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Sustainable Livestock Development in Sudan

Challenges, Opportunities, and Policy Priorities

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EXECUTIVE SUMMARY

Livestock in Sudan plays a crucial role in the national economy, particularly in alleviating poverty and enhancing food security. Despite its significance, the last comprehensive livestock census for the country was conducted in 1975, resulting in now outdated and often unreliable data. Recent estimates by USAID indicate that Sudan ranks among the top three African countries in terms of livestock numbers, with an estimated 105.6 million animals. The livestock population in Sudan is predominantly composed of camels, goats, sheep, and cattle. The spatial distribution of livestock is variable and influenced by local factors such as feed resources, land use, and ecological conditions. The Greater Kordofan and Greater Darfur regions have the largest livestock numbers. However, discrepancies between official statistics and field data show the need for updated and accurate livestock data.

The livestock sector provides 40 percent of employment and 34 percent of Sudan's agricultural gross domestic product (GDP). The livestock sector is a vital source of foreign exchange for the Sudanese economy through exports of livestock and livestock products. Besides its economic contributions, the livestock sector provides essential food products, including meat, eggs, and milk, and draught power for agricultural operations and transportation, particularly in rural areas. However, relative to irrigated agriculture, the sector faces challenges due to underinvestment and minimal government attention.

The livestock sector in Sudan is governed by a mix of federal and state-level policies, which have evolved. Historical policies, such as the 1970 Land Act and subsequent adjustments to it, often negatively impacted pastoralists by restricting their access to grazing land and mobility. Recent efforts to improve the policy frameworks for livestock include a proposed National Livestock Policy Hub, which aims at strengthening veterinary capacities and reviewing livestock policies. Nonetheless, greater coordination between governmental and non-governmental organizations is needed, as is increased funding for livestock research.

Sudan's livestock sector holds immense potential for economic growth and poverty reduction. However, to realize this potential, several issues must be addressed:

- Accurate data collection—notably, a new national livestock census should be done to provide reliable data for strategic planning and policy formulation.
- Policy reform—updating and reforming existing policies to support both sedentary and mobile livestock producers. All policy reforms should be evidence-based.
- Funding and research—increase funding for livestock research, focusing on animal health, breeding, and socioeconomic studies to better inform policy and practice.
- Stakeholder engagement—increase the participation of all livestock stakeholders in policy formulation and decision-making processes to ensure comprehensive and inclusive strategies.
- Conflict resolution—address land tenure issues and conflicts between pastoralists and agricultural communities to ensure sustainable livestock management and mobility.

Implementing these recommendations will require a multi-stakeholder approach that engages government agencies, local communities, non-governmental organizations working in the sector, and international partners. Prioritizing livestock development within an enabling

policy framework is crucial for the sustainable growth of Sudan's livestock sector and overall economic development. By addressing the issues noted, Sudan can harness the full potential of its significant livestock resources so that they better contribute to national economic growth, food security, and improved livelihoods for its rural population.

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1) INTRODUCTION

1.1 Background

Livestock is considered an important entry point for poverty alleviation efforts in some countries because the poorest rural households are likely to own livestock, even if the number of livestock each holds is quite small (FAO 2009). In many developing countries, notably those in the Horn of Africa, growth in the livestock sector could provide opportunities for the livestock-dependent poor to improve their livelihoods (Omer 2011).

The livestock sector is large and growing rapidly in many developing countries, driven by increasing demand for livestock products because of rising urbanization, rising incomes, and population growth. Continued growth in demand for and production of livestock products has significant long-term implications for both animal and human health—as the number and concentration of people and animals increase, some disease agents will pass easily between species. The social implications of developments in the livestock sector for smallholders who raise livestock present a number of serious policy challenges, including making more efficient use of natural resources in livestock production, ensuring food security and alleviating poverty alleviation, and managing joint animal and human health risks (FAO 2009).

Continued growth in global demand for livestock products is expected. Using the IMPACT model, which allows examination of many long-term drivers of the global food system, Rosegrant and Thornton (2008) projected an increase by 2050 in global per capita demand for meat ranging between 6 and 23 kg depending on the region. The model projects that this growing demand will lead to livestock populations increasing globally between 2000 and 2050, with cattle numbers rising from 1.5 billion to 2.6 billion and goats and sheep increasing from 1.7 billion to 2.7 billion. Shorter-term projections for the coming decade confirm these trends, with most of the increase expected in developing countries where meat intake is projected to grow by 28 percent, compared to 10 percent in developed countries (OECD-FAO 2009).

The contribution of livestock to any country's economy can be evaluated by its contribution to the gross domestic product (GDP) and total agricultural value (ICPALD 2016). Recent studies on the economic value of the livestock sector in the Intergovernmental Authority on Development (IGAD) states in northeastern Africa highlight its significant contribution to national economies. These include the economic contributions of livestock that are often overlooked in GDP calculations, such as livestock dung for fuel, animal power in agriculture and transportation, and livestock's role in household and community savings, investment credit, insurance, and risk pooling mechanisms (Behnke 2010).

For instance, in Nigeria, the government has generated significant revenue through taxes paid by livestock farmers, illustrating livestock's importance to national and local economies by creating employment, generating direct impacts through purchases of livestock inputs, and inducing indirect economic impacts from household spending (Kemi 2016). In South Sudan, industries such as processing hides and skins for leather products, using bones for animal feed, and manufacturing soap all depend on livestock (ICPALD 2016). In Ethiopia's Tigray region, the traditional cattle economy in mixed farming systems supports economic activities such as supplying draught oxen and purchasing agricultural inputs (Tadesse 2019).

Livestock herders provide food for their families and income for their employees, generating milk and meat from cattle, sheep, goats, and camels, as well as eggs and meat from poultry. Consumption of animal-sourced foods offers numerous health benefits, especially for the world's poor, by supplying essential nutrients and improving caloric intake and health outcomes (Frelat et al. 2016; Grace et al. 2018). In South Sudan, cattle are the primary source of red meat, providing 65 percent of the country's meat needs (ICPALD 2016). Poultry and small ruminants are often exchanged for grain and other essentials, helping households meet their dietary needs during challenging times. However, herding livestock in remote areas can reduce milk intake, leading to poorer diets (Humphrey et al. 2021). Empirical evidence suggests that livestock improves household income stability when other income streams fail, although this insurance is threatened by climate change and policy strategies that restrict mobility and access to resources (Megersa et al. 2014; Sloat et al. 2018; Magnani and Ancey 2022).

