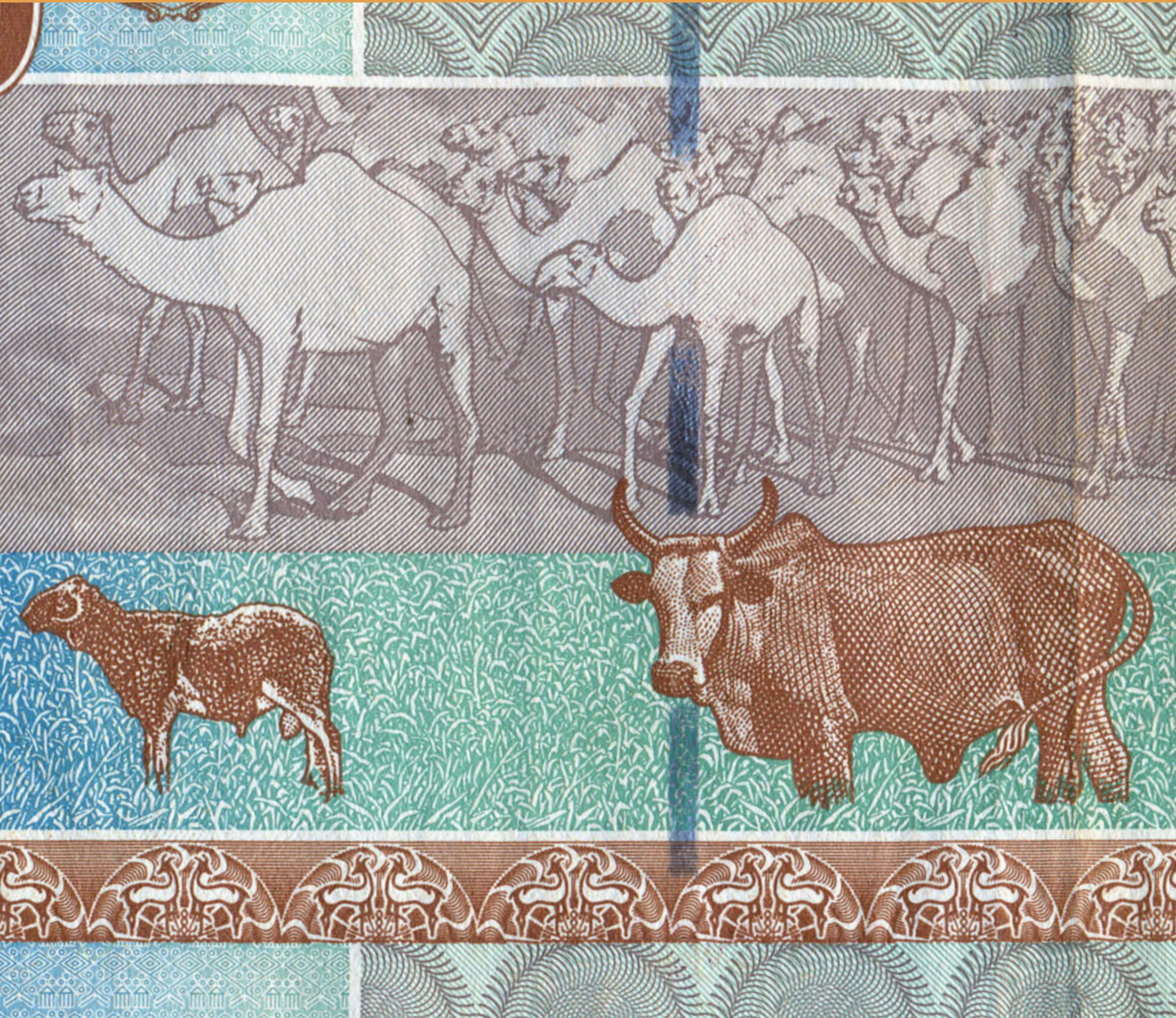




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Standing Wealth

Pastoralist Livestock Production and Local Livelihoods in Sudan



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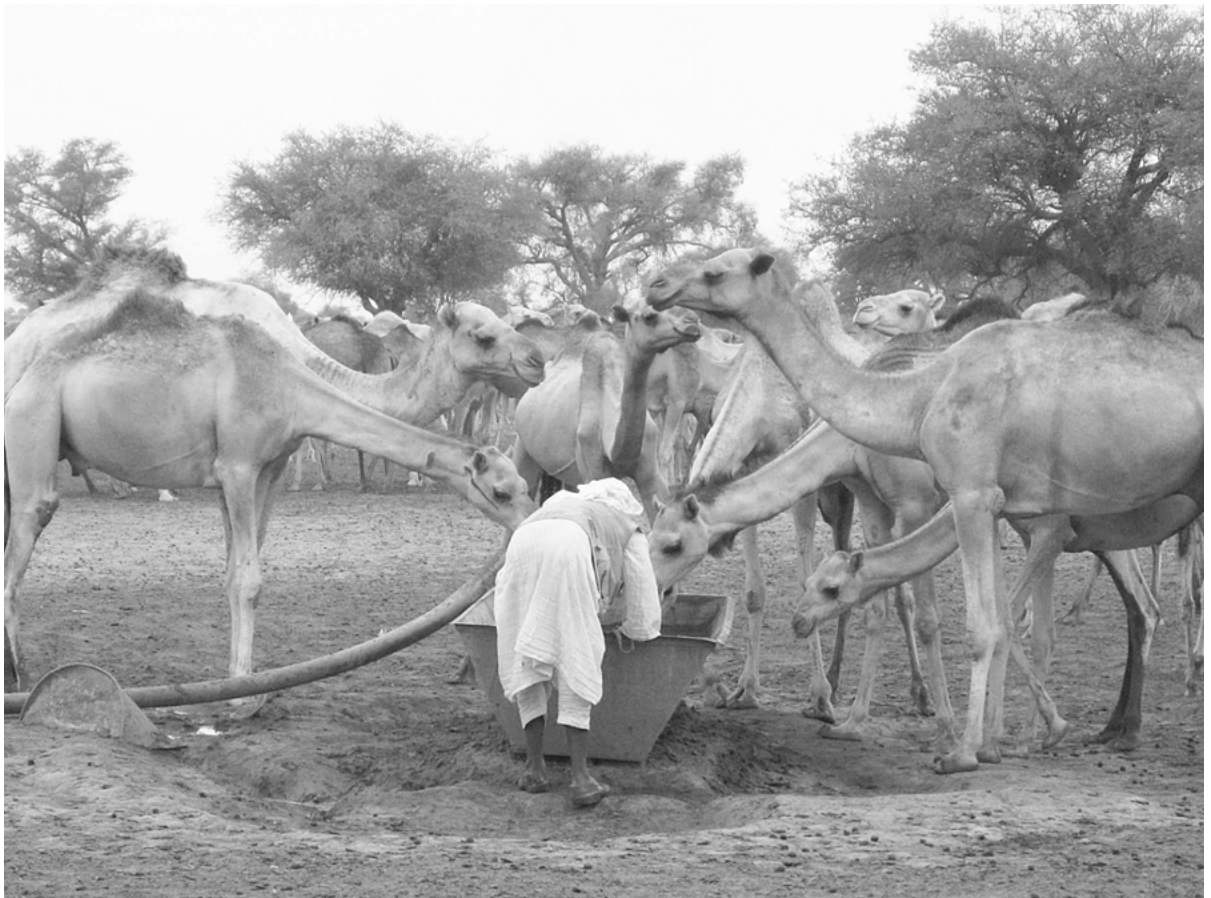
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Executive Summary

At a time when Sudan is once again turning its attention to agriculture, this study takes a fresh look at what makes livestock production – the backbone of Sudanese agriculture – operate successfully. While available evidence indicates that most livestock produced in Sudan is from pastoral systems, this is poorly captured in official statistics, and its importance widely misunderstood. Indeed, what constitutes ‘pastoral’ production is itself often poorly defined. In this knowledge vacuum, transformative interventions for developing the livestock sector risk being off target or even damaging. Successful agricultural development in Sudan depends on livestock, which is its most important sub-sector. Understanding how existing livestock systems – chiefly pastoral production – contribute to securing livelihoods and the wider economy is fundamental to this development. This study was carried out in Khartoum, West Darfur, North Kordofan and Gedaref States, with three in-depth case studies on sheep, cattle and camel production systems in North Kordofan.

Value chains

Analytical tools and monitoring procedures in operation within the livestock sector focus on two percent of the market (the exports) and on livestock as a commodity (from the moment of the first transaction); unavoidably, this results in a deeply skewed representation of problems, opportunities and stakeholders (with ‘elite’ groups being magnified by the analysis). In the absence of comprehensive data on pastoral production and its value chains, we use available pockets of information to calculate conservative estimates of the number of livelihoods and volume of business involved.

Based on the official figures, the value of livestock exports in Sudan, although significant, is about two percent of the value of the livestock domestic market. Livestock produced in pastoral systems also plays an important economic role

before reaching the market. Pastoral systems support *at least* 500,000 households of primary producers – but most likely several times this figure. The value of subsistence milk alone at the time of the 2008 census was certainly above one billion SDG per year (or 500 million USD). Pastoral livestock generates jobs and auxiliary markets all along the market chain. We identified *at least* 34,000 full time jobs supported by pastoral systems outside primary production, and a volume of business of *at least* 350 million SDG besides livestock trade. Behind each ‘full-time job’ in our estimate there are several part-time workers and for each of them numerous dependents benefiting from the activity. As these figures are the result of conservative calculations on sections of the value chain, we expect actual comprehensive values to be several times bigger. These goods and services associated with pastoral primary production are invisible to standard methods of market-based appraisal.

Livestock mobility

The primacy of livestock systems is achieved with high levels of specialization and minimum input of external resources. The vast arid and semi-arid territories of Sudan are a valuable resource to animal production on condition that livestock can access pasture selectively. Variable and patchy rainfall means that nutrients for livestock become available in unpredictable and ephemeral concentrations. Nutrients accumulate in the plant until they are used by the plant itself to complete its cycle. For livestock, accessing the plant when its nutrient content is peaking makes the difference between abundance and scarcity *within the same ecosystem*.

In the sheep, cattle and camel systems of North Kordofan, moving livestock strategically over the range in order to make the highest returns from these ephemeral pockets of abundance is the key to prosperity and livelihood security. It is a strategy used by all producers in our sample, *whether ‘sedentary’ or ‘nomadic’*,

whenever the scale of business is significant (as mobility is difficult or impossible with few animals). Similar strategies of mobility are also used by livestock traders moving their animals on the hoof to the terminal markets. Supporting and developing in sustainable ways the strategic mobility of livestock according to the logic of pastoral systems is therefore a main avenue to increase the productivity of the agricultural sector as a whole.

Livestock mobility in Sudan is not a marginal issue concerning nomadic groups only – settled communities raise their livestock using mobility as their key strategy. However, nomadic groups, being the most specialized users of mobility as a production strategy, are at the cutting-edge in all aspects of this issue.

Livestock marketing

All producers in our sample, across the three production systems under analysis, tried to market their animals systematically. All aimed at replacing unproductive with productive (i.e. male, old and sterile animals are sold and the gains are reinvested in purchasing young females), although only those in the more ‘secure’ group could use this strategy consistently. The market supply of productive animals mostly comes from producers driven by necessity to sell their capital stock. This practice is likely to impact on patterns of livestock ownership, favouring wealthier producers and outside investors at the cost of impoverishing less secure households. More research is needed in this regard.

Cultural assets

Livestock mobility is more effective as a result of cultural assets such as customary institutions for resource management, local knowledge, social capital, and a culture of endurance. Behind the positive figures on animal production lies a sophisticated framework of cultural assets. Whilst there is awareness of the ‘cultural dimension’ of pastoral systems, its role as an asset for production usually goes unrecognized. Across all production systems and levels of livelihood security, the competence of the producers was regarded as crucial both to contain a crisis and to manage a successful

recovery. This includes not only the expertise of individual herders but also the knowledge embedded in the institutions regulating critical aspects of the production/livelihood system, from breed selection to resource management and conflict resolution, from the division of labour to the safety nets of the moral economy. It takes a lifetime to learn the trade and even within pastoral groups only a handful of individuals have the capacity to handle the situations of greatest difficulty – hence the importance of maintaining the social organization of pastoral systems.

Complex cultural assets which contribute to the economic and ecological sustainability of pastoral systems are being eroded – particularly pastoral ideological identity – without being replaced with equally effective ones. Competent and reliable labour for pastoral production is becoming scarce. With a significant proportion of capital stock (reproductive animals) reaching the market, the distribution of livestock ownership is changing in favour of wealthier producers and external investors.

Integration, adjustments and distortions

Integration of livestock rearing and crop farming can take place at different scales, from farm-level systems (mixed farming), to a regional system with mobility allowing specialized livestock keepers to interact with specialized crop farmers on a seasonal basis. There are advantages and disadvantages to these different kinds of integration, but sustainability seems to increase with scale.

The legal/administrative framework in Sudan rests on a legacy that favours settled communities and crop farming.

Towards a modern livestock sector

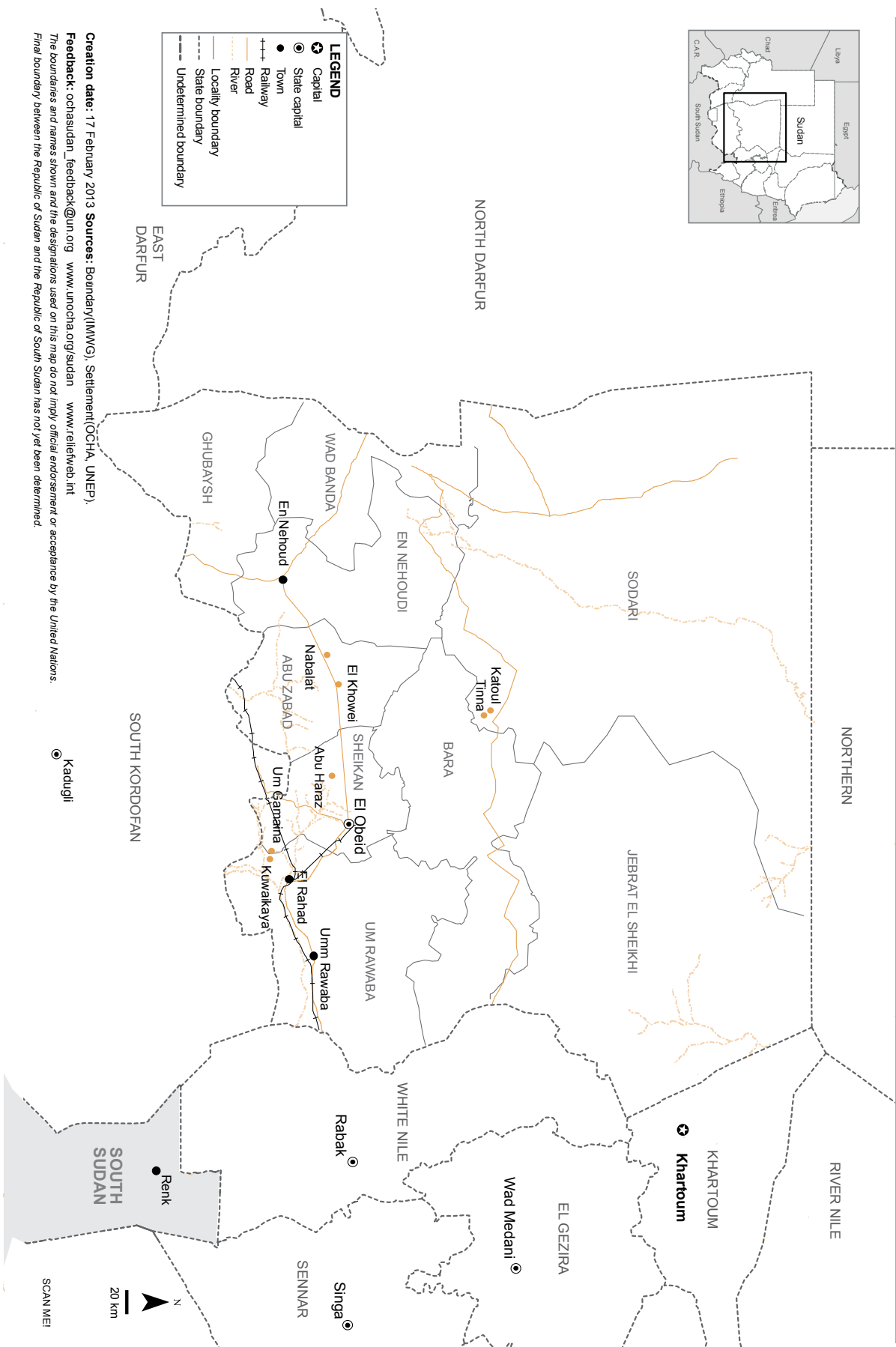
Animal production in the predominantly pastoral arid and semi-arid regions represents the most important part of agricultural Gross Domestic Product (GDP) in Sudan, yet the programmes for modernizing agriculture invest comparatively little in pastoral systems. As pastoral systems use the environment in a fundamentally different way than globalized intensive agriculture – working *with* environmental variability rather than *against* it

– genuine modernization can only happen by taking this difference into account. Rather than importing off-the-shelf ‘modernity’ that ignores local systems of production, efforts to modernize a largely pastoral livestock sector should engage with this reality, mobilizing scientific research and technological development, in a dialogue with primary producers, in order to generate innovative solutions *specific* to the logic of production in pastoral systems.

Recommendations

The report identifies five broad areas of intervention that could assist the development of a vibrant and sustainable livestock sector based on the principles of pastoral production:

- the single most important way of strengthening livestock production in Sudan is to secure the conditions for livestock mobility according to the logic of pastoral systems: that is, to improve reliable and timely access to pasture where and when nutrients peak;
- the wider policy and legal instruments concerning the livestock sector need to take into consideration the entirety of the livestock market, including the domestic market, and engage with it in a proactive and supportive way – the economic value of pastoral production systems needs to be properly analysed;
- an effective and equitable interfacing of pastoral systems with national and global frameworks (regarding, for example, taxation, litigation, and decisions on land use and land use conversion) is essential in order to promote equity and also greater parity between systems of land use;
- the regeneration of human resources and institutions specialized in mobile pastoral production should be secured;
- an approach to modernization is required that constructively engages with pastoral systems rather than dismissing them.



1. Introduction

Pastoralism is undergoing a fundamental re-evaluation both in academic and policy making circles. As our appreciation and understanding of environmental unpredictability increases on the back of global concerns for climate change, pastoral systems have come to look more and more like undervalued assets. With environmental unpredictability now becoming the norm in most parts of the world, science is developing new paradigms capable of capturing this complexity and working with it (Folke et al. 2002; Leach et al. 2010).

Governments and international organizations are facing the challenge of developing food production systems better adapted to the changing conditions but without working against the imperative of mitigating climate change. Amongst scholars and policy makers, many have started to believe that pastoral systems – having lived off unstable environments for centuries – hold an important key to ‘new’ ways of meeting both conditions¹. In the meantime, a new wave of concern is rising with regard to the costs – for both the national economies and the environment – embedded in policies that result in devaluing pastoralism (Hesse and MacGregor 2006; Hatfield and Davies 2007, cf. also Catley et al. 2012).

Following the 2011 secession, Sudan is once again turning its attention to agriculture. To

some, this might seem like a step backwards, especially if it means reviving the agricultural policies of the pre-oil era, picking up their many mistakes from where they were left. However, it could also be a step forward, if the new horizon which the country is now facing can be effectively matched by a new perspective for looking at agriculture, a perspective grounded in a sound understanding of existing production systems in their environment, and sensitive to the comparative advantage of supporting them.

This study follows this approach with regard to the top-ranking component of Sudanese agriculture in 2012: livestock-based production. As this production has a large basis in the Sudanese population (cf. the 2008 census), we looked at it not only for its capacity to generate commodities for the market but also for its value, equally of crucial economic importance, in generating and sustainably supporting people’s livelihoods. The analysis of primary production is based on case studies from three livestock systems in North Kordofan: camel, sheep and cattle production. Although there are significant differences in predominant livestock systems across states – reflecting differences in both historical development and geo-ecology – the case studies have been pitched at a level that should make them relevant for most livestock-based production in Sudan.

¹ For example, the African Union *Policy Framework on Pastoralism* begins by stating that ‘pastoralists are custodians of key national resources found in arid and semi-arid areas and, as a system, pastoralism helps to protect and safeguard these resources’ (AU 2010: 1). A recent policy for the development of arid and semi-arid lands in Kenya states that: ‘Pastoralism is the extensive production of livestock in rangeland environments. It takes many forms, but its principal defining features are livestock mobility and the communal management of natural resources [...] until recently, most governments viewed pastoral areas as net consumers of national wealth that offered poor prospects of return on investment. Pastoralism was therefore less valued than other forms of land use and less well-supported. Recent studies have shown that these views were misplaced’ (Republic of Kenya 2012). The International Union for Conservation of Nature (IUCN) recommends to ‘invest in pastoral livestock production based on the assumption that pastoralism is rational, and that it can be reinforced with appropriate technological and management adjustments, but cannot be sustainably substituted’ (IUCN 2011: 29). Work by the International Livestock Research Institute (ILRI) on payments for environmental services highlights a crucial role for pastoral systems (Silvestri et al. 2012). A recent global study by the Food and Agriculture Organization (FAO) stresses that pastoralism is a low-carbon production system compared with intensive livestock systems (Steinfeld et al. 2010). A recent series of studies on the total economic value of pastoralism revealed unexpectedly high levels of economic contribution and concluded that ‘There are clearly hidden values to pastoralism that may not be noticed as they go, but will be missed when they are gone [...] Pastoralism should not be swept aside by investment in alternative land use systems – it is making its significant contribution on the basis of minimal government investment, which suggests that it could become a much greater contributor with greater investment’ (Davies 2007: 22).

1.1 Overview of Pastoralism Trends and Issues in Sudan

Multiple forces of change affecting pastoralism in Sudan have generated a crisis narrative suggesting gloomy prospects for the future of pastoralism. Despite this, pastoralism has always been and remains the predominant system of livestock production in Sudan, making significant contributions to both rural livelihoods and the wider economy. This chapter briefly reviews some of the widely quoted trends, and tries to distinguish the evidence-based issues from the counterfactual before proceeding to the main findings of this study.

Drylands ecology, land-use conversion and degradation

With the secession of South Sudan, the ecology of Sudan has shifted towards a predominantly drylands environment. The land south of the Sahara is typical of the Sahelian zone, and is divided between low rainfall savannah in the north and to the south the higher rainfall savanna that extends into South Sudan. Precipitation is highly variable, with gradually increasing rainfall from 100mm in the north on the edges of the Sahara, to 600mm southwards into South. The rainy season lasts less than two months in the north and extends up to four months further south. This extreme rainfall variability over time and space has a remarkable impact on the distribution of vegetation, especially in more arid areas, well understood by the livestock producers making use of these areas. Analysis of rainfall, temperature and aridity data from 1941 to 2009 has shown an association with climate change, including increasing rainfall variability and seasonality (Sulieman and Elagib 2012).

Early observations of ‘nomads’ and their livestock migrations date back more than a century (Parkyns 1850; Lloyd 1907; Barbour 1954)². Nomadic pastoralists (*rohal*) have long

been characterized by their tribal affiliation, their way of life linked with animal husbandry and the traditional patterns of their migrations – the long distance north–south movements of camel herders (*abbala*) contrasting with the shorter north–south and east–west migrations of cattle herders (*baggara*) (Gaiballa 2013). Thus the landscape of Sudan has been criss-crossed by a web of livestock mobility routes (Egemi 2013). As well as the longer distance seasonal migrations practised by pastoralists, settled communities practise open range grazing with more limited movements of herds (Zaroug 2011).

Unlike other countries in the region, pastoralism is not merely an occupation of the peripheral areas of Sudan; pastoral rangelands are distributed throughout Sudan, even in Khartoum State itself, and are the backbone of livestock production in Sudan (Behnke 2012; Gaiballa 2013; Young and Cormack 2013). An early land-use mapping study reported that grazing land is ‘the most extensive of all land use categories. It stretches from the desert in the north to the northern limit of the tsetse fly in the south, over about 12° of latitude’ (Lebon 1959). A more recent remote sensing study of the Kordofan region reported that rangelands, dominated by either grasslands, shrubs or trees, account for 56 percent of the land cover in the greater Kordofan region, while rain-fed agriculture accounts for 15.3 percent (RSA 2009).

