mange, and injecting penicillin for heifer disease. Similarly, geomycin and streptomycin are sometimes used to treat pneumonia, but these are, of course, desperate and dangerous measures in situations where there is very limited or no veterinary support from the relevant government ministries. The traditional curative practices among the Beni-Amer therefore contain inherent weaknesses and obvious merits, which deserve some detailed description and an evaluation (see Annex 2).

Likewise, the Maasai have grown dependent upon modern commercial antibiotics, such as terramycine; because opportunistic individuals introduced and sold the medicine, the Maasai did not administer it properly or in effective dosages, which resulted in the creation of drug-resistant strains of diseases (Jacob, Farah and Ekaya 2004). Jacob et al. quote Dr J. Ole-Miaron's assertion (in a personal observation) that the Maasai's acceptance and reckless use of drugs such as terramycine have led to 'the erosion . . . of the Maasai ethnoveterinary medicine which was particularly effective in the treatment of many non-contagious diseases' (p. 46), and Jacob et al. go even further, stating that 'terramycine . . . and modern animal husbandry are directly responsible for the disappearance

of the ancient pastoral tradition of decentralising stocks', which has led to 'overstocking and a greater disease risk . . . and soil erosion in the pastoral land' (Jacob et al. 2004, 46). The above examples may serve as a warning to other traditional pastoralists that, without proper guidance and without true collaboration from livestock extensions, they too may be at risk of losing some of their ethno-veterinary knowledge and medicine.

On the basis of the present information the most widely used curative practices used by the Beni-Amer are body manipulation, eco-exploitation and ethno-pharmacology.

Body manipulation

This is perhaps one of the most established traditional curative practices used by the Beni-Amer and other ethnic groups in the study area. The ethno-veterinary body-manipulative technique basically involves the use of fire and knife to treat a variety of diseases caused by accidents, natural causes, and several other agents affecting the body.

The Beni-Amer believe that fire and disease cannot co-exist, so ailments such as swellings, muscular strains, tick bites and clotting are treated by using fire and a blade. Specific points on the body are cauterised with a hot iron. This practice is called *tkset*. Pin firing is used to encourage blood flow, and *elamet* or branding is used for herd management purposes.

Traditional veterinarians are called on and additional special skills are required during the cauterisation process, but usually this practice is carried out by the herders themselves. The skills of the practitioner are therefore crucial to determine the success or failure of these curative practices, and this includes good aftercare of the animal. Selective cauterisation may also be used in surgical operations, such as blood letting, and broken bone setting. As well as using fire for tribal, clan or family branding, or *elamet*, to mark the animals for herd management purposes, fire is also to dehorn calves – by burning the tip of the horn. Fire is also used to fumigate goat and sheep houses by burning tree branches to get rid of disease bearing pests, but this is more of a preventative than a curative action.

Branding and dehorning are undertaken by herders themselves and do not require a traditional veterinarian. However, bull castration may involve traditional veterinarians as this requires specialised skills.

The knife is an important tool used to treat many ailments and in general animal care, such as to trim hooves. If an animal is wounded, a

knife or blade is used to remove dead blood from a swollen limb. Wounds are then washed and dressed using salt, kerosene and herbs.

The practices of cauterisation and surgical incision are also used extensively by Sahelian and other pastoralists around the world to cure illness amongst their cattle and other animals. (Dinucci and Fre 2003; Fre 2008; Maliki 1981; Ohta 1984; Schwabe and Kuojok 1981; Wolfgang 1983).

Eco-exploitation and ethno-pharmacology

The relevance of eco-exploitation and ethno-pharmacology has been demonstrated in several contexts (e.g., production, animal husbandry and health) throughout the research. Since the focus of this research is animal production, husbandry and health, not ethno-botany, much of the material has been placed in an annex (Annex 2).

In terms of animal health management, eco-exploitation is crucial to the Beni-Amer cattle herders. Ruminal breeding, seasonal movement (to protect against ticks and flies), protection from weather extremes, avoiding infected pastures and waters, searching for salty earth and vegetation, and avoiding wet clays, are good examples of eco-exploitation which contribute to animal health, but these strategies are now seriously undermined by agricultural encroachment.

In other parts of the world, considerable research has been conducted that shows that pastoralists have a wealth of ethno-pharmacological knowledge. A descriptive study by Nwude and Ibrahim (1980) gives details of 92 different plant species and their traditional medicinal and veterinary uses in Nigeria; Chavunduka (1976), similarly, describes 53 plant species and their ethno-pharmacological uses among pastoralists in eastern and southern Africa (both studies were also quoted in McCorkle 1986). Maliki's work (1981) among the WoDaaBe covers wider aspects of ethno-botany, including pharmacology, range value and soil–plant association. In the study area, unfortunately, there is very little ethno-botanic or ethno-pharmacological research material to refer to, and the main source of information was the pastoralists.

Ethno-pharmacology is a very complex topic which deserves extended research, but among its most common practices are fumigation, herbal smearing of the udder and the body, the use of latex and extracts of certain plants, and the use of laxative plants and salty vegetation. The leaves, bark, flowers, fruits, seeds and roots of plants can be

used for these treatments, but seeds, bark and leaves are the most commonly used. Such methods are used to treat a variety of ailments and curable diseases. In some cases, they use combinations of herbal remedies which involve up to three different plants, and these are believed to be more effective against some diseases.

Sometimes a disease is treated by using only part of a plant, such as the bark, but pastoralists are unable to explain why the other parts of the same plant cannot be used effectively. This is where a chemical analysis of the plants could be useful in understanding how IKS could work with conventional medicine.

Curative medicine is administered rectally, vaginally, orally and sometimes by inhalation, but administering traditional medicine by injection is unknown to the Beni-Amer cattle owners, because remedies are packed into wounds.

Chapter 9 reflects further on these curative practices and management strategies.

Men of knowledge or traditional veterinarians among the Beni-Amer in the study area

Traditional veterinarians, generally called *Seb-lalamro* or *men of knowledge*, are a small minority among the Beni-Amer. They are mostly older people, always male, and in most cases animal herders themselves; they are mostly illiterate and live among the community in the rural setting. In the past, and under conditions of more politico-ecological stability, their numbers were greater, but in recent years their numbers have been greatly reduced by ongoing instability in the study region, the decimation of herds by drought and famine, the reduction in medicinal plant material, and the pauperisation of pastoral groups.

Currently, their main role is to cure certain diseases (traditionally or by using western veterinary medicine, or both) and advise herders on the best means of treatment. There has been a tendency among traditional veterinarians to adopt western veterinary practices, with the assistance of government veterinarians, and to integrate the two systems. For example, certain western veterinary drugs (e.g. geomycin, streptomycin) are widely used by traditional veterinarians, and sometimes ordinary herders, to treat pastoral herds. In addition to the activities listed above, they practice fire branding, bone setting, vivisection and minor operations, using traditional methods.

During the field research, four traditional veterinarians were interviewed in order to assess their role in the pastoral community, their main areas of work, and the types of diseases they treat. Among their most important functions are, disease identification and treatment, the use of curative western veterinary medicine, fire branding, and operations.

One of the important functions of traditional veterinarians is to help herders identify diseases with more accuracy and suggest the best curative measures, since not every herder can identify diseases and decide on the appropriate treatment. According to traditional veterinarians, diseases are identified by herders mainly by their symptoms and not by any other diagnostic indicators. The most important symptoms to be aware of are coughing, the state of the hair (whether it is dull or has a natural colour), lack of appetite, poor body condition, and change in character (restlessness). The Beni-Amer rely on observation to assess their animals' health, saying, 'We identify or recognise what we can see, touch and feel'.

Traditional veterinarians use ethno-veterinary language familiar to ordinary herders; the main differences between them are the way in which traditional veterinarians describe symptoms more accurately and the fact that they suggest specific measures should be taken to cure a specific disease using a specific method, as shown in Tables 7.3 and 7.4. Traditional veterinarians are also able to diagnose and treat the

Table 7.3 Examples of symptoms and cures as perceived by traditional veterinarians among the Beni-Amer

Name of disease	Symptoms	Cure
Gulhay (rinderpest)	High temperature Lacrimation Salivation Appetite loss and fatigue	Isolation of affected animals
Ansa (foot and mouth)	Sudden death	None
Habil (donkey disease, *epizootic lymphangitis*)	Wounds and lesions Dusty hair Depression	Isolation and fire branding
Sambu (pneumonia)	Continuous coughing Weight loss	Fire branding on left and right sides
Sbret achm (broken bones)	Lack of mobility Pain Loss of condition	Fire branding on known spots

Table 7.4 Examples of diseases frequently encountered and the measures taken to cure them

Type of animal	Disease	Curative measure
All stock	Broken bones (*Sbretachm*)	For forelegs and hindlegs adjust the broken leg, support by a piece of wooden board and tie firmly. Fire branding helps.
All stock	Fractured bones (*Stretachm*)	Adjust the fractured bone by means of a bandage. Fire branding must not be usedasthe bones will crack.
All stock	Breech presentation (*Ekeywelid*)	The ejected uterus is pushed back gently. The afterbirth (placenta) can be gently pulled out by hand. Stillbirth: a dead calf can be pulled out slowly. A restricted uterus can be expanded by incision.
Cattle, goats, sheep	Biting flies (*Cincay*)	No cure apart from escaping or moving seasonally away from fly-ridden areas. Abunini (a veterinary medicine) is tried.
Cattle and sheep	*Leshlesh* (a grass disease whose scientific name is not known)	Penicillin, streptomycin and Abunini cure grass disease, water disease and swelling. Large swollen parts are operated to remove the dead blood.
Cattle	Night blindness (*Awer-lali or johor*)	Confinement, pouring cold water on the back of the animal, provision of green forage. Ground *Balanitesaegyptiaca* powder is dropped on the affected eye.
All stock	Snake bite	No traditional medicine available. Abunini (a veterinary medicine) is tried.
All stock	Poisonous herbs	Provide a mix of salty water to clean up the stomach.

Source: Fieldwork, Fre 2008

more frequently occurring ailments and diseases, as shown in Table 7.3. Table 7.4 shows that traditional veterinarians use a combination of traditional and western veterinary medicine in their curative attempts.

In this chapter, I have shown that the Beni-Amer herders attach great importance to good management practices as a way of enhancing animal health and productivity. The Beni-Amer have a greater mastery of animal production and herd management than of animal health, and their lack of control of certain diseases is an indication of the inherent weakness within their ethno-veterinary knowledge system.

The traditional curative practices are still very popular; herders regularly ask traditional veterinarians to decide what treatment is needed and to conduct it for them. The curative activities most commonly performed by traditional veterinarians are fire branding, operations, bone setting, the treatment of birth complications and the injection of veterinary medicines. Particularly for solving birth complications, bone setting and fire branding, traditional vets are believed to be well qualified, and even formally trained vets refer these cases to traditional veterinarians. *Traditional veterinarians, however, despite the general acceptance of their knowledge and practices, are not recognised officially, and sometimes dismissed entirely*. They have no base from which to work, little equipment, and little official support, recognition or training. One of the traditional vets lamented, 'If your work is not recognised officially, your practice is always considered as inferior.' Traditional veterinarians and their knowledge are still greatly underutilised in both research and livestock extension, which allows huge room for improvement.

The next chapter gives a brief overview of the practices of other pastoral communities, namely the Tuareg in Mali and Niger, the Raika/Rabari in India, and the Andean pastoralists in South America. Their actions to overcome new and emerging challenges reveal common strategies and the flexible nature of their IKS.

Chapter Eight
Indigenous knowledge and practice among other pastoralist communities

Pastoralists in many different parts of the world face similar challenges to those of the study area, such as encroachment on grazing land by agriculture, lack of access to grazing and water resources, limited or no support from government ministries, insecurity issues related to conflict and warfare, and unforeseen climatic events such as drought and extreme heat. It is worth examining the similarities and differences in how different pastoralist communities address a variety of challenges and how they incorporate their own IKS to survive and be productive.

Many of the more powerful groups, such as the state, highland settlers, urban elites, commercial farmers, the military and big foreign companies tend to occupy traditional grazing lands on the pretext that it is in the national interest. Such actions can undermine the traditional land management adopted by pastoralists and make them more vulnerable economically. Wars, droughts and famines tend to affect pastoral and nomadic areas more than sedentary ones, resulting in greater insecurity for pastoralists.

In terms of ecology, wetlands, especially riverine areas, and other water sources in pastoral areas are under the greatest pressure from expanding agriculture and industry. Most pastoralists around the world inhabit similar topographical environments, such as vast savannahs, coastal plains and some mountainous regions, practising extensive grazing systems. Further similarities may be drawn among the various pastoral groups in terms of production systems: pastoral nomadic, semi-nomadic, agro-pastoral, etc. In countries like Ethiopia, Eritrea and Kenya, over 60 per cent of the population is concentrated in the highlands and their peripheries, occupying only 30 per cent of the total land. It is estimated that nomadic pastoralists typically occupy 70 per cent of

the total landmass, thus making better use of the land and not depleting resources in one area. In most of the countries of the Horn of Africa, legislation pertaining to land use does not accommodate or guarantee pastoral land rights or access, which in some cases leads to violent conflict between the state and pastoralists (Fre 2008).

Concerning development interventions, it is apparent that in pastoral areas many are delivered by central government via a top-down approach or are totally inappropriate and not tailored to the needs and aspirations of the pastoralists they purport to benefit. In reality, many such interventions have led to further socio-economic and political marginalisation of pastoral peoples.

Pastoralist communities are not as isolated as is often thought; many of them cross borders in search of grazing and water resources, as well as marketing opportunities. In many cases, they have familial or tribal ties with pastoralist communities on the other side of the border. Although the following case studies differ widely in terms of geography and culture, it will be apparent that these three groups face similar challenges and employ similar techniques as the Beni-Amer and other Horn of Africa pastoralists.

The Tuareg (Mali/Niger)

Described in a variety of colourful ways such as 'dangerously capricious' (Jalali 2013) and 'a foreboding place of desert sands and rocky escarpments' (Emerson 2011), the environment inhabited by the Tuareg is anything but mild and predictable. With an average annual temperature above 30°C and yearly rainfall varying between 100 mm and just above 150 mm (OECD n.d.), population density is unsurprisingly low. With the exception of Gao and Timbuktu, there are no sizeable agglomerations of people. 'In 500,000 km^2, there are only a handful of small villages: Tessalit, Araouane, Taoudeni, separated by hundreds of kilometres of sand or rock desert, including the dreadful Tanezrouft' (OECD n.d.). However, it is here (and in the bordering area of western Niger, which has a similar climate), amongst these not-so-temperate factors, that many of the Tuareg have managed to thrive. In 2013 they numbered between 1.2 and 3 million (Asfura-Heim 2013).