Livestock contribute to the crop nutrient cycle by consuming plant matter and returning nutrients to the soil as manure. This process can increase crop yields and expand harvested areas, benefiting both crop and livestock production (Upton 2014). Mixed crop-livestock systems are crucial for the livelihoods, incomes, and food security of the rural poor generally, globally providing 90 percent of the milk, 70 percent of the red meat, and over one-third of the poultry and eggs rural households consume. In these systems, livestock typically account for up to one-third of farm income (Costales et al. 2007).

1.2 The Sudan context

In Sudan, the livestock sector makes important economic contributions and plays a significant sociocultural role in rural livelihoods in both subsistence and commercial farming systems. The livestock sector provides around 34 percent of Sudan's agricultural GDP and more than 60 percent of the value added to the agricultural sector (Ealgzoli 2023). However, the contribution of agriculture, including livestock, to Sudan's overall GDP has seen fluctuations—the agricultural sector's share in GDP was 34 percent in 2012 but decreased to 20 percent by 2019 (World Bank 2024; Ealgzoli 2023).

Livestock products, including meat and hides, are key export commodities that generate foreign exchange for the country. In recent years, livestock exports have represented a significant portion of Sudan's agricultural exports, although their contribution has varied. For example, in 2016, livestock exports accounted for over 50 percent of agricultural exports, but this share dropped to 26 percent in 2020 (Ealgzoli 2023). The sector also provides employment for a significant portion of the population, especially in rural areas where alternative livelihood options are limited.

The diverse climatic and ecological zones in Sudan support several different livestock production systems, ranging from nomadic pastoralism to sedentary agro-pastoralism. The nomadic pastoralists—the *Abbala* camel herders and the *Baggara* cattle herders—follow seasonal migration patterns to access grazing lands for their animals. These systems are underpinned by traditional land tenure arrangements, which are now facing challenges due to administrative changes, urbanization, and environmental pressures.

The last comprehensive national livestock census in Sudan was conducted in 1975, almost fifty years ago. Thus, planning and policymaking in the livestock sector has relied for many

years on outdated and often inaccurate data. Recent efforts by the Ministry of Animal Resources and Fisheries to update livestock data have been hindered by security issues and logistical challenges.

1.3 Objectives, scope, and limitations of the report

The primary objective of this report is to provide a comprehensive analysis of the livestock sector in Sudan, focusing on its economic, social, and policy dimensions to inform future strategies for sustainable development. The specific objectives are the following:

- Promote understanding of livestock production systems in Sudan and their evolution.
- Critically review and compare official livestock population estimates.
- Explore the contributions of livestock exports to Sudan's GDP and the other vital economic roles played by the sector.
- Critically review policies and strategies affecting the livestock sector.
- Capture data to fill knowledge gaps regarding the socioeconomic importance of livestock for Sudan and its policy impacts.

This report adopts a desktop review methodology, analyzing over one hundred studies and reports on Sudan’s livestock sub-sector. These sources include academic databases, government reports, organizational publications, and fieldwork data from institutions like the International Fund for Agricultural Development and the World Bank. The report examines livestock populations by state, the economic importance of livestock, the policy and regulatory environment for the sector, and concludes with policy recommendations.

This report was written amid the conflict between the Sudanese Armed Forces and the Rapid Support Forces that started in April 2023. The fighting has resulted in significant population displacement, loss of access to key documents, and communication breakdowns. Even without the current conflict, data is limited for Sudan, particularly on the livestock economy, and official data lacks credibility due to outdated census efforts. Insecurity and conflicts in high-density livestock areas further constrain academic research.

The report is organized into five sections. Section 1 introduces the study by outlining the background, objectives, methodology, scope, and limitations of the report. Section 2 provides detailed discussions of estimates of the livestock population and its distribution since 2000. Section 3 highlights the economic contributions of livestock in Sudan, including to GDP, employment, and incomes, among others. Section 4 examines the policy environment, including the policies, strategies, and actors involved in livestock sector regulation. Section 5 wraps up the report by providing key conclusions and recommendations and policy suggestions.

2) TRENDS IN SUDAN’S LIVESTOCK POPULATION

Livestock censuses at the national level can provide valuable information on various aspects of livestock production systems, including the number, types, distribution, ownership, and management of livestock. However, in Sudan, the available national data sources are outdated. The last official national livestock census in Sudan is dated – was conducted in

1975. Although the Ministry of Animal Resources and Fisheries had planned to conduct a national livestock census in 2007, the project was not implemented due to the lack of security in many parts of Sudan, hindering the ability to conduct fair, credible, and valid assessments (Fahey 2007).

Sudan holds a prominent position among African countries regarding its number of cattle, sheep, goats, and camels, ranking first, second, or third for each type. The estimated total number of livestock in Sudan is 105.6 million, comprising 39.8 million sheep, 31.0 million goats, 30.1 million cattle, and 4.7 million camels (USAID 2022). While livestock ownership significantly contributes to the rural economy in Sudan, the focus is not solely on financial gain. In many cases, the number of livestock is considered more important than the quality of the livestock produced and their weight (FAO 2018). For instance, in nomadic societies, owning many camels is regarded as a symbol of prestige (Omer 2011). Convincing pastoralists about the importance of animal quality over quantity requires careful planning, comprehensive education, and research on the values and uses of livestock (Ahmed 2014).

The transformation in the use of pastoral livestock can only be achieved through empowerment and the creation of awareness to improve the quality of life of the pastoralists and the animals they raise (Ahmed 2014). About 90 percent of the Sudanese economy comprises agro-pastoral and pastoral production systems, which are both mobile and sedentary, run by farming and herding households in every region and state (Behnke 2011). In the following sections of the report, the livestock distribution and density in all 18 states will be demonstrated.