While rangelands continue to predominate, the past 50 years have seen rapid expansion of land under cultivation and intensification of agriculture (in both the traditional rainfed and mechanized sector), causing the rangelands to shrink. Land under mechanized agriculture increased from about two million hectares in 1954 to about 14 million in 1994, and has more recently been claimed to be the main factor contributing to deforestation and land degradation (Sulieman and Buchroithner 2009; Glover 2005). In terms of productivity, the

² Parkyns (1850) describes the movements of the Kabbabish nomads of North Kordofan, and their interactions with Darfuri ‘Arab nomads’ (Parkyns 1850). Lloyd (1907) travelled in ‘Dar Homr’ and describes the Homr *baggara* Arabs, and also mentions their Arab *baggara* neighbours – the Messeria and Keilak. Barbour (1954) describes the migrating groups drawn to Wadi Azum, in West Darfur, including the Baggara (cattle-owners); the Bari Helba who come regularly each year from the south; the Arab Abbala (camel-owners) from the north, and the Zaghawa tribesmen (agro-pastoralists) from the north. Thus historically, the term ‘nomads’ has been in use far longer than ‘pastoralists’ in Sudan. The definition of the terms ‘nomads’ and ‘pastoralists’ is discussed in Chapter 2.



scenario is less than encouraging: ‘Although large-scale irrigation schemes have been Sudan’s leading economic investment in the past century, various studies indicate that their performance has been considerably below potential. Of the 1.9 million hectares allocated to modern irrigation schemes, only half was actually cultivated in 2005, owing largely to dilapidated irrigation and drainage infrastructure’ (UNEP 2007: 163).

According to what was described as a conservative estimate, ‘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 km²) of the state’s total area in 1941 to 18.6 percent (6,700 km²) in 2002 (Babikir 2011). Conversely, the mechanized farming sector increased by 725 percent in the same period – from 3,150 km² in 1941 to 26,000 km² in 2002 (ibid.). In the area of El Obeid, in North Kordofan state, about 33 percent of pastoral land is estimated to have been lost or converted to cultivation between 1973 and 1999, whilst cultivated land, at least nominally, increased by 57 percent (ibid.). Fadul (2004) estimates losses of pasture lands in the Darfur region to be at least 60 percent, including *qoz*

(sandy soils) and *wadi* land (seasonal water courses). In the 1970s, under the Nimeiri government, an agricultural development strategy based on large-scale irrigation and mechanization schemes (including the still-to-be-completed Jonglei Canal as a source of water for the schemes), marketed Sudan as the future ‘bread-basket’ of the Arab world. The mistakes experienced in the 1960s with the Khashm el Girba irrigation scheme (from those associated with the semi-forced settling of livestock keepers to those that led to problems of drainage and salinity) were repeated in the Rahad and Kenana schemes in the 1970s (Hulme and Trilsbach 1991). According to Fahey and Leonard ‘the “bread-basket” strategy not only placed the government in massive debt, but also caused widespread social and economic problems by appropriating lands in the rain-fed North, displacing pastoralists, and disrupting migratory routes’ (Fahey and Leonard 2007: 4, with reference to Johnson 2003).

As a result of the intensified continuous cultivation (without fallow periods), soil quality and crop yields are declining rapidly, both in the traditional rainfed and mechanized sectors (Suliman and Buchroithner 2009). Farmers and pastoralists both recognize that land degradation is taking place as a result of improper agricultural

practices associated with extreme drought (de Waal 1989). A farmer quoted in a recent study in Gedaref State reported: 'We realized that our farm yields were declining. One hectare used to yield ten bags (900 kg) of cereal and now it only produces three (270 kg)' (Glover 2005: 61). In the Darfur region, Fadul (2004) notes the declining productivity in millet over the past 40 years, especially in North Darfur, as a result of which farmers have expanded their plots as a strategy to maintain production. This expansion is at the expense of pastures, affecting both settled farmers and nomads.

This expansion has pushed large numbers of pastoralist livestock into smaller, more marginal areas, leading to overstocking and increasing tensions between livestock herders and farmers (Glover 2005). The earlier customary practice of allowing nomads to graze crop residues after the harvest disappeared, with the large-scale tenants of mechanized farming schemes behaving like owners to whom everything on the leased land belongs (Schlee 2012). In addition, these farmers charge the nomads fees for grazing the uncultivated areas for which the farmers have paid rent (*ibid.*). It is now widely reported in both West and East Sudan that even crop residues are not made available to livestock, as this is considered trespassing and many farmers either burn or sell the crop residues (Osman 2013; Schlee 2012; Glover 2005). This contrasts with earlier times, when both pastoralists and farmers felt the benefits (Osman 2013). The progressive commercialization of pastoral inputs, including crop residues, natural pastures and water, is clearly evident in the literature.

Despite widespread recognition of the issues above, overgrazing has been singled out as the most important cause of soil degradation, particularly around settlements and water points in Sudan (Ayoub 1998), and pastoralists are often blamed (Swift 1996). The problem of overgrazing is not new and studies in Sudan have indicated that historically it is not caused by pastoralism. More than 50 years ago, Lebon (1959: 69) described how 'around all larger villages, intense grazing by animals, as they pass to and from more distant pastures, and firewood

cutting, have produced local deserts generally called 'village perimeters'. He went on to explain 'Broadly speaking, however, the animals belonging to nomads do not come near villages, where grazing is reserved for the cultivators' stock'. Thirty years later this was corroborated by a major desertification study in North Darfur, which states 'The most far-reaching impact on the natural resources of the savanna is affected by rain-fed cultivation beyond the climatically adapted agronomic dry limit. The most serious damages in northern Darfur are not caused by the nomadic animal husbandry, but by the combination of rain-fed cultivation and sedentary animal breeding' (Ibrahim 1984: 186).

Changing land-use practices

Changing land use practices have brought nomads/pastoralists into conflict with farmers over post harvest grazing of crop residues (access and timing), both on mechanized schemes and on traditional farms in eastern Sudan, and also in western Sudan (Glover 2005; Osman, 2013; Manger 2006).

In the Darfur region, expansion and intensification of agriculture combined with the erosion of local customary authorities, have brought about changes in land tenure regimes, which together have seriously undermined the mutual interdependencies between pastoralists and farmers (Osman 2013). In the past these two systems of production were integrated in a symbiotic manner (Manger 2005), but increasingly they have become competitive, generating tensions and violent conflict. The former widespread practice of shifting crop cultivation has evolved into a continuous and expanding land use³, accompanied by a fencing movement, widespread adoption of agricultural inputs and the abandonment of previous mutual interdependencies between pastoralism and cultivation (manuring, sharing of crop residues, animal transport of crops) (*ibid.*). The dual land tenure systems, including both federal law and customary tenure based on usufruct rights, have evolved into an individualized control system that disrupts claims by multiple users, including pastoralists, at different times of year. This

³ This includes the expansion of vegetable and fruit gardening from the 1960s to the 1980s, and the expansion of pump irrigation and intensification of irrigated agriculture from the 1980s onwards (Osman 2013).

represents a major policy challenge given the dual land tenure system, the erosion of the customary authorities and the evolution of individual tenure (ibid.).

In addition to land degradation associated with limited livestock mobility and overgrazing, other major causes include: improper agricultural practices and mechanized rain-fed agriculture, deforestation for firewood and urban demand for charcoal, and overexploitation of vegetation for domestic use (Ayoub 1998).

Employing less than 13 percent of the agricultural workforce in Sudan, mechanized agriculture (rainfed and irrigated) represents about half of the farmed land (ibid.: 161). It also represents ‘millions of hectares’ of degraded farmland, as yields dropping below economic limits trigger the abandonment of the land (Sulieman and Elagib 2012). Even abandoned farms are not freely accessible to pastoralists because they are owned by farmers (ibid.).

Lack of pastoralism policies

Numerous authors describe how successive development policies have ignored pastoralism and pastoralists, resulting in no clear policy to date (Mohamed and Egemi 2012; Ahmed 1982; Egemi 2013; el Hassan and Birch 2008). This marginalization of pastoralism in favour of cultivation was an explicit policy bias even before national independence⁴, and has continued to this day.

This is particularly evident in the legislation relating to land tenure. At the federal level access to pasture land is weakly defined in law, which particularly penalizes pastoralists. The Unregistered Land Act (1970) placed all land in Sudan under a property regime, with all non-registered land being automatically registered as ‘property of the Government’, and almost simultaneously abolished customary land use rights in 1971 (Gordon 1986). The Act has been described as ‘A government tool to facilitate the acquisition of large tracts of land for agricultural schemes, at the expense of rural dwellers and especially pastoralists’ (de Wit 2001: 7). The Civil Transaction Act (CTA) (Section 565) identifies pasture land ‘by subtraction’ from other

uses (namely agriculture and forests) (de Wit 2001: 10). The CTA also empowered State authorities to impose restrictions on grazing as to time and place, and also allocate land for grazing for the benefit of the whole community and the protection of animal resources (ibid.).

In the 1960s and 1970s, other government initiatives directly affecting pastoralist mobility were a number of schemes for resettlement and sedentarization of pastoralists, often associated with the mechanized agricultural schemes of central and eastern Sudan, for example, the Gash Delta, Rahad, Suki, Western Savanna and Fashaga agricultural schemes (Egemi 2013). Lessons learned from this experience include the importance of involving pastoralists themselves as part of the planning process, distinguishing between the settlement of people, versus animals, and also the impossibility of completely separating animals from crop production. A severe restriction on animals grazing within the schemes together with a poor understanding of pastoralism has been blamed for their failure (El Sammani and Salih 2006).

Underpinning development policy up to the signing of the Comprehensive Peace Agreement (CPA) between north and south Sudan in 2005, was the Comprehensive National Strategy (CNS) 1992–2002 (el Hassan and Birch 2008). The strategy was concerned with trebling the overall number of livestock, and increasing livestock exports 20-fold. The focus was on improving animal husbandry techniques, controlling and eradicating livestock diseases and enhancing the related veterinary professions, with little or no consideration of pastoralism as a livelihood system. It also called for reserving 25 percent of the country’s total area for forests and rangelands. The CNS promoted the notion of maintaining a balance between the official calculations of the rangelands’ carrying capacity and the number of animals, linked with the protection and management of pastures and pastoral resources (el Hassan and Birch 2008). While this notion is no longer found in more recent policies, it nevertheless persists in the understanding of many professionals despite the wider critique of the concept of carrying capacity in 1993.

⁴ A report on soil conservation published in 1944 by the government stated that ‘where nomadic pastoralists were in direct competition for land with settled cultivators, it should be the policy that the rights of the cultivators be considered as paramount, because his crops yield a bigger return per unit area’ (Galal El-Din El-Tayeb 1985: 35, quoted in Egemi 2013)..

The quest for optimal carrying capacity

Historically, quantitative carrying capacities were assigned to fenced and leased allotments in Australia, New Zealand and the US, providing a way to capitalize public lands as security for the loans and mortgages indispensable to fund ranch operations (Sayre and Fernandez-Gimenez 2003; Sayer 2008). This approach offered the administrative advantage of establishing static parameters that facilitate the bureaucracy of planning procedures. Since calculating 'carrying capacity' requires stably and clearly delimited areas of rangeland, it has an inherent affinity with enclosures and land privatization. Conversely, static carrying capacity models do not accord with the variability inherent within dryland ecosystems, and are inherently antagonistic to the dynamic ways of using the range developed within pastoral systems (in adaptation to the instability of the environments they operate with).

The concept of carrying capacity has been the object of criticism among ecology scholars for the last 50 years, while retaining appeal in administrative circles concerned with natural resource management. In popular range management applications, 'carrying capacity' defines the optimal number of livestock in a given area relative to an estimate of its grazing resources – usually, standing biomass at peak season. Models distinguish between potential carrying capacity in 'optimal' range conditions and actual carrying capacity, based on evaluations of existing range conditions below optimal levels.

The challenge to this paradigm which continues to appeal within administrative circles has included a fundamental critique to the concept based on the following arguments: i. carrying capacity can only be defined relative to the economic objectives of range management ('optimal' carrying capacity depends on the objective of range management); ii. calculations become meaningless as area limits blur and/or scale increases; iii. as different livestock populations under different management systems may make use of the range in fundamentally different ways, what constitutes livestock 'grazing resource' is not an inherent property of the range but can only be defined relative to a given livestock population under a given management system (Behnke et al. 1993).

Between the signing of the CPA and the secession of South Sudan in 2011, the five year national strategy (2007–2011) was intended as a coordinated peace and development framework. A big gap in this policy was any consideration of the implications of secession for pastoralists and cross-border migrations. This period also coincided with the Green Alert Programme intended by the National Congress Party to promote the development of the agricultural and livestock sector in Sudan (MAF 2006 as quoted by Fahey and Leonard 2007). The programme called for expenditures from public sources and banks of approximately USD1.4 billion over five

years; 37 percent of which was allocated for animal production⁵. Fahey (2007: 17) notes that 'The Green Alert Programme reflects the historical dominance of agricultural crop production for the Sudanese economy'. This budgetary allocation discriminates against pastoralism and is economically disproportional, given that the livestock sector is a substantially more important contributor to agricultural sector GDP than crop agriculture and has consistently provided more than 60 percent of the estimated value added to this sector in recent years (Behnke and Osman 2010).

⁵ The five livestock budget categories receiving most of this included: opening livestock tracks, broadcasting of pasture seeds and opening of firelines; establishment of range farms and ranches for fattening; establishment of slaughterhouse and quarantine centres; settlement of moving herders; and financing of veterinary drugs manufacture (Fahey and Leonard 2007).

National experts have attributed these successive policy failures to a lack of understanding of pastoralism, and a failure to differentiate between livestock development and the development of pastoralists and pastoralism (Salih 1990; Egemi 2013). This links to a policy focus on the pastoral sector as a source of revenue, and particularly livestock exports, and the common assumption that pastoralism needed little investment given the apparent abundance of rangelands with free access. Salih (1990: 75) concluded that ‘pastoral development policies fail to engineer development in harmony with pastoralists’ social objectives and physical environment’. An additional influence has been the widely held negative perceptions of pastoralists ‘as a repressive, static and conservative’ group responsible for environmental degradation, instability and violent conflict with other land users (Egemi 2013).

An important arena in which pastoralists’ rights are considered, is in relation to the contested areas of the new international border between Sudan and South Sudan. The Abyei Boundary Commission (ABC) distinguished ‘secondary rights of use on a seasonal basis’ associated with the Misseriya pastoralists, from the ‘dominant rights of occupation’ associated with the settled Ngok Dinka, in order to decide the legitimacy of their claims (Peterson et al. 2005: 21). The ABC stresses that the boundary decision ‘should have no practical effect on the traditional grazing patterns of the two communities as those patterns were followed for many years until they were disrupted by armed conflict’ (ibid.).

A long history of conflict

Sudan has a long history of violent conflicts and repression, dating back to the Turko-Egyptian era (Johnson 2004). The colonial period was relatively stable as a result of policies aimed at pacification of tribal groups. Following independence in some areas there was an escalation in local tribal disputes and conflict linked to the reorganization of administrative boundaries, for example in the Darfur region.

These were addressed by government supported peace building conferences, in which natural resource management and transhumance routes were central issues (Abdul-Jalil 2009).

The policy of reorganizing administrative boundaries in 1990, shortly after the new regime was installed in 1989, was intended to win the political support of different tribes, but has subsequently created tensions between tribal groups in the Darfur region, especially as land and homeland (*dar*) has become symbolic of the link to political power and influence (Takana 2008). This ‘administrative retribalization’ has led to conflict both between and within tribes in Darfur⁶ (ibid.).

Pastoralists are often portrayed as the aggressor or blamed for starting conflict. For example, in the Darfur region the early southwards migration of pastoralists prompted by drought, and arrival in the cultivated areas before the harvest, is frequently cited as a main cause of conflict between farmers and herders. In the past the local authorities prescribed a date – the *talaig*, about two months after the harvest – when nomads could allow their animals to freely graze farmers’ crop residues, thereby fertilizing the land while benefiting from this source of fodder (Shazali and Ahmed 1999; Fadul 2004; Gaiballa 2013; Osman 2013). Several trends have eroded this practice: the extension of the growing season; the investment of farmers in small stock and subsequent competition over the residues, which now have a market value for the farmers. This resulted in local conflicts and grievances, especially on the part of the nomads whose customary rights have been eroded (Osman 2013), and reveals a far more complex multi-causal problem, as compared to the fallacy of drought being the single cause.

There is a history of Arab pastoralist groups providing militias to support government armed forces in putting down rebel insurgencies. In the Darfur conflict, for example, some groups of nomads were co-opted by the government to support the counter-insurgency, purportedly in exchange for land (de Waal 2004). This was a result of them not having a *dar* and the escalation of competition, grievances and protracted

⁶ For example, Buram locality in South Darfur has been split amongst the Habbaniya, which has created divisions within them.

conflict with other groups over natural resources (ibid.). The major policy challenges linked with this are the dual land tenure system, the erosion of the customary authorities and issues arising from the increasing control of land by individuals (Osman 2013). Furthermore the social, political and economic marginalization of pastoralists by the State has contributed to their weak representation and failing local institutions (Young et al. 2009). This marginalization of pastoralists has been even more extreme than the marginalization of the Darfur region as a whole (Young et al. 2005).

The final issue that threatens pastoralism arises from seasonal livestock migration across the new international border between Sudan and South Sudan. This new border represents Sudan's longest national border (2,100 km), and the adjacent area is home to more than 25 percent (12 million) of the combined total population of Sudan and South Sudan (Cormack and Young 2011). It is economically important – high rainfall, savannah belt, with mechanized farms, and a wealth of natural resources including oil and gum arabic. There are two sets of issues of immediate concern for pastoralists: first, the high profile and hugely important political and legal issues, including for example, border demarcation, citizenship of pastoralists and national agreements on oil, and second, the implications of these issues for cross-border livelihoods and pastoralism more broadly (ibid.). All along this border from the Darfur region in the west to Blue Nile State in the east, there are numerous migration routes crossing into South Sudan, allowing livestock to access vital dry season pastures in the south. Continued instability and heightened tensions along this border, as well as outright conflict between Sudan and South Sudan in Southern Kordofan, are affecting the ability of pastoralists in the region to have full access to the rangelands they need to sustain their livelihoods. This in turn can only increase conflict in the region.

This brief review of pastoralism in Sudan provides the context in which the study findings should be viewed and analysed. The subsequent

chapters will return to some of these crucial issues, including the national importance of pastoralist livestock production on the one hand, and the evolving challenges on the other. The literature indicates that over the past 30 years, processes of land use conversion and changing land use practices have contributed to land degradation and shrinking rangelands. The lack of a specific policy on pastoralism is partly a result of a lack understanding of the importance of strategic livestock mobility, which has exacerbated the explicit bias in favour of sedentary farmers.

1.2 Methodology

Focus of this study

This study is concerned with the ways different livestock management systems in Sudan contribute to securing livelihoods and the wider economy. Besides this primary focus, the study also looked at issues of integration, adjustments and distortions in the strategies of production.

In Sudan, classifications of livestock systems are crisscrossed by two traditions. The first one, shared with mainstream pastoral development worldwide, differentiates by degrees of mobility and crop farming. The second, more particular to the Sudanese context (as per the national census), singles out 'nomads' (from 'rural households') on an ethnic basis, as people belonging to a tribal group classified by the administration as 'nomadic', often without their own tribal territory and fundamentally distinct from the national notion of 'pastoralist'⁷. This issue is addressed in more detail in the next chapter.

While privileging the economic value of pastoralism as our entry point, given its predominant position in the livestock sector, we also kept our options open with regard to other livestock systems. Our sample included producers who lived in settlements and practised crop farming besides livestock rearing, and producers who did not practise any crop farming and lived in movable camps, as well as the three main kinds of specialization in Sudan: camel, sheep

⁷ See for example: Elamin Ahmed and Abdel Rahman (2008). There are several tribal groups practising pastoralism who traditionally have their own tribal territories or *dar* within which they have permanent settlements, some of whom are sometimes referred to as nomads, for example Midob (Hales 1979); Zaghawa (Tubiana and Tubiana 1977); Kabbabish (Asad 1970); Beja (Ahmed and Lajnah 1976); and Southern Rizaygat (Cunnison 1966; Egemi 2000).

and cattle. A design to include ranching as one of the case studies was discussed with the Ministry of Agriculture, Animal Resources and Fisheries (MAARF) in North Kordofan but had to be abandoned in the absence of a working example.

Case studies

Security conditions in Sudan in the first half of 2012 restricted fieldwork options, especially in rural areas and for international teams. Estimated to represent over 12.5 percent of the livestock sector in Sudan and about 50 percent of livestock exports, North Kordofan was the only accessible state amongst the top four livestock producers (South and West Darfur and South and North Kordofan)⁸. Within the state, the team could count on crucial support from MAARF and partner organizations. Fieldwork in North Kordofan was carried out by four teams over 14 days: six of preparation, pre-analysis and closure, and eight working with the informants in their respective locations.

Tinna, in Sodari locality, was chosen for the strong concentration of camel herders and their families. During the dry season, a large number of camel herds from Sodari locality are taken south, to take advantage of the cheaper water⁹ from the large watering station in Abu Haraz. A second team worked there. El Khowei was chosen because of its thriving production of Hamari sheep and the proximity of one of the largest livestock markets in the state, well connected to Khartoum State by a tarmac road. Finally, a team worked with cattle herders near El Rahad. For reasons outside our control, the fieldwork took place at the peak of the hot dry season, when normally the cattle herders would have not yet returned from the south. In 2012 however, with the prospect of a war with South Sudan and the ongoing conflict in South Kordofan, many cattle herders spent the dry season in the north and therefore some of them could be met at their semi-permanent settlements south of El Rahad town.

Research methods

The team looked at both livestock markets and primary production. The team leaders received a three-day training in Khartoum. The sites for the work with the producers in North Kordofan, as well as all local researchers, were identified in discussion with MAARF staff in El Obeid. Structured and semi-structured interviews were carried out with brokers, traders, government officials and veterinary authorities at the livestock markets of El Obeid and El Khowei (North Kordofan), El Geneina and Kerenik (West Darfur), El Moeilih and Assalam (Khartoum State), and Gedaref (Gedaref State). For the case studies, we used a combination of focus group discussions, semi-structured interviews and participatory techniques looking at the following dimensions in historical perspective: dynamics in herd management and composition, household economy (especially division of labour, income and expenditures), resource basis and institutional basis of production, interactions with other production systems. The data were collected with attention to capturing differences amongst our informants following from their level of livelihood security or wealth (as defined locally), as well as gender and age. In particular, focus-group discussions in each site concentrated on two samples, one of households identified by

Example of focus group (El Rahad)

	'more secure'	'less secure'	total
youth (boys)	3	5	7
youth (girls)	1	2	3
women	2	3	5
men	5	10	15
elderly men	2	5	7
elderly women	–	2	2
total people	13	27	40
total households	10	10	20

⁸ A team also spent a week in West Darfur, interviewing key informants in El Geneina and Kerenik, but was unable to travel to meet producers in their camps because of the restrictions imposed by security requirements.

⁹ At the livestock watering facilities in Tinna or Sodari, the water during the dry season costs 25 SDG per herd of camels (80–100), but reaches up to 116 SDG for a flock of sheep (100–150). The North Kordofan State Water Corporation prescribes an official price for water from state-owned facilities but prices are often further negotiated case by case and therefore there can be differences in practice.

the participants as noticeably ‘more secure’ but without being exceptionally wealthy, and one of households identified as noticeably ‘less secure’ but without being poor. Below is an example of the sample group in one of the sites.

The collection of information on levels of wealth and size of herd is sensitive amongst most livestock producers in Sudan, as people are concerned about taxation and security. Consequently, quantitative discussions concerning personal wealth and livestock were limited to proportional values in the form of fractions of a random quantity (for example a handful of sand). For the sake of simplicity these values are sometimes expressed in the text as percentages; however, the reader should be aware that these percentages are only indicative. Drop-out from pastoral production is often seen as an indicator of poor economic sustainability of these systems. In order to get a sense of the magnitude of drop-out in our sample, we discussed the matter with the help of family trees. This was done by going back three generations focusing on the male lines, excluding those who died young, and finally counting all

those who spent their entire life in pastoralism. In the context of our study this exercise was one out of a large front of activities and we carried out only a handful of them. However the exercise takes about 20 minutes, including the explanation, and could easily be carried out on a large scale. Below is one of the diagrams produced with this exercise. They have been analysed but not included in the text.