Tuareg society is highly stratified. The people are comprised of *imajeren* (nobles – the proud and free), *imrad* (free but subordinate), *ineslemen* (the religious caste), *ikelan* (slaves in neo-peonage) and *inadin* (artisans) (Minority Rights Group International 2008). Furthermore, the

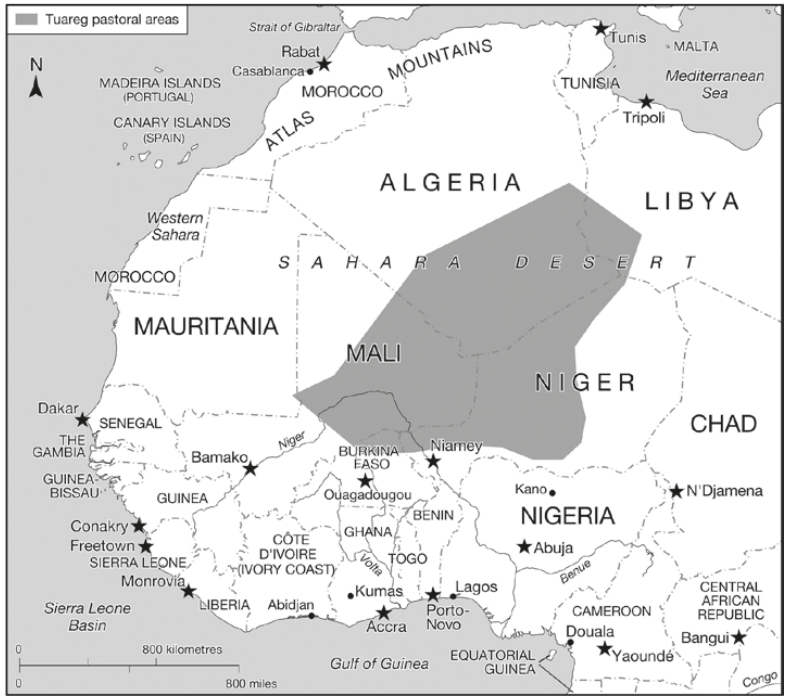

Fig. 8.1 Tuareg pastoral areas. Source: Cath D'Alton

Tuareg are not one political entity, but are made up of various tribes, each with its own agenda. 'There is no pan-Tuareg movement. The Tuareg do not speak with one voice. They are divided along tribal, generational, and ideological lines, and there is no consensus on the need to establish a separate Tuareg state' (Asfura-Heim 2013, 2).

However, what unites all Tuareg is their reliance on livestock. Although camels are far and away the most highly prized in terms of the social prestige they confer on the owner, it is the rearing of other, smaller livestock (sheep, donkeys, and particularly goats) that conveys the greater economic benefit (Cranstone 2007). As animal rearing is such an integral part of their livelihood strategy, naturally the Tuareg have developed an intricate system of ethno-veterinary knowledge designed to safeguard the health of their investments. Antoine-Moussiaux, Faye and Vias (2007) go into detail about the various veterinary methods commonly employed by the Tuareg, including surgical procedures (e.g. the extraction of a calcified sublingual cord), bleeding (e.g. in response to a swollen jugular vein), ethno-botanical treatments, such as green tea, millet and tobacco to treat diarrhoea, bloating and ticks, and even the

incorporation of extra-traditional materials such as 'powders collected from batteries, various haircare or skincare creams, crushed glass, insecticides or motor oil'. This Tuareg *broad-mindedness* (as argued by Antoine-Moussiaux et al.) about incorporating new methodologies and materials into their ethno-veterinary repertoire provides the ideal pathway for the introduction of occidental medical knowledge, allowing a merger of knowledge systems.

Of course, it is not only in the ethno-veterinary field that the Tuareg have been exposed to new and *outside* influences. Indeed, the economic, political and environmental stresses of recent decades have begun to bring them to breaking point, to the extent that some can no longer practise livestock production or their ethno-veterinary activities. These are similar challenges to those facing the Beni-Amer, as mentioned earlier.

One of the most transformational of these factors has been climate change. As temperatures rise, water sources are drying out, causing a reduction in herd size; some Tuareg communities lost 75 per cent of their herds during the droughts of the 1970s (McKune and Silva 2013). These droughts continue today (Harris 2007), and Tuareg populations are being driven ever southward. As they move south, 'pastoral communities encroach upon agricultural land, and thus must negotiate access to grazing land and water with agricultural communities' (McKune and Silva 2013). Such negotiation over limited resources can and does lead to increasing tension and conflict in the region. One can draw parallels with pastoralists in the Greater Horn of Africa.

Of course, climate isn't the only shaping factor in Tuareg society. Government sedentarisation policies have been pivotal in the changes seen in the Tuareg way of life. Although such policies can be traced back to French colonialism in the area, the 1970s saw increased efforts to settle nomadic tribes coming from areas with newly independent governments as pastoralist people were increasingly being blamed for desertification supposedly due to overgrazing (McKune and Silva 2013). This pressure to give up their traditional lifestyle and settle increased as privatisation of land continued well into the latter half of the twentieth century and, indeed, continues to be a force now. Sommerhalter (2008) notes that this land privatisation is not merely a foreign affair, but one that is domestically fuelled: 'Recently, a heavy menace has hung over the area caused by rich and influential people trying to get large parcels of land for their exclusive private use' (p. 169). Similarly, in Tanzania the government promises never to evict the Maasai from their ancestral lands (Smith 2014a), but earlier reports clearly showed how wealthy and powerful local people could profit from the sale of Maasai pastoral lands to the

United Arab Emirates royal family, forcibly evicting some Maasai so they can have private hunting land (Smith 2014b). Recent developments have made this less relevant, as it looks as though the Maasai will not be evicted, but how long this will last is difficult to determine.

One of the more publicised examples of this push for private ownership and usage of land has been in the newly established uranium mining industry. In Niger, for example, the French company AREVA is developing the Imouraren mine, the world's second-largest uranium deposit. The site, co-owned by AREVA, Sopamin, and the South Korean firm KEPCO (Mining Technology 2014), as well as the mining industry as a whole, has been a point of major contention between the Tuareg and national governments. 'The Tuareg, pastoralists in whose ancestral lands the uranium deposits exist, claim continued discrimination and economic neglect (Emerson 2011), a lack of benefit from the presence of the mining companies (Keenan 2008), increased burden of disease (Meyer 2010; Simanowitz 2009), and dire consequences to ecosystems on which they depend' (McKune and Silva 2013, 1719). In the case of western Eritrea, agricultural encroachment on pastoral grazing lands through agricultural and horticultural expansion in wetland areas, water-intensive activities, mining and industries that benefit local elites and foreign investors are undermining the viability of the pastoral production system.

While sedentary policies are being pursued by various governments and agencies, and climate forces drive male herders southward to secure grazing and water resources, a new domestic tension is being created in the semi-sedentary spaces inhabited by those women and children left behind, particularly in the sphere of education. Whereas Mohamed Ag Mustafa, a traditional Tuareg herder, sees little value in occidental education, saying, 'Maybe school is useful for people in the cities, but not for us. As far as we are concerned, children are only useful for getting water or keeping an eye on the cattle' (Harris 2007), his absence has created the ideal situation for some NGOs to establish *fixation sites*, which are camps with wells, grain banks, education facilities and a management committee made up of, and elected by, the local community. These sites, among other things, are 'targeting women's literacy' (Woodke 2012) and introducing their own set of changes to the society by challenging the prevailing Tuareg knowledge dichotomy in which '"women tell lies and children's tales"', while '"men tell true historical legends . . . and true history"' (Rasmussen 1998, 253 n. 6, 251). Research among the Tuareg in Algeria has shown conversely that women are negatively affected by sedentarisation,

which brings a move from a matrilineal to a predominantly patrilineal society. One of the factors driving this change is the growth of village schools, which has taken away women's responsibility for the education of their children (Keenan 2005). Only time will tell how Tuareg society will ultimately be shaped by these occidental knowledge and lifestyle interventions. However, several early indicators are worth noting.

The first is a general tendency to supplement pastoral livelihoods with agriculture to increase food security. Such transitions are made easier by the previously mentioned trend toward sedentarisation, and are well exemplified by the work done by Ibrahim Boubacar (2010) in his efforts to train local Tuareg children and parents in sustainable irrigation practices at the Ingui School in Niger.

Another adaptation, which has been internationally noticed, is radicalisation; researchers have noted instances of Tuareg fighters who have partnered with *Al Qaeda*, instigating uprisings against the Mali government and reclaiming lost territory (McKune and Silva 2013). Such radicalisation has even caught the attention of the United Nations Security Council, which has called for calm through 'inclusive discussions' (Diarra and Diallo 2014). From the author's long experience of working among the Beni-Amer over decades, the Beni-Amer are devout Muslims, but there is very little evidence of Islamic radicalisation of such communities.

The Tuareg are thus in a state of transition and will face a variety of challenges: some are opting for sedentarisation by *default* (forced upon them by political conflicts and insecurity, and loss of traditional grazing lands), others by diversifying their economy, and the younger generation in particular by abandoning pastoralism altogether in search of alternative livelihoods.

Raika/Rabari pastoralism (north-west India)

Living largely in the Gujarat and Rajasthan states of north-western India, as well as in several areas of western Pakistan, the Raika people are no strangers to extreme climates. The Thar Desert is a prominent feature of this region and is the place most of the Raikas call home. With temperatures approaching 50°C, rainfall varying between 350 and 500 mm per year, and water with a high saline content (ENVIS 2013), the Raikas have long adapted a variety of their cultural practices to suit these conditions, particularly with regard to societal structure and norms and ethno-veterinary practices. However, it is precisely these norms and

Fig. 8.2 Raika pastoral areas. Source: Cath D'Alton

practices that are coming under increased stress as the Raikas' interaction with the outside world is being forced to change.

Traditionally, the Raikas are specialised camel breeders who raise camels to sell as work animals to farmers and traders. Slaughtering camels, eating camel meat and making commercial gain from milk and wool are forbidden in their culture. Despite market pressures, these cultural constraints have been strongly maintained, leading both to falling camel production and economic fragmentation rather than responsive systemic change, as young people are led away from camel production to seek jobs in town (Sansthan and League for Pastoral Peoples 1999).

Like many pastoralist groups worldwide, Raika society is highly segregated, with specific work roles being defined along gender lines. In general, women are 'responsible for milking ewes, processing milk products, caring for newborn lambs, collecting dung, cleaning the corral and preparing and giving supplementary fodder and water', while 'typical male tasks include herding, cutting branches for home feeding and applying modern medicines' (Geerlings 2004, 15). It must be mentioned, however, that this does not necessarily mean that one sort of work is valued more highly than the other. Nor does it mean that this division of labour is set in stone, with no ability to adapt to acute need. The case of Dailibai, a Raika woman, illustrates this well:

> She possesses a reservoir of traditional knowledge that is slowly being lost in changing agricultural practice amongst the Raika in the dryland state of Rajasthan. Besides her part-time job in a government-sponsored preschool programme, she tends to her small herd of livestock, comprised of two goats and a cow. The

> three animals were all discarded by the owners because they had broken legs. Dailibai treated the animals back to health by applying a traditional remedy to the fractures. (Gnacadja 2009)

It is in this practice of medicine (particularly traditional ethno-veterinary medicine) and selective animal breeding that the Raika have demonstrated breadth of knowledge. Singh, Kachhawaha, Choudhary, Meena and Tomar (2014) go into detail, listing various ailments and diseases capable of being addressed by traditional Raika practices; these range from *Golga* (bottle neck) to *Mata* (sheep pox), *Haldariya* (haematuria) and more, all with varying rates of success. Moreover, Raika traditional ethno-veterinary medicine is so renowned that 'other caste groups sometimes come to Raika healers to treat their livestock' (Robbins 2007, 48). Like the Beni-Amer, the Raika freely share their knowledge with other communities (Geerlings 2004), and they could even be called the Indian 'men of cattle'. Geerlings (p. 12) discusses how their system of *nav guna* ('nine qualities') is used to select the most suitable stud ram and how very selective breeding, including knowledge of progenitor generations, has allowed the Raika to crossbreed back and forth among three breeds of sheep, according to local and extra-local need, pressure and opportunity.

However, recent decades have placed extraordinary pressure on Raika society, pushing it, arguably, to breaking point. Again, we see here the triad of change vectors at work: climate, politics and economics. Climate change has ushered in a new age of drought more devastating than previously felt, particularly as fodder sources become less abundant (Geerlings 2001). This is a problem recognised even by the Food and Agriculture Organization of the United Nations, as the droughts are forcing some to sell their sheep to investors, resulting in food and income insecurity (FAO 2014).

Efforts by government to sedentarise pastoralists and intensify agriculture in the area have compounded this climatic problem for the Raika people. One of the most famous of these sedentarisation initiatives was the *Pasture and Sheep Development Programme* of the early 1980s. Implemented by the Indian government and financially supported by the World Bank, its objectives were six:

1. To convert land not used for agriculture into pasture plots
2. To maximise the utilization of rainwater for pasture development
3. To check soil erosion by means of tree plantation
4. To maintain soil fertility by rearing a limited number of animals

5. To check the migration of animals in famine years
6. To improve the quality of wool and mutton in the area through cooperation and to improve upon the financial status of the poorer sheep breeders. (Agrawal 1999, 65–6)

Of particular salience to the Raika people were objectives 1, 4 and 5, which restricted their customary migration and flock size. Current government realities, by either default or design, have ensured continued restrictions on migration and herd size among the Raika. In some instances, smaller herds are forced to remain semi-sedentary, as the cost of transportation, including bribing traffic officials, outweighs the financial benefits of migrating (Geerlings 2004), while in others Raika herds have been banned outright from grazing in certain areas (Dutta 2007).

Even the government push for greater education (in line with the Millennium Development Goals, as well as UNESCO's Education for All initiative) has been fraught with controversy:

> Schooling, with its colonial legacy of disdain for manual occupations (Kumar 2005), its validation of the assumed superiority of a sedentary way of life and its discourse of equity, is understood as an instrument capable of propelling children out of pastoralism and towards alternative income-generating opportunities . . . . . Despite its often dubious quality, such education is legitimated by its powerful role as gatekeeper to participation in the 'modern' economy. (Dyer 2012)

So, despite being heralded almost universally as a *gateway* to greater opportunities and, arguably, a *better* life, current models of formalised schooling are seen by some as merely working, if indirectly, as an instrument of what Foucault (1991) might have deemed academic governmentality, or, as Shih (2010) puts it, 'academic colonialism'.

More in the realm of economics, Paul Robbins (2007) cites Green Revolution practices as pushing agriculturalists towards year-round crop cultivation rather than the traditional method of leaving land fallow during the winter months. Although this certainly increases yields, it leaves less grazing land for the Raika as they migrate, despite the major bargaining chip, through animal dung, milk, meat, etc., that they have with agriculturalists (Robbins 2007). Furthermore, increased use of pesticides has further reduced grazing fodder for Raika pastoralists.

In response to these pressures, the Raika have made several drastic changes to their way of life. As mentioned, they have altered their herd

composition to favour sheep and goats rather than the traditional camels (Singh et al. 2014). This is in order to service the ever-growing meat market as well as the wool industry (Geerlings 2004).They have begun to favour non-traditional, western veterinary medicines and practices, which has 'reduced the reputability of extremely valuable traditional ethno-veterinary knowledge' (Robbins 2007, 48).

They have also nearly all abandoned a truly nomadic life, with only 1–2 per cent of them full-time nomads (Geographical 2014). Indeed, many now practise some form of agriculture to supplement their income (Singh et al. 2014). This sedentarisation has facilitated not only new economic avenues for women as they abandon their traditional roles for jobs outside the home (Geographical 2014), but also the assimilation of Raika children into the formalised school system. A prime example of this was mentioned at the beginning of this section: Dailibai and her daughter Pavni, 'for whom she wants to get a good education at any cost' (UNCCD 2007, 13).