2.1 Livestock population by state

Numerous factors influence livestock density in different regions, including the type of livestock production system. When livestock production relies on locally accessible feed resources, such as natural grasslands and crop residues, the availability of these resources is the primary determinant of spatial livestock distribution. In other instances, agroecological conditions may be supplanted by factors such as land opportunity cost and the balance of output and input markets (FAO 2009).

Sudan is divided into regions, each comprising several states. For example, the Greater Kordofan region includes South, North, and West Kordofan states, while the Greater Darfur region encompasses North, South, East, West, and Central Darfur states. A recent USAID livestock study focused on the Greater Kordofan and Greater Darfur regions and Blue Nile state found that Greater Darfur has the largest livestock population, as shown in Table 2.1.

Table 2.1 Livestock in major production regions of Sudan, 2022 estimates, millions

Region	Camels	Goats	Sheep	Cattle	Total
Greater Kordofan	1.8	7.1	10.5	8.6	28.0
Greater Darfur	1.2	10.4	11.7	9.1	32.4
Blue Nile	0.0	0.7	3.9	1.9	6.5
Total of the three areas	3.0	18.2	26.1	19.6	66.9

Source: USAID (2022).

Variation was seen among states within the study regions (Table 2.2). In the Greater Kordofan region, West Kordofan state has the largest number of livestock. North Darfur state

has the highest livestock population and East Darfur state has the lowest in Greater Darfur (USAID 2022).

Table 2.2 Livestock in selected states, 2022 estimates, millions

States	Camels	Goats	Sheep	Cattle	Total
East Darfur	0.07	1.39	1.79	1.97	5.23
North Darfur	0.60	2.94	3.85	0.70	8.07
South Darfur	0.09	1.68	2.15	2.38	6.29
Central Darfur	0.20	2.01	1.79	1.87	5.87
West Darfur	0.24	2.46	2.14	0.28	7.17
South Kordofan	0.25	2.11	2.15	4.42	8.93
North Kordofan	0.92	2.38	4.10	0.76	8.42
West Kordofan	0.63	2.39	4.33	3.04	10.78
Blue Nile	0.01	0.46	3.97	2.06	6.51

Source: USAID (2022).

In 2016, Annex Table 2, based on estimates from Fadlullaha et al. (2018), shows that the Western Region of Sudan had the highest number of livestock, with North, South, and West Kordofan, along with White Nile state, accounting for over 37 million animals or almost 35 percent of the total national livestock herd. The Darfur Region, encompassing the Darfur states, ranked second with 32.9 million animals or almost 31 percent of the national total. Combined, the livestock populations in these two regions constituted two-thirds of Sudan's total livestock, highlighting the concentration of livestock in the Western area of the country.

Annex Table 3 presents for 2016 livestock population figures from the Ministry of Livestock's Statistical Bulletin. West Kordofan state, with a total livestock population of 10.8 million, ranks first among the Western region states, as was also reported in the recent USAID study (2022). However, discrepancies are seen between the national livestock herd size estimated by the Ministry of Livestock for 2016 and those for the same year by Fadlullaha et al. (2018)—the Ministry reported 107.55 million animals, which is 0.93 million more than the 106.62 million estimated by Fadlullaha et al.. This discrepancy underscores the challenges in livestock data documentation and validation for Sudan despite all of the scholarly works, conference papers, and reports referencing the same official source, the Ministry of Livestock and Fisheries Information Center.

Annex Table 6 shows livestock estimates for eighteen states in 2019 (Ministry of Livestock 2021). The Western region states, including all eight states of Kordofan and Darfur, accounted for 57 percent of the national herd.

Table 2.3 displays animal population estimates for 2020 (Ministry of Livestock 2021). West Kordofan state has the largest livestock numbers, as it had for the previous four years (2016 to 2019—see Annex Tables 3 to 6), accounting for about 10 percent of the national herd. The three Kordofan states collectively have 22 percent of the national livestock population. The Darfur states collectively have the largest livestock population, with about 31 percent of national livestock. White Nile state is the only state outside of Kordofan and Darfur that has a high number of livestock, ranked third among all states.

Table 2.3: Livestock population by state, 2020 estimates, millions

States	Camels	Goats	Sheep	Cattle	Total
North Kordofan	0.94	2.74	4.22	0.79	8.70
South Kordofan	0.25	2.19	2.21	4.65	9.31
West Kordofan	0.64	2.45	4.37	3.56	11.02
North Darfur	0.62	3.06	3.94	0.74	8.35
South Darfur	0.09	1.74	2.21	2.50	6.55
East Darfur	0.07	1.43	1.81	2.05	5.35
Central Darfur	0.20	2.09	1.85	1.96	6.10
West Darfur	0.24	2.55	2.25	2.40	7.45
El Gedaref	0.36	1.12	2.24	1.12	4.83
Kassala	0.72	1.76	2.12	0.91	5.51
Red Sea	0.30	0.76	0.44	0.15	1.64
Blue Nile	0.01	0.48	4.09	2.17	6.75
Sennar	0.12	1.73	1.44	1.70	4.99
El Gezira	0.13	2.26	2.59	2.67	7.65
White Nile	0.04	2.70	2.67	3.77	9.17
Northern	0.05	1.21	1.03	0.27	2.56
River Nile	0.12	1.27	1.08	0.11	2.58
Khartoum	0.01	0.68	0.46	0.26	1.41
Total	4.92	32.22	41.00	31.79	109.93

Source: Ministry of Livestock (2021).

Although government reports, bulletins, and other sources do not explicitly mention the reasons affecting livestock density distribution among states, it is reasonable to attribute the drop in Darfur's ranking from first to second in 2017 to the conflicts in that region at that time.

2.2 Livestock distribution by type

In Sudan, pastoralists are responsible for most livestock rearing. They can be sub-categorized based on the type of livestock they herd—the Abbala, who are camel herders, and the Baggara, who specialize in cattle. Each has distinct production systems and cultural practices shaped by their respective ecological zones. However, in certain circumstances, a combination of different herds is also practiced (FAO 2002). Additionally, many urban residents in Sudan keep livestock such as donkeys or horses for transportation, as well as small ruminants and chickens for personal consumption or sale (Wilson 2018).