Seasonality also needs a word. The pastoral areas of Sudan are characterized by largely unpredictable seasonality. While a wet season/ dry season cycle can be expected in the course of the year, the length and intensity of these seasons can change from year to year depending on the intensity and distribution of precipitation (in time as well as space). For this reason, the report avoids naming the seasons in English, instead preferring a description (cold dry season, hot dry season, beginning of rains, wet season, end of rains). The yearly cycle of production is divided into five seasons. The first showers of the year (*rushash*), expected in June, are followed by the rainy season (*khariif*). By the end of October the dry season sets in again, briefly hot at first but

Family tree for the analysis of resilience in production

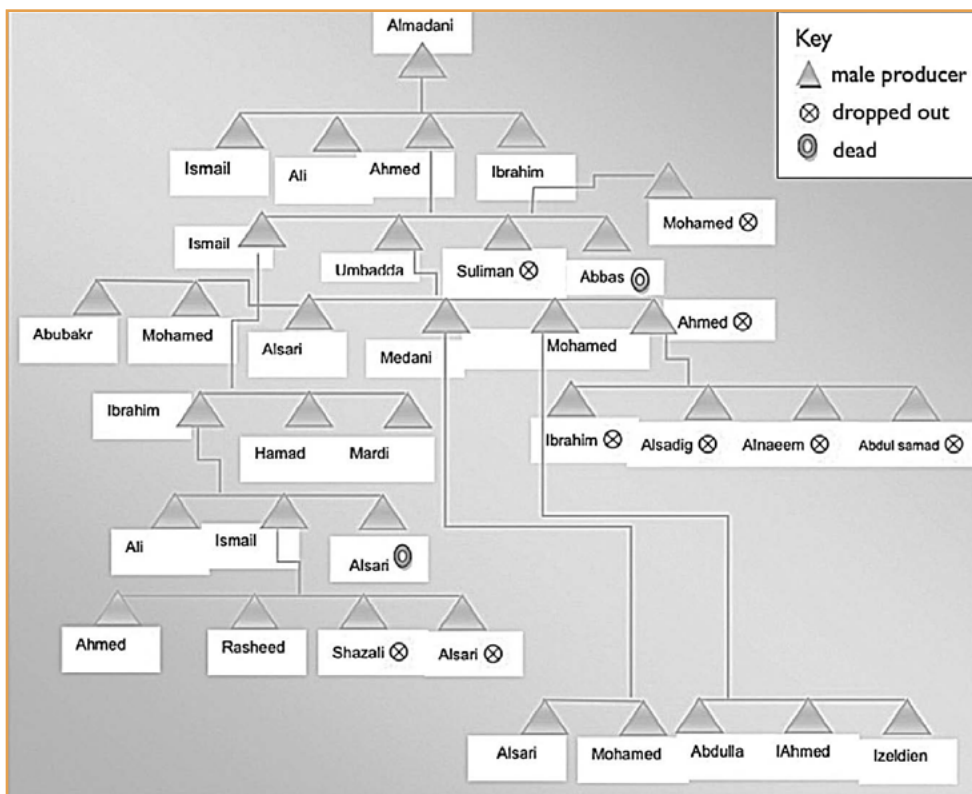
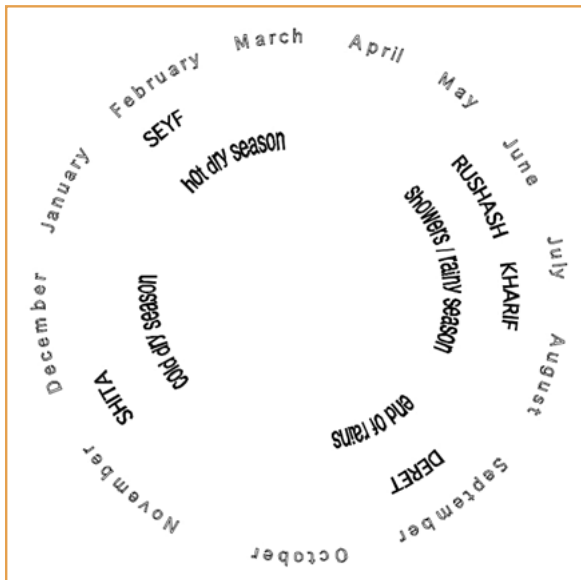


Figure 1. Comparative diagram of seasonality¹⁰



cooling down until mid December (*deret*), then cold until the beginning of March (*shita*). By late February/early March the temperature is on the rise again and the hot dry season (*seyf*) sets in until the new showers. This cycle is summarized in Figure 1.

Shortcomings in the methodology

The methodological approach taken by this study has been to focus on livestock-based production. At the basis of this approach is a need to establish the grounds for effectively differentiating between issues that belong to the logic of pastoral systems and issues that, instead, result from preventing pastoral systems from operating according to such logic – a good example is land degradation from overgrazing, usually caused by reduced mobility of livestock and sedentarization, therefore not an issue inherent to pastoral systems but one emerging when pastoral systems are being eroded or altogether dismantled.

Pastoralism in Sudan has operated for decades in situations of protracted conflict and

where key resources were diverted away from the systems of production. In these situations, livelihood strategies are shaped by complex institutional mixes, pull-and-push forces, and adjustments to the imperative of risk-aversion, while the fundamental logic of pastoral production might fade into the background. By focusing at the fundamental level, this study does not mean to downplay the importance of contextual pressure; on the contrary: it intends to provide a baseline against which to recognize and analyse it. Nevertheless, the need to complete the first stage of this process has left relatively little room for the second. Issues of vulnerability, impoverishment or conflict were considered from the perspective of production only. Issues of households' interaction with the institutional level, or of altered institutional arrangements and ongoing adaptations, have been touched upon only briefly.

Finally, our sampling has been unable to include a substantial representation of women and youths. The data collected are skewed towards animal production and herd management, with relatively little or no information on the milk economy, mostly controlled by women and likely to be very significant for subsistence, social cohesion and trade¹¹. This shortfall is partly due to the structure of the research teams: three women and three men were trained for the group of national researchers, but only one of them remained in the team for the fieldwork in North Kordofan, while all local researchers were men. With hindsight, questions concerning the milk economy were also not sufficiently emphasized during the training and in the methodological framework. As for the youth, the methodological framework targeted them specifically, but we actually met only few in the course of our visits, especially aged between 15 and 25 years old. This was in part due to the season and in part a reflection of the general 'shortage of labour' lamented by all groups of producers.

¹⁰ The spelling follows Cunnison (2009).

¹¹ As expected on the basis of recent studies in other pastoral systems: Sadler et al. (2010), Behnke (2010). Also in the case of milk production, comparative studies indicate that returns increase substantially with mobility (Niamir 1982). The bulk of milk in Sudan is produced by nomadic herds of cattle (Abdelgadir et al. 1998).

2. What producers?

The literature concerned with the total economic value of pastoralism has drawn attention to the confusion surrounding the classification of pastoral systems¹². Classifications are helpful tools for ordering reality, especially when this is dominated by complex dynamics and blurred boundaries. However, if their function as analytical tools is forgotten, or their abstract categories are confused with the real thing, classifications can mask reality rather than revealing it. Agronomists, economists and administrators working with pastoral systems have all produced classifications based on their professional benchmark of ‘normality’. Within such classifications, pastoralism is defined in opposition to crop farming, the market economy and sedentary livelihood. Definitions hinge not on substantive descriptions of pastoral production strategies, but on what pastoral systems are supposed to be without: lack of productive potential; lack of integration with the wider economy; lack of integration with crop-farming; lack of modernization; limited to land that lacks value for other uses¹³. Further confusion follows from the fact that the word ‘pastoralism’ refers to both an economic activity and a cultural identity, but the latter does not necessarily imply the former.

The *Policy Framework on Pastoralism* adopted by the African Union in 2011, departs from this characterization by subtraction and offers a substantive description of livestock mobility (AU 2010). This follows the current positions within the study of pastoralism (see footnote 1 above and Box 2), reflected also in the codes of law concerned with the upholding of mobile pastoralism adopted in Mauritania (République Islamique de Mauritanie 2000), Mali (République du Mali 2001) and Niger (République du Niger 2010), and a national policy on arid lands recently approved by the Kenyan parliament (Republic of Kenya 2012).

In Sudan, the rural population has been divided into ‘rural’ and ‘nomadic’ since the first census in 1955–1956 (UN 1964). In that census, ‘nomads’ (*rohal*) were defined by practising mobile livestock keeping, but the term ‘pastoralists’ (*ra’a*) was associated with the ‘rural’ population, as livestock keepers distinct from ‘nomads’ and therefore, by exclusion, settled. Census enumerators classified people as ‘rural’ if they found them in a ‘well-defined village’ or in ‘scattered *tukuls*’. Problems with this system were noted in the *Methods Report*:

Box 2.

The link between mobility and productivity in pastoral systems

Studies comparing the performance of dryland livestock systems (cattle) with different degrees of mobility in East and West Africa found a positive correlation between mobility and productivity for all key parameters, with fertility and milk production increasing and calf mortality decreasing in relation to increasing mobility (e.g. Colin de Verdière 1995; Wilson and Clarke 1976). Twenty six independent studies in nine countries in East, West and Southern Africa found returns per hectare several times higher in pastoralism than in ranching (Scoones 1995; Ocaido et al. 2009). According to one of the early attempts to formalize the link between production and mobility: ‘The producer’s strategy within non-equilibrium systems [...] must aim at responding to alternate periods of high and low productivity, with an emphasis on exploiting environmental heterogeneity rather than attempting to manipulate the environment to maximize stability and uniformity’ (Behnke et al. 1993: 14–15).

¹² For example Hesse and MacGregor (2006).

¹³ For example ILRI (2010).

The classification of the mode of living depended upon the enumeration technique used. For example, the 'village technique' was used for the enumeration of certain semi-nomadic groups, because the census in that region was carried out at a time when the groups were settled, if it had been carried out at a different time of year, they would have been counted by the 'nomadic technique' and classified as nomads (Government of Sudan 1955/1956, cited in UN 1964: 139).

In the Second Census (1973) and the Third Census (1983), 'nomads' were no longer defined by their lifestyle (if imperfectly recorded) but by an administrative parameter that associated them with a northern identity: a person 'who owes allegiance to a nomadic sheik' (el Tay 1980). In the 1955/56 Census, the census form had distinguished between time of birth and time of census: a person could have been born in one category and moved to the other. Later censuses dropped that question. Although still formally associated with a 'mode of living', 'nomads' were in practice defined on an administrative basis rather than by empirical observation.

In the 2008 Census, the division into 'urban', 'rural' and 'nomadic' populations was maintained. Only the 'nomadic population' was defined in the documents of the census, in the following way:

[...] a group of the population, which consists of tribes characterized by raising and depending on animals. Their animals usually graze natural pastures and are watered from natural water bodies; nomadism is both a way of utilizing resources and a way of life. The nomads usually move with their animals for long distances, searching for water and pasture and consequently live in mobile homes or temporary houses made out of hair, tree branches, or the hides of their animals. The nomadic population is in many respects different from the settled one in their cultural, socioeconomic and demographic characteristics (Elamin Ahmed and Abdel Rahman 2008: 454).

In this description, as in those of the previous censuses, 'nomads' are defined against the background of a rural/sedentary population.

This classification has three important consequences for the way pastoralism is understood in Sudan: i. it frames mobility as the outstanding feature of the 'nomadic' population, implying that everyone but the nomads is settled (that 'nomadic' is defined, whilst 'rural' is not, suggests that the latter is taken as the baseline of normality); ii. it establishes an opposition between mobile (nomads) and sedentary in such a way that people can either belong to one category or the other; iii. by defining nomads on a tribal basis (since the 1970s), the classification excludes in principle that people could move across the categories: people belonging to a 'nomadic' tribe remain 'nomads' even if they settle, unless the classification of the tribe changes from 'nomadic' to 'rural', and people assigned to the 'rural' category continue to be presumed sedentary even if they adopt production strategies based on mobility. The definition of 'nomads' in relation to both mobility and tribe institutionalizes the confusion between economic practices and cultural identity already mentioned when discussing the definition of 'pastoralism' at the beginning of this chapter (cf also Assal 2009). In a context where successful production is expected to demand flexibility and dynamic adaptation, the abstract rigidity embedded in this classification makes it inadequate, and potentially misleading, as an analytical tool for informing policy making concerned with livestock systems and the economic development of the rangelands.

This study concerned both 'nomadic' and 'rural' groups as identified by the administration, but investigated actual strategies of production – including mobility – on an empirical basis rather than deducing them from one of the classifications. We looked at producers of the three main species. The camel keepers involved in this study were Kababish and Kawahla in Tinna (Sodari) and Kababish and Shanabla in Abu Haraz (Sheikan). The sheep keepers were Hamari from the village of Nabalat (El Khoweï), about 45 km west of El Khoweï town. The cattle keepers were Messeriya, Fallata, Zaghawa, Tomam and Bedeiria from Kewekaya and Engamina areas, about 35 km south-west of El Rahad town¹⁴.

¹⁴ Tinna (14.15324N; 29.44728E); Abu Haraz (29.868740N; 12.969677E); Nabalat Village (13.022083N; 29.00315E); Kuwaikaya Village (12.60741N; 30.43352E); Um Gamaina Village (12.59043N; 30.48222E).

Although focusing their investments on one species, all these livestock producers keep mixed herds¹⁵ with a main species backed up by another two or three. Producers of camels and producers of cattle also keep sheep. Producers of sheep and producers of cattle sometimes keep a few camels. All keep goats. All species are regularly marketed, whenever possible within a strategy aimed at either sparing or increasing the capital stock of the main species. Within each group of specialization, changes in wealth/security are associated with growing or shrinking of capital stock in the main species. A drop in security/wealth leads to shifting the focus of production to the back up species ‘next-in-the-line’: from camels and cattle to sheep, from sheep to goats. A focus on goat rearing amongst these specialized groups is an indicator of vulnerability. All households – including the ‘less secure’ groups – claimed that animal production provides the main source of livelihood. Table 1 below summarizes local perceptions of livelihood security/wealth for the three specializations.

Although livelihood security was defined exclusively in relation to livestock production, most of the households in our sample also engaged in rain-fed agriculture. Sheep and cattle

specialists cultivated groundnuts, millet, sesame, hibiscus and watermelons. Some of the cattle specialists also cultivated sorghum. Amongst the sheep specialists, some in the ‘more secure’ group occasionally harvested gum arabic. Most households in our sample were attached to permanent villages; only a small number were ‘nomadic’.

2.1 Camel specialists

Within this group, livestock is the main economic activity, representing more than 70 percent of the income. Camels are seen as the outstanding indicator of livelihood security. Goat rearing is present at all levels of security as ‘pocket money’ livestock, but becomes a defining character for the less-secure groups, tied in with a drive to settle as livestock assets become too few for supporting mobile strategies. Sheep can represent a substantial proportion of the herd, especially in communities that are relatively settled, as in the case of many of our informants. The proportion of females in a herd of camels is about 70 per cent, slightly higher in the case of sheep (the rest being young or castrated males). About a third of the animals are above six years old, a third between four and six years old, and a

Table 1. Local livelihood security/wealth indicators at household level

	Camel specialists	Sheep specialists	Cattle specialists
more secure	Between 150 and 200 camels and between 400 and 500 sheep.	About 500 sheep and 100 goats.	More than 100 cattle, 100 to 150 sheep and 40–50 goats.
moderately secure	Between 50 and 100 camels and maybe 150–300 sheep.	About 200–300 sheep and 100 goats.	About 40–60 cattle, 50 sheep and 50–60 goats.
less secure	Between 5 and 25 camels and between 50 and 100 sheep; most likely also 10–20 goats.	A few sheep and up to 50 goats.	About 5–10 cattle, 3–4 sheep and 5–10 goats (the poverty line was defined as owning 7 sheep plus a fine ram)

¹⁵ Keeping mixed herds is a common strategy in pastoral systems. As different species have different feeding patterns, mixed herds allow for an intensive use of the highly diverse rangeland environment – as well as helping in risk management. Small stock, especially goats, are also kept as pocket money for the household’s expenses.

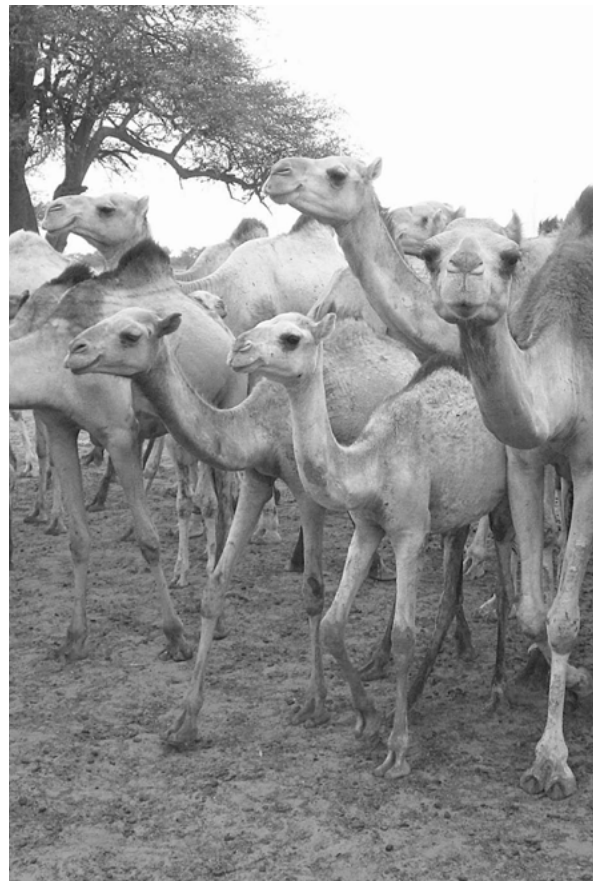
third between one and three years old. With sheep, about half of the animals are in the four to six year old age group and only 20 percent in the group of the youngest. All women of different age groups have long daily household routine duties, including preparation of the meals, and responsibility for firewood and water for the household and the animals kept at the camp. When living in a village, women have the extra burden of the small group of 'household' milking animals, as well as supportive services to those who are taking care of the main herd. Children between seven and 15 years old take full responsibility for the herd during the wet season, reducing expenditures on hired labour and freeing men for other occupations (including salaried work).

2.2 Sheep specialists

The productive household includes hired labour used in both livestock rearing and farming (especially weeding and harvesting). Livestock rearing represented about 60 percent of the household economy in both of our two sample groups ('more secure' and 'less secure'), followed by rain-fed crop farming (about 30 percent) and, for the 'more secure' group, gum arabic (about 10 percent). Animals are selected for fitness and with attention to the colour of their fleece (selecting for those that have higher market demand). Feeding young animals during the hot dry season (with water melons or groundnut husk) is the responsibility of women and children. In our 'less secure' sample group, women are in charge of milking the goats as well as watering and feeding the donkeys. Women and children also assist the men in sowing at the beginning of the rainy season. People in the 'secure' group are involved in the production of gum arabic, usually done by hired labour under the supervision of the head of the household. Sometimes, our informants pointed out, the gum is wasted because the people controlling the trees cannot pay for the labour, or are absent from the village, involved in other activities. Crop farming contributes less than a third of the household economy but represents the largest proportion of labour demand.

2.3 Cattle specialists

More than 70 percent of the income of the households in our sample came from animal production. This was followed by the revenue from the sale of crop surplus (including residues and failed harvests). About a third of the income came from other activities. During the hot dry season (*seyf*) men sometimes engage in small business, often as livestock traders (*galaga*) or food crop traders (*galaty*) on the local markets. They may also purchase some animals to be fattened at the village for one to two weeks on concentrate, before being taken to the market in Omdurman. The revenue from these activities is used to cover the cost of fodder, water and hired labour. In the 'insecure' households, men sometimes generated extra income by collecting and selling wood for construction. Surplus money is reinvested in livestock. If capital is substantial, buying a vehicle, or even a house in town (to rent out) are considered good options. Women in both secure and insecure households sell milk during the wet season and up to the end of the cold dry season; they also collect and sell wild fruits and firewood or charcoal.



3. Livestock market: tracking supply back to production

The confusing qualitative knowledge embedded in the classification of livestock systems, as we have seen in the previous chapter, inevitably impacts on the collection and organization of quantitative data. Analysts have pointed out that the current quantitative knowledge on the economic value of pastoralism is often made out of poor-quality aggregates of incomplete and incommensurable data (Hesse and MacGregor 2006, Behnke 2010). Quantitative data which ignore shaky qualitative foundations can be as misleading as classifications forgetful of their function as analytical tools and taken to represent the reality they should instead help to study.

The economic importance of pastoralism has long been hidden by methodological

shortcomings and lost in data aggregation within national statistics (Rodriguez 2008). The idea that pastoral systems are an outdated form of production that makes only a small contribution to national economies has been the object of intense debate amongst the specialists in the sector and is listed amongst the ‘myths and misunderstandings in pastoral development’ in a now ten year old UN publication (UNDP-GDI 2003). Nevertheless, information highlighting that the economic role played by pastoralism is often substantial is finally emerging from a growing number of studies (see Box 3).

In Sudan, the current system of statistical analysis of livestock marketing focuses on value-adding and exports, with little methodological sensitivity for primary

Box 3.

Economic importance of pastoral systems

In Burkina Faso, 70 percent of the cattle population are herded by the transhumant Fulani (IIED and SOS Sahel 2009).

In Mali, exported live animals produced under pastoral conditions were worth USD 44.6 million in 2006 (IIED and SOS Sahel 2009).

In Niger, the livestock sector is the second source of export revenue after uranium (République du Niger 2011), with pastoral/agropastoral systems representing 81 percent of production (Rass 2006).

In Chad, pastoral livestock make up 80 percent of ruminants, 40 percent of agricultural production, 18 percent of GDP and 30 percent of exports (Alfarouk et al. 2011).

In Sudan, with the great bulk of livestock production from smallholder and migratory producers, the 2009 livestock offtake was worth USD 3.7 billion (Behnke and Osman 2011),

In Somalia, 90 percent of the national herd is in pastoral systems (Rass 2006).

In Kenya, 14.1 million animals, worth USD 860 million, are kept in pastoral production systems. They enable an annual offtake worth USD 69.3 million (Davies 2007).

In Tanzania, pastoral/agropastoral systems represent 94 percent of the livestock and supply 70 percent of the 1.38 billion litres of milk consumed in the country (United Republic of Tanzania 2006).

production. Livestock reach the terminal markets through informal networks of brokers, agents, sub-agents and local traders, from production areas 200–1,200 kilometres away. Animals change hands up to six times. The market authorities collect a flat fee by species from every sale but the records from this process are limited to the number of animals arriving and sold by species and sex. The veterinary authorities at El Moeilih terminal market in Omdurman (Khartoum state) record the ‘origin’ of the animals based on the last transaction. Therefore, in their records the cattle from local feedlot operations, supplied from the greater Darfur and Kordofan regions, are recorded as originating from Khartoum state. Abattoirs record the type of animal being slaughtered but hold no information on their origins. Livestock producers might appear in the records of the Zakat taxation system, but our team was not able to access the data at the Zakat chamber at state level.

Overall, primary production is largely invisible except with regard to exports. There are no official systematic data on the size of the livestock domestic market. This approach has become particularly pronounced from the 1990s,

when ‘the adoption of market economy approaches for Sudan’s development urged strongly for maximum utilization of livestock resources in earning foreign exchange at minimum cost’ (UNDP 2006: 26).

Recently published data from the Sudan Central Statistical Bureau (SCBS) allow the value of livestock exports to be put in perspective. The livestock sector’s contribution to Sudan’s agricultural GDP for 2009 is estimated between 26.670 and 33.843 billion SDG, while the contribution to exports amounted to 0.581 billion SDG (Behnke and Osman 2011). Using these figures, we calculate that for 2009 the value of the livestock export market in Sudan, although significant, was still only about two percent of the value of the domestic market. For more data on the value of the livestock sector, see Appendix I, Tables 1–3.

With the present weakness of monitoring along the market chain, tracking livestock supply back to the primary producers remains largely speculative. To an extent, differences in breed composition and seasonality within the supply can be an indicator of the system of production. For example the West Baggara Short Horn cattle

Box 4.

Cattle trade at El Moeilih livestock terminal market

Seventeen kilometres west of Omdurman town, El Moeilih terminal market is the biggest livestock market in Sudan for cattle and camels (over an area of 6,821 feddan, or about 2,850 hectares including holding grounds and feedlots, El Moeilih absorbs 90 percent of all traded cattle and camels in Sudan). Cattle supply is from the greater Darfur and Kordofan regions as well as White Nile, Blue Nile and eastern Sudan. The proportion of different cattle breeds varies according to the season, but Rizaigi and Nyalawi (Darfur region) make up for more than 70 percent of the annual trade of more than 300,000 head of cattle¹⁶. At the end of the 1970s, about 80 percent of the cattle traded in El Moeilih were produced under pastoral conditions in the greater Darfur and Kordofan regions: South Darfur 47.5 percent, North Darfur 6.4 percent (including today’s North and West Darfur states), North Kordofan 17.2 percent, South Kordofan 7.8 percent (El Dirani-LMMC 1982). The predominant role of pastoral systems in supplying El Moeilih persists, with figures collected in 2011 presenting a similar aggregate figure if with differences in the breakdown: South Darfur 52.98 percent, North and West Darfur states (previously together as North Darfur) 12.47 percent, North Kordofan 4.41 percent, South Kordofan 6.54 percent (see Table 2 below). From the records held by the veterinary authorities at the market, in 2010–2011 the share of traded cattle from these regions appears to have increased, with about 39 percent reaching El Moeilih directly from the greater Darfur and Kordofan regions and 51.5 percent traded from the feedlot operations in Khartoum state, which are known to be mainly supplied from these regions.