Andean pastoralism

Largely confined to the semi-arid regions of Peru, Chile, Bolivia and Argentina (Andaluz Westreicher, Mérega and Palmili 2007), Andean pastoralism exists in a climactic scene which is significantly different from those of the Raika and the Tuareg. In the highlands of these countries, large temperature variations are common: 'scorching temperatures in the day plummet to sub-freezing at night' (Andaluz Westreicher et al. 2007, 90). However, while these people share similar climatic conditions, their migratory patterns differ greatly. Whereas many pastoralist groups across the globe will travel horizontally, those in the Andes will tend to travel vertically between the wet and dry seasons. That being said, elevation is a limiting factor for these pastoralists, as certain species cannot thrive at high altitudes. For example, llamas, alpacas and sheep do well in a high-altitude pastoral system (3600–4600 m), sheep and cattle in a high-altitude agro-pastoral system (3200–3800 m), and sheep, goats and cattle in an inter-Andean valley agro-pastoral system (below 3200 m) (Degen 2007).

In terms of social structure, the basic social unit is usually the nuclear family, and it is these families that tend to engage in herding activity as a unit, rather than the community at large (Kuznar 1991). However, this is not to say that each family is completely isolated from

Fig. 8.3 Inter-Andean pastoral areas. Source: Cath D'Alton

others, or the community; traditionally, families have been knit together into larger communities called *ayllus* (Dong, Wen, Liu et al. 2011).

> [*Ayllu*] can refer precisely to a social unit composed of kin related within three generations. On the other hand, it may be a more general kind of sociopolitical unit, composed of households related to one another by ethnicity, common landholdings, rank, or class. (Seligmann 1995, 29)

These *ayllus*, although each has a head, tend to decentralise power organically, and rely on 'an interdependence and reciprocity among kin, more than hierarchical relations, as a means of achieving economic production and redistribution' (Graffam 1992, 886).

The non-centralised nature of the *ayllu* can present a problem, as in the hypothetical example provided by Kuznar (1991), in which one family grazes the land of another family, and the two families must come to an agreement themselves rather than relying on a more prescriptive, hierarchical system of deliberation. This problem is particularly exacerbated by the fact that, traditionally, property is held communally, with households having only usufructuary rights to it. Postigo, Young and Crews (2008) study this land tenure system in the village of Pilpichaca, Peru, in detail, noting particularly that is difficult for community chiefs and elders to assign such land to newcomers simply because of its scarcity. 'New households must request access to pasturelands from the community because most of the available lands in community territory are already allocated' (Postigo et al. 2008, 539).

The ethno-veterinary knowledge and practices of Andean pastoralists are certainly areas that are understudied. However, preliminary research amongst neighbours, such as that put forth by Gustavo Scarpa (2000), has indicated a complex and rich knowledge system. With particular reference to pastoral communities in north-western Argentina, he notes 61 plant species employed for their medical properties. Categorised as *hot* or *cool*, these plants are used to redress imbalances between heat and cold thought to be detrimental to livestock health. They also serve metaphysical purposes, as they play essential roles in ethno-veterinary 'religious and magical techniques' (Scarpa 2000, 257).

Since the 1980s, new pressures have arisen that have forced change into the lives of Andean pastoralist communities. A highly visible change, as in other parts of the world, is climate. As temperatures rise, there has been a loss of permafrost, leading to and increasing areas of wetland as well as areas of barren soil. Again, in Pilpichaca, Postigo et al. (2008,

541) conducted research to measure this phenomenon: 'At the local level, in an area that corresponds to Pilpichaca itself, wetland increased 172 per cent and barren soil increased 45 per cent, whereas snow/ice diminished by 99 per cent'. This increase in wetland was furthered by pastoralists themselves, who have built irrigation channels in order to maximise the impact. So, although in this instance an increase in temperature has generally been seen as positive, how the community will react to the increase in available land is yet to be known, and 'debates about who has access to these [increased] benefits (water, pasture) may raise tensions within the community' (Postigo et al. 2008, 544). It would be worth while to investigate further in order to establish whether this is a case of pastoralists capitalising on or adapting to climate change, or whether they are adding to the problem and alienating themselves from the surrounding community.

Interestingly, climate isn't the only factor of change that has brought both pressure and opportunity; political and economic change has had a substantial impact on these groups. One of the most hard-hitting and direct pieces of legislation was the *Peruvian Agrarian Reform* of 1969. Characterising it as 'the most important transformative social and development process in Peru during the twentieth century', Postigo et al. explain its intent and impact:

> It aimed to end exploitation by modernizing and mechanizing production, establishing wage labor, abolishing feudal relations, bringing an end to the *haciendas*' regime, forcing pastoralists to settle in communities, and creating peasant communities which received a share of the land. (Postigo et al. 2008, 544)

This settlement and modernisation took on a new intensity in the 1990s as a shift towards neoliberal constructions of private land titling took the stage. Such reforms have 'led to increasing inequity and poverty among [Andean] pastoral societies by enlarging social differentiation, increasing pressures on pastures by diminishing governmental participation in agrarian development, and dismantling of the traditional land tenure system' (Dong et al. 2011, 11).

However, along with lifestyle change, this neoliberal shift has brought with it new opportunities: pastoralists have found eager consumers in the increasingly accessible global market. Nowhere is this more keenly felt than in the world's demand for wool. In fact, this global demand for wool has been so intense that the late twentieth century saw the expropriation of traditional haciendas and the establishment

of large government agencies such as ALPACAPERÚ and INCOLANA. In 1978, Bolivia established the *Corporación Boliviana de Fomento Lanero*, which was the only legal alpaca wool purchaser in the country (Andaluz Westreicher et al. 2007). It is not clear how the smallholder Andean pastoralists are treated by such large government or private agencies, or if there is still a role for illegal alpaca purchasers or the informal market. This is something worth investigating in the future.

It can be argued that the global economy has made direct offers to pastoralist groups by not only offering steady income, but also fundamentally changing their traditional way of life. 'In December 2005 the community of Pilpichaca made an agreement to sell 2,000 kg of alpaca meat fortnightly to *Salchichería Alemana* (a business which produces sausage, ham, hot dogs, etc.). As a result, they now have to slaughter approximately 800 alpacas each year' (Postigo et al. 2008, 545). Not only does this push the community from being an extensive to a more intensive producer, but it further links them to the global market and monetary system, as opposed to the ayllu system of social relationships.

Education, as seen in both the Tuareg and Raika examples, is also playing a major role in social and economic change in Andean pastoral societies. Many of the *Aymara* people (especially youth), for instance, have migrated to cities in search of education, and, indeed, 'most Andean communities maintain houses in the city so that their children can receive schooling that does not exist in their original towns' (Eisenberg 2013, 50).

The battle for knowledge sovereignty across pastoral communities

These case studies of different pastoral communities have highlighted the common elements of their indigenous knowledge systems, as well as the challenges they face, which despite different political and environmental backdrops have many similarities. The three change vectors of climate, politics and economics experienced by all communities are driving pastoralists towards more diversified livelihood strategies, such as breeding different animals for milk, meat or wool, and growing agricultural produce, which in turn is affecting their social organisation and culture. Education is a big factor which is impacting on their mobility, and leading to the empowerment of women in particular. The adaptability and flexibility of their knowledge systems – and the incorporation

of western knowledge and science – play a crucial role in ensuring their survival and resilience, and in strengthening their community.

This chapter has outlined a number of interconnected issues, such as climate change, politically inspired sedentarisation, state policy and investment approaches, which have joined forces to subsume and undermine indigenous knowledge. In short, I argue that loss of knowledge sovereignty is really a loss of freedom, a loss of balance, and a loss of perspective. The loss of knowledge sovereignty in a region can have a severe and detrimental effect not only on the economic outlook but also on the food sovereignty and security of that region.

Pastoralists around the globe have been innovative in the light of policies aimed at encouraging agriculture and undermining their practices. They have developed new social and economic relationships with agriculturalists. They have changed their migration routes and taken advantage of scarce resources that would go unused but for their presence. They have effectively deployed kin and other networks to exploit changing socio-economic contexts. In these and other ways they have worked to show the resilience of a mode of livelihood that many have assumed to be out of step with modernity (Agrawal and Saberwal 2006).

In the future, fierce battles over food and knowledge will be waged all over the world. With the hearts, minds and stomachs of over 7 billion people, and life and death hanging in the balance, it may be easy to think of modern agriculture and the scientific knowledge system as magic bullets. However, there are those who would fiercely disagree, and we must realise that food sovereignty is merely one symptom of a much larger issue: knowledge sovereignty. With its presence felt nearly everywhere in society, in gender issues, economy, ethnicity, culture, history, and more, the battle for knowledge sovereignty is an issue which affects us all.

Chapter Nine
Discussion of the main findings

The extensive description of cattle production, husbandry and health management (Chapters 4, 5 and 6) has shown that the Beni-Amer take great care to maintain the general wellbeing of their livestock, as well as paying special attention to the particular needs of the animals they have bred specifically for their fragile local ecology. The combination of management strategies, herding techniques and animal health care practised by the Beni-Amer constitutes a management regime that is complex and ordered.

The Beni-Amer, as I have emphasised throughout, have mastery over breeding and animal husbandry, and an analysis of a range of topics in their methods of animal production, husbandry and animal health clearly demonstrates the resilience of the pastoralist system. Among the general pool of pastoral knowledge and practice already described, the following will be subject to further analysis: productivity of pastoral herds, knowledge of breeds and breeding and selective breeding and practice, animal health (ethno-veterinary semantics, disease perception, etc.), preventive and curative methods, and use of traditional veterinarians.

An analysis of the productive potential of the Bgait cattle in the study area

The productivity of the Bgait cattle has appealed to some regional researchers and institutions, most notably, the EIAR, which conducted several trials on the Bgait breed that included improved management and crossbreeding.

From 1966 to 1972, an assessment was made by the EIAR of how traditional breeds would respond to better feeding and management systems; the Bgait were shown to be superior in milk production and fertility rates to other Ethiopian breeds, such as the Boran and the Horro. The Bgait cattle of the Beni-Amer were known to produce around 1500–1800 litres per lactation under improved environmental and feeding conditions, with an average fertility rate of 70 per cent being common, while the Boran, in normal years, had a fertility rate of 60 per cent (Gedamu et al. 1984).

Crossbreeding Bgait with Friesian and Ayrshire stock imported from Europe from the early 1960s until the escalation in 1975 of the Eritrean Independence War (1961–91) saw remarkable production: Eritrean dairy farms surpassed the local demand for milk and were supplying markets across the border in parts of Ethiopia (Sherman 1980).

At the EIAR stations in Ethiopia, Bgait crossed well with Friesian cattle, and crossbred calves out of Bgait dams have a high rate of weight gain, clearly superior to that of other Ethiopian breeds such as Boran and Horro (FAO/UNEP 1982). Results from a large number of crossbred calves out of the European-breed dams (heifers) and Ethiopian-breed sires suggest the performance ranking for rate gain is, in descending order, Bgait, Boran and Horro; thus, the Bgait outperformed the better-known Boran breed of southern Ethiopia.

Unfortunately the war and conflict between Eritrea and Ethiopia from 1961 to 1993 and 1998 to 2000 (Fre 2002) has practically undermined joint cross-border research efforts between the countries and, to date, relations between the two neighbouring countries have not been normalised, which stifles the potential for regional cooperation on key research issues, including livestock production and cross-border trade.

I admit I have limited knowledge of the Boran and Horro breeds from southern Ethiopia. Therefore, it should be noted that these breeds may have been selected by pastoralists in southern Ethiopia for aesthetic and environmental considerations; high milk productivity may not have been the critical requirement.

Table 9.1 shows that the Bgait are producing high-quality steers and high levels of butterfat, but smaller amounts of milk than European breeds. The Bgait and other local breeds are disease- and heat-resistant compared with the European breeds.

Table 9.1 Productivity of Bgait cattle in comparison with European/ temperate and local breeds (per lactation)

Breed name	Milk yield (kg per lactation)	Butterfat (%)	Crossbred steers
Jersey (UK)	3300	5.0	Fair to good
Guernsey (UK)	3500	4.6	Fair to good
Ayrshire (UK)	4000	3.9	Fair to good
Friesian (Dutch)	4500	3.7	Very good
Red Poll (UK)	3500	3.7	Excellent
Arado (Eritrea)	60–90	(not available)	(not available)
Bgait (Eritrea)	1630+	6	Very good
Dankalia (Eritrea)	200–300	(not available)	(not available)

Source: Barrett and Larkin 1979; Mason and Maule 1960; FAO/UNEP 1982; Fre 2009a

Research by the EIAR on the comparative advantage of the Bgait breeds

At the EIAR stations in Ethiopia, Bgait crossed well with Friesian cattle, and crossbred calves out of Bgait dams have a high rate of weight gain, clearly superior to that of other Ethiopian breeds such as Boran and Horro (FAO/UNEP 1982). Results from a large number of crossbred calves out of the European-breed dams (heifers) and Ethiopian-breed sires suggest the performance ranking for rate gain is, in descending order, Bgait, Boran and Horro; thus the Bgait outperformed the better-known Boran breed of southern Ethiopia. The second phase (since 1982) of experiments conducted at the EIAR involves crossing exotic breeds, *Friesian*, *Simmental* and *Jersey*, with local breeds, *Bgait*, *Boran* and *Horro*. The result is that during their first lactation the F_1 (first generation) Bgait × European heifer cows showed a higher productivity than F_1 heifer cows from the other two local breeds (Boran and Horro). The animals in the experiment were kept under slightly improved conditions and fed coarse hay from natural grasses, a limited amount of maize silage (10 kg per head), and a fixed amount of concentrates (2 kg per day), regardless of milk yield.

The above research outcomes show that the hybridisation of western and indigenous knowledge of Bgait cattle demonstrates three things:

Table 9.2 Comparison of first lactation milk yield of F1 heifers out of European-breed sires and three local breeds based on EIAR research in Ethiopia

Heifers European cross local	No. of animals	Milk production	
		kg in 350 days	kg per cow day
Bgait dam	22	2042	5.83
Boran dam	66	1909	5.45
Horro dam	36	1665	4.75

Source: Gedamu et al. 1984

The first phase of breed selection should be based on upgrading local genetic material and using available indigenous genetic information.

The case of the Bgait shows that better management (better feeding and veterinary care) alone could lead to better milk yields and weight gain without the introduction of exotic blood.

Although exotic crossbreeding is not seen as a priority by the Beni-Amer cattle herders, the scientific evidence is that crossbreeding is possible and the Bgait scored highest (compared with other Ethiopian breeds) in live-weight gain, milk yields, food conversion ratio and growth rate. Under conditions of intensive production (e.g. dairy and beef), there is indeed a great potential for Bgait–European crosses.

It is also clear that the Beni-Amer not only breed cattle for milk production, but look for qualities such as hardiness, walkability and disease resistance. It can be argued that cattle are multi-purpose animals and their importance should not be judged by comparing milk yields with those of exotic breeds. Resistance to disease and hardiness are important considerations for cattle herders and the comparison of exotic systems with traditional ones is irrelevant as long as we lack basic data for the latter.

Knowledge of breeds and breeding

In rudimentary genetics, the Beni-Amer breeding system, in relation to Bulad/Bgait, can be described as follows. Traditionally, in their home base in western Eritrea, they breed from: a) *Emat-aha* or mother cows of well-known pedigree; or b) cows of less well-known pedigree whose

productive traits may be less well known. Genetically speaking, most Beni-Amer breed cattle with the same genotype (they are purebred).