The estimates from several sources of annual livestock numbers nationally for the major livestock types of camels, goats, sheep, and cattle for the period from 2015 to 2022 are presented in Table 2.4. (Similar annual national estimates for the earlier period from 2000 to 2014 are presented in Annex Table 7.) The different sources highlight the variations in estimates and the unreliability of the data available. Discrepancies are seen in the estimates provided by different sources for the same year, which is difficult to understand. For instance, in 2015, there was a difference of 2.64 million between the figures reported by Ibrahim and Hutur (2022) and the 2018 conference presentation of the Ministry of Animal Resources. This divergence is seen in the years that follow as well—in 2017, the difference in estimates was 2.25 million. These inconsistencies raise questions about the methods and record-keeping practices used to generate these estimates, problems that may extend back several years.

Table 2.4: Annual livestock population estimates for Sudan by type, 2015 to 2022, from various sources, millions

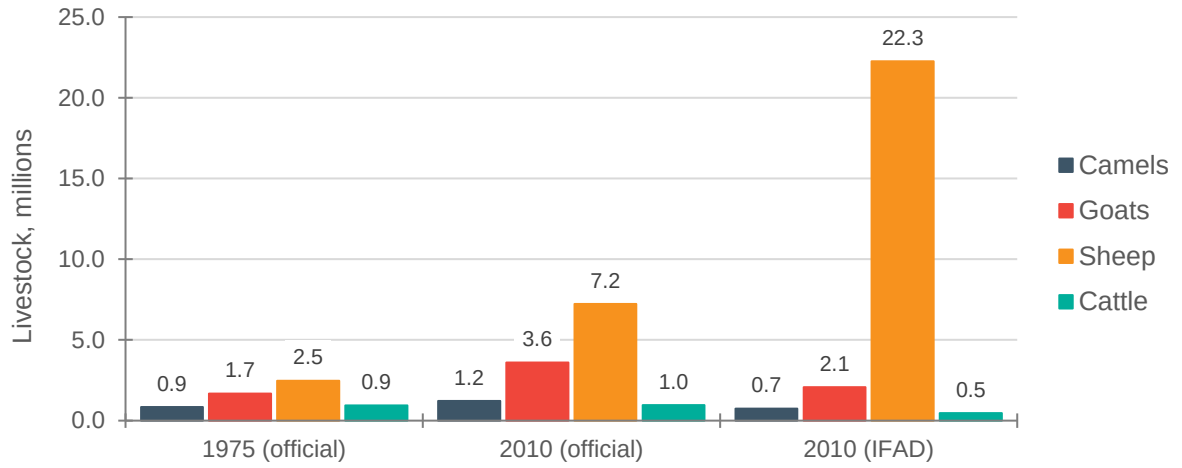
Year	Camels	Goats	Sheep	Cattle	Total	Source
2015	4.81	31.23	37.47	30.46	103.96	MoAR 2018
	4.83	31.25	40.13	30.40	106.60	Ibrahim and Hutur 2022
2016	4.83	31.48	40.61	30.63	107.56	Statistical Bulletin, Ministry of Livestock 2021
	4.83	31.48	37.84	30.75	104.90	MoAR 2018
	4.86	31.47	40.41	30.62	107.35	Ibrahim and Hutur 2022
2017	4.85	31.66	40.75	30.93	108.18	Statistical Bulletin, Ministry of Livestock 2021
	4.86	31.74	38.21	31.05	105.85	MoAR 2018
	4.89	31.69	40.69	30.83	108.10	Ibrahim and Hutur 2022
2018	4.87	31.84	40.85	31.22	108.77	Statistical Bulletin, Ministry of Livestock 2021
	4.88	32.00	38.58	31.35	106.80	MoAR 2018
	4.87	31.84	40.85	31.22	108.78	Ibrahim and Hutur 2022
2019	4.90	32.03	40.90	31.49	109.31	Statistical Bulletin, Ministry of Livestock 2021
	4.91	32.26	38.95	31.65	107.77	MoAR 2018
	4.90	32.03	40.90	31.49	109.31	Ibrahim and Hutur 2022
2020	4.92	32.22	41.00	31.79	109.93	Statistical Bulletin, Ministry of Livestock 2021
	4.95	32.52	39.33	31.95	108.74	MoAR 2018
	4.92	32.22	41.00	31.79	109.93	Ibrahim and Hutur 2022
2021	4.98	32.78	39.71	32.26	109.73	MoAR 2018
	4.70	31.00	39.80	30.10	105.60	USAID 2022
2022	5.02	33.10	40.11	32.57	110.74	MoAR 2018

Note: The numbers for the years 2019, 2020, 2021, and 2022 from the MoAR (2018) are based on projections made in 2018.

2.3 Comparison and complementarity of official livestock estimates with those from other surveys

International institutes often conduct livestock censuses in specific areas targeted by their livestock-focused development projects or programs. In 2010, the International Fund for Agricultural Development (IFAD) conducted a livestock census in North Kordofan state. Their fieldwork revealed a measurable shift in the species composition of pastoral herds. Figure 2.1 demonstrates this shift among the four types of livestock in North Kordofan state. The official livestock population estimates were generated by a model that assumed constant proportions of different livestock species in the Kordofan regional herd from 1975 to 2010. Comparing the official model-generated estimates to the results of the 2010 IFAD survey, the model underestimated the number of sheep by several orders of magnitude relative to what the IFAD survey found and overestimated the numbers of camels, goats, and cattle. This may possibly indicate a shift in the species composition of Kordofan herds in favor of Sudan's most important live livestock export, sheep (Behnke 2011).

Figure 2.1 Livestock in North Kordofan state, estimated numbers by type for 1975 and two sources in 2010



Sources: Official statistics are from the Ministry of Animal Resources and Fisheries, Information Centre. IFAD numbers are from IFAD (2010) and unpublished records.

Another example of such discrepancies is seen in a comparison of livestock statistics in 2020 from three sources: a 2018 presentation delivered by the Ministry of Animal Resources, a World Bank estimate for 2020, and the Ministry of Livestock (2021) estimate in the Statistical Bulletin (Table 2.5). Using sheep numbers as an example, the difference between the Ministry of Livestock and Ministry of Animal Resources numbers is 1.67 million animals, whereas the difference between the Ministry of Livestock (official source) and data from the World Bank is just 0.10 million. Similar variance is seen in the numbers for the other types of livestock but to a lesser degree.