¹⁶ Dr. Mustafa Ismael, manager of El Moeilih for the last 18 years, personal communication to Omer Hassan El Dirani.

breed, and especially the Nyalawi variety, is mainly produced in the greater Darfur region under pastoral conditions. Hamari and Kabashi sheep (desert sheep) are mainly produced in North Kordofan and, to a lesser extent, in South Darfur. Gash cattle and sheep breeds are typical of Kassala state. Dubasi (also Abrug) and Ashgar sheep are mainly produced in Gezira state and the Butana area in East Sudan. The Wateish sheep is produced in White Nile and Blue Nile states. Desert goats come mainly from the northern territories of Darfur, Kordofan, Gedaref, Kassala and Red Sea. The Bushari camel is typical of Butana whilst the Annafi is produced in Gedaref. The breed of

traded animals is only known to be recorded for the eight markets run by Animal Resources Services Company (ARSC) of Animal Resources Bank affiliates, with headquarters in Omdurman. These markets are El Moeilih and Assalam terminal markets in Omdurman, El Obeid market in North Kordofan, the Medani market in Gezira, the Kosti and Rabak markets in White Nile and Sinnar market in Sinnar state. A systematic survey of the data held by ARSC was not possible within the scope of this study. However, Table 2 gives an indication of the range of source areas for cattle entering El Moeilih market.¹⁷

As important routine fluctuations in supply

Table 2. Cattle inflow to El Moeilih terminal market in 2010–2011

State	Total numbers in heads 2010	Total 2011	Total (2010+211)	% of total	% excluding Khartoum
Khartoum (Darfur and Kordofan*)	187,728	183,891	371,619	51.5	//////////
South Darfur	95,532	90,004	185,536	25.7	52.98
Gedaref	42,686	22,062	64,748	9.0	18.49
West Darfur	19,406	19,234	38,640	5.4	11.03
South Kordofan	10,448	12,450	22,898	3.2	6.54
North Kordofan	9,724	5,678	15,402	2.1	4.41
Kassala	3,476	3,262	6,738	0.9	1.92
Sennar	3,802	2,624	6,426	0.9	1.84
North Darfur	2,447	2535	4,982	0.7	1.42
White Nile	1,630	1,462	3,092	0.4	0.88
Blue Nile	576	464	1,040	0.1	0.30
Gezira	298	309	607	0.09	0.17
South Sudan	54	25	79	0.01	0.02
Grand total	377,807	344,000	721,807	100 %	//////////
Total excluding Khartoum	190,079	160,109	350,188	//////////	100 %

* These figures refer to feedlot animals originally produced in the greater Darfur and Kordofan regions. Source: Recalculated by Omer Hassan El Dirani from the data held at the Ministry of Agriculture and Animal Resources (Khartoum State), 2012.

¹⁷ See also Appendix I Table 4 for a breakdown of livestock population by state.

are closely related to the strategies of production (especially migration patterns and the use of rain-fed pasture) the seasonality of supply is also telling of the origins of primary production. For example, export camels traded at El Obeid market are trucked to Sawakin port (Red Sea) mainly during the rainy season because that is when the seasonal presence of Shanabla, Jawama and Kawahla producers in the area (or heading north) boosts the supply. During the hot dry season, when these producers have gone, the main supply is from El Gardood and El Hajiz (South Kordofan). During the hot dry season

(especially May), Fora Boranga and Beida markets are animated by cross-border trade in cattle and camels supplied by Rizeigat, Beni Halba, Fellata and Salamat on their way to and from Chad (with 60 percent of the livestock supplied by Chadian pastoralists). Also during the dry season, the markets of Kurfi, Om El Teiman and Om Besha play a similar role in Chad. During the rainy season, Kabashi and Shorani¹⁸ sheep from Bara and West Bara localities satisfy the demand for local consumption at the El Obeid market.

Box 5.

A snapshot of the beef market chain¹⁹

September 2012: a producer from Rahad locality arrives at the market in El Obeid with five bulls to sell. The market guards ask him to register his animals and pay the market fee. This is 10 SDG per head but there is usually a margin for negotiation. The seller gets away with paying 40 SDG. Now he needs the services of a broker. He has arranged a meeting over the phone with one he has used before. A broker willing to spend time trying to secure a sale with a trader, rather than to another broker, is the best chance for a good deal. Approaching unknown traders directly is not usual as producers prefer to deal with people they already know. Mature bulls – the broker tells him – four years old, in good form and of the preferred breed like the ones he brought (Western Baggara Short Horn Zebu of the Nyalawi type) are selling for about 4,000 SDG each. Being a relatively small transaction, the seller can expect to be paid in cash. The animals are likely to be shipped to Omdurman the same day, by road from El Obeid, or by train from El Rahad. Had it been the rainy season they might have been taken to Omdurman on the hoof, to take advantage of the opportunity to fatten them along the route (see Box 10). Sending the animals by road would cost the trader 20 SDG per head for the transport plus 1.5 SDG per head to the labourers who help with loading. Small trucks take 20 head of cattle, large trucks take 50. A trader may organize two or three trucks at a time during the dry season. Sometimes transporters or traders are also asked to pay a fee for the use of the ground where they load the truck²⁰. Once in Omdurman, the animals are kept two to three days to rest from the journey before being sold again, most likely to a butcher (as only a small proportion of cattle sold in Omdurman is exported). In another season, they would have been taken to feedlots for finishing.

¹⁸ A variety also called *Garage* at the livestock markets: usually a crossbreed between desert sheep (Hamari, Kabashi or Meidobe) with Nilotic sheep (Zaghawa).

¹⁹ This box describes an imaginary situation discussed with an experienced cattle trader and is simply meant as a vehicle to highlight the stages in the market chain.

²⁰ For example in El Khowei, traders or agents loading export sheep were asked to pay one head per truck for the use of the ground (the money was given to the owner of the land). This was before the renovation of the livestock market. Now the locality has allocated a dedicated ground.

4. Making a living along the livestock value chain

The total economic valuation (TEV) approach to livelihood analysis emphasizes the need for methodological tools capable of capturing both market and non-market goods and services in a livelihood system. Pioneering studies on pastoral TEV have drawn attention to the contribution of pastoral systems not only to the national economies but also to environmental services, domestic biodiversity, development of skills and knowledge (cf Hesse and MacGregor 2006; Hartfield and Davies 2007)²¹. The recent series of studies on the economic value of the livestock sector in IGAD states represents a significant contribution in this direction, including values that are currently overlooked in GDP calculations, such as the production of livestock dung for fuel, the use of animal power in agriculture and transports, and the value of livestock's financial services such as savings and investment, credit, insurance, and risk pooling – the latter especially amongst pastoralists (Behnke 2010; for an overview of pastoral TEV methodology see Krätli 2013). Unlike what happens in commercial-only systems of production (e.g. ranching), by the time an animal produced in a pastoral system reaches the market it has already provided years of economic services, including substantial subsistence services in the case of a milking animal (Behnke 2010).

Besides these important dimensions of value directly associated with production, the supply of livestock produced under pastoral conditions also supports the livelihoods of all the operators along the market chain, by generating jobs and a range of auxiliary business. Those making their living from the livestock trade include not only market operators but also armies of transporters and trekking herders (or 'drovers'), as well as the workers in feedlotting, abattoirs and processing plants of meat and hides and those supplying

auxiliary markets such as water for livestock, fodder/crop residues and the feed used in feedlotting.

Official data are absent for most of these activities and carrying out systematic surveys was beyond the scope and resources of this study. Instead, this chapter highlights just a few dimensions where the available information allows us to calculate a conservative estimate of the number of livelihoods and volume of business involved. Most of the activities considered here are part-time or seasonal, but for the sake of simplicity we have calculated our estimates in 'full-time jobs'. Behind each 'full-time job' there are usually several part-time workers and numerous households benefiting from the activity. Finally, a word of caution about our estimates. The figures produced in this way are to be read as 'at-least values' that are robust only in one direction: in each case the actual value could be several times higher but almost certainly not lower. Although of minimal use, in the absence of actual data they can help to 'fence' uncertainty (establish limits to it) and it is our hope that they will stimulate further analysis by specialists with better resources.

4.1 Primary producers

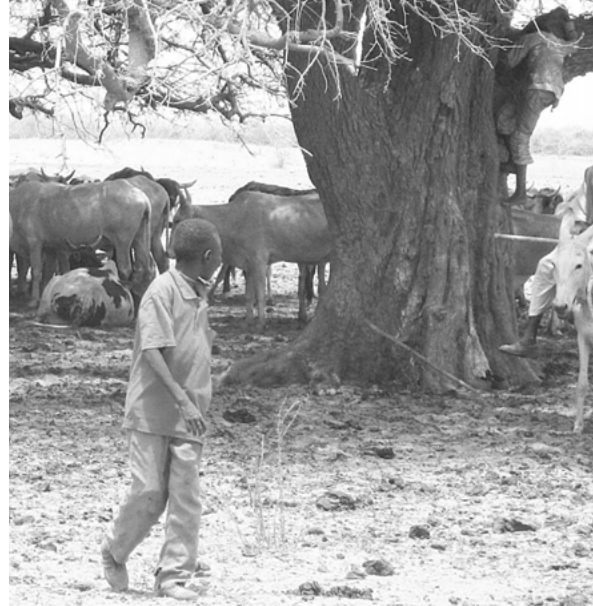
The number of people directly depending on mobile livestock keeping strategies in Sudan is unknown. According to the 2008 census, 2.7 million people (500,000 households) qualified for the category of 'nomadic' adopted by the exercise. However, as we have seen in Chapter 2, the definition of 'nomadic' used by the census is based on tribal affiliation as well as livelihood strategy. Therefore such categorization is likely to have missed out people who are living by production strategies characteristic of mobile pastoralism, but who are not themselves

²¹ Amongst the environmental services provided by pastoral systems, a recent study by the International Livestock Research Institute (ILRI) identifies the following: Increased fertility and carbon sink in improved savannahs (there is greater carbon accrual on optimally grazed lands than on ungrazed or overgrazed lands); reduced evaporation, run off and sedimentation; invasion control; flora preservation (by controlling shrub growth and dispersing seeds); fauna preservation (mixed livestock/wildlife systems have a greater variety of species than wildlife-only systems); stimulation of grass tillering; improvement of seed germination; and break-up of hard soil crusts (Silvestri et al. 2012).

'nomadic' by tribal affiliation. Our findings (see Chapter 6) lead us to believe that this latter group might represent the bulk of primary production in the livestock sector. Following this line of reasoning, here we take the figure of 2.7 million people counted as 'nomadic' by the census to represent a *minimum* number. Assuming a minimum daily milk consumption in a pastoral household of 0.5 litres per capita²², 2.7 million people enjoy the use of little less than 500,000 tons of milk per year. Priced at 1952 SDG per ton – following Behnke and Osman (2011) – in 2008 this milk alone had a value of almost 0.96 billion SDG, or 460 million USD. In reality, this figure is likely to be much bigger. The 2008 census found that 3,510,481 households in Sudan (52.8 percent) are engaged in cultivation/ plantation, 3,936,131 households (59.2 percent) are engaged in animal husbandry, and 34,748 households (5.2 percent) are engaged in fishery (Elamin Ahmed 2008: Table 1). If a conservative 50 percent of the households engaged in animal husbandry according to the census rely on pastoral production strategies, the number of households enjoying subsistence services and other economic services from pastoral livestock increases to 1.96 million (four times).

4.2 Trade operators

Only large operators in the export trade are registered. In 2011, 180 legal persons (companies or people) were registered as exporters: 69 for sheep (mainly to Saudi Arabia), 79 for camel (to Egypt), 7 for cattle (to Egypt), and 25 for goats (mainly to Saudi Arabia). Beside these big players, market operators in Sudan go unmonitored. We were only able to collect unofficial figures, through interviews with traders and market authorities. The work at the market follows the seasonal variation in the supply. At the El Khowei livestock market, during the three to six months trading season, there are 76 livestock traders, 90 export agents representing 36 exporters, 150 middlemen, 24 butchers, and 400 labourers helping with loading



and unloading the animals. This gives a total of about 700 people, with a ratio of 1/10 between traders and non-traders. At the peak of the trading season, at the important secondary market of El Daein in East Darfur, the traders might be as many as 350. The large terminal markets in Khartoum (El Moeilih and Assalam) are operated by about 200 traders each. In El Moeilih, these traders handle in a year a volume of business of 344,000 cattle (Table 2 above), that is at least one trader to every 1,800 head of cattle in a terminal market. The estimate cattle offtake in 2009 was more than 4 million head (Behnke and Osman 2011) but not all these animals will have been marketed. Assuming conservatively that about half of these animals reached a market, at one trader for every 1,800 head we estimate the number of traders in Sudan to be *at least* 1,000 – a figure that in reality, considering the offtake of camels (700,000), and sheep&goats (18 million) is likely to be significantly higher. Including both trading and non-trading roles (with a ratio of 1/10), we estimate the number of market operators across Sudan to be *at least* ten thousand²³. How many of these jobs are supported by livestock from pastoral systems is a function of the proportion of pastoral livestock in the national herd, believed to be about 80–90 percent, a figure which has not yet been substantiated (Behnke and Osman 2011).

²² This is well below the amount estimated necessary in subsistence pastoralism (Dahl and Hjort 1976) and less than 30 percent of the daily per capita consumption found in relatively wealthy pastoral households in northern Kenya (Davies 2007).

²³ The market actors and their function are summarized in Appendix I, Table 6.

A new trade channel for the Hamari sheep

Marketing channels from catchment areas to the final export markets and main domestic consumption areas are dynamic. Until a few years ago El Moeilih livestock market in Omdurman played a major role in sheep export, with an annual turnover of almost 500,000 head, sent from there to the Al Kadaro Quarantine Centre. The establishment in 2005 of an inspection and vaccination centre at El Khowei market, at the heart of the main sheep production area in Sudan (North Kordofan), brought this to an end. Attracted by the lower operational costs and the availability of rain-fed pasture in the area, the main brokers in the sheep-export business moved their activity from Omdurman to El Khowei, making it the most important export market for sheep. In 2012 the sheep-trade channels appeared to have been changing again. A large part of the export trade was now taking place in Gedaref, with about 400,000 Hamari sheep (according to the official records) being channelled there from El Khowei in 2011. Five export companies (three main large companies and two medium sized) now purchase sheep from El Khowei as local trade, starting the export procedure only after the animals have been transported to Gedaref. In North Kordofan, local trade is taxed 8.6 SDG per sheep, against 41.5 SDG per sheep for exports. The cost of transporting the animals from El Khowei to Gedaref market is 5 SDG per head. As the Ministry of Animal Resources in Gedaref state has eliminated export fees, by buying in El Khowei but exporting from Gedaref traders can save almost 30 SDG per head. Attracting the sheep-export business to Gedaref boosts the market for fodder (sorghum and sesame) from the large agricultural schemes in the state. The shift to Gedaref is also driven by financial reasons. In El Khowei the payment for a batch of export sheep (1,000 head) is usually 50 percent at purchase and the rest after one or two months. In Gedaref, where the competition between traders is higher, the full payment is at purchase. This is because some exporters are financed by loans from commercial banks, and in order to purchase three export batches in El Khowei it will take from three to four days each time between obtaining the loan, purchasing the batch, selling it and returning the loan. When exporting directly from Gedaref, the time between purchase on the domestic market and export is shortened, sometimes to the point of eliminating the need (and cost) of a grace period for the loan. More time is also saved with the different way of processing the (compulsory) Brucella test: in El Khowei the samples are processed at a laboratory in El Obeid and the results come the next day; in Gedaref the laboratory is near and the result immediate.

4.3 Transporters and drovers

Transporters are difficult to quantify but, for sheep and cattle, a reasonably safe 'minimum' can be calculated from the number of animals known to be moved every year and knowledge of the procedures that this involves. Records show that 2.7 million sheep were exported in 2011, mostly moved from production areas to Sawakin by truck. A truck takes up to 500 head and needs at least one driver (often two) plus two drovers who travel with the animals. Trips take a minimum of four days: three on the road and one of rest. At 500 head per truck it would take

5,400 trips to move 2.7 million sheep, that is 21,600 days. Dividing this figure by the working days in a year (260) gives a minimum of 83 teams of three to four people needed to cover the workload, that is at least 250 full time jobs in the transport of sheep. In reality, trucks are organized by companies, large and small, and not all carry 500 head, which means additional jobs. As for cattle, the inflow to El Moeilih market, in Omdurman, was 344,000 head in 2011²⁴. We know from market operators that most of these animals were taken to Omdurman on the hoof,

²⁴ See Table 2 above.

so perhaps 300,000 head. On the hoof transport of cattle uses two drovers every 75 head and one leader about every 600. With these teams doing as many as four trips in a year, this corresponds to approximately 1,100 full time jobs in the transport of cattle. Together, this represents at least 1,350 full time jobs in transporting sheep and cattle to terminal markets.

4.4 Hides and meat processing

Exports of hides and skins are monitored. In 2011, Sudan exported 4.2 million pieces for a total revenue of 33.6 million USD. The raw supply is directly from the pastoral areas or via the abattoirs. About 20,000 people make a living from this industry, from the processing of raw materials to the making and selling of leather products (FMI 2012).

For data on meat processing we are not as lucky. Khartoum State has seventeen meat factories: two are relatively large (Looli and Al Goussi with capacity of 2.5 tons per day), three are medium sized (Beladi, El Wagba and Memo) and twelve are small (Samar, El Amri, Moni, El Agwad, Saeir, Waad, Hala, Agwat, El Arabi, Maxim, El Joody and El Tabakh). Only the two large plants operate at full capacity, needing roughly 100 people each. The smaller factories operate with between 10 and 15 people each. Altogether, the meat factories can be estimated to represent a minimum of 350 jobs. The export abattoirs are ten: four in Khartoum state, one in Gezira, one in Nyala, one in Gedaref, one in Atbara, one in El Geneina, one in Port Sudan. However, only the four in Khartoum are operational (processing for exports about 5,000 tons of meat in 2010²⁵). They can also slaughter for domestic consumption. In all 16 states there

are slaughterhouses for domestic consumption in addition to informal butchering operations at village level, slaughtering all types of livestock. The number of slaughterhouses is unknown. Based on official records on meat exports (Behnke and Osman 2011: 29), and on average processing times at the abattoir, it is possible to estimate the number of jobs necessary to cover the workload. As the recorded exports of goats and camels in 2010 were negligible, our calculation was limited to sheep and cattle. The key stages are shown in Table 3 below. It might be worth remembering at this point that livestock exports represent only about two percent of the domestic market in livestock, where meat processing is much more labour dependent.

4.5 Feedlots

With the important exception of the wet season, the cattle traded in El Moeilih are first finished in feedlots. Feedlot operations exist in Sennar, Gezira, Kassala, South Kordofan, North Kordofan and White Nile, as well as in Khartoum State. However, most of the cattle in El Moeilih are finished in feedlots in Omdurman. Apart from the animals from Kassala State, which represent about five percent of the total flow, the cattle in feedlot operations are the Western Baggara Short Horn Zebu breed produced under pastoral conditions in Darfur and Kordofan. It is known that about 180,000 head of cattle are feedlotted in Omdurman ever year (Table 5). On average, cattle stay in feedlots for 45 days. Feedlot operations process between 50 and 200 cattle at a time, using the work of two people for about eight months of the year. Assuming an average of 100 cattle per

Table 3. Jobs in meat processing for exports in 2010

Elements of the calculation	sheep	cattle
Number of head exported as meat in 2010	409,793	3,923
Maximum number of head processed in one person/day	80	26
Minimum number of person/days of work	5,122	150
Minimum number of full-time jobs to cover the workload	20*	

* Based on theoretical maximum performance at the abattoirs. The number of head actually processed per person/day fluctuates greatly and can go down as much as 10 times.

²⁵ Behnke and Osman (2011: 29).

feedlot at every point in time over the eight months (240 days), with a turnover of 45 days, a team of two people can feedlot five sets of 100 cattle in a year. Therefore in order to feedlot 180,000 cattle 360 teams are needed for eight months, or at least 650 full time jobs.

Supplying cattle for feedlotting in Omdurman also supports a significant market in feed. Cattle are fed concentrates, sorghum grains, cakes (groundnut, cottonseeds and sesame cake in order of importance) and roughage of sorghum stalks and *siwa* (bran). Feedlotting costs 15 SDG per head per day, including feed, water and labour, of which about 13.5 SDG is for the feed. Therefore 180,000 cattle represent a yearly market in feed to the value of about 109 million SDG²⁶ (or 18 million USD in June 2012). Finally, feedlot operations produce a significant amount of cattle dung. At 1.3 kg of dry dung 'per head of cattle' produced in a day²⁷, 180,000 head of cattle feedlotted every year in Omdurman, on average for 45 days, produce 10,692 tons of dry dung per annum. In Omdurman, dry dung is collected from the feedlots by poor people (women and boys)

who apparently are allowed to take it for free (or rather in exchange for clearing the compound). Some of this dung is used by the household for cooking while the rest is accumulated for selling to other industries, especially brick making. In rural areas, dung is also valued for coating the walls of mud-brick buildings.

4.6 Market in water and fodder

The trade in livestock and related products is not the only market chain supported by livestock production. The market in water for livestock and that in fodder have grown to represent an important volume of business in Sudan²⁸. Water is not only commercialized through the renting out of water sources and selling water at the wells, for people and livestock, but also by delivering it by truck, to villages and camps and even directly to the livestock in the grazing areas²⁹. The sale of fodder and feed is also very significant, both in the form of hiring out land for pasture and selling cut grass, crop residues and feed cakes or grains. Most of this business is supplied

Box 7.

Cattle feedlotting

From 50 percent to 70 percent of the annual inflow to El Moeilih is between September and December, in the period immediately following the rainy season. In recent years, this seasonal inflow has reached 7,000 head of cattle per day. These are animals that reach Omdurman in excellent condition. The rest of the annual supply is in two waves, in January–April (up to 2,500–5,000 per day) and May–August (no more than 2,000 per day). Some of these animals have been in feedlot operations before reaching Omdurman, but most of them need feedlotting: about 65 percent in the first wave and 25–50 percent in the second. These animals are referred to as *gashashi*. Beside the many operations in Omdurman, feedlotting is also carried out on El Moeilih holding grounds, for cattle (both domestic and export trade), and camels to be exported to Egypt. The only government-owned feedlot operation is managed by MARFR in Hilat Koko, Khartoum North. The animals there (bulls and calves) are purchased on visual assessment (not weighed) and sold by live weight. Some feedlot operations specialize in maintenance and reconditioning (e.g sheep in Gezira, White Nile, Blue Nile, Gedaref and Kassala States). In Gezira State, Dubashi sheep are reconditioned in feedlots in Rufaa and re-sold in Tamboul market.

²⁶ Calculated by multiplying 13.5 SDG (per day) times 45 (days average per cattle), times 180,000 cattle.

²⁷ Based on MARF estimate of manure output for 1000 head of cattle (MARF 2010, Tables 3–9).

²⁸ Commentators at the workshop on 'Livestock Market Chains, Ministry of Animal Resources, Fisheries and Range', July 2012, Khartoum.

²⁹ In North Kordofan, Zaroug (2011) reports that water provided by tankers and other sources and the use of supplementary feed have changed the lambing season in sheep and some claim to obtain two lamb crops per year.

from rain-fed pasture and cultivation. Although the animal-feed industry started in the early 1960s and 16 factories are operational today, the output is inconsequential. A recent study calculates it in the order of 215,000 tons annually, which represents 0.21 percent of the demand. The Kenana sugar cane factory, in White Nile State, sells its by-product as animal feed, including sugar-cane tops, internodes, leaves, bagasse and molasses. However, most of the livestock feed traded in Sudan is believed to come from crop residues.

These auxiliary markets concern not only primary production and feedlotting but also at least three stages along the market chain: when newly purchased animals are assembled waiting for transportation, during the long-distance journey to the terminal markets, and as part of the routine operation of markets themselves. At Sawakin port in April 2012, water and fodder prior to loading cost 10 SDG each per animal (Appendix I Tables 7 and 8). Assuming similar costs for all sheep exported from Sudan (about 2.7 million head in 2011, Appendix I Table 5) this small fraction of the water and fodder business across Sudan amounts to about 27 million SDG (approximately 8 million USD at the time).

Estimating the market in water and fodder serving primary production poses greater challenges. Demand is subject to important variables such as species and breed, season, mobility (enabling access to free and better quality fodder), animals' age, marketing strategy (animals destined for export require more), farming (farmers have free access to limited fodder from their own crop residues). Differences in price across states and localities further complicate things. Despite these many sources of uncertainty, some work to estimate at least portions of this market is possible. We focused in this case on North Kordofan, where the majority of livestock relies on purchased water for at least 150 days, from February to June, and most producers pay for crop residues. These markets have greatly increased in value following the distortion of mobility patterns due to insecurity and the conversion of rangelands to other uses, especially the

migrations to the South for the dry season. In other states – for example in South Kordofan – water for livestock might be freely accessible for most or all of the year from ponds and rivers. In South Darfur, on the other hand, the Sudan Water Corporation (SWC) price of water is about 25 percent higher (almost 60 percent higher for camels).