One can assume, therefore, that the Bulad/Bgait were more productive, much aspired to and liked by Beni-Amer herders, and in an ideal situation (of no conflict), they would breed Bgait bulls with Bgait cows to maximise productivity and ensure characteristic cool-heartedness (docile, with less fight-or-flight behaviour). Genetics, in general, is a very complicated subject, and for the purposes of my research, an average result from groups of animals is more important than individual animal performance.

A critical reflection on curative practices and management

It has been shown in the assessment of ethno-veterinary knowledge and methods among the Beni-Amer that their curative practices have, along with their many virtues, inherent weaknesses, yet they still remain in wide use. The traditional practice, despite its limitations, is still the only medical system widely accessible to the majority of cattle owners.

The purpose of describing the preventive practices employed by the Beni-Amer and the curative options open to them is to show that their animal healthcare combines prophylactic measures based on good management with curative measures based on some indigenous skills and limited use of western veterinary medicine. An evaluation of this nature, based on exploratory research, must be limited to assessing only some curative pastoral skills. Needless to say, much more detailed veterinary and anthropological research is needed to fully evaluate traditional practices and the incorporation of western veterinary practices in the study area. For example, laboratory-based chemical analysis of specific plants currently used as herbal medicine (and claimed by pastoralists to be effective) is vitally important (see Table 9.3).

Similar laboratory-based research and use of indigenous plant knowledge are initially important in the study area if traditional practice is to be developed, and such a research could develop from the information in Chapter 7.

Among the Beni-Amer herders, the fact that 13 per cent of a total of 24 diseases are explained in supernatural terms is an indication that the knowledge has some magico-religious elements that need to be understood in the proper context.

Table 9.3 Plants and their medicinal applications

Plant name	Parts used for medicine
Cappatisdecidua	Extracts
Balanitesaegyptiaca	Bark and fruit
Esculentus sp.	Fruit
Ziziphusspina-Christi	Leaves/fruit
Hamta (unidentified plant)	Leaves
Kulmt (unidentified plant)	Leaves
Cordiaabyssinica	Leaves
Calotropisprocera	Sap
Tabacum sp.	Leaves

In many cases, animal husbandry, religion and healing are viewed together. McCorkle and Jimenez-Zamalloa (1982) point out that Quechua villagers in Peru make little or no distinction between natural and supernatural illnesses and cures. Maliki (1981) notes that among the WoDaaBe of Niger and Mali the line between pharmaceutical and magical veterinary treatments is thin. Wolfgang (1983) has conducted detailed ethno-veterinary research among the Fulbe herders in Upper Volta (Burkina Faso) and found that they possess a wealth of ethno-veterinary knowledge. However, they prefer western veterinary medicine for reasons not clear to me, since I have found that ethno-veterinary knowledge is widely used by the Beni-Amer in the study area.

The Beni-Amer believe that *fire and disease do not stay together*, so a wide variety of ailments (swellings, muscular strains, tick bites, clotting, etc.) are treated by cauterising specific points on the body. The Beni-Amer use *tkset* or *cauterisation* with a curative purpose; pin firing, which is similar to acupuncture, is used to encourage blood flow, and *elamet* or *branding* (tribal marking) is used for herd management purposes.

The success or failure of these curative practices very much depends on the skills of the practitioner and the management of the animal that follows treatment (e.g. good feeding and rest). The role of traditional veterinarians is crucial if the cauterisation requires special skills, but very often the herders do it themselves, with varying degrees of success. Selective cauterisation is also used as a back-up to surgical operations such as blood letting and broken bone setting, but the intention of this back-up practice is not clear to me.

Tribal, clan or family branding, or *elamet*, also uses fire to mark the animal, and, since this is a management and not a curative practice, every

herder is able to do it and it does not involve traditional veterinarians. Dehorning of calves by burning the tip of the horn is another management practice undertaken by herders themselves, but castration of males requires specialised skills, which may involve traditional veterinarians.

Fumigation of goat or sheep houses by burning tree branches from *Acacia senegal* is a different example of the use of fire to fight off disease-bearing pests, but this is more of a prophylaxis than a cure.

The *knife* or *blade* is a well-known tool for treating many ailments; it is used for surgical purposes that range from simple foot trimming to surgical removal of dead blood from a swollen ankle. At the end of the operation, wounds are washed and dressed with salt, kerosene and a herbal preparation. Works by several authors show that Sahelian and other pastoralists extensively use cauterisation (pin firing and marking) and surgical incisions to cure a variety of illnesses (Maliki 1981; Ohta 1984; Schwabe and Kuojok 1981; Wolfgang 1983).

In conclusion, it is worth highlighting the inherent weaknesses in the ethno-veterinary system:

- The knowledge is unevenly distributed (it is restricted to males) and there is a limited role for women in the health management of cattle.
- Discreet diseases, or those with no clear symptoms, tend to be ignored. Sometimes they are even misdiagnosed because symptoms are misread.
- Some herders blend western veterinary medicine with traditional medicine to cure certain diseases, but they may use drugs that are expired or as a treatment for the wrong disease.
- Overdosing and underdosing is common when herders treat their own animals using western medicine, since they are not trained to do this.
- Traditional veterinarians cannot treat certain major diseases, and the use of western curative medicine then becomes indispensable.
- The traditional medicinal plant sources are dwindling, and persistent drought in the study area has meant more pastoral destitution and hence the redundancy of traditional veterinarians, which results in the eventual loss of their skills.

This chapter has focused on verifying the productivity of the Bgait (Beni-Amer) cattle, evaluating the Beni-Amer breeding systems, and analysing the pastoral capacity to manage and produce healthy cattle for the domestic and regional markets.

There is a scientific basis for arguing that the Bgait cattle is an indigenous breed with the greatest genetic potential for breeding and milk production. Basically, the indigenous genetic source is there to be potentially improved. The key to increased production is improved management through better feeding, better healthcare, and the use of traditional skills and concepts, along with *western* concepts and practices.

The evaluation of the curative and preventive practice common among the Beni-Amer has shown that the herders have a very positive attitude towards western veterinary medicine (especially for those diseases which cannot be controlled or cured by traditional means), and in some cases emphasise the possibility of combining the two systems.

The evaluation, in general, shows that the traditional ethnoveterinary concepts and practices of the Beni-Amer have significant limitations in the diagnosis and treatment of diseases, particularly of those caused by bacteria and viruses.

In non-disease-related health problems (bone fractures, physiological problems and environmental illnesses), the evaluation has shown that the traditional practice has many merits. On the basis of evidence provided in this and the previous chapters, I conclude that the preventive practices that result from the adoption of good management skills enhance animal health and productivity.

The final chapter will make specific recommendations and suggest strategies and interventions, which, hopefully, will advance the cause of indigenous knowledge sovereignty and its sustainability among the cattle herders in the Horn of Africa and elsewhere.

Chapter Ten
Conclusions and recommendations for research and policy

The description and analysis of indigenous pastoral knowledge and practice among the Beni-Amer have shown that this knowledge provides a sustainable livelihood for pastoral communities, contributing increased productivity as well as resilience in the face of environmental and political stresses. Comparisons with other pastoralist knowledge systems illustrate how these communities incorporate their own knowledge into their local livelihood strategies and integrate some aspects of western veterinary knowledge into their practice.

The Beni-Amer herders attach great importance to good management practices that enhance animal health and productivity. Their pastoral production practices have been systematically refined over time, as is evidenced by their having a production system which is scientifically sound. They understand the close relationship between livestock production, herd management and animal health, and have an awareness of how these three factors influence each other; this makes them successful professional herders. I have a high regard for this pluralism of knowledge.

As well as the technical and scientific skills of the Beni-Amer, their day-to-day work and their practices of cattle husbandry demonstrate their unique relationship with the land and with the animals, which is embedded in cultural and spiritual values. These understandings determine their milking and breeding practices, their herd composition and management, and their seasonal movements. The fact that they share veterinary knowledge with other pastoralist groups in the study area shows that they have an interest in improving the ways in which they care for their livestock, and that they are open to other methods and techniques. They are therefore in a good position to be the focus of research on ethnoveterinary knowledge and practices, and they can make a significant

contribution to livestock research and to pastoral development more widely.

This combination of management strategies, breeding and herding techniques, and animal health is part of a complex yet rigorous knowledge system which is dynamic and adaptive, and encompasses the Beni-Amer's cultural and ecological understanding of their environment. This means they are well placed for an uncertain future. This adaptiveness and resilience future-proofs them against a range of stresses, such as climate change, unfavourable government policies, natural resource conflicts, land grabbing, biodiversity loss and cattle raiding, and these threats are set to increase and intensify.

Although IK is negotiated by communities and adapted in response to experience, it also incorporates western science, in particular veterinary knowledge. The clash of paradigms between indigenous and scientific knowledge systems is evident in some of the policy decisions that have been made over recent decades. As demonstrated by the practices of the Beni-Amer cattle herders, IK is pluralistic, replicable and dynamic. It is not static, but is ever evolving through observation and practice. Its flexibility and adaptiveness make the case to sustain and build on IK, and this should be seen as a policy and research priority as we go forward into an uncertain future.

Pastoralists have generations of collective knowledge and experience of adapting to ecological and socio-economic changes, and have developed an immense wealth of indigenous knowledge and practices to deal with these changes. Their indigenous knowledge system is dynamic and characterised by flexibility and adaptability and is strongly integrated into their socio-cultural system. It is not easy to distinguish these practices from more recent processes of local innovation, which is equally a reflection of flexibility and adaptability. It is, however, important to give attention to local innovations, whether they are in response to climate change or to other changes, because they are sources of valuable new knowledge based on the deep-rooted experience of pastoralists (GebreMichael, Bayer and Waters-Bayer 2011).

This adaptive nature of IKS means that practices can move with the times and be supplemented with modern technology, in particular in food production, so that new technologies such as genetic modification (GM) are not the only solution to food insecurity.

As outlined in Chapter 8, pastoral communities around the world adapt to challenges on a daily basis to ensure their livelihood. They endure marginalisation and political alienation, as their mobility is crucial for their survival. There are many lessons to be learnt from the resilience of

these communities as we all face new and emerging threats from climate change and globalisation. The case studies show how their IKS is evolving to deal with common challenges such as resource-based competition and conflict. Diversifying their economies has impacted on their social and cultural structures and threatens some of their traditional knowledge. Their ethno-botanical knowledge may be lost as they become less mobile and resources dwindle, and it is clear that agro-pastoral communities must all become involved in the conservation and management of plants, and medicinal plants in particular (Fenetahun and Eshetu 2017).

Moving the debate forward

IK shows considerable resilience in the face of a wide variety of stressors (physical, economic, political and academic), being adapted by its practitioners to best service the community. We have also taken note of the times it has collapsed in the face of a new economic reality which it could not withstand, and of its shortcomings, namely its limited socio-geographical scope and applicability. We followed through with the idea that, far from being an indicator of a loss of sovereignty, IK has the potential to merge with occidental knowledge, incorporating certain concepts and methodologies, reaffirming the knowledge sovereignty of local actors and practitioners and providing them with a more workable knowledge platform with which to act. Finally, we saw how such mergers are being carried out, successfully and unsuccessfully, in the real world.

Now we take the discussion squarely into the realm of the political. The question we intend to address is: 'How do we bring this debate forward into the formation of policy?' That is: 'How do we ensure that IK remains relevant and of practical value to its practitioners without being completely subsumed by the occidental paradigm, and how do we ensure that policy makers facilitate such a political environment?'

IK, far from being a static body of knowledge, is an ever-changing amalgam of observation and practice. In order to secure the survival of such a living and dynamic IK, certain policies must be pursued in several areas.

The first such area is the courtroom. Throughout the world, practitioners of IK (particularly pastoralists) are finding themselves evicted from lands traditionally worked by their people in favour of (ostensibly) more lucrative enterprises. In response, some of these groups have used the courts in an attempt to counter these evictions and secure their lands for themselves. Such a legal struggle is exemplified by

the 2010 court battle of 600 pastoralists in the Buliisa district in western Uganda. Here, these pastoralist groups, with the help of the civil society organisation the Uganda Banyarwanda Culture Development Association (UMUBANO), petitioned the Uganda Human Rights Commission for a stay of eviction (Wanambwa 2010). On 15 December 2010, the Masindi High Court granted that stay and the pastoralists were allowed to return to their land (Muramira 2010). Policies must be enacted to facilitate civil society to act in this way, as a facilitator and conduit to the legal system.

In addition to mere legal representation and guidance, data from joint projects such as the previously mentioned land use map (Kristjanson et al. 2009), as well as other joint IK-occidental knowledge projects, could be used to bolster the arguments brought forward by civil society organisations and to spotlight IK practitioners (again, pastoralists in particular) 'as "custodians of the commons" in an era of global climatic change' (Upton 2014, 207). Such arguments could go a long way towards changing the opinions of policy makers, allowing them to see pastoralism and other traditional lifeways not as quaint, low-output practices, but as realistic, prudent and modern answers to current climatic pressures. Policies which stress the use of social scientists and local actors in both the design and the implementation of joint community projects would lead to greater success rates, furthering the cause of IK in the minds of lawmakers (DeWalt 1994; Kristjanson et al. 2009).

Policies that influence technological investment could also, if so targeted, promote the advancement and effectiveness of IK. Current technology tends to focus on high-input/high-output forms of production while lowering the amount of human labour necessary to perform such tasks. If, however, as DeWalt suggests, policy makers invest in 'knowledge and technology that is labor demanding to create employment opportunities' (DeWalt 1994, 128), this would not only help keep IK alive, but also allow traditional roles, such as pastoralism, to remain relevant career options to those who have passed through the education system.

Finally, within the academic system itself, IK must be recognised as legitimate knowledge, relevant to certain lifestyle and economic choices. In particular, education garnered from the school system should not be assumed to be ineffectual in a 'traditional' environment. Some efforts are already in progress, such as the College of Indigenous Studies in Taiwan (Shih 2010). Promotion of such policies would help to ensure that the education system adequately prepares students to excel in whatever field they choose, and is decoupled from certain assumptions about the graduate's future values and lifestyle.

Policy and research recommendations based on the present findings

This concluding chapter provides an opportunity to ask those tasked with the challenge of designing the future for the region (policy makers, NGOs, research institutions, social movements, etc.) serious questions about the role IK plays in designing and implementing development interventions and programmes. Doing so means that we move beyond simple pro- or anti- positions on a narrow set of options; we ask more nuanced questions about what kinds of development are available if these different knowledges are considered.

There are many misperceptions about IK. Development planners and policy makers often do not see it as being rigorous; they see it as simplistic, and fail to see its pluralistic and adaptive nature. On the other hand, conventional development interventions, based on external scientific knowledge, can be short-sighted and politicised, and often lack resilience and the genuine participation of those whose lives are affected. As demonstrated by the practices of the Beni-Amer, the hybridisation of these knowledges must be given consideration when future research programmes and policy initiatives are designed, and the points discussed in the following sections must be taken on board.