Table 2.5 Annual livestock population estimates for Sudan by type in 2020, from various sources, millions

Source	Camels	Goats	Sheep	Cattle	Total
Ministry of Animal Resources 2018	4.95	32.52	39.33	31.95	108.74
World Bank 2020	4.89	32.03	40.90	31.49	108.69
Statistical Bulletin, Ministry of Livestock 2021	4.92	32.22	41.00	31.79	109.92

Note: The number for the year 2020 from the Ministry of Animal Resources (2018) is based on projections made in 2018.

There are valid reasons to question the accuracy of official livestock population estimates. Two widely accepted models of ruminant livestock population dynamics are the disequilibrium model, which attributes large swings in animal populations to abrupt changes in environmental conditions affecting death and reproductive rates, and the equilibrium model, which explains population variations through density-dependent changes in recruitment and death rates as animal numbers exceed carrying capacity. However, the Sudanese herd growth model differs from both models (Ellis and Swift 1988; Caughley 1977; Behnke 2012). The Sudanese model used to generate the official estimates of the size of the national livestock herd by type assumes stable reproductive, recruitment, and mortality rates regardless of herd size or present weather conditions without aligning with any theoretical alternatives (Behnke 2012). A new livestock census is not expected for several years. Consequently, gaining a better understanding of Sudan's national herd size will require a reevaluation of existing evidence.

In the meantime, some states have attempted to count their livestock through aerial or ground surveys. These include the states of El Gezira in 1986, Red Sea in 1989, Khartoum in 1999, River Nile in 2006, and North and South Kordofan in 2010. The results of these state-level livestock enumerations, along with the 2010 national and state-level official projections and estimates from the 1975 aerial census for individual states, lead to several conclusions. These are summarized by Behnke (2012) as follows:

- The livestock enumerations conducted in El Gezira and Red Sea states during the 1980s, which followed a severe drought that caused significant livestock mortality, indicate much sharper declines in animal numbers than the national official estimates.
- Despite the stark contrast in livestock production conditions between El Gezira, where producers have access to irrigated feed, and Red Sea state, which relies on extremely low and irregular rainfall, both states experienced notable decreases in livestock numbers.
- This suggests that the official estimates overestimated herd losses caused by drought in the 1980s, as illustrated in Table 2.6 for Red Sea state and Table 2.7 for El Gezira state.

Table 2.6: Red Sea state livestock population census results for 1975, 1989, 2009, and 2010

Year	Camels	Goats	Sheep	Cattle	Total
1975	83,000	373,700	187,600	40,700	685,000
1989	45,100	380,600	182,800	9,000	617,500
2009	274,000	714,000	360,900	133,000	1,481,900
2010	280,200	716,800	416,600	125,300	1,538,900

Source: Integrated Livestock Surveys of Red Sea Province, Sudan. Environmental Research Group Oxford for 1975 and 1989. Information Center, Ministry of Animal Resources and Fisheries for 2009 and 2010.

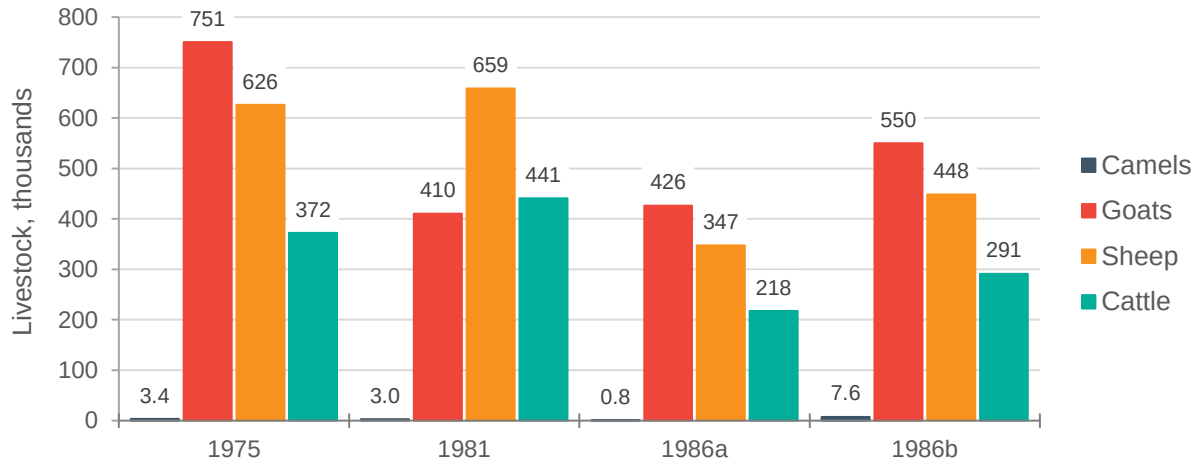
Table 2.7: El Gezira state livestock population census results for 1975, 2009, and 2010

Year	Camels	Goats	Sheep	Cattle	Total
1975	146,100	1,143,700	216,300	503,900	2,010,000
2009	118,000	2,128,900	2,448,900	2,456,400	7,152,200
2010	120,700	2,137,300	2,473,800	2,463,900	7,195,700

Source: Sudan National Livestock Census and Resource Inventory, Resource Management and Research for 1975. Information Center, Ministry of Animal Resources and Fisheries for 2009 and 2010.

Livestock estimates for El Gezira state in 1986 were based on aerial counts conducted at several times of the year to document seasonal fluctuations in livestock populations because of nomadic herd movements. These fluctuations underscore the unavoidable lack of accuracy in livestock population estimates that refer to areas that are part of larger migratory systems. Figure 2.2 shows swings in livestock estimates during 1981 compared to the 1975 census as well as 1986 projections in two different seasons.

Figure 2.2: El Gezira state livestock population estimates, 1975, 1981, and two periods in 1986



Source: El Gezira Livestock Integration Study Final Report, Volume IV, 1987.