In the localities of our sample, during the hot dry season cattle are watered every second day, sheep every five days and camels once a week. Officially, pricing is done by species and per head, but at watering stations herds and flocks are usually estimated in round numbers: 100 head, 50 head, etc. We looked at the prices from the SWC and those collected in the field from private watering points. This information was combined with the official estimate of the livestock population in the state in 2010. The results for the SWC prices, summarized in Table 4 below, indicate a volume of business of 32.2 million SDG, equivalent to 14.4 million USD at the 2010 exchange rate³⁰. It is a very crude impression, but we expect any overestimation possibly hidden in our approach to be compensated for by the fact that the exercise only considered the hot dry season, that is 90 days out of the 150 day period during which water is usually purchased. The slightly lower prices from Abu Haraz and El Rahad, especially for camels, give a total figure of 26.8 million SDG³¹.

Finally, with regard to the fodder market we can only extrapolate from field observations. Price volatility is high, subject to a great number of variables. At the time of the fieldwork, a producer keeping 200 sheep in the area for the four months of the hot dry season faced a total cost in crop residues of about 1,000 SDG in the area of El Rahad and 2,000 SDG in Abu Haraz, where incoming herders attracted by the watering facilities raise the competition. For the purpose of this exercise we used the lower cost. A calculation against the official number of sheep in North Kordofan in 2010 (7.2 million) gives a volume of business of 35 million SDG per year in crop residues (15.6 million USD at the exchange rate of 2010) from sheep production alone. Not all sheep keepers might need to buy

³⁰ That is 2.23 SDG : 1 US Dollar (<http://www.xe.com/currencytables/?from=SDG&date=2010-05-01>).

³¹ Water in Abu Haraz and El Rahad was sold in 2012 at 0.25SDG/cattle; 0.08SDG/sheep and 0.45SDG/camel.

Table 4. Water for livestock in North Kordofan: an estimate of the annual market value based on prices from the Sudan Water Corporation

species	official estimate number in 2010**	minimum watering over hot dry season (90 days)	SWC price per head per watering session*	value of business
cattle	968,503	30 times	0.2 SDG	5,811,018 SDG
sheep and goats	10,828,960	15 times	0.1 SDG	16,243,440 SDG
camels	1,212,613	12 times	0.7 SDG	10,185,949 SDG
Total				32,240,407 SDG

SWC water for cattle is priced at 0.2 SDG per head for ‘local cattle’ and 0.4 SDG per head for ‘commercial cattle’. Given the conservative approach of this exercise we have used the lower price.

** Based on Behnke and Osman 2011.

crop residues; nevertheless we expect our estimate to hold true as an ‘at least’ figure based on the fact that we have used the lower cost (1,000 SDG) and that the number of sheep in the state might be much higher than the official estimate³². The commercialization of crop residues in North Kordofan began about ten years ago. Crops fail once every three years or more often. Therefore the sale of residues from both harvests and failed crops is likely to represent a significant proportion of the farmers’ income in these areas. There is no information on the exact proportion, but it is common understanding in the region that many

farmers rely on these sales more than on the actual crops. Crop residues in the drylands are known to have lower nutritional value than good pasture. To the extent that rangeland farming survives on the sale of crop residues, land-use conversion has resulted in pastoral producers subsidizing unsustainable dryland farming by keeping their animals on a diet that is of poorer quality than the diet they used to obtain from the pasture before the conversion.

Table 5 gives an overview of the ‘at least’ estimates in this chapter.

Table 5. An ‘at least’ estimate of non-pastoral livelihoods and business depending on primary production under pastoral conditions

Category	Full-time jobs	Volume of business
Market operators (trading)	>1,000	—
Market operators (non-trading)	>10,000	—
Transport of sheep by truck	>250	—
Transport of cattle on the hoof (drovers)	>1100	—
Feedlot operations	>650	18 million USD in feed input alone
Hides and skins	>20,000	exports: 33 million USD
Meat processing for export	>20–100	exports: 28 million USD
Meat processing for domestic market	>1,000–10,000	1.5 million tons
Water market (serving livestock exports)	—	> 4.5 million USD

Continued on next page

³² The most recent independent survey returned a figure of 22.2 million (IFAD 2011. *A Base-line Livestock Survey Kordofan Region 2010*. Unpublished records, quoted in Behnke and Osman 2011: 42).

Continued from previous page

Fodder market (serving livestock exports)	—	> 4.5 million USD
Water market (serving primary production)	—	>14 million USD in North Kordofan
Market of crop residues serving primary production (sheep only)	—	>15 million USD in North Kordofan
Market and subsistence consumption of manure (for brick making, wall coating, fuel and fertilizer).	—	Unknown volume of business. The feedlot operations in Omdurman, alone, produce more than 10,000 tons of dry manure per annum.
Total	>34,000–44,000	118 million USD

Box 8.

Watering in a void of regulation

The watering complex in Abu Haraz is a key service in the region. Every day from March to July the centre is visited by an average of 60–70 herds. About 40 percent of the users are Kababish camel keepers from Sodari locality (more than 100 km north). They come to Abu Haraz because the water there is cheaper. Some 25,000 camels are watered at the station weekly with a turnover of 3,000–4,000 per day. The rest of the time their herders keep them to feed in the area, but as far as 40 kilometres from the centre. During the rainy season, when the camel herds have gone, the station serves the herds of Hawazma cattle keepers, who leave the muddy soils and flies of the Nuba mountains for the high-quality pasture of the northern region. The main watering facility was created in 1976 as part of the livestock route and veterinary stations project. Since 2005 it has been rented out to a private entrepreneur. All in all, there are 20 watering points, 14 of which are also used for irrigation. All are motorized and, with the exception of the main one, they are all privately owned.

Prices are per barrel or on a 'per herd' estimate. A barrel (200 litres) costs 5 SDG. Traders buy water by tanks (100 barrels) and resell it to villages in the area as well as to wealthy livestock keepers within a 20 km range, who prefer to take water to their animals rather than the animals to the water station. When a new herd arrives in the morning, the herder is asked to pay a forfeit sum based on an estimate of the number of animals to be watered. For a camel herd of 35–50 head, the watering price is about 20 SDG. Above 50 head, payment is negotiated depending on the size of the herd. Cattle are watered at the price of 15 SDG for 50–70 head, sheep at 10 SDG for 100–150 head. Depending on the relationship between the owner of the facility and his customers, prices may change. These prices cover a whole watering day, with animals usually drinking twice. The huge concentration of livestock generated by the watering station does not appear to be regulated nor monitored in any way. Once the money is paid, the herder is on his own. There are a handful of watering containers scattered around and all the animals drink from them. In the middle of the hot dry season, the station was riddled with parasites. In the only shade available, under the few acacia trees, people and animals had no choice but to rest on a bed of ticks. Occasionally, the station is visited by officials from the veterinary service and some anti-parasite is sprayed around but not enough to make a difference. The herders lamented the infestation of ticks and exceptionally high rates of mortality from disease amongst their animals.

³³ A government project established to provide water, feed and veterinary services to livestock all along the trade route from Nyala (South Darfur) to Khartoum. The rural water provision and development authority played a key role in the creation of the station. Today the station is run by citizens who rent it from the local government authority.

5. Livestock marketing and herd growth

The historical analysis of livestock marketing from pastoral systems in West and East Africa indicates that producers generally engaged in voluntary marketing whenever the exchange value proved to be higher than the use value (Kerven 1992). This does not mean that pastoralists follow the marketing logic prescribed in the handbooks of animal production. The conditions of pastoral production are usually different, and there is a logic, vis à vis these conditions, in keeping a large herd (Roe et al. 1998) or securing the presence, in the breeding population, of old but competent animals (Krätli 2008). Livestock also provides an important range of financial services – from credit to social insurance – besides the narrow function of animal production (Behnke 2010). Overall, pastoralists rarely have the choice of keeping significant numbers of unproductive animals. An important study by FAO in the 1990s also emphasized this point, saying that it is more common to find unproductive animals in investment herds than in the herds of pastoral households.³⁴ External investors, who use livestock chiefly for financial services and who do not depend on it for their own livelihood, have more freedom to indulge in marketing strategies aimed at maximizing social status and prestige rather than immediate economic return.

Policies promoting livestock marketing in pastoral areas have often been associated with concerns for natural resource management, especially issues of grazing control (Kerven 1992). The underlying argument behind this combination is that a vibrant marketing of livestock would keep in check otherwise ecologically unsustainable and socially problematic ever-growing herds.

Empirical evidence on marketing strategies collected in the course of this study appears to be at odds with this argument and suggests a more complex scenario. All producers in our sample, across the three production systems under analysis, tried to market their animals systematically replacing unproductive with productive (i.e. male, old and sterile are sold and the gains are reinvested in purchasing young females). This strategy, which we call for brevity ‘investment marketing’, was particularly consistent amongst those in the ‘more secure’ groups, operating with fewer constraints.

Given this strategy, at the local scale livestock marketing accelerates herd growth. Although the overall livestock population continues to grow at reproduction pace, investment marketing can trigger periodical concentrations of animals in certain areas by absorbing supply from other areas³⁵. For example, most of the sheep-trade from the greater Darfur and Kordofan regions flows through El Khowei. Sheep producers in the area, if able to operate investment marketing, have access to more choice and more animals than their local production can offer. Not surprisingly, they are worried about the fast-paced growth of their flocks (also in view of the loss of pastoral land to crop farming). The producers in the ‘more secure’ group within the sheep system claimed to have experienced a 50 percent increase in the size of the flock over 2011, only from births. They claimed that in ten years their flocks had increased about 40 percent. The producers in the ‘less secure’ group, having few or no sheep, placed more importance on goats. Their herds of goats were said to have increased by about 22 percent over the last year, including births (15

³⁴ Steinfeld et al.: ‘The perception that pastoralists maintain unproductive animals in their herds for “prestige” rather than economic reasons, is still widespread. This, in the eyes of many, is one of the main reasons for overstocking and land degradation. However, almost all studies on pastoral and agro-pastoral systems show that there are very few unproductive animals in traditional herds (ILCA, 1994). Animals are sold when they have their optimum market weight. Unproductive animals are sometimes found in “investments herds” owned by traders or civil servants who, in the absence of reliable and remunerative banking systems in sub-Saharan Africa, invest in livestock’ (Steinfeld et al. 1997: Box 2.2).

³⁵ Investment marketing would involve a redistribution of livestock, and most likely a concentration of ownership in fewer hands, but *not* an overall increase of the livestock population in an area, only on condition that purchases of productive animals are limited to supply from within the same area.



percent) and purchased animals (7 percent). Herd growth over 10 years was indicated in the range of 20 percent.

As all producers in the system aim at replacing unproductive with productive, the market supply of productive animals mostly comes from producers driven by necessity to sell their capital stock. Young or performing females are only sold as a last resort in order to resolve urgent financial needs. Therefore the speed at which more secure households can implement this strategy, and indeed the very possibility and existence of this strategy in the first instance, is, to an extent, an indicator of troubles or impoverishment in other parts of the system. Indeed, the informants in Tinna described routine herd growth through investment marketing as a relatively new possibility. This phenomenon is likely to embed a virtuous cycle in the changing patterns of livestock ownership, which favours wealthier producers and outside investors. More research is needed in this regard. Besides pastoralist households in difficulty, productive animals are also marketed by farmers or town dwellers with few animals and whose

living conditions place strict limitations on the number of animals they can keep.

Not all the earnings from marketing are reinvested and marketing is not the only channel through which animals leave the herd. Mortality due to disease and abortion is said to have been on an increasing curve for years. People attributed this to the high concentrations of animals and parasites at the watering points, and to frequent malnutrition. Beside mortality, occasionally animals are donated or entrusted to close relatives. In this case they leave the herd but remain in the system (and can be expected to return to the herd in the case of loans). Slaughtering for direct consumption is rare and limited to the celebration of important social events and ceremonies. Another significant factor affecting herd growth, also said to have increased over the years, is livestock rustling³⁶. The payment of hired labour in kind (today not always the case) would also represent a small reduction in the herd, except that these animals are usually kept within the herd until the herder leaves, which can happen after several years³⁷.

³⁶ As most rustled animals end up being sold, this phenomenon undermines animal production to a degree that is not immediately reflected in the working of the markets.

³⁷ Herders and shepherds are expected to keep their animals within the herd or flock under their care, as both a motivation booster and a guarantee of their performance.

5.1 Counterbalancing the frequency of crises?

Although our study has not explored this aspect of the process, we can advance the hypothesis that, to an extent, the accelerated growth rate in the stock of secure households counterbalances the pressure of frequent crises: if the livestock reproduction rate struggles to keep pace with the present frequency of crises, the artificially accelerated stock growth achieved through ‘investment marketing’ might make it. Besides accelerating stock-rate growth, this shift in ownership also represents a transfer of productive livestock towards the management systems that offer the highest returns, that is those based on strategic mobility and known to be correlated to herd size. However, at present this is happening unmonitored and at the cost of increasing the gap between wealthy and poor within pastoral groups, with poorly understood systemic consequences. Possible negative effects could include: *i.* the undermining of the necessary level of social organization within the production system (a system that is not meant to be operated by individual producers in competition with each other); and *ii.* the loss of expert knowledge, especially as the commercialization of *capital stock* opens up the system to outside investors and absentee owners, with little or no ties within the pastoral society and a poor understanding of specialized dryland animal production. Today, outside investors harness this specialization of animals and people from the pastoral system while relying on the pastoral system for its reproduction. It is therefore crucial and urgent to gain a clearer understanding of how sustainable this trend is and where it leads.

5.2 Marketing strategies in the three production systems

Marketing of sheep is systematic and all transactions are money based. Male lambs born during the rains and in the following season (*kharif* and *deret*) are sold at the age of four to five months, that is before the beginning of the hot dry season. Females that have been unproductive for two years are also sold. The newborn animals, when not sold, are kept to suckle for 12 months. As Hamari sheep with a red or blonde

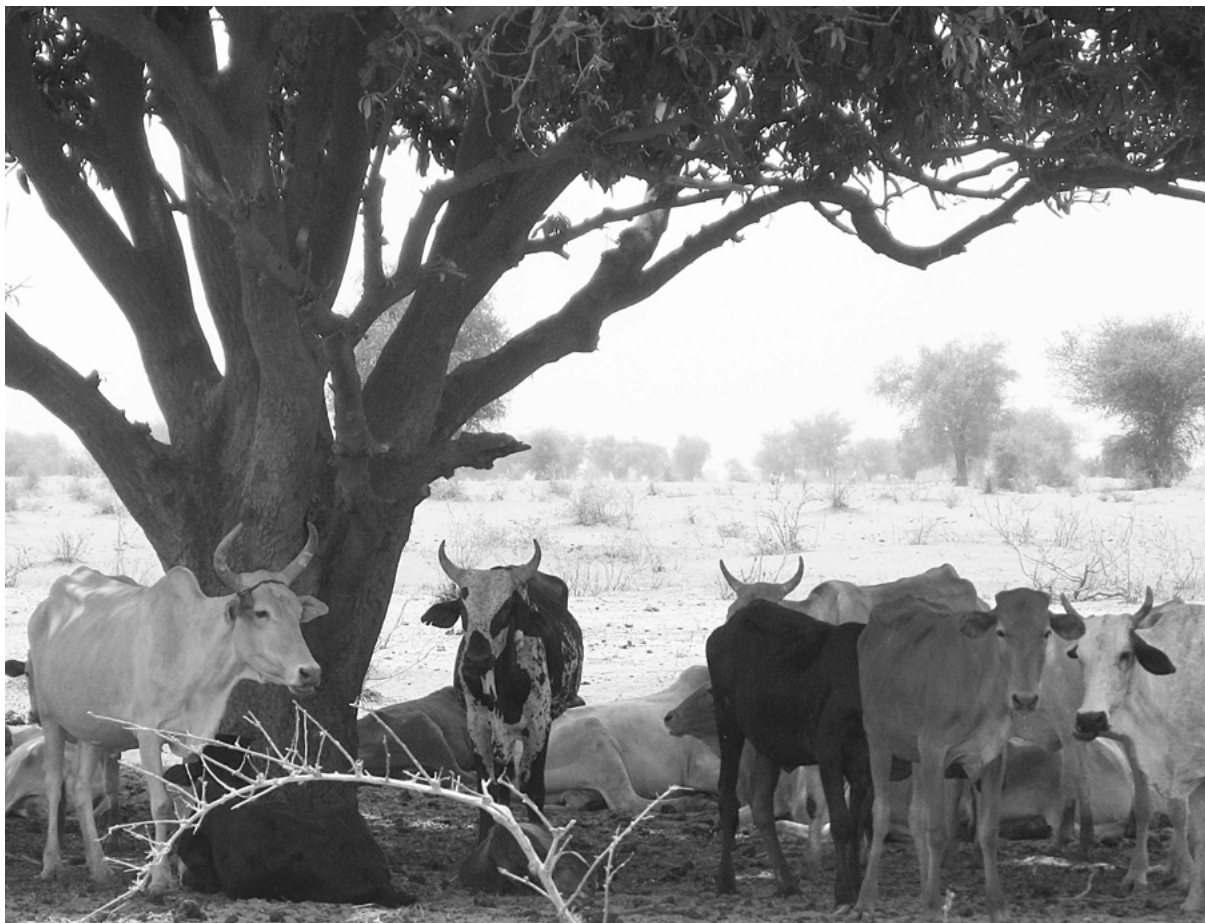
fleece are preferred on the export market (because of buyers’ preferences in Saudi Arabia) the producers select for those colours. Part of the money from the sale of livestock is reinvested in annual vaccinations and veterinary drugs. In the ‘less secure’ group, six to seven-year-old ewes might also be sold, even if still productive. Goats require less supervision than sheep and therefore are preferred by people who must also engage in other jobs (a reason why they are popular amongst women). Most people in the ‘less secure’ group seek to diversify their income. Livestock rearing is often combined with small-scale livestock trade (*ghelaja*) in order to boost herd growth. Throughout the year, animals are purchased in the bush on credit and sold for cash at local markets, especially billy-goats aged five to seven months and females aged seven to ten years. In *ghelaja* trade young animals are preferred as they offer higher profits. These transactions usually remain limited in scale, with the number of animals involved depending on their size (fewer in case of bigger animals). Over the long term, these practices are directed to gradually replace goats with sheep, only keeping a few goats for milk.

The marketing of cattle is concentrated in two periods. Ageing cows and weak animals are culled before the first showers (*rushash*). Bulls are sold in October–November, at the end of the rainy season, when they are in their best condition and fetch the highest price. Part of the money from this sale is used to cover large annual expenditures (grain, clothes, social events and ceremonies) and the rest is reinvested in heifers and young ewes. Occasionally, a good male may be purchased for breeding purposes. Mature bulls (aged five to six years) are taken to Omdurman. The marketing of sheep in the cattle system follows a different strategy, as the flock is seen as ancillary to the cattle herd and ultimately functional to increase its growth. The herders’ goal in the case of sheep is simply to keep their number steady. Sheep are marketed throughout the rainy season to cover for day-to-day needs (food, salt, and the cost of some agricultural practices), and during the hot dry season to also pay for water and fodder. At times, a few sheep may be sold in order to buy a cow or even a camel. Because they allow for more flexible and fragmented marketing, and in this way help to protect the main capital – the cattle

herd – from consumption, sheep are colloquially referred to as the ‘underwear of cattle’ (*surwal*).

Marketing of camels almost exclusively concerned males and poorly performing females. Ideally, the household expenses during one season are covered by the sale of the sheep born in the previous year. Controlling the composition and size of the herds was considered a standard practice. Investment marketing is done in bulk at the end of the rainy season, when the livestock is in best form and can fetch the highest prices. Households in the ‘secure group’ interviewed in Abu Haraz claimed to sell between 20 and 40 camels every year. The investment market also concerned male sheep, sold when three years old. In our ‘less secure’ group, the camel herd and the flock grew through controlled seasonal births, purchases and occasional donations (in this order of

importance). Also amongst these producers, surplus money from the marketing of livestock or from other activities is routinely reinvested in purchasing other livestock, usually replacing males and old animals with young females. Some of the camel keepers met in Tinna were landless ‘nomads’. Their production strategies can be different from the Kababish who can rely on tribal land (*dar*³⁸) for permanent settlements (although some Kababish are also nomadic). All groups tend to keep camels, sheep and goats, but whilst many landed pastoralists in Tinna keep large flocks, the nomadic groups specialize in camels. Marketing patterns are also slightly different. Nomadic producers can save on the costs of keeping part of the family in settlements and consequently can concentrate more resources on investment marketing.



³⁸ *Dar* is used to denote a tribal territory or homeland governed traditionally by a specific tribe, for example *dar* Kababish or *dar* Kawahla. *Dars* are not ethnically homogenous and are usually home to people from many tribes. The Shanabla have no *dar* in Kordofan but they have one in White Nile state. *Dammar*, sing. *damra*, are the semi-permanent nomadic settlements, describing the place where some households set up their homes.

6. Livestock mobility is not limited to ‘nomadic’ producers



As we have seen in Chapter 1, the classifications used to talk about different production systems within the livestock sector rest on the assumption of a clear and permanent distinction between mobile and sedentary producers, livestock keeping and farming. Besides working with some camel keepers classified as ‘nomadic’ (Shanabla, Kawahla), the present study focused on ‘rural’ producers who are associated with permanent villages and describe themselves as semi-nomadic (most of the Kababish sheep and camel keepers in Sodari locality) and sedentary agro-pastoralists (most of the sheep keepers in El Khowei locality and cattle keepers in El Rahad locality). In analysing livestock mobility patterns across this spectrum, we expected to find mobility decreasing in intensity and importance following the steps of classification: high amongst the nomads, moderate amongst the semi-nomads and absent amongst the sedentary agro-pastoralists. Instead, we found a high degree of routine livestock mobility in all three systems, with differences in intensity being above all related to the degree of livelihood security. (See Appendix III Table 1.)

The Nomads Development Council defines ‘nomad’ (*rahal*) as ‘those who travel in search of pasture and water depending on the environmental conditions, across known tracks and the animal stocks for them are the source of life’ (NDC 2012). All the ‘secure’ producers in our sample appeared to match this definition³⁹. Moreover, strategic mobility almost identical in its goal and process to that used by pastoralists is

also used in the livestock trade, when large numbers of animals are moved on hoof during the wet season, taking advantage of a long journey to the terminal market through pastoral land for improving the state of the animals to the point of not requiring feedlotting for export⁴⁰.

It follows from this set of considerations that livestock mobility in Sudan is not a marginal issue concerning nomadic groups only – although nomadic groups, being the most specialized users of mobility as a production strategy, are at the cutting-edge in all aspects of this issue. It also emerges that livestock mobility exists beyond the boundaries of cultural tradition – although mobility is made more effective by cultural assets such as customary institutions for resource management, local knowledge, social capital, and a culture of endurance.

Two key lessons can be generalized. First, the sedentary conditions of livestock-keeping households (as in the case of most of the producers in our sample), does not result in sedentary animal production: settled communities raise their livestock using mobility as their key strategy. Second, trust in the idea that settling pastoralists is a solution to problems rightly or wrongly attributed to the mobility of livestock⁴¹ appears to be misplaced, as the mobility of livestock (with shepherds and herders) continues and even increases as the communities of producers become more sedentary – unless of course they settle because of the loss of livestock.

³⁹ See Figure 2 and Appendix II Figures 1 and 2.

⁴⁰ The same practice has been documented on a larger scale in a recent study of cattle exports in West Africa (Corniaux et al. 2012), from the areas of production in the Sahel (Burkina Faso, Mali, Niger, Mauritania) to the fast-growing livestock markets on the coast (Nigeria, Benin, Ivory Coast, Senegal).

⁴¹ For example, in debates on rangeland management, modernization of the livestock sector and, more recently, issues of conflict between farmers and pastoralists (Pearson 1980; Zaroug 2011; Fahey and Leonard 2007).

There and gone

When the research team in Abu Haraz visited the camp (*farig*) of nomadic Shanabla for the first time (in mid May), the leader of the group was on a scouting trip in search of a good place to camp during the imminent rainy season. On his return, the man announced that they were soon going to move the camp. There were, as we were told, about 15 households camping together. The next day they were gone. With the exception of two to three months during the hot dry season, when they remain in the proximity of a water point, the household is on the move all year round, and especially so during the rainy season. During the dry season they would still move camp every four to six weeks in order to be on clean rangeland close to good pasture. They claimed that moving has been made more difficult by the expansion of crop-farming and particularly following the introduction of mechanized agriculture: farmers that used to cultivate two to three *feddans*⁴², can now plough 50 *feddans* with a tractor.