Repositioning indigenous knowledge and knowledge sovereignty within a global context

Rapid environmental, economic, cultural and political changes on a global scale are having negative impacts on indigenous practices. Indigenous knowledge and practice are important drivers of the global economy (for example, by influencing the market price of meat), and also contribute to the sustainability of the global environment. Yet IK is still an underused resource in scientific research and development, and its contribution has often meant a loss of traditional ownership and the exploitation of indigenous communities, when their knowledge is used without their consent. Livestock knowledge is still largely untapped, and threats to indigenous knowledge and food sovereignty, which have been outlined earlier in the book, can have a detrimental impact on food security at national, regional and global levels, and lead to wider (global) economic, social and environmental insecurity and instability.

Involving pastoral communities in research and policy design

Pastoral indigenous knowledge is transformative and fosters resilient communities, while sustaining natural resources. It is imperative to engage these communities in the design of research. Such engagement is not without its challenges. According to Pimbert (2006, 10), 'a future challenge lies in bringing together . . . plural forms of knowledge within a more comprehensive, power equalising dynamic of participatory learning and action'. The use of indigenous knowledge could lead to the increased participation of pastoralists in pastoral development projects and be a starting point for supporting grassroots institutions (such as herders' associations and groups) that can back up technical and social interventions (Fre 1992).

The promotion of a dialogue between pastoral communities, researchers and policy makers is therefore a progressive move towards dealing with the challenges of climate change adaptation and food insecurity. The participation of women and young people in particular is crucial, given the diversification of livelihoods, increasing urbanisation and the increasing disengagement of youth from pastoralism, which affect social and cultural dynamics.

As well as informal knowledge sharing, formal training should be encouraged, in order to document indigenous knowledge and practice, and the ways in which traditional adaptive strategies can be combined with new technology (such as early warning systems (EWS)). Pastoralism is already being incorporated into some university courses in Africa; for example, Mekelle University in Ethiopia is running a PhD programme on *Dryland Ecology and Resource Management including Pastoralism*. Over the last 25 years, a number of home-grown pastoralist training and research centres, as well as African-led NGOs, community-based organisations (CBOs) and networks, have emerged in the region, making a positive contribution by advocating policy changes in support of pastoralist livelihoods. The Pastoral and Environmental Network in the Horn of Africa (PENHA), founded by the author in 1989, has such home-grown initiatives.

For example, in Kenya some policy makers are introducing more progressive dryland policy and planning. The Ministry of State for Development of Northern Kenya and Other Arid Lands has designed fiscal incentives to attract private-sector investment into pastoral production in the region. It is also 'integrating climate foresight and adaptation into local and national government planning in a way that explicitly

strengthens the strategies used by communities to adapt to climate variability and to reduce and manage the risks from natural disasters' (Hesse 2011).

Strengthening rights

We have a duty to ensure that IK is treated with respect and celebrated, just as it respects and celebrates the diversity of life. This cannot be achieved without protecting the rightful ownership of IK and ensuring the non-exploitation of pastoralist communities, who have called for the protection of their knowledge in accordance with customary law and human rights (Swiderska, Roe, Siegele and Grieg-Gan 2008). Safeguarding the diversity and pluralism of IK is imperative if we are to ensure a sustainable use of resources and the preservation of biodiversity in all its forms. National and international law must ensure that community ownership rights to IK are protected. It is only recently that the intellectual property rights of indigenous communities have been given any kind of legal status, and these are now enshrined in the UN Convention on Biological Diversity (CBD). Article 8(j) of the CBD states: 'Each contracting party shall, as far as possible and as appropriate: . . . Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge innovations and practices' (United Nations 1992, 6).

The contribution of IK to the conservation of biodiversity has been recognised at a global level in the CBD, and the Food and Agriculture Organization (FAO) refers to livestock keepers as 'guardians of biological diversity' (FAO 2009). The intellectual property rights of IK have been incorporated into the CBD under the *Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity: Text and Annex*, which came into force in 2014, and which aims to create equity between providers and users of genetic resources and associated traditional knowledge. At the local level, however, rights are not always recognised and international agreements are not always implemented. Local communities have developed tools to support the implementation of the protocol, such as community protocols, model contractual clauses

and voluntary codes of conduct or guidelines (UNCBD 2016). Livestock bio-cultural protocols (BCPs) have been developed by some pastoral communities, such as the Raikas, which document breeds and associated traditional knowledge and practices, and invoke rights under various existing legal frameworks, including the CBD. 'The process of developing these documents – when driven and designed by communities – offers the potential to strengthen community cohesion and the capacity to secure and defend rights' (Köhler-Rollefson, Kakar, Mathias, Rathore and Wanyama 2012, 110).

As pastoral communities are increasingly being deprived of access to grazing areas and other natural resources, their legal rights must be safeguarded in national laws. Where the political climate allows, civil society organisations can help pastoralist groups to access legal channels, and new and existing institutions can monitor and document these processes.

Recognising multiple knowledges

A book like this one, with an ambition to advance the cause of knowledge sovereignty and sustainability, sees such debates within a wider context than that of choice (a context which extends to democratising knowledge and developing new or hybrid knowledges). The manner in which entire sets of relevant and valid knowledges (and indeed the worlds they represent) become delegitimised and – to borrow from the philosopher Isabelle Stengers (2010) – 'disqualified' are worth noting. Ultimately, this leads us to the fundamental question of what types of future are being constructed under the current approaches, and how beneficial they are for the Beni-Amer and other pastoral and farming communities.

The world is not a single entity; it is comprised of multiple ways of understanding, being and living. Thus the world (and by extension the universe from which ideas of universality stream) is made up of the multiple, making it a 'multiverse' (Latour 2004). What happens, though, is that this reality is rarely acknowledged and respected; rather it becomes squashed and made to fit into a universe. This book is an example of this, as it documents that the manner in which the knowledge of the Beni-Amer – despite being valid and often superior – is being squashed by the imposition of 'scientific' knowledge from the 'universal' and 'objective' world of scientific knowledge.

Michel Serres (1995) provides a good gateway to making sense of this idea of *multiple worlds*. In *The Natural Contract* he makes a

distinction between the '*worldwide world*' and the '*worldly world*'. He defines the 'worldwide world' as the 'world of things', and the 'worldly world' as the 'world of contract of law', which is 'inhabited by scientists'. For purposes of convenience, the 'worldwide world' can be understood as that of the real and lived world, comprised of the complex, the dynamic and the uncertain. By studying the Beni-Amer through starting with their understandings and documenting them, but also through gathering empirical evidence that shines a light on their 'worldwide world', I have shown the tension that exists when the world they inhabit meets the more powerful and dominant 'worldly world' inhabited by scientists. This leads us on to my position on the broader debates of wider significance.

Reflections on ways forward

I have a foot in both of the worlds described above. While very appreciative of the world inhabited by the pastoralists, and having documented the logic and rationale they employ in order to make sense of, and thrive in, their environments, I also inhabit the world of scientists. This position in relation to the debates enables me to understand the forces that push the two worlds apart, and to reflect on the gap between them and on what can be done to bridge them. This book is written in the spirit of sharing the knowledge of the pastoral communities and finding ways to align it with what is deemed to be superior scientific knowledge.

Reaffirming indigenous knowledge

What comes out in this analysis is how pastoralist knowledge is being suffocated because of the primacy given to 'scientific knowledge'. Pastoralist knowledge – despite being more context-appropriate than, and in many instances superior to, 'scientific' knowledge – is not taken seriously. This reminds me of a point argued by Grosfoguel (2009, 11); he says, 'Unlike other traditions of knowledge, the western is a point of view that does not assume itself as a point of view. In this way, it hides its epistemic location, paving the ground for its claims about universality, neutrality and objectivity'. In other words, 'the western' – which in this instance can be read as 'the scientific' – is a point of view that considers itself to be not a point of view, but the truth.

Much of the 'scientific' knowledge that underpins approaches to development in pastoral areas has a history, and emerges out of a particular time

and location (Sullivan and Homewood 2003). The location, however, is hidden behind a language of objectivity and universality, implying it should be accepted everywhere. However, the reality, to use the title of Walter Mignolo's (2000) book, *Local Histories/Global Designs*, is where local history is used as a global (objective) baseline against which the Beni-Amer are being judged. This would not work in reverse: we would be considered crazy if we took indicators from Africa and then used them to judge agricultural systems in the West. Treating scientific knowledge as 'universal', when it is in fact a 'local knowledge', means that the Beni-Amer, despite having valid sets of knowledges, are disqualified. On a philosophical level, this can be tied back into the promise of modernity, that (European) man believed that through science and technology he would have control and mastery of nature.

Democratising knowledge

If one takes Latour (2011) seriously, especially his idea that Europe – and European knowledge as a baseline – is an exercise in exoticism, what happens if, rather than viewing the debate as it is currently is, as one of 'indigenous' knowledge from the margins needing to be incorporated into an 'objective centre', we locate both sets of knowledges and give neither immediate primacy, and say, 'Here are two knowledges coming out of different locations with different histories, and both are potentially valid'. So one set of knowledges arises out of the Beni-Amer and is located in the study region, and the other arises out of scientific knowledge and is located in Europe/the West. By getting rid of the baseline, we put the knowledges on equal footing. Thus the prefixes of 'indigenous' and 'scientific' knowledge do not denote worth or value, but only the locations in which the knowledges we want to put into conversation with each other arise. Saying they are of equal value makes hybridisation an exercise in democracy.

I use the term democracy as Fraser (1996, 197) defines it, as 'a process of communication across differences, where citizens participate together in discussion and decision making to collectively determine the conditions of their lives'. And then the question becomes; How do we communicate across the differences? What are the criteria that we are using to judge effectiveness, and so on? These I have already established in this book by highlighting the importance of food sovereignty and knowledge sovereignty.

Shih (2010) describes how, in academic circles, IK has essentially been relegated to the status of a second-class citizen in comparison to

its occidental cousin. However, there are those who are responding by attempting to change this. Shih (2010, 46) states, 'Starting with the idea of Indigenous knowledge sovereignty, we envision a determination to made Indigenous Peoples . . . the 'subject', rather than 'object', of Indigenous research and education'. With this in mind, the College of Indigenous Studies at National Dong Hwa University in Taiwan was established in 1991 to show the government's commitment to enhancing indigenous education as well as research. It is probably unique in the world in being a faculty dedicated to local indigenous studies. So we can see that, even in academic circles dominated by the occidental paradigm, IK is beginning to find ways to raise its voice as an equal.

There is ample evidence to show that IK responds and adapts itself to new situations and imperatives in order to service the community that uses it. It is not, however, in simple adaptation that we see the true strength of IK, but rather in IK's ability and willingness to adopt principles and practices from other systems of knowledge. This ability to extract information and practices from elsewhere and incorporate them into one's own knowledge system is one of the quintessential expressions of knowledge sovereignty, that is, the power to use one's own system of knowledge to evaluate an integral component of another knowledge system and pronounce it worthy or unworthy of incorporation into one's repertoire of knowledge and practice.

Building alternative futures

Finally, we turn to the future as something that needs to be built and constructed. So, rather than having a universe imposed, we don't reject universality, but, like Latour (2004), we say a common universe needs to be constructed through an exercise of knowledge democracy.

Under the current system the basis (both social and resource) upon which the knowledge systems of the Beni-Amer depend is being systematically undermined. A variety of possible and viable potential futures are being denied the chance to be built, for reasons that are more political than scientifically legitimate (given that science is meant to be an exercise in uncovering truth).

Therefore, if things continue as they are, the knowledge that sustains the Beni-Amer will be suffocated to death: it won't have failed, it will have been killed.

With new challenges ahead and rising demand for meat, the integration of livestock systems within the agroecology debate could be a

way forward. Applying agroecology to the question of animal health would imply focusing on the causes of animal diseases in order to reduce their occurrence. Major attention will therefore be given to choosing animals adapted to their environment and using a set of management practices that favour animal adaptations and strengthen their immune systems (Soussana, Tichit, Lecomte and Dumont 2015), a practice which is inherent in the IKS of the Beni-Amer, as outlined in this book.

The interaction between livestock and vegetation is a principle that pastoral communities embody. Extensive livestock grazing is an excellent example of managing biodiversity and soil fertility. For example, through the transport of seeds and insects by livestock, the migration of pastoralists and their flocks supports habitat connectivity and biodiversity (Florin and Quiroz 2016).

Adaptive pastoral practices, such as crossbreeding more resilient cattle to combat raiding by intruders, demonstrate the integral role of IK in a sustainable future. As national governments focus more on private investments, such as crop intensification, mining and tourism, and thereby are complicit in land grabbing, they fail to see not only the economic value of pastoralism, but also how the holistic nature of indigenous pastoral practices and traditional land management is key to a sustainable future. The undermining of customary law brings tensions between the objectives of customary and national laws into play. Consultation with pastoral communities in this process is often inadequate or non-existent, and pastoralists are losing access to and control over their lands, which leads to conflicts among other land users (Florin and Quiroz 2016). This highlights the need for more productive and resilient herds. Food sovereignty, therefore, cannot be achieved without secure pastoral land rights.

In addition, policy makers still interpret practices such as livestock mobility and negotiated and reciprocal access to pastures and water as 'coping' mechanisms in response to scarcity, rather than as what they really are: proactive husbandry strategies that exploit variability to manage uncertainty and maximise productivity (Krätli and Schareika 2010). For these reasons, indigenous pastoral practices have an in-built flexibility and adaptability, and they have evolved by building on the strengths of scientific knowledge through tried and tested formulas. Mobile technology has enhanced the ability of herders to locate good-quality grazing areas, and freed them to explore other livelihood opportunities, which is changing the power dynamics between genders and generations.

As pastoralists are more marginalised than the settled population, and are not offered access to education, they are not able to make or

influence decisions about land and water access that impact their daily life. They do their best to adapt to changing situations, using their indigenous knowledge. However, such knowledge needs to be interlinked with scientific knowledge if sustainable development and modernisation of the sector are the goal (Sulieman and Ahmed 2013). In addition, the recognition of local innovativeness by pastoralists provides an entry point for a bottom-up approach to supporting adaptation to much more than climate change (GebreMichael et al. 2011).

Attempts to replace traditional land use practices with modern techniques have simply exacerbated poverty, degradation and conflict. 'In the face of climate change and increasing uncertainty in the drylands, the need to reframe policy and practice has never been greater. The future must be built on sound scientific information, local knowledge, informed participation and the wisdom of customary institutions that emphasise social equity, ecological integrity and economic development' (Hesse 2011, 1). The recognition of IK and the integration and hybridisation of different knowledge systems must be taken on board by both researchers and policy makers.

Challenges are here to stay, and it will be the duty of the next generation of scientists, policy makers, social movements, the communities and other stakeholders to salvage the situation, and I hope this book contributes to that struggle – which is going to be tough, but winnable. In Nelson Mandela's great spirit, 'after climbing a great hill, one only finds that there are many more hills to climb' (Mandela 1994, 751). Nothing is impossible.

Annex 1
Range resources and vegetation in the study area

The vegetation of the study region ranges widely from tall savannah grass (3 per cent) to scattered desert scrub (13.5 per cent) and riparian vegetation along riverbanks (3 per cent). There are tree and grass categories of vegetation well known to the Beni-Amer as fodder resources.

The southern part of the study region has the best water resources and it is the area in which more intensive irrigated and rain-fed plantation agriculture is practised. According to Gedamu et al. (1984), an estimated 125,000 hectares is potentially irrigable and arable in western Eritrea; such acreage has increased substantially since the end of the long war in Eritrea. Its high potential has made Eritrea and eastern Sudan vulnerable to intensive agriculture, overgrazing, and ultimately desertification, and the Beni-Amer and other pastoral people have little control over this land. Land grabbing of high-potential pastoral areas by states, foreign companies and local elites has become a major challenge for pastoral people in both countries (Fre 2009a).