River Nile state census results for 2006 and official estimates for 2009 also show significant variances in the estimated populations of different herd species, indicating considerable discrepancies between field counts and official estimates in the state (Table 2.8).

Table 2.8: River Nile state livestock population census results for 1975, 2006, 2009, and 2010

Year	Camels	Goats	Sheep	Cattle	Total
1975	59,100	263,000	272,500	43,700	638,300
2006	18,700	242,200	354,200	68,200	683,300
2009 (official)	109,400	1,198,600	1,020,800	99,800	2,428,600
2010 (official)	111,900	1,203,300	1,005,100	83,500	2,403,800

Source: Sudan National Livestock Census and Resource Inventory, Resource Management and Research for 1975. Information Center, Ministry of Animal Resources and Fisheries for 2006, 2009, and 2010.

The 2010 census results and 2010 official estimates of livestock numbers in South Kordofan state (Table 2.9) are similar. This is a remarkable result given that official estimates have been extrapolated from data that was collected in 1975, 35 years earlier.

Table 2.9: South Kordofan state livestock population census results for 1975, 2006, 2009, and 2010

Year	Camels	Goats	Sheep	Cattle	Total
1975	1,800	696,000	830,100	1,467,400	2,995,300
2009 (official)	507,700	3,353,400	3,077,800	7,340,000	14,278,900
2010 (official)	519,200	3,366,700	3,098,700	7,349,900	14,334,500
2010 (IFAD)	451,000	2,422,000	3,802,000	7,129,000	13,804,000

Source: Sudan National Livestock Census and Resource Inventory, Resource Management and Research for 1975. Information Center, Ministry of Animal Resources and Fisheries for 2009 and 2010 official statistics. IFAD unpublished records for 2010.

In summary, the state-level livestock censuses since 1975 have shown no consistent trend, sometimes matching and sometimes deviating considerably from official estimates. The accuracy of the official estimates, once field evaluations of those estimates are made, is likely to differ by state. However, these significant data limitations and uncertainties negatively impact public and private sector livestock development planning, as well as

strategic thinking in the formulation of pro-poor policies. Therefore, collaboration among all livestock sector stakeholders is recommended to close the significant gaps in knowledge and information in this critical sector.

3) ECONOMIC CONTRIBUTIONS OF THE LIVESTOCK SECTOR

The livestock sector plays a pivotal role in the Sudanese economy, contributing significantly to the national GDP and generating substantial foreign exchange through export revenues. Beyond these economic benefits, the sector provides essential food supplies and valuable animal protein to the entire population of Sudan. Livestock also offers draught power for agricultural production and processing and produces manure for soil fertilization and fuel (Wilson 2018).

3.1 Contribution to Sudan’s gross domestic product (GDP)

Crop production, livestock, fisheries, and forest management all contribute to Sudan's agricultural GDP. According to official data collected before South Sudan's independence, livestock consistently contributed more than 60 percent of the value added to the agricultural sector and was a larger contributor to agricultural GDP than crop production (Wilson 2018).

Despite the decline in the agricultural sector's relative contribution to national GDP following the advent of oil production and exports in the late 1990s, agriculture has remained a vital part of Sudan's economy. Notably, at no point in the last decade has petroleum's contribution to GDP matched that of agriculture. During this period, the livestock sector emerged as Sudan's largest domestic economic industry by value, even surpassing petroleum (Wilson 2018). Following the loss of most of the country’s oil fields after the independence of South Sudan, agriculture once again became Sudan’s most important economic sector, contributing approximately one-third of the country’s GDP (World Bank 2020). In 2016, the economic value of the livestock sector was estimated to account for 34 percent of all farm production value (FAO 2020).

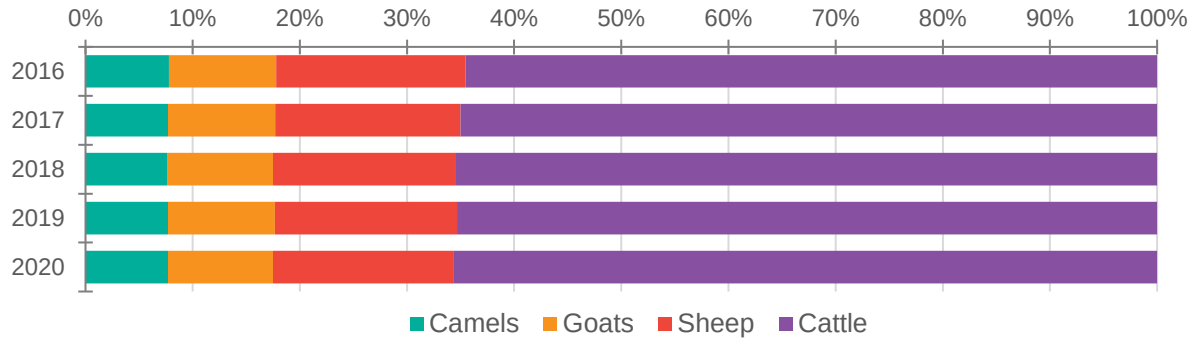
However, analysis done during the transitional political period in 2021 found a decline in the agricultural sector's share of GDP in recent years. The research showed that the share of Sudan’s overall GDP made up by the agricultural sector, which was 34 percent in 2012, had decreased to 20 percent by 2019 (MoFEP 2021). Recent estimates concur that there has been a recent decline in the contribution of the agricultural sector to the national GDP (Alhelo et al. 2023).

3.2 Contribution to food consumption and food security

Livestock in Sudan is a primary source of food, significantly contributing to both food consumption and food security. Livestock provides milk and meat for direct local consumption by households or the camp or herd unit, depending on how the community organizes itself (Ahmed 2014). Sudan's domestic demand for meat has been on the rise due to rapid population growth and increases in real incomes. Between 1990 and 2019, average household incomes increased from USD 674 to USD 1,676, in constant 2010 US dollars.

While red meat in Sudan is also sourced from sheep, goats, and camels, cattle remain the most significant source (Humphrey et al. 2021). Figure 3.1 illustrates the percentage distribution of red meat consumption in Sudan by livestock type from 2016 to 2020. Cattle consistently remains the dominant source of red meat, accounting for about 65 percent of total red meat consumption each year. This underscores the importance of cattle in Sudan's food security.