6.1 The production rationale of mobility

All the herders in our sample, not only the 'nomadic' producers, considered livestock mobility the cornerstone of their production system. Production-related mobility patterns discussed by our informants follow two main criteria: i. maximize production, by reaching the best available pasture in relation to the conditions of the herd (especially important during the rainy season); ii. reduce production costs, by minimizing the need to buy forage and water by reaching areas where pasture and water are available for free or are cheaper (especially during the dry season, or after the first showers at the beginning of the rainy season). Herders from all production systems claimed that their animals feed selectively, and receive more benefit from grazing when they are able to feed on their preferred fodder. The main goal of mobility is therefore to take the livestock where their preferred fodder plants are available.

The analysis of mobility patterns and their role in the system of production shows that producers in all our sample groups operate with a sophisticated knowledge associated with livestock mobility. This is evident, for example, in the subtlety and precision of the language used to talk about mobility in relation to specific functions and seasons, or about feeding selectivity in livestock of different species. For the sake of brevity, we give here only the

example of one of the two 'sedentary' production systems in our sample: the sheep keepers in El Khowei. The mobility patterns of 'semi-nomadic' camel keepers in Tinna and 'agropastoralist' cattle keepers in El Rahad are described in Appendix II.

6.2 Mobility and 'sedentary' producers

The 'settled' sheep producers in our sample practise at least four distinct types of mobility. The mobility during the rainy season, when pasture is more abundant, is considered the most important and referred to as *al munshag*. The strategy of *al munshag* is to keep the flock on the highest quality pasture for as long as possible. This strategy involves scouting on the part of the shepherd before moving the flock to the site. On site, animal nutrition is optimized by moving the flock between different patches (*falla*) according to the same strategy. These pasture sites are about one day trek from the village. The animals leave the pasture site only to be taken to drink surface water (*rahad*), usually within a three-hour range, or to another site. The dense bush during the wet season, especially on the pasture sites, increases the risk of losing animals as they scatter to graze. The particular kind of mobility immediately after the first showers (*rushash*), associated with the animals grazing on the new grass, is called *showgara*. During the season following the end of the rains, sheep are moved

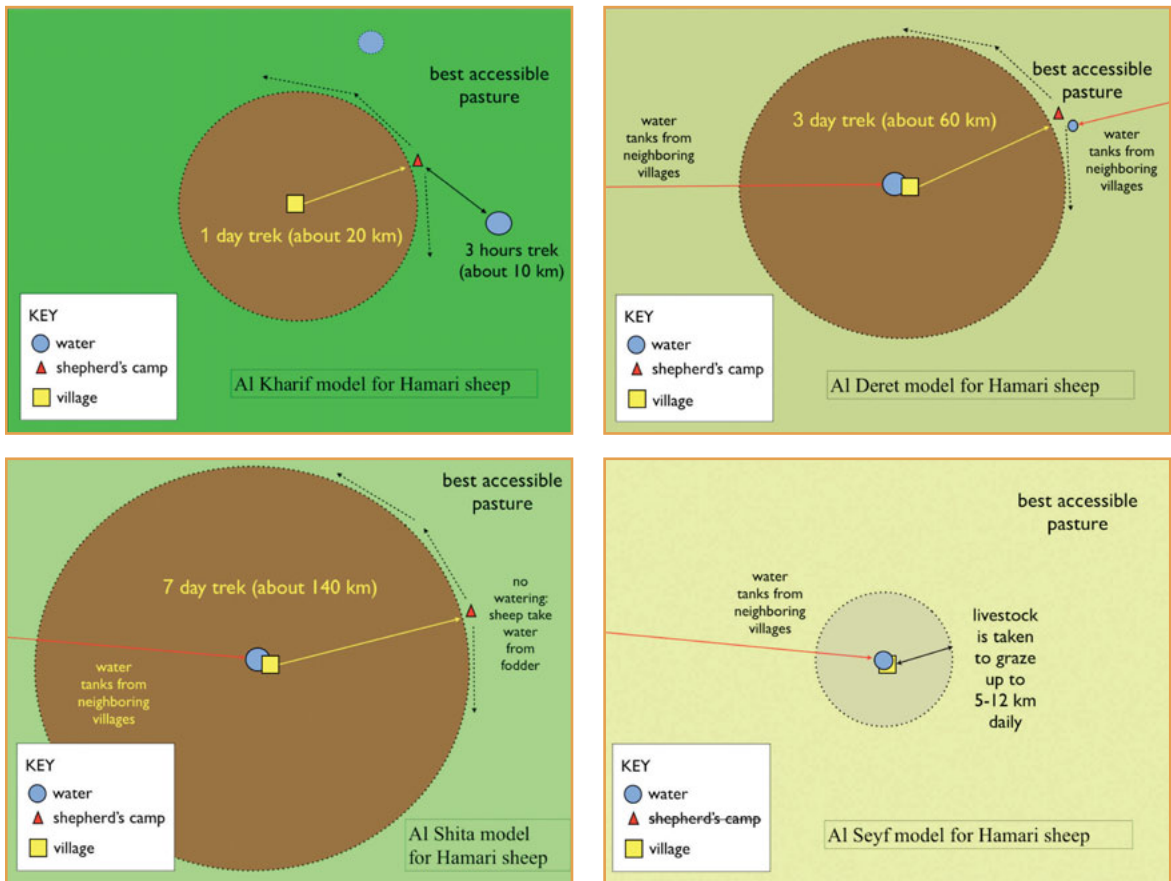
⁴² 1 *feddan* = 1.038 acre.

south (*moatta*). This involves a three-day trek from the village, to reach the pasture. Water is brought in tanks from neighbouring villages. Part of the water is kept in concrete reservoirs (*khazan*) at the village and part is taken to the animals on the pasture. These strategies of mobility are related to the animals' feeding preferences. During the cold dry season, until mid February, the sheep are taken to pasture that is particularly rich in water (grasses such as *argassi* and *abdaib*). As part of this strategy the flock is kept at about seven days trek from the village (some 140 km), but once on site the animals do not need watering (a condition referred to as *jaladat*). Finally, during the hot dry season (*seyf*) the flock is kept at the village and taken to graze daily, not further than 5–12 km. Watering is

carried out at the village, the water purchased in tanks.

The short-distance livestock mobility characteristic of the dry season is called *al misdar*. Households with large flocks move their animals for longer distances in order to secure pasture of the desired quality, and also to keep clear of farmlands. Less secure households are more dependent on crop farming and alternative activities. Their mobility tends to be over shorter distances. Producers are aware of feeding preferences amongst their livestock and try to adjust mobility patterns accordingly. Sheep are known to prefer to feed on *haskaneet* (*Cenchrus spp*), camels like sesame and *hashab* (*Acacia Senegal*, the gum arabic tree), and goats prefer gum arabic trees and *shelenee* (*Zornia alachidiata*).

Figure 2. Sheep system: Seasonal patterns of livestock mobility



Note: The circle represents the area around the village where pasture of the desired quality is not available. Shepherds place their camp on the pasture. The dotted lines represent the movements of the camp. The directions in the diagrams do not represent the directions of the compass. For the meaning of the seasons, see the 'Comparative diagram of seasonality' at the end of Chapter 1.

These preferences are believed to vary from one breed to another. The diagrams in Figure 2 are simplified models of routine mobility as described by Hamari producers in El Khowei.

6.3 Pastoral mobility strategies blending primary production with trade

Mobile strategies are not limited to primary production. Mobility almost identical in its goal and process to that used by pastoralists is also used as a value-adding strategy in livestock trade. Large numbers of animals are taken to the terminal market on the hoof during the wet season, taking advantage of a long journey through pastoral land for improving the state of the animals to the point of not requiring

feedlotting for export⁴³. That traders continue to trek on the hoof, despite the enormous challenges, especially linked with conflict and access, can be taken as a measure of the expected added value. Trade on the hoof is also done during the dry season, but more rarely as the costs involved are higher and only traders with substantial resources can afford to risk the journey at this time. On the other hand, higher returns can also be achieved in this way, because during the dry season livestock prices are lower on primary markets and higher on terminal markets. Overall, the end of the hot dry season is the time when traders can strike the best deals, at least as long as they have the means to keep the animals alive and improve their condition before reselling them.

Box 10.

Trekking and drovers

Cattle, and in a smaller proportion sheep, from the Darfur and Kordofan states are taken to the terminal markets in Omdurman on the hoof by herders (*raa-ai*) hired for the task under the leadership of a 'pasture expert' (*khabeer*). These treks can be from as far as the Darfur markets of Nyala (1200 km) and Fora Boranga (1600 km) and take between 40 days and three months, depending on the season and the conditions of the business. It can take traders in the production areas between one and two months to gather enough livestock for a trip to Omdurman. Two relatively small traders may put their livestock together to lower the costs. Moving 500 head of cattle would require hiring perhaps seven drovers. One of them would need to be a *khabeer*, specialized in finding the best pasture along the way. The ratio between livestock and drovers used to be 60:1, with one pasture expert to every five drovers. In recent years, in order to save on costs as labour became more expensive, this ratio has shifted to 70:1. Hiring these 'lead drovers' costs between 2,000 and 3,000 SDG per trip, reaching 4,000 SDG when risk from insecurity is expected along the way. These figures can be put in context by comparison with the standard wage of 600 SDG per month paid to shepherds in Omdurman. Long-distance drovers are paid about 1,000 SDG per trip, down to 400 SDG for shorter trips. Trekking is usually about 20 kilometres per day, but of course could be different depending on the needs of the trader and the availability of good pasture and water points along the way. If the trek is during the hot dry season, these fees are higher. In the case of a rainy-season trip to Omdurman, the traders start purchasing the animals towards the end of the hot dry season, aiming to start the trek by mid August. When there is no particular reason for hurrying to the terminal market, the rainy season trek from production areas to Omdurman is a slow process, during which the animals are expected to put on weight feeding on high quality pasture, according to a strategy of mobility very similar to that used in mobile pastoralism. Indeed, pasture experts are recruited from the ranks of mobile pastoralism and are herders or former herders themselves.

⁴³ The same practice has been documented on a larger scale in a recent study of cattle exports in West Africa (Corniaux et al. 2012), from the areas of production in the Sahel (Burkina Faso, Mali, Niger, Mauritania) to the fast-growing livestock markets on the coast (Nigeria, Benin, Ivory Coast, Senegal).

7. Knowledge and other cultural assets

As we have seen with regard to strategic mobility, behind the figures on animal production lies a sophisticated framework of cultural assets. Across all production systems and levels of livelihood security, the competence of the producers was regarded as crucial, both to contain a crisis and to manage a successful recovery. This includes not only the expertise of individual herders (for example on livestock health or environmental knowledge), but also its social dimension: the knowledge embedded in the institutions regulating critical aspects of the production/livelihood system, from breed selection to resource management and conflict resolution, from the division of labour to the safety nets of the moral economy. It takes a lifetime to learn the trade and even within pastoral groups only a handful of individuals have the capacity to handle the situations of greatest difficulty – hence the importance of maintaining the social organization of pastoral systems rather than breaking production into

individuals competing with one another.

At a more fundamental level, pastoral production rests on an intangible system of values or moral code that could be described as ‘the culture of the trade’ (see Box 11). Raising livestock in the extreme conditions of semi-arid lands is not a business for the faint-hearted. Herders are alone with large movable capital in remote and unforgiving environments. Even relatively small mistakes can trigger an escalation of problems and send the household down a path of vulnerability from which it will be difficult, if not impossible, to recover. The job takes courage and determination and requires an ideological identity and strong social bonds similar – in structure and function if not in content – to those one finds in other extreme professions such as fire-fighters or military special forces. Whilst there is awareness of the ‘cultural dimension’ of pastoral systems (Casciarri and Ahmed 2009), its role as an asset for production usually goes unrecognized.

Box 11.

Something that is not fungible

At the livestock market, producers prefer to deal with a known broker rather than making direct contact with traders they have no relationship with. There is more behind this preference than the simple hope to sell at a higher price. A story we heard in the field, from a well seasoned trader with an inclination for research, gives a good idea of what this is about. The trader in question tried once, at the market, to jump the middleman. He checked the average price of the kind of livestock he wanted to buy, then made an offer substantially above average directly to the producer, ready to pay in cash. The man refused. Later in the day, the same man sold his animals through his broker for a price slightly below the average. Why did he refuse more money? We can only speculate but the explanation offered by our experienced trader seems material for reflection. In his view, the seller reasoned that behind the high offer by a stranger behaving suspiciously (traders normally operate through brokers) there must have been plans for a much bigger profit, so big a profit that it would have made the deal look like the seller had been taken for a ride. Here is the important point: there is not only money at stake in a transaction at the livestock market. Something else, a less tangible but no less important value is also present and potentially at risk. We can call it reputation, dignity, or simply ‘not to pass for a fool’, combined of course with the power of institutional practice (even if informal) and the resistance to moving outside established boundaries. Whatever the name we prefer, it is something the producer perceives as

Continued on next page

necessary in order to get by in his business and his life. We might understand it by analogy with ‘honour’ for the military, where an honourable defeat may be considered preferable to winning, or staying alive, in a dishonourable way. Such intangible value cannot be traded for money (is not ‘fungible’), therefore it is imperative that a deal is not off-balance. It is not simply money that defines a ‘good deal’, but also the fact that the two parties in the transaction are balanced in their gains: receiving more money under conditions that put your social identity at risk can be a worse deal than receiving less money under fair conditions.

7.1 Knowledge-basis of pastoral livelihood security and productivity

Attention to animal nutrition is key to the producers’ definition of competence in the business in all three livestock systems under analysis: the ability to identify sites with accessible water and a variety of prime fodder plants in the preferred stage of development, as well as the most convenient route to get there (with regard to the need to feed the animals and minimize problems with farmers along the way); the fortitude to spend long hours with the animals while they are feeding; and the attention to what they eat and how much (including providing supplements when necessary).

Mobility, especially over relatively long distances, requires substantial planning. Particularly competent herders (called *mugadam* or *engeeb*) are responsible for collecting information on the conditions of the pasture over large areas and act as scouts for identifying the best place to move next. These kind of scouting missions (*al dour*⁴⁴) can last for several days. During the rainy season, livestock is taken to places where it can feed on the preferred pasture: untouched new vegetation (*addie*). The herders distinguish this pasture from one that has already been grazed upon, called *majkoon*. Even distant rain can be visible on the horizon or detected from the direction of lightning.

Monitoring the direction of rain for the purpose of production-related mobility is called *al tankheel*.

Herd management is careful to minimize stress amongst the animals, which is well known to reduce productivity. For example, in large herds or flocks males are kept in a separate group (*anbar*). Some pregnant females in camels, or (in sheep) old females that have passed the reproductive age, are sometimes kept with them for their calming effect. Newborn lambs are also kept in a separate group (*shoul ghanam*). The newborn camels are not allowed to suckle their mothers’ udders at will⁴⁵. Suckling is controlled by *surar* – making the udders smell unpleasant to the newborn combined with isolation procedures. There might be between one and three studs in a herd. The other males are routinely castrated in preparation for marketing. Good studs are borrowed between households for a few days for breeding purposes.

In the sheep system, pregnant ewes are closely monitored. Amongst the ‘more secure’ producers, ewes with suckling lambs and males prepared for the market are given sorghum flour as a supplement. Breeding is given much attention. Males for breeding purposes are chosen on the basis of the characteristics of the mothers.

We did not specifically look into individuals’ expertise in animal health and were not driven

⁴⁴ During *al dour* a number of scouts travel in different directions collecting intelligence on suitable grazing sites to plan the most convenient strategy of mobility.

⁴⁵ This practice, which might appear contrary to what is known about the beneficial effects of colostrum, was also recorded amongst camel keepers in northern Kenya, where animal scientist Brigitte Kaufmann found that ‘High amounts of colostrum ingested by the calf are considered responsible for digestive problems in new-born calves (in some diarrhoea and in others constipation) especially if the dam is high-yielding’ (Kaufmann 1998: 66).

to this dimension whilst collecting other data. The overall impression from our fieldwork was that producers were struggling in this regard. The problem of ticks was rampant. Almost everybody in all three production systems lamented exceptionally high livestock mortality because of disease and poor nutrition (we carried out our fieldwork at the peak of the hot dry season). At the watering station in Abu Haraz, herders and animals were on a bed of ticks. We saw evidence of deticking practices but also met a sense of resignation and what seemed like a degree of neglect (for example on a couple of occasions we saw sick animals just abandoned to die). Amongst specialized pastoralists, famously attentive to the condition of their animals, this is usually an indicator that the system is under great pressure.

7.2 Division of labour: the example of the camel system⁴⁶

Whether the family is nuclear (parents and children) or extended – including married sons and their wives, or more rarely married daughters and their children – all members participate in the production process. Women have long daily routines duties, from rearing the livestock kept at the camp (e.g. goats and young animals) to fetching water and firewood, the preparation of meals (*al zad*⁴⁷), and the supportive services rendered to the people in charge of the large herds. In nomadic groups (e.g. Shanabla), women are responsible for the household shelter (*shugag*) and organizing its transport when the camp is moved. Male children between 7 and 15 assist men in the care of the herds, especially during the rains and in the following season. Specifically termed *al angaib*, this work commitment reduces the expenses on hired labour and enables the men to engage in other jobs. Today, many young men waiting to start their own family leave in search of quick gains with gold mining.

Adult men manage the large herds of camels and sheep especially during the dry season and the transition to the rainy season, as well as

during the long migration to *al gizu* areas in the north. The most senior (aged 45–60) play a key role in identifying better pasture sites (*dour*) to move to and supervise the shepherds (ideally the elder sons) in all herding related activities. When pastoral labour demand is lower (e.g. during the rainy season and approximately until October), these men often engage in other income-generating activities such as seasonal jobs elsewhere. Older men (70 years old and over) usually remain at the main camp for consultation and supervision of household activities. There are well-established forms of co-operation with regard to executing major tasks such as washing and shearing of animals, branding, treating sick animals, and providing help (*al faza*) in the form of ‘gatherings’ (*nafeer*) against robberies.

Even so, a significant proportion of the herding is done by hired shepherds (*arrawaeya*). These might be paid in kind or (increasingly) in cash. Payment in kind is on annual basis, for example a camel, or distributed throughout the year in the case of sheep (for example 25 lambs, but born in different seasons). Payment in cash is made monthly. The demand for hired labour is especially high during the last months of the hot dry season from March to May, when very few households, including those in our ‘less secure’ group, can do without extra help.

7.3 Specialized labour, education and livelihood

All throughout the sample, our informants claimed that one of the most direct threats to the livelihood security of their household is the lack of dependable labour. Three main causes were highlighted: schooling and a loss of interest in pastoralism by the generation now between 15 and 25, recently accentuated by the promises of fast gains from gold mining. For children in impoverished pastoral households school is the main option, as mobility becomes redundant, labour demand drops and the family tries its luck settling by an urban centre. On the other hand though, our informants pointed out that well-off pastoral households with children in school are at

⁴⁶ See also Appendix III, Tables 2–5.

⁴⁷ The term *al zad* refers to meals prepared almost always by women and particularly for long and short distance migrations. Food items of *al zad* are dried meat, flour, onions, oil, etc.

risk of impoverishment if, as a consequence of schooling, too much of their dependable and competent labour is drained out. They claimed that school takes their children away from learning the family business and all too often indoctrinates them in ways that make it very difficult for the children, if not impossible, to return to the village and make a living with livestock keeping. Even those few who complete their education to the primary or secondary level seem to have but scanty opportunities to make a living with it. Most of our informants manifested a vivid interest in education and a burning awareness of the inequity associated with the lack of it, which only put them in a worse dilemma about using the available services or keeping away from them.

Across the three production systems, access to competent and dependable labour and the capacity to supervise the work in person were ranked at the top of the list of requirements for a successful pastoral business or a quick recovery from a crisis (see Appendix III Table 1). Hired labour is used both in animal production and in agriculture, but it is more expensive in the former. In the cattle system, hired cattle herders were paid around 300 SDG per month; shepherds received 400 SDG per month. The higher wage reflects the difference in workload

and specialization. With cattle, the herder moves to the pasture area for one or two days then must go back to the water. Shepherds on the other hand stay on the pasture for longer periods (more than five to six days at times). Besides, in certain seasons sheep must be grazed at night, which is a difficult task requiring maturity and experience. In the camel system around Tinna, the monthly salary for a shepherd was as high as 500–700 SDG⁴⁸.

Hired shepherds and herders usually prefer to be paid in kind. This is because there is more value in animals than in money, especially if the final objective of the labourer is to build his own herd or flock. However, according to our informants the preference for cash is on the increase. The reason is likely to be in the timing of payments: annual in case of payment in kind and monthly for cash. With the annual payment in kind the owner of the livestock can exercise more control on the shepherd's performance but takes upon himself the liability associated with the animals earned by the shepherd in the course of the year. On the other hand, young shepherds may want to use the job to finance other options without waiting for a whole year, for example trying their luck with gold mining; or they simply cannot afford to wait a year before receiving the first payment.



⁴⁸ Equivalent to 150–210 USD at the official exchange rate at the time of the interviews (mid May 2012).

8. Integration, adjustments and distortions in the strategies of production

Integration of livestock rearing and crop farming can take place at different scales, from farm-level systems (mixed farming), to a regional system with mobility allowing specialized livestock keepers to interact with specialized crop farmers on a seasonal basis, when harvested fields are manured by transhumant livestock feeding on crop residues. There are advantages and disadvantages to these different kinds of integration, but sustainability seems to increase with scale. A study looking at farm-level integration in the West African Sahel, observes that '[a]s crop expands, local rangelands are subjected to increasing grazing pressure during the wet season, that is at the time when herbaceous vegetation is most sensitive to grazing: this can lead to rapid degradation, either through severe reduction of herbaceous cover and production [...], or through encroachment of an unpalatable weed'. The study concludes, against policy-makers' inclination to promote mixed farming over pastoralism, that such '[c]rop-livestock systems are known to present a higher risk of management-driven environmental degradation than pastoral systems' (Hiernaux and Turner 2002: 144, abstract). An earlier study in North Darfur also found great land degradation resulting from mixed farming as compared to nomadic systems (Ibrahim 1984).

With a few remarkable exceptions⁴⁹, the only time in the year in which livestock on rain-fed pasture in Sudan can put on weight is between the growth of the first grass (June) and the beginning of the cold dry season (December). This is a longer period than in most Sahelian countries but still a relatively small window of opportunity. To be able to implement livestock mobility strategies at this time is crucial to the efficiency and sustainability of the system. This is also the time of crop farming. With more and more rangeland converted to other uses or managed under restricted access (UNEP 2007), and with administrative pressure to move as little

as possible across states and even smaller administrative areas, livestock keepers are compromising their strategies.

Integration of crop and livestock systems at the regional scale is affected by the interruption of long-distance transhumance (due to insecurity and/or the administrative constraints with regarding to crossing the new border). Scaling down integration has increased competition for crop residues, both with farmers and between pastoralists, increasing the risk of conflict and further limiting the chances of recovery for the less secure households in the pastoral system (often women-led), as the basic costs of animal production swell. However, it is important to remark that, at least for the producers who have interrupted the long-distance annual transhumance across geo-ecological zones, the mobility of livestock has decreased in scale but increased in intensity.

Production-related mobility is inhibited by shortage of livestock. Across the three production systems under analysis, the capacity to engage in production-related mobility was seen as a mark of wealth by both 'more secure' and 'less secure' producers (men, women and youths). The superior nutritional regime associated with this kind of mobility is critical to the production of high-quality animals for the export market while minimizing the dependence on expensive feed supplement. More generally, the capacity for mobility was related by all groups to the capacity for engaging in 'investment marketing', as the condition for a sustainably successful business. The households in the 'less secure' groups had limited livestock mobility patterns (although individual members would move in search of work or as waged herders for wealthier households). They tried to use water points close to trading centres, and resorted to long distance movements only in case of absolute necessity.

⁴⁹ For example the exceptionally good *gizu* pasture in the north west, available in certain years during the cold dry season, now made inaccessible by insecurity and apparently reduced in frequency.

8.1 New patterns of mobility

Cattle and sheep systems have partially adjusted to the loss of resources following the interruption of the transhumance by increasing the length and frequency of medium-distance movements.⁵⁰ Long periods of short-distance mobility over pasture areas linked by a long transhumance have been replaced by an almost permanent medium-distance mobility. This has significantly altered the annual distribution of livestock, creating permanent concentrations in certain areas against the best judgement of the producers. Both the producers and technical staff in the state and local administration in North Kordofan manifested concern for the potential consequences of this state of affairs on the condition of the pasture, already jeopardized by previous mismanagement (UNEP 2007; Zaroug 2011).

In the sheep system, Hamar shepherds from neighbouring villages used to combine their livestock for a long-distance transhumance at the beginning of the rainy season. They travelled up to Ubadir, at the far north of Kordofan, and stayed there for about three months. They could then spend the rest of the year relatively close to their villages. Neither such a long-distance transhumance nor large-scale operations are practised today. Current strategies of mobility are said to follow from exceptionally high stocking rates in the region because of the inflow of herds from Darfur and other parts of North Kordofan. Fodder shortage was also attributed to the expansion of rain-fed cultivation. In what seems like a vicious cycle, the new kind of mobility frees labour at the time of crop farming and allows more opportunity for cultivating (as people are close to the fields during the rainy season) and trading. The residues from boosted crops (watermelons, hibiscus and groundnut husk) compensate only partially for the shortage of fodder they contribute to. Thus, in order to stretch as much as possible the period the animals can graze on green or relatively wet grass, and minimize expenditures on fodder, the flocks now are kept on the move for three quarters of the year.