The Gedaref district of eastern Sudan, which receives over 600 mm rainfall annually, produces more than half of Sudan's sorghum crop; an estimated area of over 1.5 million hectares is cultivated, according to Shaami (1988). The Gedaref district produces 3 million sacks[1] of charcoal for Sudanese cities. Most of this region was traditionally a dry-season grazing haven for pastoralists and part of a thick forest, but studies by El Tayeb (1985) and El-Hassan (1981) indicate that the encroachment on traditional grazing territory by farmers forced pastoralists to concentrate their stock in some areas, and this has caused severe overgrazing and a depletion of water and land resources.

Table A1.1 Discharge estimates for the Setit, Gash (Mereb) and Barka in Eritrea

River	Drainage area (km²)	Annual discharge (km²)
Setit	68,000	8,000
Gash	23,000	6,600
Barka and Anseba	41,000	–

Source: Gedamu et al. 1984

Table A1.2 Rough estimation of carrying capacity (CC) of the region in tropical livestock units (TLU) in the Gash-Setit area, western Eritrea

Vegetation type	Area (km²)	%	Total area (km²)	Estimated CC per ha. per TLU	Total TLU
Bare land 60%	25,881	32.7	2,588,100	40	38,821
Grass land	24,821	31.3	2,482,100	6	413,683
Scrub land	10,698	13.5	1,069,800	10	106,980
Riparian vegetation	2,355	3	235,500	6	39,250
Moderately cultivated	15,517	19.5	1,551,700	8	86,981
Total	79,272	100	7,927,200		685,715

Source: Based on the Draft Land Use and Cover Type map prepared by the Land Use Planning and Regulatory Dept. of the Ministry of Agriculture (UNDP et al. 1984).
Note: A tropical livestock unit is defined as a zebu weighing 250 kg live weight. 10 sheep or goats = 1 TLU, 1 camel = 2 TLU.

The study region, as already stated, has always been one of the most attractive range areas to Beni-Amer and non-Beni-Amer groups alike, and livestock concentrations increase considerably during the dry season (Table A1.2).

The following are dominant among tree species in the Eritrean western plains, according to Gedamu et al. (1984):

- *Acacia mellifera* (black thorn)
- *Acacia seyal*
- *Acacia nilotica*
- *albida*
- *Acacia senegal*
- *Ziziphus spina-Christi*

- *Dichrostachys cinerea*
- *Diospuros mespiliformis*
- *Cadaba*
- *Oclandra*
- *Balanites aegyptiaca*
- *Dalbergia melanoxylon*
- *Erythrina abyssinica*
- *Combretum hartmannianum*

The understorey is covered with *Tetrapogon* spp., *Sporobolus* spp., *Ischaemum brachyatherum* and *artistida* spp.

Only 60 per cent of the area can be used for grazing and browsing: the remainder is unproductive. Of the 60 per cent that is productive, roughly 50 per cent can be considered for grazing; the rest is cultivated land. Along the River Setit in the south, open grasses dominate the landscape. This is a major grazing area for the Beni-Amer. The predominant grass species are:

- *Hyparrhenia anthistiroides*
- *Cenchrus pennisetiformis*
- *Aristida rhiniochloa*
- *Pachycondyla sennarensis*
- *Cynodon dactylon*.

The principal tree species are:

- *Acacia mellifera*
- *Grewia flavescens*
- *Sclerocarya birrea*
- *Hyphaene thebaica*
- *Dichrostachys cinerea*
- *Boswellia papyrifera*
- *Ziziphus spina-Christi*
- *Acacia seyal*
- *Boswellia papyrifera*.

(Howard 1983)

Note

1. 1 sack = approx. 50kg.

Annex 2
Pastoral diseases and Beni-Amer curative practices

Table A2.1 describes diseases, agents, parasites and other physiological problems that lead to poor health, by cause, animal type affected, and locality if known.

Inherent strengths and merits of some of the Beni-Amer curative practices

Sarcoptic mange (*Abeg*)

Mange is treated effectively by the use of Gelwed. This is a thick tar-like substance produced by boiling branches of *Capparis decidua*. Thorough cleaning by scraping the affected skin is essential before the liquid is applied. In the absence of Gelwed, engine oil may be used as a substitute. Affected animals are also washed (in the absence of Gelwed) with a mixture of red soap and cattle urine. Some herders mix salt and geomycin and paint it over the body of the affected animal.

Lice, mites, fleas (*Balee*)

Sesame oil is given to goats as a laxative and as a cure against such parasites. Kerosene is used as a dressing. Primarily, good, clean, dry housing for small stock can prevent these parasites. In colder environments, warming and fumigation (*Tenan*) of goat houses by burning special tree species clears such parasites.

Table A2.1 Causes of poor health among animals

Common name	Local name	Cause	Description	Animal(s) affected	Locality	Season
Night blindness	Awer-lali	Lack of green fodder	Cattle fail to see at night. Their sight is good during the day and they graze normally. The disease depresses cattle; they tumble, fall and get injured. They tend to have a high body temperature. On the onset of rains, it becomes less of a problem. This disease is not common in Eritrea, but more common in eastern Sudan (see also Johor).	Cattle	Widespread	Dry
Foot and mouth	Ansa	Not known (believed to be destiny)	This is a killer disease with no cure; it is spread by wind or pasture. Ansa is transmissible. It is more serious as a hoof disease because it leads to the cracking of the hoofs. It restricts cattle movement. The disease also affects the muzzle, badly affecting feeding. Affected animals also become susceptible to other diseases. They give no milk.	Cattle	Widespread	Any
Sarcoptic-mange	Abeg	Overcrowding, poor, wet housing and mixing with other flocks	The main cause of mange on goats is believed to be poor housing and wet clay soils. To some extent donkeys are also affected because they consume human faeces. Wet environment and biting flies exacerbate the disease. The disease starts on the muzzle and nose and then spreads to the forehead and other parts of the body.	Sheep, goats and camels of all ages, but cows are not affected seriously	Widespread	Mainly rainy

(*Continued*)

Table A2.1 (*Contd*.)

Common name	Local name	Cause	Description	Animal(s) affected	Locality	Season
Mites and lice	Balee	Mites and lice	Goats particularly suffer from these diseases. Mites favour crowded conditions.Poor housing, infected manure, and dampness. Lice affect them anytime. Mites are common during harvest season when it is cool. They badly affect kids. Various biting flies are most common in the rainy season.	Goats of all ages	Low-lying wet clay areas	Harvest, rainy, and dry, depending on the type of disease
Biting flies	Cincay	Biting flies (the same name is given to the agent and the disease it causes)	Disease is recognised by behavioural changes in the animal, which becomes restless. Symptoms are poor body condition, falling milk yields and hair dropping. There is also a belief that mosquitoes affect people as well as livestock in some way as biting flies. Such flies bite donkeys and goats under their bellies to irritate them, especially during the morning and during daylight.	Cattle, sheep and goats of all ages. In camels, the disease caused by flies is known as *Shn*.	Low-lying areas	Rainy
Anthrax	Fahmia	Not known (believed to be caused by destiny). The Beni-Amer do not know what causes it but they believe bad pasture and poisonous plants can cause it.	Kills animals suddenly.	Cattle, sheep and goats	Widespread	Any

Cattle plague, rinderpest	Gulhay	Contagion	This disease is dangerous. It is transmitted from stock to stock through grazing. Crowded animals get cross-infection. Wild animals such as kudus or gazelles transmit it to cattle in the bush. Once animals are infected, they die fast and no one can stop it. It is *agel* or *day of destiny*, implying that it cannot be controlled.	Cattle of all ages	Widespread	Any
Swelling	Hbat	Several causes	Fighting between cattle may cause swelling. Beating animals can also cause swelling. Both cases can be treated by hot iron burning. Swelling of the udder and joints sometimes kills livestock. There are several types of swelling on the back, on the neck, on joints, etc., which can be caused by various agents including biting flies, ticks and fleas.	Mainly cattle and donkeys	Widespread	Any
Lameness	Hnkus or enganefit	Long walks or treks	Disease of the hoof that leads to lameness. During the long dry season, the clay soils crack and cattle walk long distances to the River Rahad(south-east Sudan) to get water. This results in hardened feet and cattle are unable to walk. In general, lowland cattle graze in the hills and are affected because they are not suited to hilly areas.	Cattle	Areas of clay soils cracking during the dry season	Dry

(*Continued*)

Table A2.1 (*Contd*.)

Common name	Local name	Cause	Description	Animal(s) affected	Locality	Season
Donkey disease	Habil	Cross-infection	A serious disease of donkeys that is manifested and diagnosed by a chest wound. The disease is transferable from donkeys to donkeys and goats. It kills donkeys within six months and leads to the greatest animal losses. We do not know what really causes it inside the animal. When we see the donkey's hair falling and wounds on its chest we know it is the end of the donkey's life.	Donkeys (donkeys not adapted to clay soils)	Areas of heavy clay and wet soils	Rainy and dry seasons
Water-borne disease	Idr-maay	Standing water	Caused by drinking boggy or standing water (e.g. seasonal ponds).In some cases it kills, but sometimes the cattle recover. Such water can also lead to swollen feet, and animals will be unable to walk and may become paralysed.	Cattle of all ages	Widespread in river areas	Dry
Stress or fatigue	Intihab or gherir	Physical stress	Disease caused by excessive travelling in search of grazing and water; after a long run cattledrink cold water when their body is hot, which is dangerous. Some herds, for example, travel about 10 km from their home base in search of water. This leads to fatigue. The condition leads to *gherir* or disease of the joints. The joints become watery and swell. The stress can kill animals.	Cattle of all ages	Widespread	Dry

Blindness	Johor	Bruising, fliesor lack of shade	When cattle are exposed to too much heat, 'fats from their head melt and cover their eyes leading to blindness'. Excessive heat (sunlight) and lack of shade cause this. Blindness leads to cattle getting lost, poor condition, and poor milking. Some also believe bruising of the eye can cause the blindness. This is called *remed* (blindness) caused by accident, rather than excessive heat (see also 5.3.1., *Awer Lali*, blindness, which is caused by lack of green fodder).	Cattle	Areas without shade, described as Saharan (desert)	Any
Ticks	Karad	Ticks, overcrowding, bad housing	Ticks affect the udder and teats. In serious cases, milk production ceases. Ticks get inside the animal's ears. Some believe that ticks get into the animal's brain.	Cattle, sheep and goats	Widespread	More during the rainy season
Abortion or premature birth	Kul-la	Mosquito bite, mist, excessive sunlight, flies, ticks and dusty conditions	The Beni-Amer believe that mosquito bites (because of restriction by tethering near fields in one area) and mist cause miscarriage. Sometimes the kid dies in the womb (still birth) and this leads to complete sterility. Some believe mosquito bites may cause swelling under the belly, whichweakens the animal and leads to miscarriage. Too many ticks can also lead to miscarriage. Serious miscarriage can lead to death. Encroachment conditions where grazing territory is insufficient can lead to miscarriage.	Mainly goats	Widespread	Kidding season (rainy and harvest season)

(*Continued*)

Table A2.1 (*Contd*.)

Common name	Local name	Cause	Description	Animal(s) affected	Locality	Season
Diarrhoea	Krh	Excessive milk at birth or biting flies	This is a disease of young suckling animals as well as old animals. In some cases the cause is excessive suckling. In others, it may follow rinderpest vaccinations, when a calf suckles a vaccinated dam. Among young kids and lambs it causes great losses during the rainy season. If seriously affected, animals produce blood in their dung, then die.	Young animals, kids and calves	Widespread	Rainy
Heifer disease	Krkb	Not known	Affected animals need good care. They must be isolated and remain ina shed day and night. The affected animal cannot walk. Water should be poured onto their back for two days to cool them because of the high body temperature. Animals can survive if free from other diseases.	Heifers or *Rabaat*, 2–4 years of age	Widespread	End of rainy season and beginning of dry in September
Heifer killer disease	Hmam-Saar or Agel	Not known (but believed to be caused by destiny)	This can kill a heifer in two days. The swelling of front and hind legs leads to pus formation. Because it kills so swiftly it has the metaphorical name *agel*, or the *day of destiny.* It is also known as *leged.*	Heifers (not adult cattle)	Widespread	Rainy
Bloat	Mnfah	New grass or crop husks on threshing yard	The stomach becomes bloated. This is followed by diarrhoea, which kills the affected animal.	Cattle, sheep and goats	Widespread	Rainy and dry (crop remains)

Foot rot	Mahkes	Wet-clay soils and unhealthy animal camps	Goats and sheep tread on wet-clay soil and get foot rot. This leads to lameness for as long as one year, restricting their ability to graze and to conceive.	Sheep and goats	Wet-clay areas	Rainy
Mastitis	Nfret-tb or gresh	Ticks and flies	The udder swells and becomes painful. After a while, blood comes instead of milk and the teats completely shrink and become hard, producing no more milk.	Cattle and goats	Widespread	Lactation period
Bovine and caprine-pneumonia (BCP)	Shambu	Cross-infection by mixing with unfamiliar herds, as well as stress caused by long-distance trekking	This is a chronic disease of the lungs; it *spoils the lungs.* The disease lives with the animal, weakens it and kills it. It kills sheep faster than goats and it is known as *ghintir* among goats and sheep. Affected animalssnort and produce a watery discharge from the nose. Badly affected animals also show pale coat colour. They become weaker and weaker until they die.	Cattle, sheep and goats of any age	Widespread	All year, but especially serious during rainy and colder seasons
Non-expulsion of the afterbirth	Selyatkerie	Natural cause	This regularly occurs during birth. The placenta (*selyat*) fails to come out following birth.	Cattle, sheep and goats	Widespread	During calving, lambing and kidding seasons

Biting flies (*Cincay*)

A mixture of linseed and salty water is given to livestock. The Beni-Amer also mix salt and sesame oil and use this as an ointment against mosquito bites. It is believed to lead to better health and milk yield. They believe the best cure for biting flies is Abunini, a manufactured veterinary drug.

However, the Beni-Amer say the best cure is to protect your animals against biting flies by avoiding wet-clay and forest areas during the rainy season (June–September). Stock should move north to upper ground, where fly infestation is less. Provision of salt or of salty ground or vegetation is also believed to build up resistance to diseases.

Anthrax (*Fahmia*)

As a last resort, crushed Hamta leaves (plant unidentified) are spread over the body of the cow. But this is despite the fact that the Beni-Amer believe that this almost certainly has no effect, and that this disease is a killer and has no cure.

Rinderpest or cattle plague (*Gulhay*)

This has no traditional cure, and annual vaccination is the only way to prevent it.

Epizootic lymphangitis (*Habil*)

The affected part of the body is treated by the application of a red-hot iron. But prevention is better than cure, and isolating infected animals and keeping healthy animals away from them is the best way to achieve this. Dung and smell transmit the disease.

Swelling (*Hbat*)

The swelling of joints caused by biting flies can be treated by giving the animal a lot of rest and food. The swollen part of the leg should be smeared with hot dung and soil.

Heifer killer (*Hmam saar*)

'Onions, Usher sap (*Calotropis procera*) and soured milk are mixed together and kept for three days in a container. The mixture is well fermented by the [four]th day. It is then applied to the joints of unaffected heifers as [a] preventive measure. When [the] 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 [unclarified] butter to the same effect. Others said traditional medics cut an incision to remove the [pus] 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.'