Figure 3.1: Red meat consumption in Sudan by animal type, percentage share of all red meat consumption, 2016 to 2020, by year



Source: Ministry of Livestock (2021).

Cattle: The consumption of cattle meat has remained stable in recent years, reflecting a steady preference for cattle meat among Sudanese consumers. In 2009 cattle contributed 67.2 percent of red meat consumption, but this share only fell slightly to 65.7 percent in 2020 (Humphrey et al. 2021).

Sheep: Sheep meat consumption has seen a minor decline over the years. Despite the overwhelming market share of cattle, sheep (mutton) is the preferred choice of red meat consumption, so it commands a higher price than cattle (beef). The higher price of mutton is due to both increased domestic demand and its scarcity in the domestic market, given its prioritization for export markets.

Goats: Goat meat consumption has remained consistent at around 10 percent throughout the period. Goats are prevalent across Sudan, particularly outside of the northern desert zones, and are raised by sedentary families mostly for milk and meat consumption. Although less popular than mutton, goat meat is consumed by low-income families in particular (Omer 2011). Goat milk is an important source of protein in Sudanese diets, and many urban families keep a few goats for milk.

Camels: Camel meat consumption has remained stable at 8 percent each year, reflecting its niche but consistent role in the diet of Sudanese people. Camels are useful for dual purposes—milk and meat (Omer 2011). Many camel owners raise them primarily for milk, which they value for the animal’s ability to provide sustenance during protracted dry seasons when other animals, like goats, may provide much less milk (Fahey 2007). Meat from camels is typically a by-product, usually from older animals that no longer produce much milk or are unable to serve other functions (Wilson 2018).

All four species of livestock provide milk, but much of it goes to feed their offspring. Only the surplus is consumed by the household. This aspect of milk production in Sudan is often overlooked in broader analyses (Wilson 2018).

Poultry and fish production: In recent years, poultry meat and eggs have assumed increasing importance in Sudanese diets—poultry meat production increased from 65,000 mt in 2016 to 78,000 mt in 2020, while egg production also rose from 60,000 mt to 73,000 mt (Wilson 2018). The total production of fish grew from 36,000 mt in 2016 to 41,000 mt in 2018 and 2019, but dropped to 37,000 mt in 2020 (Table 3.1).

Table 3.1: Annual consumption of various types of animal products. 2016 to 2020, thousands mt

Year	Red meat	Poultry	Eggs	Fish	Milk
2016	1,502	65	60	36	4,507
2017	1,519	68	63	38	4,553
2018	1,540	70	65	41	4,591
2019	1,543	75	70	41	4,623
2020	1,553	78	73	37	4,655

Source: Ministry of Livestock (2021).

Milk production and imports: The national animal herd produced an estimated 7.4 million mt of milk in 2009. Less than one-quarter of this milk is marketed, so the country imports liquid and powdered milk and processed dairy products, primarily to meet urban demand. Annual imports of milk powder increased from 2,678 mt in 1996 to 30,365 mt in 2006 (Wilson 2018). Individual farmers in dairy cooperative societies and small to medium private dairy farms, as well as a few corporations, supply more than 90 percent of the milk consumed in Khartoum. Despite increasing domestic demand, the supply of dairy products in Khartoum state is still insufficient. This is associated with decreased milk output and occasional milk waste due to inadequate pasteurization and storage facilities in various parts of the country. Sudan's milk yield remains poor despite efforts to meet regional yield levels (Ibrahim and Hutur 2022).

3.3 Contribution to exports and foreign exchange earnings

The livestock sector in Sudan is a major component of the country’s trade. The value of exports from the animal sector has consistently comprised just under 50 percent of all agricultural exports and nearly 30 percent of all non-oil export production (Wilson 2018; Behnke and Osman 2013).

According to the Statistical Bulletin of the Ministry of Livestock (2021), livestock exports exceeded agricultural exports in 2016, accounting for 111 percent of overall agricultural exports, and were 80 and 77 percent of agricultural exports in 2017 and 2018, respectively. However, the percentage of livestock exports fell to less than 50 percent (43 percent) in 2019, and was projected to be only 26 percent in 2020, as shown in Table 3.2.

Table 3.2: Value of livestock exports compared to value of agricultural exports

Year	Agriculture. USD millions	Livestock. USD millions	Livestock exports as share of agricultural exports, %
2016	750.4	833.9	111.1
2017	1,039.0	833.9	80.3
2018	1,114.6	855.8	76.9
2019	1,491.5	645.3	43.3
2020	1,703.0	439.1	25.8

Source: Ministry of Livestock (2021).

Export markets and trade dynamics: Most live sheep and goats are exported to Saudi Arabia, with significant cross-border live animal trade with Chad, Libya, and Egypt (Omer 2011). A small number of cattle are exported to Yemen and the Gulf countries. Live camel traffic is gradually rising, with most camels being transported on the hoof to Egypt and Libya (Fahey 2007). Sheep account for between 85 and 90 percent of the quantity and value of live animal exports each year (Table 3.3). However, camels are also a notable export, with the recorded value per camel climbing dramatically—an ordinary camel is currently worth up to USD 3,000 if exported. Some export routes, particularly those used to transport camels across the desert from Darfur to northeastern Egypt, may use unmarked and unguarded border crossings (Humphrey et al. 2021).

Table 3.3: Annual live animal exports, number and value, by type, 2016 to 2020

Year	Camels		Goats		Sheep		Cattle	
	Number	Value, USD thousands	Number	Value, USD thousands	Number	Value, USD thousands	Number	Value, USD thousands
2016	25,464	28,989	32,234	2,149	475,253	39,762	66,980	3,875
2017	256,445	302,025	289,232	19,251	147,643	457,418	94,710	51,753
2018	192,207	216,843	247,109	52,538	141,175	431,579	103,489	63,426
2019	110,739	121,847	186,782	13,148	133,037	397,785	NA	NA
2020	127,769	137,597	140,950	1,933	605,340	1,968,649	NA	NA

Source: Ministry of Livestock (2021).
Note: NA = “Not available”.