The cattle keepers met in El Rahad told a

similar story of reduced migrations and increased mobility. Before the second civil war (1983) their mobility was over longer distances but more concentrated in time. Between the migrations to the south and back, people could keep the herds relatively close to their camp, 'sending' them in the morning to graze and simply going to get them in the evening. They had access to good-quality pasture. Local Omdas⁵¹ in the South offered grazing areas on harvested farms, also in order to manure them. Regular and protracted contact across distant groups of producers sometimes resulted in conflicts, but also in trade, friendships and intermarriages that strengthened their relationships. This system also allowed the livestock more opportunities to graze at night and better fed animals gave birth more regularly and produced more milk, allowing for the milk economy, controlled by women, to continue also during the dry season. Livestock is now kept on the move for the entire hot dry season. Rather than south towards available resources, the herds have now to be taken north, either to areas at the limit of their physical capacities – as distant as they can go away from the water point but still not of great quality – or to even more distant pastures where the water has to be shipped by truck at great cost. Spending the dry season in the North means that the pasture finishes before time (by March–April) and the herders have to buy fodder. Those who can afford it, buy crop residues immediately after the harvest, when it is cheaper as good pasture is still available. Some of the producers in our sample pointed out that keeping the herds on a regime of intense mobility across unfamiliar areas during the hot dry season is a last resort that reduces productivity, especially milk, and increases mortality from disease and exhaustion, as it places extra stress on animals that are already stretching their resources. The new patterns of mobility also cause considerable stress to people, as households now remain split for most of the year in order to secure the necessary labour with the livestock, and the most vulnerable members of the household at the village, especially young children and women, are cut off from the bulk of the milking animals.

⁵⁰ For changes in mobility and household economy among camel keepers, see Appendix III Tables 3 and 5.

⁵¹ The leader of the smallest administration unit (omodiya). Omodiyas were introduced in Sudan in 1911 (Cunnison 1966).

The recent restrictions on seasonal cattle migration to South Sudan (or back) from South Kordofan, has had a severe impact on the *baggara* (cattle herding) households' long-term capacity to produce, especially the landless pastoralists, both directly and indirectly. Directly, by closing access to important grazing reserves and consequently introducing important and still largely undescribed distortions in the complex circulatory system of livestock in the country. In some cases, the herders with part of the livestock in South Sudan have been cut off from the rest of the household in Sudan, unable to return. Indirectly, because the extraordinary grazing pressure it triggered elsewhere led to undesirable social dynamics and unhelpful (if understandable) reactions at local level, such as the refusal to sell fodder to the newcomers or to let their animals graze. However, the new international border is not the only border-related obstacle to pastoral production: there are locality borders, tribal borders, state borders, all involving particular fees and regulations. Often localities impose 'self aid' fees on incoming pastoralists and, in some case, other customs related to the 'local regulation for pasture use' (*rafa al assa*) at the beginning and end of the agricultural season. States impose a fee on incoming pastoralists every time they cross their borders with their livestock. Between North and South Kordofan, that is across vital transhumance corridors, this fee is respectively 6 SDG per head of camels crossing southwards and 3 SDG crossing northwards.

8.2 Litigations

The cattle at the dry-season camps used to be fed free of charge on crop residues or (more often) failed crops in the farms. People had a

name, *talaig*, for the time when livestock were allowed to enter the farms. That was before the notion of property in farming shifted from crop to land (see Chapter 1.1 above). Over the last 10⁵² years people who were freely granted land *to farm* have started to consider their property not the crops they produce but the land itself and whatever is on it, following the example of the tenants of mechanized farming schemes⁵³, and now ask money for crop residues and for failed crops too. The commercialization of crop residues and failed crops means that the risk of trespassing (therefore the necessity to closely monitor the herds – with all the implications in terms of labour demand and potential conflict) is now extended to the post-harvest months when in principle cultivated fields are open to the livestock (and return to be a pastoral resource). This sometimes leads to problems between neighbouring farmers and even between herders. For example, animals legitimately feeding on purchased crop residues in a farm, may trespass into another where the residues are not on sale (because the farmer needs them for his own livestock), or have already been sold to a different herder.

In the past, litigations between herders and farmers were dealt with by the local Sheikh or the Omda using customary law. Recent years (especially following the politicization of the Native Administration since the late 1980s) have brought a culture of mistrust and a disregard for tribal authorities and rules governing these practices⁵⁴. The respective roles of customary and formal law and institutions have become confused, opening opportunities for 'forum shopping' (people appealing to one system or the other according to their convenience). Now, according to our informants, it has become common for farmers to complain directly to the

⁵² From the perspective of our informants, but recorded earlier elsewhere (Osman 2013).

⁵³ The relatively inexpensive leases in mechanized farming schemes are granted for a particular form of use, but often interpreted in practice as plain property on the land. There are records of leaseholders charging nomads fees for the use of natural vegetation on untilled land (Schlee 2012).

⁵⁴ Analysts have pointed out that considerable social capital is built up as a by-product of the negotiations around the use of common property resources between communities; conversely, they highlighted that dialogue and trust between communities is broken down as a by-product of the privatization and commercialization of once informally exchanged resources (Hesse and MacGregor 2006). The phenomenon is also inscribed in the wider issue of the relationship between customary institutions and formal law, with the related problem of 'forum shopping', when disputing parties use the existence of different fora for the settlement of disputes to strategically pick only the norms that support their claims (Lund 1998; Toulmin 2009).

police. The procedure followed in these cases is to confiscate the livestock and arrest the owner, waiting for his relatives to negotiate a solution. It is known that in some cases the owner of the livestock was punished directly by the police. Litigations are supposed to be addressed by a technical state committee which includes the police department amongst other members. When a complaint of trespass is filed, the committee is supposed to visit the site and hear the litigants. In this potentially delicate negotiation, the police are meant more as a back up and last resort than as the main operator. Unfortunately, as it happens, the police representative is the only member of the committee that has access to transport so in practice they are often the only ones to intervene. Amongst the factors that would contribute to strengthen their production system,

people emphasized their longing for a guarantee of security for people and animals moving on the rangeland, and a guarantee of justice in the assessment and handling of incidents of trespass.

8.3 In and out of mobile production

Rising costs of production (for feeding, watering and moving the animals) are a heavy burden on the less secure households, especially if in combination with other causes of stress (e.g. an epidemic or a long dry spell). When slowly pulled out of the mobile production system, pastoral households turn their resources to farming and/or activities such as brick making and handicrafts, with the aim of rebuilding the herd. The youth go to the city (Khartoum) looking for daily-paid jobs and selling handicrafts, especially during the hot dry season,

Box 12.

A Conflict Resolution Centre in Abu Haraz

In operation since 2010, the centre is one of three of this kind established by IFAD-WSRMP⁵⁵ in North Kordofan at the request of the farmers' and pastoralists' unions. Customary institutions for the management of conflict, such as the Ajaweed committee, now operate through the Centre in the form of two bodies: the executive committee and the advisory council. The nature of the case dictates the composition of the Ajaweed committee. In a hearing for a litigation between two married couples, the Ajaweed committee was formed by two elders, two middle-aged people and a youth. Only one of the elders was also a formal member of the Centre. Two of the committee members were related to the two couples. The Centre operates independently from the Police Department, although police officers may at times be selected for the Ajaweed committee. If the litigation has resulted in physical injuries the police may take over the case. Even in those cases though, if both parties in the litigation request that the case is transferred to the Centre, the police may agree once the legal procedures have been satisfied. Claims raised in the rural court may also be transferred to the centre upon request by both parties. About 45 percent of the cases handled at the centre concern allegations of crops damaged by livestock. Also, some of these litigations are between local people, many of whom own livestock. During the dry season, most of these cases concern claims of gum arabic trees damaged by camels. Hired herders are more frequently involved in incidents than owners, but this might simply reflect the fact that the greater part of the herds watering in Abu Haraz are managed by hired herders. Frictions with farmers also occurred with herds moving to and from the watering station as well as in and out of the area at the change of seasons, for example in January–March as the camel herds arrive from the north through the gum arabic belt; or in June–July when the camels leave and the cattle herds arrive from the south; and in October when the cattle leave but the crops are not completely harvested.

⁵⁵ Western Sudan Resource Management Programme.

or they try their luck at gold mining. Within our sample, including both 'more secure' and 'less secure' producers in the three production systems, livestock was considered the long-term option associated with the highest returns. Those abandoning a direct involvement in primary production, by necessity or by desire, often tried livestock trading.

Impoverished pastoralists in the camel system can find help through two main informal 'moral economy' institutions common between relatives: *al rasmala* and *al manieha*. The first one consists in donating a productive female. The second consists in entrusting a productive female (sheep) for one or two years so that the relative can use its milk and keep its offspring⁵⁶. In the

view of the Kababish herders in our sample groups ('more secure' and 'less secure'), relatively few people, even amongst those hit by a crisis, abandon pastoralism altogether. The main causes of drop out are the lack of a functional herd and the attractiveness of easier gains from other activities, especially gold mining. Drop out can be only temporary, with the remaining animals entrusted to some relatives whilst looking for extra cash or by taking up a job as a hired shepherd. Even in the face of today's exceptional challenges, according to the informants the majority of households remains in pastoralism, and amongst those who drop out, most invest a great deal of effort trying to get back in.

Box 13.

Dropping out and getting in again

A herder who had become too poor for generating any significant growth in animal production turned to gold mining as an alternative way of accumulating capital. He acquired enough gold to invest in a herd of camels and a flock of sheep, as well as purchasing a 4x4 vehicle.

A young man was expelled from his household as his father found him not sufficiently committed to his work. This son then worked as a hired shepherd. Being paid in kind, he managed to build up his own herd and, after 20 years, he is now a wealthy man with productive herds of camels, sheep and goats.

In the sheep system, poor households can be entrusted with livestock for a certain period, a practice called *wedaa*. The informants in our samples believed that impoverished producers, provided that they are well skilled in the business, can recover from their losses and rebuild a flock in about four years. Out of 32 men born in a family from our 'less secure' group over three generations, 20 made a livelihood in pastoralism (about 60 percent)⁵⁷. In a family from our 'more secure' group, also over three generations, only two men out of 35 dropped out. This said, our informants showed scepticism about the options of their children now between 15 and 20 years old. Across both groups in our sample, there was a common

impression that expertise in sheep rearing was in decline and that this phenomenon will eventually lead to an increase in the number of people dropping out of production. Livelihood alternatives mentioned by the informants were: investing in trade, or migrating to an urban centre to look for a job. For the youth, this also included education (for employment) and gold mining. The young men interviewed at the village felt that with the current high levels of stocking the system has reached saturation. They saw no opportunities for themselves in sheep rearing. Although all the sheep raisers in our sample were also cultivating crops, no one, adult or youth, mentioned farming as an alternative livelihood in case of failure with the flock.

⁵⁶ This is also common among cattle pastoralists in south Darfur: especially in a year of food shortage a productive cow may be given to an impoverished relative. The loan and the loaned animal are called *shailaa*.

⁵⁷ Indeed, the proportion of those who remained in pastoralism is a little higher because five of the nine people who were no longer in pastoralism at the time of the research belonged to the same household, and when the head of the household dropped out, four sons followed him.

In the cattle system, informants from the 'secure' households ranked good animal nutrition as the most important basis of livelihood security. This included monitoring the rangeland for the best-quality pasture (a process called *rowagha*) and reaching it with the herd when it is still prime. Producers from the 'less secure' ranked the frequency of crises (from lack of access to pasture or epidemics) as the main threat to security, as the increased livestock mortality, lower calving rate and milk production associated with crises jeopardize one's chances of rebuilding the herd. Severity and duration of crises, although dangerous in the short term, were seen as less problematic than frequency and the overall context in which they happen. Even severe droughts do not automatically trigger a spiral of impoverishment. People emphasized that if many of the households who were rich in the 1980s are now poor, there are cases of others who were poor at the time of the drought and are now rich.

Issues of management and labour were also mentioned as threats to livelihood security: having to take care of the herd without any help; leaving unsupervised children entirely responsible for the herd (when one cannot afford to hire herders); and having a very large household with a prevalence of young children and elderly people. If frequent crises lock you into a poverty trap, lack of trustable labour was seen as the most immediate cause of impoverishment. This might happen when children decide to abandon the family business as they grow up, or move to town as they enrol in

school. In the second case, the head of the family might be ill or working elsewhere; the absence of competent supervision is expected to result in poor nutrition (the animals 'not feeding on good pasture') and a higher number of animals getting lost. In the third case the high proportion of dependents involves high expenditures, especially during years of drought, which as they need to be covered by the sale of livestock jeopardize herd growth. Besides specific factors, people in this group also mentioned loss of access to pastureland as a generalized, long-term trend. This is both the result of ongoing conversion of pastoral land to cultivation and the indirect consequence of the increased risk of armed robberies and conflict (including conflicts in South Kordofan and along the new border with South Sudan). Both causes place stress on the system of mobility, disrupting or complicating its functional patterns and increasing the need for costly conservative movements with no direct return on animal production. All surplus money is invested in purchasing livestock, starting from goats, then sheep and cows. When the whole herd is lost, recovery may take 20–30 years. Besides dropping out, in only very few cases were people known to have intentionally abandoned animal production for a job in town. The analysis of three family trees amongst this group found only a relatively small number of family members (men) had dropped out of pastoralism over the last two generations: three out of nine in one family, two out of 14 in the second and two out of 26 in the third.



9. Final remarks and recommendations

9.1 Final remarks

At the beginning of this report we promised a new perspective based on the latest developments in the scientific understanding of pastoral systems and their lessons on turning environmental instability into an asset for food production, especially in light of global climate change. In order to keep our promise, we took a step back from traditional ‘self-explanatory’ classifications of livestock systems and, instead, questioned the producers about their actual strategies.

The previous chapters have presented the data from our study articulating the economic value of three livestock management systems from various angles: the strategies of production and marketing, and the shared foundation of strategic mobility of livestock; the value of cultural assets and particularly the economic role of pastoral ideological identity; the scale and distribution of pastoralism’s support to livelihoods outside primary animal production; the cost of past and present distortions to the functioning of these systems; the importance of economic sustainability and the expectations of the new generation of producers.

The overall picture emerging from the three different production systems analysed in this study suggests that classifications based on a divide between ‘sedentary’ and ‘nomadic’ might put the emphasis in the wrong place. While there are undoubtedly differences between camel, sheep and cattle systems in North Kordofan, including along the nomadic/sedentary axis, these differences do not appear to be fundamental with regard to livestock management, in particular with regard to livestock mobility. On the contrary, a fresh look at the production strategies as described by the producers themselves shows that livestock mobility (in combination with livestock feeding selectivity) is a crucial principle of production across the three systems. Both ‘nomadic’ and ‘sedentary’ producers consider livestock mobility strategies – with the basis of cultural assets, institutional environment and resource access

that make them possible – key to the success of their business. In our view, the strategic link between this role of livestock mobility and the structural instability of the operating environment makes these findings relevant, at this fundamental level, for most livestock systems in arid and semi-arid lands in Sudan and at the regional level.

In our sample, obstacles to long-distance transhumance only resulted in a distortion of mobility patterns, actually increasing their intensity (with implications for range management) and triggering adjustments in the composition of the households now frequently split between herding and non-herding members (with an impact on social reproduction). The full range of implications of this change is still poorly understood, especially the impact, on women and the efficiency of the milk economy, of the physical separation of the herd, with the bulk of the milking animals, from the non-herding section of the household.

The way these production systems responded to limitations on mobility can be compared to the effects on ‘circulatory’ systems (e.g. blood, but also transport, water or money) when constraints to circulation are applied: increased pressure, forced outlet in undesirable directions, dysfunctional concentrations in certain parts of the system and cutoffs of others, drop in the overall efficiency. When approached in isolation (e.g. from a sectoral perspective) these problems might appear to be solvable by stopping circulation altogether. From a systemic perspective, of course, this is hardly a ‘solution’. In our case studies, mobility of livestock decreased and finally stopped only for the ‘less secure’ households in the systems, as vicious cycles of increasing vulnerability and lowering productivity pushed them out of business.

Most of the distortions to the functioning of livestock systems today are the legacy of history, but history is being made all the time and Sudan is at a particularly charged moment. In this final chapter we look at the future. Representing the bulk of a livestock subsector that ‘is by value the largest subsector of Sudan’s domestic economy,

larger even than petroleum' and (in 2009) about half of combined agricultural exports, pastoral systems have become the driving force of Sudanese agriculture (Behnke and Osman 2011: 7).

With global climate change, these production systems have also become interesting for their specialization in taking advantage of ecosystems where unpredictable variability is a characterizing feature (e.g. AU-IBAR 2010) – in other words for their capacity to turn environmental instability into an economic asset. Today, comparative advantage for investments in agriculture in regions like North Kordofan, is peaking in pastoral systems and expected to further increase with global climate change. However, while the modernization of pastoral production is long due, if this path is to be pursued current sets of problems and solutions in pastoral development need re-qualifying.

Efforts to modernize animal production in arid and semi-arid areas have so far identified pastoral systems with the past. Operating on the assumption that development necessarily leads animal production out of pastoralism, modernization programmes have rarely, if ever, invested in pastoral systems as such. Instead, they have invested in facilitating processes of transition to ready-made modernization packages, but have rarely mobilized *new* research and technological development in order to modernize *existing* production systems, potentiating the strategies and facilitating the conditions that make pastoral systems economically successful and ecologically sustainable. It was left to the producers themselves to fill this void as best they could, through self-funded and spontaneous initiatives on an opportunistic basis (e.g. the unprompted and yet incredibly fast spread of mobile phones despite the obstacle of illiteracy). Another example of this kind is the system of portable watering points developed in the region of Sodari. This system is discussed below, before the final section on recommendations, as a way of introducing the idea that processes of modernization do not have to be an alternative to pastoralism but are perfectly possible – if fundamentally different from the way they have been traditionally promoted – also *within* the logic of pastoral production.

A case of spontaneous modernization

Abdul Qader used to keep sheep and a few camels around Tinna. When migrant in Saudi Arabia he saw small-stock pastoralism on the mountains and decided to try it at home. Twelve years ago he took his flock of Kababish desert sheep and some goats to the Khatoul Mountains, about 25 km northwest of Tinna. His plan was to set up camp at the foot of the mountain and graze his animals on the pasture at the top. The mountain offered a large variety of fodder plants beneficial to the flock and the harsh environment was a promise of low competition. The flock took one year to get accustomed to the new environment. During the first three months the animals nearly starved to death. Their soft 'desert' hoofs wore off on the rocks. They did not know how to climb or how to find their way. A few were lost. From the second year, the new hoofs were stronger and production increased. These days their diet is so good that twins are frequent. Abdul Qader moves his camp targeting the best pasture from the beginning of the hot dry season up to the beginning of the rains. During the rainy season and well into the following season (*deret*) he waters his flock using surface water and ponds in natural cracks in the rocks up the mountain. During the dry season, the animals depend on a 12,000 litre water bladder periodically filled by a truck. For the household's needs, Abdul Qader uses a smaller water bag that fits on the back of his pick up. The pick up makes it relatively easy to reach Tinna and we saw a solar panel outside one of the huts at Abdul Qader's camp, used for charging the mobile phone and operating a laptop. There are four other households operating in the area now and following a similar strategy. Apart from the relative isolation, the main problems are the losses from jackals and foxes and the lack of services, especially education for the children.

A large number of livestock producers in Sodari locality manage water requirements for the household and for the livestock making use of large water bags known locally as *girab* (sing. *girba*, *bladder*). The bags are made in Brazil, traded from Saudi Arabia via Omdurman. They come in different sizes, from small enough to fit full on the back of a pick up, to up to 18,000 litres. Made of flexible heavy-duty plastic similar to that used in inflatable motorized boats, these

bladders, looking like gigantic water mattresses, were introduced in the area about five years ago. Used by herders as portable water sources, they offer an imaginative solution to the thorny problem of settlement and land degradation around permanent water points for pastoral production (see Box 8 and Box 14). The herders place these bladders strategically to serve the camp or to enable animals to exploit otherwise unreachable good-quality pasture, and have them filled by a commercial cistern truck (sometimes using two or more bags along a planned route). A water-transport business has rapidly developed around their use. As soon as better pasture can be found elsewhere, even the largest models can be transported empty on camel back. A 12,000 litre bag was said to cost about 3,000 SDG in May 2012. Filling one up in the bush of Tinna cost 250–400 SDG depending on the terrain and the distance from town. One full bag was enough to water 300 sheep five times, lasting about 45 days during the cold dry season and 25–30 days during the hot dry season when the watering interval is shorter.

The introduction of this system of portable watering points has opened up new ways of using not only water but also pasture. Water development schemes in pastoral areas, not only in Sudan, have been aimed at increasing production by opening up new rangeland to grazing. However, they always operated on the assumption that water had to be ‘found’ locally and made available from a fixed and permanent service. As in all service provision, the search for economy of scale led to a preference for large watering plants. The unwanted consequences of this approach are well known (Cotula 2006; Babiker 1996). Portable watering points, on the other hand, match access to water with the

selective and transient use of pasture made possible by strategic mobility. In our sample, they served only the ‘more secure group’ in this way, as the ‘less secure’, whether or not they owned a bag, could afford only limited mobility. Depending on large watering plants leads shepherds to make use of a pasture area for longer than they would ideally do, because moving to another watering point is costly. With water bladders there are higher running costs for refilling, but shepherds can organize a delivery to another pasture site as soon as the quality of the fodder is expected to be better elsewhere. The additional cost for water is compensated by improved nutrition and saving on fodder. There is likely to be little or no impact on grazing pressure, either positive or negative, as bags are only used during the dry season, when grazing pressure on grassland is inconsequential. Yet, water bags don’t come without challenges: they allow shepherds to bypass the usual land management based on the control of wells, generating a whole new family of resource management issues. There are also concerns for the possible impact of heavy-vehicle traffic on fragile soils. Some shepherds heard of a drop in the reproduction rate in sheep regularly watered from these bladders, explained by the high temperature of the water. We present this case not as a silver bullet but only because of its unusual match with pastoral production strategies, which is largely the reason for its popularity amongst the producers. A similar or better match could surely also be achieved in other ways; thus what matters to us in this example is not the *solution*, ‘water bladder’, but the *approach*, ‘matching existing production strategies’.

Box 14.

Better without water than without pasture

We heard this story in West Darfur but it seems to have much wider relevance. In the story, a high-ranking official from the Ministry of Animal Resources visits a remote village of pastoralists. It takes his guests two hours to bring him some water. As they are perfectly hospitable in all other respects, the man figures that the water must have been fetched from far away. Back to his office in town, the impression of the people in the waterless village remains in his mind. The man decides to help them. Two weeks later, a water engineer

Continued on next page

arrives at the village in a Ministry vehicle. The local notables gather to meet him and after the standard welcoming the engineer asks: 'So, where would you like us to drill the well?' 'A well? What well?' replies the Omda. There is a pause. Then the engineer explains that the Ministry decided to sort out their problem of water. He has been sent to survey the village and identify the place for the well. 'Al hamdu lillahi, we are really grateful', says the Omda with his best smile, 'but we don't.. want a well..' – a light of apprehension in his eyes. 'What do you mean you don't want it?' says the engineer. 'Don't you have a problem with water?' 'Wallahi we do', says the Omda lifting his right hand to the sky, 'it takes us two hours to fetch water to the village! But.. you see... we keep livestock and there is plenty of good pasture around here. It is because there is no water. If you drill a well, a lot of people will come to this village, some with livestock and others just because there is water. Some will start cultivating a small garden, then a bigger garden.. Very soon there will be no more pasture around for miles. We can take our animals far away to drink, and we can deal with fetching the water all the way back to the village, but we would be in trouble without pasture. This is why we would rather not have a well here. Can you help us with water without putting pasture at risk?'

9.2 Recommendations

So far, the focus of interventions in the livestock sector (including monitoring) appears to have been on livestock and its commercialization, with primary production from pastoralism largely taken for granted in the background. However, the basic conditions within which primary production could be taken for granted – if they ever existed – are changing. For years now pastoralists have been driven to adjust their practices to an increasingly antagonistic context, in which it is more and more difficult to make use of the specialized strategies that allow them to maximize returns from the drylands (chiefly strategic mobility), while the costs of production multiply and grow uncontrolled. Changes all around primary production are affecting it to a scale that can no longer be ignored.

Looking at the world through development lenses as part of one's profession can lead one to treat change as automatically good, yet if development interventions almost certainly bring change, not all changes bring development. In order to see such differences in the processes of change brought along by pastoral development, we need to read them against a fine-grained understanding of how pastoral production works. Although, till now, producers have proved

exceptionally resourceful, managing to sustain substantial economic growth despite the swelling load of challenges, this protracted effort is putting strain on the system and generating unnecessary costs, and cannot reasonably be expected to go on forever.