Water-borne disease (*Idr-maay*)

Kulmt leaves (the tree is unidentified) are crushed and mixed with water and given to cattle orally.

Stress (*Intihab* or *Ghrer*)

Stress predisposes animals to illnesses, which may include swelling. The swollen part is burnt with a hot iron. Sometimes incision is used to remove the abscess inside the swelling. The wound is then dressed with salt.

Blindness (*Johor*)

Such animals should be rested. For bruised eyes, ground bark of the tree *Balanites aegyptiaca* (Qog) are put on the eye. This hot powder is effective and clears the eye.

Ticks (*Karad*)

There is no traditional medicine as such, but tick removal by hand is common. 'Black' ticks can be cleared by 'on the spot' burning of the affected part.

Most herders think using different ecotypes at different seasons is the best preventive and curative measure against ticks. As a desperate measure some herders mix DDT with water and oil to use as an ointment to cure the animal.

Diarrhoea (*Krh* or *Qrh*)

Starving the animal for two days in order to clear its stomach. Salty water is given. Burning with hot iron to activate the animal is also common.

Foot rot (*Mahkes*)

Herders use a clean knife or a blade to make a cut in the infected part of the hoof, in order to wash it thoroughly with salty water and soap. Most animals recover, but sometimes the infection doesn't heal. In such cases the herders use kerosene as a detergent to wash the wound, and this clears it.

The bark of *Balanites aegyptiaca* (Qog) is ground finely and dressed over the infected part of the foot. This is very effective and leads to rapid healing.

Bloat (*Mnfah*)

To wash out the animal's bloated stomach, caused by eating too much fresh grass or too much fibre (such as sorghum heads), coffee is used. Ground coffee is prepared and kept cool overnight. Then in the morning black coffee with sugar is given to stock.

Mastitis (*Nfret-tb* or *Gresh*)

Hamta leaves (unidentified plant) are crushed until they form a paste which is spread over the udder to ease the swelling and help remove the 'dead milk' from the udder. The cow is also encouraged to smell the crushed leaves of Hamta. Others use the leaves of Osia (*Ziziphus spina-christi*) in the same way to treat mastitis.

Non-expulsion of the afterbirth (*Selyat-Kerie*)

a) Pounded Bamia (*Esculentus* spp. or lady's fingers) is pushed through the cow's vulva to act as a lubricant, and sometimes given orally.
b) Liquid soap is pushed through the cow's vulva as a lubricant.
c) Awhe (*Cordia abyssinica*) crushed and pushed into cow's vulva.
d) Senselie (plant unidentified) leaves crushed and pushed into cow's vulva. Other crushed plant material is also provided orally.
e) Sorghum soup is given to the cow as a laxative drink. This is believed to lubricate their stomach.
f) Cow's own milk milked out and given to it to cool its gut.
g) Hot iron burning (*tkset*) is used on the cow's barrel (belly and loins) to help removal of the afterbirth.
h) Shinfa (fenugreek seed) mixed with water is given to the animal as a lubricant.
i) Malted grain is pounded and mixed with water and given as a drink.
j) Debina (unidentified plant) leaves are crushed and given to goats as a cure against bloated stomachs and for removal of afterbirth. It acts as a purgative.
k) Very rarely, a calf dies in the womb. In this case tobacco powder is mixed with water and the cow is forced to drink it. This helps the removal of the dead calf.

Pneumonia (*Shambu*)

Treated by western veterinary drugs which the Beni-Amer sometimes administer themselves. This is the best cure.

Annex 3
Customary law of the Beni-Amer

(Source: Bhardwaj 1979: 227–38)

ERITREAN ASSEMBLY

Ref: EA/HM/3 P.O. Box 206
Date: lst June, 1960 ASMARA
Attorney-General
Government of Eritrea,
Asmara

Subject: New Customary Law of the Beni-Amer Tribes

I attach herewith a copy of the New Customary Law to govern the necessities of the whole of the Beni-Amer wherever they might be in disputes arising out from the fundamental principles of the Customary Law.

2. This new codification has been arrived at as a result of numerous meetings of the elected representatives of the tribes, and the result of each meeting was communicated to the people concerned.

3. Whilst I have to inform you that I have been, in turn, delegated to reduce into writing the above Law I wish to state that I am doing this work for my people only in my capacity as a member thereof and not in any other status which I may be holding officially in the Government.

(Sgd.) (Hamid Farej Hamid)
(Delegate of the Beni-Amer Tribes)

Copy to: The President Supreme Court
" " Secretary Law & Justice
" " The President High Court
" " All S.D.O.s[1]

Source: Courtesy of Tribal Chiefs.

In the name of Almighty God on whom we depend on worldly affairs and for the judgement day.

We: the undersigned Nazirs, Omades, Sheiks and notables of the Beni Amer Tribes, do hereby delegate Sheik Hamid Feroj Hamid, to prepare the following Customary Law. This request of ours has been kindly accepted by him. Having taken a great deal of time, he has finally presented us with the following Customary Law. We have carefully studied and also hereby officially adopt it unanimously and also seize this chance to convey our inmost gratitude to Sheik Hamid Feroj Hamid, praying Almighty God will guide us to anything that brings happiness to ourselves and our people.

This Customary Law has been so adopted on the 12th February, 1958.

Signature of the Nazirs	**Representing tribes**
1. Nazir Osman Abeeirahman	Nazir Almada tribe
2. Nazir Daud Idris	Nazir Asfada tribe
3. Nazir Hamid Noray	Net Awad
4. Nazir Adum Suleman	Bet Maala A. Yacob
5. Nazir Saleh Ali Tacosh	Bet Maala Hamasien
6. Nazir Abdalla Adum	Aflanda
7. Nazir Moh. Taher Diglel	Nabtab
8. Mohammed Mustaffa	Ashraf
9. Hamid Ali Mohmoud	Wuludnoho
10. Nazir Ferej Idris	Abhashela
11. Mohamed Ali Idris	Algobdab
12. Moh. Ibrahim Karrar	Rigbat Barca
13. Nazir Mohamed Drar	Krab Knab
14. Nazir Alhussein Saleh	Bet Mala A. Mahmoud
15. Nazir Idris Kabarb	Nazir Labat
16. Abubaker Hamid Ali	Nazir Algheden
17. Hamid Mohamed Ismail	Nazir of Unaffiliated
Wakil Nazirs	
18. Omar Adum Idris	Wakil Nazir Aflanda
19. Hassan Ali Ismail	" " Almada
20. Omar Ahmed	" " Bet Malla Ham
21. Adam Abdalla Sheitel	" " Asfada
22. Hassan Mohd. Taher	" " Asfada

(*Continued*)

23. Mohd. Idris Damba	”	”	Abhashela
24. Karrar Idris	”	”	Bet Awad
25. Ibrahim Ali Sul	”	”	Bet Maala Yacob
26. Moh. Karrar	”	”	Algodab
27. Moh. Ali Hamid	”	”	B/Mala Mah.
28. Abdalla Sdai	”	”	Rigbat
29. Omda Mohd. Ab.	”	”	Asfada
30. Omda Osman Kheir	”	”	Asfada
31. Humed Aushak	”	”	Asfada
32. Omda Moh. Ali Habash	”	”	Bet Maala
33. Ibrahim Ali Batri	”	”	Melhit Kinab
34. Ali Idris Hummed	”	”	Almada
35. Saleh Shinkhai	”	”	Almada
36. Adem Ghebir	”	”	B/Mala Yacob
37. Mohamed Afatuay	”	”	Wuldnoho
38. Mohd. Omar Irta	”	”	Almada
39. Ahmed Osman Togik	”	”	Abhbaha

In the name of Almighty God on whom we depend on our worldly affairs and for the judgement day.

We Nazirs, Omdas, Sheiks and Notables of the Beni-Amer Tribes, have unanimously agreed to codify our Customary Laws which govern our traditions and regulate our communities' life.

We, therefore hereby adopt the following codified Customary Law of the Beni Amer, and should there be any omission or gap therein, these shall, after due consideration, be added to this Customary Law of ours.

ARTICLES

Blood Money	1. Whoever causes the death of a human being intentionally or unintentionally, he shall be bound to pay blood money amounting to Eth. $2610.00 according to the provisions of the Mohammedan Sharaitic law which is in force in the country.
Loss of eye	2. Whoever causes the loss of an eye to a human being shall be bound half 'dya' amounting to Eth. $1305.00.
Loss of tooth	3. Whoever causes the loss of a tooth to a human being shall be bound to pay compensation to the victim at the rate of one-tenth of a 'dya' mentioned in Article 1 above.

Affray	4. (a) Whoever takes part in an affray and causes fractures of an organ of a human being whether intentionally or unintentionally, whether with the use of a stick or stone, or by using any other means, provided that the victim is incapacitated; the offender shall pay a compensation of Eth. $300.00 to the victim. He shall also give the victim a goat, two litres of butter and 12 measures of dhura (according to the measures of the Agordat size). This last procedure is known as 'Saur'. (b) If a joint of the victim's body gets twisted as a result of the injuries caused by the offender and is not incapacitated because of this, the offender shall pay a compensation amounting to one quarter of the 'dya' mentioned in Article 1 above. He shall also be bound to bring the victim one goat, 2 litres of butter and 12 measures of dhura (according to the measures of the Agordat size). This procedure is known as 'Saur'. (c) If the victim gets incapacitated, as a result of a fracture of his bones, or loses use of an organ, with permanent incapability, the offender shall pay the victim a compensation amounting to half of the 'dya' mentioned in Article 1 above. He shall also bring the victim a goat, 2 litres of butter and 12 measures of dhura (according to the size of measures used in Agordat).
Skull Fracture	5. Whoever causes fracture of a skull of a human being, with use of a stick or stone, intentionally or not, shall pay the victim a goat, 2 litres of butter and 6 measures of dhura (according to the size of measures used in Agordat) and E.$50.
Injuries	6. Whoever causes injuries with a stick, stone or hand, shall pay compensation of Eth. $10.00 to the victim, but if he only threatened and did succeed in hitting the victim, he shall in this instance, pay the victim a compensation amounting to Eth. $100.00.
Neck Injuries	7. Whoever hits another with a stick, stone or hand on the neck causing the victim to faint, but revives normally, he shall pay a compensation to the victim amounting to Eth. $100.00.
Assault with White weapon	8. Whoever assaults another with white weapons causing wounds with penetration, intentionally or not, shall pay compensation to the victim of Eth. $150.00 also a goat, 2 litres of butter and 12 measures of dhura (according to the size of measures used in Agordat).

Threatened Stabbing	9. Whoever threatens to stab another with white weapon with no success causing, no bodily harm, shall pay compensation to the victim amounting to Eth. $75.00 which is half of the compensation which he would have had to pay had he caused bodily harm.
Assault during sleep	10. Whoever assaults another whilst sleeping shall pay compensation amounting to a quarter of the 'dya'. This is applied when such assault takes place with the use of a stick or stone, but if done with white weapon, the offender shall pay a compensation amounting to half 'dya' in addition to other legal punishment.
Biting	11. Whoever bites another with his teeth thereby causing him bruises shall be punished as if he had committed the offence provided in Article 5 above.
Collective Affray	12. Whoever takes part in an affray and gets the assistance of others, the latter shall each be fined with Eth. $50.00 in addition to any other punishment for any other offence.
	13. If two persons have been conciliated after an affray but one of them comes later on to revenge, he shall be bound to pay Eth. $100.00 in addition to the other compensation for his second offence.
Marriage Processions	14. (a) No women with their drums shall contribute in a marriage procession from one village to another. If they do so the party partaking in this shall be fined Eth. $100.00 to be spent in the village to which such party belong.
	(b) Men and women with drums shall not play together whether in the village or outside. If they do so either party shall be fined Eth. $100.00 or the party concerned.
	(c) If the people of the village in which the marriage is held throw stones on the coming procession, such village shall severally (if the offender was not recognised) be fined Eth. $50.00 which amount shall be paid by the offender if found, to the offended village. This money shall be spent in the collective interests of the offended village. But the individual offences proved shall be tried separately.
Boasting with cattle	15. Boasting with cattle, whether camels or cows, happens to cause shedding of blood, or otherwise exchange of insulting words as it was the custom before, such cattle boasted of shall be exposed for public auction and the proceedings shall be deposited with the tribe.

Insult

16. (a) If the insult touches the whole tribe or forefathers, the insulting party shall be fined Eth. $500.00 to be spent on the tribe insulted.

(b) If the insult was directed to an individual and was defamatory, the insulting party shall be fined Eth. $100.00 together with providing the Mosque of the place of sitting with straw mats.

(c) If women quarrel with, one another and pull the hair of one another, each piece of hair shall be valued with Eth. $5.00 considered as fine to be paid by the offender. The fine shall be estimated according to the damage. If such hair was pulled from the middle half, the said fine shall be applied. In this manner shall fine be decreased. If the position of the pulled hair has swollen, the offence shall be regarded as under Article 5 of this law.

(d) If a person insulted another saying 'BE CURSED YOUR FATHER OR GRANDFATHER OR YOUR DESCENDANTS' such insulting party shall be fined Eth.$100.00 to be paid to the offended person.

Rape

17. If a mature young man seized a virgin young girl who is not one of his relatives:

(1) without her goodwill he shall be fined Eth. $100.00 provided that he did not throw her on the ground or commit any prohibited sexual activity;

(2) if he threw her on the ground but did not commit sexual intercourse with her, he shall be fined Eth. $300.00 to be paid to the girl;

(3) if he threw her on the ground and committed sexual intercourse with her and she did not get pregnant thereafter he shall compensate her Eth.$750.00 provided that she related the incident at the time of its commission so that evidence to confirm this is found. On the other hand, if she did not relate the incident within 30 days, and the rape was not proved, she shall not be entitled to anything;

(4) if the girl gets pregnant as a result of the sexual intercourse, the offender shall be bound to pay a 'dya' of a person;

(5) if the sexual intercourse happened with her consent whether in the house or somewhere else and she gets pregnant thereafter, the offender shall bear the expenses of the conception and the maintenance of the child until it reaches Sharistic majority. This will be enforced if the offender confesses, or otherwise she proved the event.

Slaughtering

18. Such slaughtering shall be confined to one head of cattle:

(a) one head of camels to those who have camels and one of the cows to those who have cows;

(b) whoever slays more than this shall be fined Eth.$100.00. The MAATAM shall not continue more than 3 days, if it continues more than 3 days without an excuse or justification, a fine of Eth. $100.00 shall be inflicted to be spent in public interests;

(c) women shall not partake in the MAATAM except those having close relationship with the dead person. Every woman who violated this shall be fined Eth. $20 to be paid by her or by one responsible for her.

Marriage

19. (a) According to the Sharis, the dowry whether more or little belongs to the woman who is to be married. Therefore, the husband shall have no share in this dowry.

(b) The population of every village or tribe according to tradition have got their own internal customs in matters of marriage '*Dukran*' and '*Fitih*'. These customs shall be enforced following the agreement of every village. However, compromise on this will be made by the wisemen.

(c) Marriage shall not be complete unless the husband brings all the things wanted by the wife including the house. This is provided for fear that the husband will procrastinate in completing the necessary things according to the tradition.

The time of the husband to meet his wife shall be not later than 7 days from the completion of the marriage contract. Whoever violates this Article shall be fined with Eth. $30.00 at first and thereafter this fine shall be doubled unless he follows the provisions heretofore stated.

(d) If the wife cries upon entering the house of her spouse, as it was the custom previously, the person responsible for her shall be fined Eth. $30.00. The same fine shall be inflicted if the wife runs away from her spouse.

(e) If the wife bitterly hated her husband and refused to return back to him, and divorce takes place between them, the wife shall be bound to give back all the cattle which was their property including the gold, but the money shall be paid back in double. All this shall be carried by the consent of the spouse.

Wells for drinking

20. (a) As is the custom, the wells shall belong to those who had precedence on its digging and drinking from it with their cattle. If other people from another village who are not their co-inhabitants came and asked for the share in using the well, these shall be regarded as offenders unless the village having precedence allows them to do so.

(b) In rainy seasons these wells are buried and the people set out to other places. In such time if other people come, who are not of those having precedence to these wells, they shall be fined Eth. $100.00 and bound to leave the well which is the subject matter of the dispute.

(c) Any village is not allowed to dig a well near enough to an already dug well. The distance between a well and another shall not be less than 500 metres.

Concerning Quartering

21. (a) No tribe is allowed to come for settling among another tribe who has precedence in that place and if such happens the intruders shall be bound to pay a fine of Eth. $100.00 and to quit the place immediately so that security may prevail and tribal disputes avoided.

(b) No tribe is allowed to settle in the grazing field of another tribe who has precedence of settlement and in case of contravention the intruding tribe shall be bound to pay a fine of Eth. $100.00 and to leave the place on the spur of the moment to avoid dispute.

Concerning cattle owners

22. (a) Any shepherd shall follow the instructions of the owner of the cattle and shall not drive such cattle in places of which the owner has warned him against and if such shepherd failed to act up to the instructions given to him and that the cattle are harmed as a result, he shall be bound to pay all the damages unless the owner pardons him.

(b) If a shepherd loses some of the cattle in his care and has proved to be negligent he shall be held responsible for the loss unless it was proved that he has done his best but failed.

(c) If a shepherd climbs on a tree to pull down leaves for the cattle in his care and that a branch has fallen to cause the death or the break of one of the cattle, in this case he will not be responsible for he had no ill will.

(d) If a shepherd has hired another shepherd and the second has lost some of the whole of cattle, the first shall directly be responsible for the loss before the owner.

Animal's attack on human being

23. (a) If a furious camel attacks a person and causes his death or injury the owner shall not be responsible for any compensation unless he had previous knowledge of his camel's state and he neither tied it nor informed the people; in this case then he shall be bound to pay for the damage.

(b) If a dog's owner knew that it was rabid much to harm people or animal and he did not kill it, he shall be responsible for the damage caused by his dog.

(c) If a dog's owner knew that it was rabid or is found among rabid dogs and he was duly informed by the authorities that such a dog must be killed but he took no care of that, he is held responsible for any harm caused to people or animals by his dog.

Death

24. (a) If a dead person or animal was found out of the village, the nearest or the village that is situated within five kilometres from the place of the accident shall be responsible for the crime or to bring up the killer.

(b) If cattle were stolen from a village, it will follow the tracks to the nearest village which shall be responsible for the theft unless it proves that the tracks go further out of such village.

Damage to cultivation

25. (a) If cattle were driven deliberately to a cultivation and destroy it, the shepherd shall be responsible for compensation to the owner of the cultivation plus any other legal fines.

(b) If a herd of wandering cattle destroy a cultivation the responsibility for such shall lay on the shepherd, if any, and the compensation shall be paid by the owner in the absence of a shepherd.

(c) It is customary that there are no fences or boundaries between the cultivation of a village and another, but during harvest time some of them may be late in cutting down the crops due to their being late in spreading seeds while the others are in time to cut down, and in this case the first ones shall never allow their cattle to feed on the remains of the cultivation for they may destroy the non-pulled crops and, in this case, they have to compensate the owners. The feeding of cattle on the remains of the collective cultivation shall begin together.

(d) Whoever contravenes the preceding last paragraph shall be bound to pay a fine of Eth. $30.00 to be spent in the general interests.

(e) A fine of Eth. $30.00 shall be paid by any shepherd who contravenes and takes his cattle to any cultivation and such fine shall be spent in the general interests. This is in addition to a compensation to the owner of the destroyed cultivation.

(f) No person is allowed to beat cattle which he might find in his cultivation but he shall deliver it to its owners and ask them for compensation in a peaceful manner, if he contrarily causes harm to the cattle by beating; he shall be hold responsible for that before the wisemen of the village.

Note

1. Senior District Officers.

Glossaries

Occupational categories of Beni-Amer pastoralism

Beni-Amer term in Tigre language	Meaning	Remarks
Seb-Aha	Cattle pastoralists	May be owner or hired herder
Seb-Ensa	Camel pastoralists	” ”
Seb-Atal	Goat nomads	Using Red Sea coastal areas and hills
Seb-Abaghie	Sheep nomads	” ”
Seb-Nway-Laalew	Ex-pastoralists	” ”
Seb-Hars	Farmers	” ”
Seb-Tgar	Wealthy pastoralists	Includes absentee herders and urban-based Beni-Amer

Source: Fre 1989

Beni-Amer terms

Tigre/Beni-Amer (T = Tigre; A = Arabic)	English
Abar (T)	Emaciation
Abeq (T)	Sarcoptic mange
Abi-Egra (T)	Older cows within the herd
Adelway (T)	Cattle with black, white or red spots
Aghnet (T)	Nomadic tent
Aha-Arem (T)	Cows who mother dead calves by licking dried skin. They are singly known as Em-Arem or Ghirja
Aha-Barka (T)	Barka cattle, synonymous with Bgait
Aha-Bgait (T)	Bgait cattle
Aha-Dwehin (T)	Dwehin cattle
Ajel (T, A)	Death by destiny

Tigre/Beni-Amer (T = Tigre; A = Arabic)	English
Ansa (T)	Foot-and-mouth
Arado or Gallab (T)	Small hill-type cattle in Eritrea
Ashret (A)/Nesuf (T)	Dry cattle
Aweli (T)	Hand-dug deep wells
Awer-Lali (T)	Night blindness
Awhe (T)	*Cordia abyssinica*
Baal-Nway (T)	Owner-herder
Beja	Ti-Bedawiet-speaking group in north-eastern Sudan
Beni-Amer	Sons of Amer (they call themselves Mina-Amr)
Bet-Tekayb (T)	Tents made from palm leaves
Bet-Teklib (T)	Traditional huts
Bgait (T)	Short-horned zebu cattle owned by the Beni-Amer and non Beni-Amer groups in both eastern Sudan and Eritrea
Bukrt (T)	Older cows (2–3 calvings)
Bulad (T)	A strain of the Bgait breeds
Damer (T)	Seasonal camp base
Damer Haghay (T)	Dry season camp
Damer Kerem (T)	Wet season camp
Derir (T)	Milk let-down
Dwehin (T, A)	Sudanese bull known for its characteristics (wilder breed) and cross-bred with Beni-Amer cattle
Emat-Aha (T)	Mother of pedigree cows
Fahmia (T, A)	Anthrax
Feddan (T)	A local land measure (1 feddan = 1.04 acres)
Gelwed (T)	A herbal medicine made from *Capparis decidua*
Ghebilet (T)	A clan
Ghedob (T)	Old cow
Gulhay (T, B)	Cattle plague
Gum-arabic (A)	*Acacia senegal*
Habil (T, A)	Donkey disease

(*Continued*)

Tigre/Beni-Amer (T = Tigre; A = Arabic)	English
Haghay (T)	The dry season
Halail (T)	Small rivers or tributaries
Halib-Hawet (T)	Soured cold milk
Hamta (T)	Unidentified, but a salty plant in Eritrea
Hasani (T, A)	Lowland-type goats in Eritrea and eastern Sudan
Hetcha (T)	Late dry season.
Hib-qualot (Beja)	Browser camels (tree-browsers)
Hilb (T)	Milking herds
Hnkush (T)	Lameness
Hnot (T)	Foetus
Idr-May/Wed-May (T)	Water disease
Intihab/Ghrer (T, A)	Stress
Johor (T, A)	Blindness
Karad (T)	Ticks
Katebot (T)	Castration
Kbb-Sito (T)	Thirst and drink days
Kdr (T)	Heavy-milking productive cows
Keleb (T)	Cattle camp
Kerem (T)	The rainy season
Khaym (T)	The hottest season
Kryet-wuhr	Introducing new blood to the herd
Lgnet (T, A)	Local council
Mahber (T,)	Traditional village council; can also mean a gathering of people for a purpose
Mahkes (T)	Foot rot
Mahlew (T)	Afternoon grazing after watering during the day
Mahsay (T)	Night grazing
Mdr Atal-Abaghie* (T)	Goat and sheep country
Mdr-Aha (T)*	Cattle country
Mdr-Ensa (T)*	Camel country
Meb-seit (T)	A fighter or defensive cow
Mensorer (T)	Madness, usually in goats
Meraa-senni (T)	Good husbandry
Mered/Keba (T)	Disease or ailment

Tigre/Beni-Amer (T = Tigre; A = Arabic)	English
Merses/Ghire (T)	Heat/oestrus in animal
Met-beghas (T)	Following animals to pasture and water
Mkray-Wuhr (T)	Herd introducing to cattle
Mlih (T, A)	Salty plant or salt
Mnfah (T)	Bloat
Mnhit-Seb-Nway (T)	Few milking cows mixed with dry migrant herd for herders' milk use
Mora (T)	A 'stick' used to signify a management unit. One herd is called one mora
Natab (T)	Aristocratic and ruling classes among the Beni-Amer
Nay-Berana (T)	Rural or traditional veterinary practice
Nazr/Dglal (T, A)	The chief of the whole tribes among the Beni-Amer
Nesuf (T)	Dry, non-milking part of the herd
Nfret-tb/Gresh (T)	Mastitis
Nibet-ib (T)	Permanent teeth or broad teeth
Nu-u (T)	Genetic term used to describe the making of the animals
Nuush-Egra (T)	Young footed among the herd, e.g. heifers
Omda (T, A)	Clan chief, among the Beni-Amer as well as other tribes
Qog (T)	*Balanites aegyptiaca*.
Qsla (T)	*Ziziphus spina-Christi*.
Rashaida (A, T)	A camel-herding group in Eritrea and eastern Sudan
Re-Yet-Senni (T)	Good husbandry
Reyet-Nway (T)	Pastoralism
Sahra (T, A)	Desert-like environment
Said (T, A)	Vast savannah clays
Sawahil (T)	Coastal areas
Seb-Aha (T)	Men of cattle
Sebk-Saghm (T)	Ascending and descending type of semi-nomadism
Self (T)	A herd (dry or milking)
Self-Haghay (T)	Beginning of dry season

(*Continued*)

Tigre/Beni-Amer (T = Tigre; A = Arabic)	English
Selyat-Keri (T)	Non-expulsion of the afterbirth
Semuy (T)	Large mud-built watering troughs
Senselie (T)	Soar but unidentified plant
Serob (T)	*Capparis decidua*, a plant with medicinal qualities
Shakat (T)	Shallow well along a riverbed.
Shalaageit (Beja)	Coastal camels browsing salty vegetation along the Red Sea coast
Shambu (T)	Caprine or bovine pneumonia
Shebiq (T)	Colostrum
Sheik (T, A)	Religious or community leader at camp or village level
Shinfa (T, B)	Fenugreek
Shukrya	A major tribal grouping in eastern Sudan. Traditionally pastoralist
Sobib (T, A)	Sterile teaser male-looking cow in eastern Sudan
Sorghum (A)	Known as 'Dura' in Sudan and 'Mashela' in Eritrea.
Stret achm (T)	Bone fracture
Tagribat (T, A)	Experimentation
Tigrinya	A major ethnic group inhabiting the Eritrean plateau commonly referred to as 'highland'. The language is also called Tigrinya
Tkset (T)	Metal branding
Tthaleb (T)	Good milking ability
Tughrat (T)	Watering bucket
Tukul (T)	Traditional huts
Ubel (T)	Unidentified salty plant in Eritrea
Ughl (T)	Calves
Usher (A)	*Calotropis procera*
Wuhr (T)	Bull
Wuhr-Kray (T)	Hired bull
Zed-Sim-Sim (A, T)	Sesame

* All referring to environmental adaptation of stock.
Source: Fre (1989)

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Further Reading

He Xiahong, Zhu Shusheng, Wang Haining, Xie Yong, Sun Yan, Gao Dong, Yang Jing, Liu Lin, Li Qixin, Zhang Shaobo, Zhao Gaohui, Hu Mingcheng, Jiang Kaimei, Li Chengyun and Zhu Youyong. 2010. 'Crop diversity for ecological disease control in potato and maize.' *Journal of Resources and Ecology* 1 (1): 45–50. Available at: http://www.bioone.org/doi/abs/10.3969/j.issn.1674-764x.2010.01.006, accessed 4 November 2017.

Index

'This ground-breaking ethnography of Beni-Amer pastoralists in the Horn of Africa shows how a partnership of conventional science and local indigenous knowledge can generate a hybrid knowledge system which underpins a productive cattle economy. This has implications for sustainable pastoral development around the world.'
–**Jeremy Swift**, *Emeritus Fellow, Institute of Development Studies, University of Sussex*

'Indigenous knowledge and the sovereignty issues addressed in the book are hallmarks to recognize African cattle herders and also to use this knowledge to mitigate climate change and appreciate the resilience of these herders. The book will be a major resource for students, researchers and policy makers in Africa and worldwide.'
–**Mitiku Haile**, *Professor of Soil Science and Sustainable Land Management, Mekelle University*

'This important book arrives at a key moment of climate and food security challenges. Fre deploys great wisdom in writing *about* the wisdom of traditional pastoralists, which – reflecting the way complex natural systems really work – has been tested through history, and remains capable of future evolution. The more general lesson is that both land, and ideas, should be a common treasury.'
–**Robert Biel**, *Senior Lecturer, the Bartlett Development Planning Unit, UCL*

Beni-Amer cattle owners in the western part of the Horn of Africa are not only masters in cattle breeding, they are also knowledge sovereign, in terms of owning productive genes of cattle and the cognitive knowledge base crucial to sustainable development. The strong bonds between the Beni-Amer, their animals, and their environment constitute the basis of their ways of knowing, and much of their knowledge system is built on experience and embedded in their cultural practices.
In this book, the first to study Beni-Amer practices, Zeremariam Fre argues for the importance of their knowledge, challenging the preconceptions that regard it as untrustworthy when compared to scientific knowledge from more developed regions. Empirical evidence suggests that there is much one could learn from the other, since elements of pastoralist technology, such as those related to animal production and husbandry, make a direct contribution to our knowledge of livestock production. It is this potential for hybridisation, as well as the resilience of the herders, at the core of the indigenous knowledge system.

Fre also argues that indigenous knowledge can be viewed as a stand-alone science, and that a community's rights over ownership should be defended by government officials, development planners and policy makers, making the case for a celebration of the knowledge sovereignty of pastoralist communities.

Zeremariam Fre is the founding director and former head of regional NGO, the Pastoral and Environmental Network in the Horn of Africa (PENHA). He currently works at the Bartlett Development Planning Unit at UCL as a teaching fellow and course tutor.

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Afar pastoralist woman
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