Fundamental resources for the economic strength and ecological sustainability of pastoral systems need to be secured and strengthened. They can be organized under three headings:

Reliable and timely access to pasture where and when nutrients peak (strategic mobility). That is, access to the short-lived concentrations of high-quality pasture characteristic of rangelands in arid and semi-arid regions, including the pre-conditions for doing so: *i.* the possibility of implementing the strategies of mobility associated with production and sustainability; *ii.* specialized capital stock, defined by its capacity to perform well under the conditions of pastoral production strategies; *iii.* access to affordable water; and *iv.* reliable access to the pockets of more fertile rangelands that serve as indispensable grazing reserves during the dry spells (e.g. South Sudan or the wetlands that have historically served this purpose throughout Sudan). 'Good pasture' is a resource to pastoral producers only in combination with the possibility of accessing it selectively: that is,

through competent feeders⁵⁸ and by moving in when nutrients peak.

Specialized human resources and institutions (cultural assets), including the regeneration of: *i.* competent and dependable labour for livestock managing and breeding and the sustainable management of pasture and water; *ii.* the values and social ties that assure the ideological commitment to the profession; *iii.* gender and intergenerational relationships based on principles of reciprocal respect and satisfaction.

Effective and equitable interfacing with the national and global context, particularly including: *i.* dedicated legal and institutional framework, infrastructures, and services for the efficient and fair marketing of livestock products – as no pastoral system today operates without the income from the sale of the annual growth in the herd or flock and, in many cases, the sale of milk; *ii.* high-quality education services effectively accessible by the producers without leaving their activity – as in a globalized world a highly specialized job like animal production in the arid and semi-arid lands needs to be combined with formal education (i.e. formal education should not only be available as an alternative to pastoralism); *iii.* complementarity and integration with other production and livelihood systems *at the regional level*, especially crop farming (i.e. crop–livestock integration in the drylands should be sought at regional level rather than at the scale of the farm, as the former promotes complementarity in the use of resources and joint decision making on land access, whereas the latter promotes competition for the same resources, to the extent of increasing the risk of conflict).

Any comprehensive development programme concerned with promoting sustainable animal production and livelihood systems in the arid and semi-arid regions of Sudan would need to take into account these three fundamental dimensions. When focusing on particular sectors, programme design and impact-assessment methods should be sensitive to the fact that changes in one of these dimensions will trigger systemic adjustments in the other two.

The following recommendations focus on a selection of issues which emerged as particularly compelling from the case studies and the work on the markets. Each of them is addressed from three perspectives: (a) policy/legal framework; (b) investment/direct intervention; and (c) research. The recommendations are, respectively, for (a) state level and federal institutions; (b) development actors and donors at national and international level; and (c) higher education institutions and other national and international organizations promoting research.

Issue 1: Reliable and timely access to pasture by livestock producers is being jeopardized by constraints to mobility strategies, pressure to down-scale crop–livestock integration to the level of the farm, and unregulated practices of land-use conversion, including the privatization of the commons and financial speculation on land. With livestock mobility being a crucial strategy independently of the producers' administrative status as sedentary or nomadic, these trends are affecting pastoral production as a whole, believed to represent the bulk of the livestock sector in Sudan. Combined with the effects of insecurity and climate change, these trends are also at the root of vicious cycles of distorted livestock management and production strategies, concentrations of livestock against the logic of the production system, and consequent pasture degradation.

Policy/legal framework. Short-term returns from these trends to discrete groups of people should be balanced against long-term costs to all. A comprehensive policy on pastoralism and a clear and supportive legal framework to regulate its activities and connect pastoral systems with the wider context – other production systems, the local, state and federal administrations, and the markets – are urgently needed. The AU Policy Framework on Pastoralism, the experiments

⁵⁸ All ruminants can feed selectively, but they have to learn to do so (through experience and from other animals in the herd). Some breeds, and some lineages within a breed, are better than others at becoming competent feeders. The role of feeding selectivity in relation to strategic mobility in pastoralism was first recorded in Breman and De Wit (1983); for an update on this issue see Krätli (2008).

with pastoral codes in West Africa (especially the Islamic Republic of Mauritania) and the innovative policy on the development of arid and semi-arid land recently adopted in Kenya⁵⁹ (Republic of Kenya 2012) offer a good platform for a national initiative of this kind. Of particular urgency is the regulation of the market for rangelands and the auxiliary markets which have emerged or been greatly boosted as a consequence of distortions to mobility patterns and strategies of adjustment: water for livestock, and crop residues (e.g. the market in water for livestock should apply minimum standards of hygiene, including parasite control on the watering grounds).

Investment/direct intervention. Research-based support to reliable and timely access to pasture, starting from finding solutions and alternatives to current hindrances. Pasture/rangelands regeneration programmes should be designed and implemented within this perspective. Building capacity, at all levels of the administration, for a research-based, fine-grained understanding of the logic and patterns of production strategies in existing specialist livestock systems. Building capacity amongst the producers, for engaging in a productive way with the institutions of governance and with development agencies, as well as for articulating their objectives and the logic of their system of production at local, state and federal forums. Promoting and supporting the development of a policy on pastoralism based on the AU framework and of a code of law reflecting the same approach.

Research. The externalities involved in the processes concerned by this issue need to be identified and quantified, and their long-term impact assessed. A fine-grained understanding of the logic, patterns and scale of adoption of pastoral mobility strategies in Sudan – rooted in the perspective of pastoral producers – is needed in order to be in a position to understand ongoing changes, distinguishing between distortions, adaptations, adjustments, and desired

patterns. More attention needs to be given to understand i. the roots and development of crop–livestock integration on the regional scale; ii. the implications of changes in mobility patterns for the milk economy and the balance of responsibilities and economic control across gender divisions.

Issue 2: Analytical tools and monitoring procedures in operation within the livestock sector focus on two percent of the market (the exports) and on livestock as a commodity (from the moment of the first transaction): unavoidably, this results in a deeply skewed representation of problems and opportunities as well as of the basis of stakeholders (with ‘elite’ groups being magnified by the analysis).

Policy/legal framework. Policy and legal instruments concerned with the livestock sector and pastoral systems should be created or modified to take into consideration the important dimensions of the economic value of pastoral systems that are currently invisible to the official mechanisms for monitoring and statistical analysis – starting from the full scale of the domestic market – and engage with them in a proactive and supportive way. The present gap between the policy focus at federal level and the economic situation in the livestock sector needs to be reduced. Legal instruments and decision making mechanisms across the relevant sectors need to be reviewed, to enable them to see the full spectrum of the economic contribution of pastoral use, and to legitimate the forms of productive land use and development that are characteristic of pastoral systems.

Investment/direct intervention. Primary production, especially the bulk of it supplying the domestic market, is badly in need of support, from basic services to infrastructures. It is crucial that these interventions be highly targeted and designed to match the actual strategies of production (within a framework that allows to

⁵⁹ For example, a unique case amongst initiatives of this kind, this policy sets out to ‘recognize through legislation, *pastoralism as a legitimate form of productive land use and development on the same basis as farming*’ and ‘[e]nsure that devolved structures accommodate mobility and resource-sharing across administrative boundaries and draw on the knowledge and experience of customary institutions’ (Republic of Kenya 2012: 19, emphasis added).

distinguish the inner logic of the production systems from distortions and adjustments following stress or constraints). Failing to do so, interventions are likely to do more harm than good.

Research. The economic value of pastoral systems needs to be made visible. There is a need to fill the present gap in data collection and the disaggregated analysis of national datasets. New methodologies and analytical/monitoring tools are needed, capable of capturing the dimensions of this value (actual and potential) that remain poorly understood: the magnitude of the contribution of pastoral systems to the livestock sector, to auxiliary markets (water for livestock, fodder/feed, services – including financial services and environmental services); to crop farming and land regeneration (through manuring and seed dispersion); the magnitude of their support to livelihoods in primary production, along the market chains of livestock products, and in auxiliary markets; the long-term economic returns from supporting and developing the 98 percent of the livestock sector (the domestic market) that is at the moment largely invisible to statistical analysis.

Issue 3: The legal/administrative framework rests on a legacy that favours settled communities and crop farming. This is especially problematic with regard to three sets of issues: the administration of justice in cases of litigation, taxation, and decisions on land-use and land-use conversion. The legal framework for defining trespass and damage is used as a defence of crop farming and settled communities against the activities of livestock keepers and, with rare exceptions, appears to provide little protection the other way round. Taxation concerning livestock on the move is poorly regulated and often predatory in its approach (i.e. takes place as a levy, often under unclear juridical conditions, rather than being a well defined contribution towards funding particular services to citizen). Decision making mechanisms concerning land management and especially use conversion are sensitive to the forms of

land development characteristic of crop-farming and sedentary occupation, but not always cognisant of pastoral use.

Policy/legal framework. Equity needs to be introduced in the regulations concerning farmer/pastoralist conflict and the assessment and handling of incidents of trespass and issues of land use. A guarantee of justice should operate for both parties. Taxation of pastoralism should be rationalized in a coherent system, divorcing it from predatory logic and clearly linking the payment of taxes to an appropriate return in services and governance. At a more general level, the tax systems should include mechanisms to promote business in livestock primary production and trade. If the producers in pastoral systems are to be convinced that the state is on their side and operates in their interest too, the issue of equity needs to be addressed and be prioritized in a general policy on pastoralism and a pastoral code. In the meantime, there should be efforts to ensure that existing rules and regulations in protection of pastoral resources are enforced.

Investment/direct intervention. Development interventions directed to support conflict management and/or promote pastoral production and marketing should openly address issues of inequity, in participatory ways with all stakeholders, with the aim to generate awareness about them and facilitate a change of approach.

Research. The scale and depth of this phenomenon should be surveyed and its dynamics and implications with regard to both issues should be understood in detail, with a view to inform change at administrative and legal level. Research in this direction should start at grassroot level, involving primary stakeholders with appropriate methodologies (e.g. participatory action research).

Issue 4: Complex cultural assets playing a fundamental role in the economic and ecological sustainability of pastoral systems are being eroded – particularly pastoral ideological identity – without being replaced with equally effective ones. Competent and reliable labour for pastoral production is becoming scarce.

With a significant proportion of capital stock (reproductive animals) reaching the market, the distribution of livestock ownership is changing in favour of wealthier producers and external investors.

Policy/legal framework. Safeguard the cultural assets associated with pastoral systems, not in isolation, as folklore, but in their relationship with the sustainable functioning of these systems (both economically and ecologically). Promote and facilitate responsiveness in service provision concerning pastoral producers (especially formal education). Promote the dissemination – through staff training, through the media and through the curricula of formal education – of a positive image of pastoral systems and mobility strategies, such as defined in state-of-the-art scientific knowledge of them. Promote secure alternative forms of investment and regulate the penetration of pastoral systems by financial investors. Promote research on the implications of a large-scale use of pastoral systems for financial services.

Investment/direct intervention. Embed into development programmes a sensitivity to changes in gender and intergenerational relationships associated with production in pastoral systems. Identify and promote imaginative ways of providing high-quality formal education to producers in pastoral systems *while in the job*. The ‘Education for Nomads’ strategy developed in Kenya as part of the process that has recently led to the creation of a National Commission for Nomadic Education, offers a good example of work in this direction⁶⁰. Support pastoral households that have become vulnerable, but are still in business, to rebuild their capital stock – either directly via restocking, or indirectly via: i. supporting and strengthening specialized pastoral institutions for addressing vulnerability amongst producers and the values behind them; and ii. regulating (in order to secure its sustainability), the commercialization of capital stock and the practice of investment marketing.

Research. Increase understanding of the role played by cultural assets in pastoral systems, with regard to the system’s economic and ecological sustainability, and investigate the circumstances under which they are being undermined, and the causes (with particular attention to *i.* pastoral identity and the provision of formal education; and *ii.* gender and intergenerational relationships). Investigate ways of facilitating the integration of such cultural assets with dynamics of cultural development within the pastoral communities and in the wider society so that their support to sustainable pastoral production is maintained – possibly strengthened – rather than lost. Investigate the economic, ecological and social implications of changing distribution of livestock ownership (e.g. is it counterbalancing the increased frequency of crises? What social dynamics is it inducing, especially with regard to social cohesion and patterns of collaboration within the production system? Does it involve changes in herd management, production strategies and/or marketing? Is it affecting processes of economic recovery in vulnerable households?). With the opening to outside investors, pastoral systems have been partially harnessed to provide financial services (i.e. the primary function of livestock is to be a form of investment rather than a means of production): given the scale of this phenomenon, there is a need to understand its long-term implications on strategies of production and the management of pastoral resources.

Issue 5: Animal production in the predominantly pastoral arid and semi-arid regions represents the most important part of agricultural GDP in Sudan, yet the programmes for modernizing agriculture invest comparatively little in pastoral systems, and when they do so it is usually in order to facilitate a transition out of them.

Policy/legal framework. The policy focus with regard to modernization of the livestock sector should shift from transfer of technology to research and development, from importing solutions designed for generic food production

⁶⁰ MDNKOAL (2010), <http://pubs.iied.org/pdfs/G02742.pdf>. Cf also Siele et al. 2012.

systems (i.e. using uniformity and stability in the environment) to developing solutions based on the particularity of specialized animal production in arid and semi-arid areas (the use of environmental instability as an economic asset by pastoral systems), based on participatory processes involving pastoralist producers.

Investment/direct intervention. Promote research as above and liaise with it. Identify, study and replicate cases of spontaneous modernization and

help to address challenges they might be posing, either in the context where they are already functioning or with regard to their expansion into other areas where there is an interest.

Research. Mobilize scientific research and technological development to generate modernizing solutions that fit the logic of production in pastoral systems (namely, turning environmental instability into an asset) and that can be effectively integrated within them.



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Research team carrying out the study

Saverio Krätli is an independent researcher and honorary editor of the journal *Nomadic Peoples*. With a background in philosophy and anthropology of development, and a PhD on cattle breeding amongst Wodaabe pastoralists in Niger, Saverio specialises in the interface between pastoral producers, science and policy. He has worked with pastoralists for the last 15 years in East, West and Central Africa, as well as a brief but seminal experience in Mongolia. Saverio's research and consultancy activity has focussed on pastoral livelihoods and strategies of production, theory of pastoralism, policy analysis and the provision of basic services (especially education) to mobile producers.

Omer el Dirani is a leading livestock specialist with over 30 years of experience in livestock management. He holds a BSc. in Veterinary Science and an MSc in agriculture from the University of Khartoum and a post graduate diploma in agricultural economics from Reading University. Dirani worked for the Livestock and Meat Marketing Corporation in Sudan from 1982-1992. From 2003 to 2005, he served as the Head of Marketing, Research and Studies for the Ministry of Animal Resources and Fisheries, as well as the Director of Animal Resources Economics Administration from 2007 to 2008. Additionally, Dirani has contributed to numerous capacity building projects in Sudan including the Sudan Productive Capacity Rehabilitation Project (MoAF and FAO) and the Sudan Institutional Capacity Program: Food Security Information for Action (MoAF, FAO and the EU). He has also served as the National Technical Focal Point for the IGAD Livestock Policy Initiative project (MARF and FAO) from 2007 to 2009. With experience and expertise in livestock markets, management, and policy, Dirani's publications have extensively explored constraints and opportunities in livestock market chains, including market intelligence and international trade analysis.

Helen Young is a Professor and Research Director at the Feinstein International Center at Tufts University. Helen has worked in Sudan since 1985. Since 2004 she has led the Tufts Darfur Livelihoods Programme, and is currently Project Director of the Pastoralism, Trade and Markets component of the UNEP Sudan Integrated Environment Project. With a background in food security and nutrition, for more than 25 years Helen has combined practical field experience, action research, teaching and training. She has produced best practice guidelines, training packages, and led the development of the Sphere food security minimum standards. Helen has co-edited the *Disasters* journal since 1998 and is author of more than 50 peer-reviewed articles, books, book chapters, published reports, articles and conference papers.

Samira Mohamed Ahmed holds a BSc from the University of Khartoum and a MSc in Natural Resources Management, with a focus on Semi-Arid Zones, from the University of Khartoum. Samira also holds certifications in the areas of agricultural extension and water point harvesting techniques. She has worked with the Ministry of Agriculture since 1988 as a Range Inspector, Range Officer, and a Range Manger in the Department of Natural Resources Management in North Kordofan state and has extensive experience in implementing programs of resource management in Western Sudan. Additionally, Samira has extensive experience working with organizations such as ADS, Plan Sudan, CARE, and the WFP, particularly in the areas of natural resource management, conflict resolution, and pastoral management systems and policies.

Dr Osman Mohammed Babikir currently works as a Livelihoods and Marketing Expert for Sudan Peace Building and Development project (World Bank) prior to which he worked as Operations Manager for this Project. Dr. Babikir served as an Assistant Professor of Agricultural Economics at Zalingei University from 1995 to 2011 and holds a BSc, MSc and PhD from the University of Khartoum, specialised in agricultural economics. He is an author of 'Economic Analysis of the Rural Labour Markets in Sudan' (Lambert Academic Publishing, Germany) as well as a contributing consultant to the UNEP report on Alternative Domestic Energy Options for Darfur – A Review. Dr Osman has extensive expertise in the area of production and development economics, livelihood analysis, food security and conflict analysis, and has contributed to several publications on these subjects.

Dr. Musa Adam Ismail is currently the Dean of the Faculty of Agriculture at the University of Zalingei. From 2001 to 2005, he was the Director of the Centre for Peace and Development Studies at the University. He has extensive experience in the field of agriculture (employed by the Ministry of Agriculture IRAQ, 1986-1988; Ministry of Agriculture, South Darfur State 1995-1996) and has also worked with SCF.UK (1991-1995). He has contributed to numerous studies focused on the Darfur context including coping strategies and wild food research programs, a field survey targeting conflict areas for Darfur states (team leader) (UNDP, UNICEF and Ministry of Higher Education, 2001), a socio-economic study and Range inventory survey in Zalingei and Wadi Salih areas, west Darfur state (CRS and DRC, 2004). Additionally, Dr. Musa has worked with the WFP, UNEP, SOS Sahel (Sudan), and more recently with the Management System International, INC. and the Darfur Development and Reconstruction Agency. Dr. Musa's areas of interest include conflict resolution, peace building, livelihoods, food security and agriculture.

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Dr Azharia Abd Elbagi El Bushra is an agricultural economist currently working as an assistant professor with the University of Bahri. She holds a B.A. in agricultural sciences from the University of Khartoum, an M.A. in agricultural economics from the Faculty of Agriculture Science, University of Gezira (Wad Medani) and a Ph.D. in agricultural economics from the Faculty of Agriculture, University of Khartoum. Dr. Azharia has extensive experience working across the Sudan states with the World Bank Institute, the Ministry of Agriculture and Forestry, the Sudan Peace Building and Development Project (World Bank), the Sudan Economic and Social Research Bureau, and the Ministry of Higher Education and Scientific Research. Dr. Azharia's research interests include agricultural trade and policy, food security and poverty alleviation issues, liberalization policies, economic modelling and production economics aspects.

ACRONYMS

ABC	Abyei Boundary Commission
ARSC	Animal Resources Services Company
CNS	Comprehensive National Strategy
CPA	Comprehensive Peace Agreement
CTA	Civil Transaction Act
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
IFAD-WSRMP	International Fund for Agricultural Development, Western Sudan Resource Management Programme
IGAD	Intergovernmental Authority on Development (comprising Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan, Uganda)
IIED	International Institute for Environment and Development
ILRI	International Livestock Research Institute
IUCN	International Union for the Conservation of Nature
MARF	Ministry of Animal Resources and Fisheries
MARFR	Ministry of Animal Resources, Fisheries and Range
MAARF	Ministry of Agriculture, Animal Resources and Fisheries
NDC	Nomad Development Council
SCBS	Sudan Central Statistical Bureau
SDG	Sudanese pound
SWC	Sudan Water Corporation
TEV	Total Economic Valuation
UNEP	United Nations Environment Programme
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
USD	US dollar

GLOSSARY

ab asabae	<i>Dactyloctenium aegyptium</i>
abbala	camel herders
abdaib	type of herb (edible)
abumalih	fodder plant
addie	fresh pasture
al angaib	herding by young boys
al bayadah	fodder plant
al darma	fodder plant
al dour	scouting mission
al fariesa	fodder plant
al faza	help
al gaz	shearing
al gizu	Associated with favoured desert plants used by camels for winter grazing, found north of latitude 16° in North Darfur, and extending into Chad and North Kordofan.
al manieha	loan of a productive animal
al mashasha	animals' reluctance to move to another site
al munakara	animals stopping grazing until they are moved
al munshag	mobility during rainy season
al nushouque	movement to better quality pasture along the transhumance route
al nussi	fodder plant
al oram	fodder plant
al qutb	fodder plant
al rabaa	fodder plant
al rasmala	donation of a productive animal
al raza	pregnant ewe
al sadana	fodder plant
al sharaa'	fodder plant
al tankheel	monitoring direction of rain
al wasm	branding
al zad	food for journeying
al-misdar	short distance mobility
aleina	different rainy periods with varying rain characteristics
anbar	group of males
Andarab	fodder tree
argassi	type of herb
arrawaeya	hired shepherds
baggara	cattle herders

bahla	controlled sheep breeding
barood	washing of animals
begel	fodder plant
daash	cool breeze
dallal	big auctioneer
damra	nomadic settlement
dar	homeland
deret	end of rains
diferra	fodder plant
dour	(better) pasture sites
elkurmot	<i>Cadaba rotundifolia</i> Forssk.
elrabaa	<i>Commicropus verticillatus</i>
engeeb	expert herder
falla	moving flock between different patches
farig	nomadic or pastoralist temporary camp
feddan	1.038 acre
feresha	fodder plant
fouge	day animals reach water source
gaa'ra	hot dry west wind
galaga	livestock traders
galaty	food crop traders
garwa	dry northeast wind
gashashi	animals needing feedlotting
ghawab	first day after watering
ghelagi	bush trader
ghelaja	smallstock trade
girba	bladder (water container)
gongot	sorghum threshing residues
hantood	fodder plant
haraz	<i>Fedeherbia albida</i>
hashab	<i>Acacia senegal</i>
haskaneet	<i>Cenchrus spp</i>
haskaneet 'albagou'	young <i>Cenchrus spp</i>
howaila	old wet growth
hulaa	worm infestation
jalab	sale of livestock
jaladat	not needing watering
jazar	butcher
jellaba	supplier
kadad	<i>Dichrostachys cinerea</i>
karkade	<i>hibiscus subdarifa</i>
kataha	dusty north wind

kawal	<i>Cassia obtusiflora</i>
khabeer	pasture expert
kharif	rainy season
khazan	concrete reservoir
khour, pl. kheiran	valley of seasonal stream
kitter	<i>Acacia mellifera</i>
laloob tree	<i>Balanites aegyptiaca</i>
mahal	overgrazing of pasture
majkoon	already grazed pasture
makharif	rainy-season temporary settlement
mirshishiya	move to first green pasture after showers
moatta	southward movement
mossier	rainy-season migration north
mounteg	producer
moutah	migration from temporary settlement to main settlement
mugadam	expert herder
murhal	transhumance route
nabag	fruit of <i>Ziziphus spina-christi</i>
nafeer	gathering for voluntary work
nujo/nujou	long distance migration
Omda	head of an omodiya
omjiko	fodder plant
omodiya	tribal administrative unit
omshihait	fodder tree
qoz	Stabilised sand dunes
ra'a	(settled) pastoralists
raa-ai	herders
rafa al assa	regulation for pasture use
rahad	rain water collected in local naturally formed depressions
rawabie	second day in the pasture
reem	wet south wind
rohal	nomads
rowagha	monitoring the rangeland for best quality pasture
rushash	onset of rains
sadriya	first night after watering
safoura	purchase of millet from source
samoum	dry north wind
sarha	daytime grazing
sebaba	local broker
semsar	broker
seyf	hot dry season
shaer	fodder plant

shailaa	loan of a cow
shelenee	tree <i>Zornia alachidiata</i>
shita	cold dry season
shoul ghanam	group of newborns
showgara	move to first green pasture after showers
shugag	shelter
siwa	bran
surar	control of suckling
surwal	trousers worn under the outer garment
tabar	fodder plant growing in wet areas
tagir mowashi kabir	big livestock trader
tagir mowashi sagheer	small livestock trader
tagtaga	<i>Ruellia potula</i>
talaig	The time when post harvest crop residues are made available for grazing by animals
thalatha	third day in the pasture
tukul	hut
um bashar	first rains
umchir	fodder plant, possibly <i>Brachiaria obtusiflora</i>
wadi	valley surrounding seasonal water course
wakil	agent
wedaa	loan of livestock

Further technical information may be obtained from the UNEP Post-Conflict and Disaster Management Branch website at: <http://www.unep.org/disastersandconflicts/> or by email: postconflict@unep.org



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