Sudan also exports chilled and frozen beef to the United Arab Emirates, Qatar, Kuwait, Oman, Jordan, and Egypt. Jordan is becoming an important market for chilled beef, while Saudi Arabia remains the primary destination for chilled mutton and, to a lesser extent, camel meat. Exports of sheep and sheep meat have more than tripled since 2000—the trade is now worth more than USD 400 million per year. However, Sudanese traders exporting live animals may be vulnerable to price setting in the importing countries (Wilson 2018).

Hides and skins: The production of hides and skins in Sudan varies yearly. Over 41 million pieces were exported in 2005, generating more than USD 40 million. In 2009, the export value was just over USD 34 million. However, waste in the production of hides and skins is significant due to poor production practices, including in the preparation, conservation, and processing of the hides and skins. To maximize returns, the hides and skins and leather sectors in Sudan need significant upgrading, especially in value addition (Wilson 2018).

The livestock sector's contribution to Sudan's exports and foreign exchange earnings is substantial, providing critical support to the national economy. By addressing the challenges

and leveraging opportunities, Sudan can enhance the performance of its livestock exports, ensuring sustained economic benefits and improved livelihoods for its population.

3.4 Employment and livelihoods

The Sudanese livestock sector is crucial to the country's employment landscape, with about 40 percent of workers having jobs directly or indirectly related to livestock (Behnke and Osman 2013; Wilson 2018). In the early 1990s, around four out of five people in Sudan relied on agriculture and livestock keeping as their main source of income (Fahey 2007; Omer 2011). More recent studies indicate that the sector employs half the labor force and provides livelihoods to approximately two-thirds of the population (World Bank 2020).

Besides the significant employment directly associated with production, the livestock sector supports full- and part-time jobs in auxiliary domestic markets, benefiting numerous workers along livestock-dependent supply chains (Ahmed 2014). UNEP (2013) identified at least 34,000 full-time jobs supported by livestock systems outside of primary livestock production as well as businesses worth at least SDG 350 million involved with livestock, including in livestock trade. Each full-time job in the sector is supported by several part-time workers, each with numerous dependents who benefit from the activity. Those making their living from livestock trade include not only market operators but also transporters, trekking herders or drovers, workers in feedlots and abattoirs, those working in processing plants for meat and hides, and those supplying goods and services in auxiliary markets, such as water for livestock, fodder and crop residues, and feed for use in feedlots.

According to the 2008 census, 53 percent of households in Sudan are engaged in cultivation agriculture, 59 percent in animal husbandry, and 5 percent in fishing. If a cautious 50 percent of the families involved in animal husbandry are assumed to rely on pastoral production systems, 2 million households are estimated to receive sustenance and other economic benefits from pastoral livestock livelihood activities (UNEP 2013).

3.5 Support for agricultural and rural transportation

Livestock in Sudan supply draught power that is essential for crop production in many areas. The animals also contribute to environmental protection by producing manure, which aids in sustainable nutrient cycling and maintaining soil fertility and structure. They also help with bush and weed management in many regions (Wilson 2018). Livestock further support agricultural processes in various ways; for example, donkeys transport cereal grain, other crops, straw, and other crop residues from fields to homesteads and markets, as well as water and fuelwood for household use (Wilson 2007).

The pack donkey is a classic beast of burden, carrying significant loads on their backs. In urban areas and some larger villages, pack donkeys are harnessed in carts. Donkeys, although primarily used as pack animals, are also used for riding. Horses are ridden in rural areas, while in urban centers, they are attached to wagons or carts. All Sudanese equines are work animals (Wilson 2007).

Among Sudanese pastoralists, camels or oxen are used as transportation by the Baggara cattle herders of Kordofan and Darfur regions and the pastoral Fulani in Blue Nile state, particularly during their yearly migrations in search of better grazing areas for their herds

(Ahmed 2014). Camels are also used by nomadic and semi-nomadic peoples in the desert and sub-desert regions of northern Darfur and northern Kordofan, where they serve as the preferred mode of transportation (Omer 2011).

Despite these significant contributions of livestock to the national economy, public investments and support for livestock and animal health services are not proportionate to the revenues generated by the sector. It is common for less than one-quarter of the development budget allocated to the livestock sector actually to be delivered. Access to finance by producers is difficult, and credit is limited and expensive if obtainable. Services to the sector are inadequately funded and poorly equipped (Wilson 2018). Strengthening financial services to enable them to procure inputs and services more readily will directly benefit livestock producers (USAID 2022).

In sum, the livestock sector is integral to Sudan's economy, contributing significantly to GDP, food security, exports, employment, and rural transportation services. It remains a vital economic driver, particularly in the agricultural sector, supporting a substantial portion of the population through direct and indirect employment. The sector's role in providing essential proteins and sustaining livelihoods underscores its importance in food security. Despite challenges such as disease outbreaks, inadequate infrastructure, and limited access to credit, livestock exports continue to be a major source of foreign exchange earnings. Additionally, livestock provides crucial agricultural support through draught power and transportation, enhancing rural development. Addressing the sector's challenges through enhanced allocation of resources, financial services, and infrastructure improvements will unlock its full potential, ensuring continued economic benefits and improved livelihoods for Sudan's population.

4) POLICY FRAMEWORK AND REGULATORY ENVIRONMENT

4.1 Historical development of livestock policies

The historical development of the federal ministry responsible for livestock provides some understanding of how the government of Sudan has engaged in the livestock sector. At independence in 1956, Sudan established a separate Ministry of Animal Resources. In 1969, under the Nimeiri regime, this ministry was merged with agriculture and irrigation into the Ministry of Agriculture and Natural Resources (Awuondo 1999). The Ministry of Animal Resources was reestablished to again focus solely on livestock during the mid-1980s with civilian rule but was reincorporated into the Ministry of Agriculture by the al-Bashir regime in 1989. In 1996, the new government reestablished a separate Ministry of Animal Resources and Fisheries (Fahey 2007).

The National Assembly's Committee on Agriculture and Animal Resources, which includes members from the Ministry, the Pastoralists Union, individual Assembly members, and other federal and state ministries, plays a crucial role in policy development. Policy decisions are made by a majority vote of the committee. The committee also invites contributions from various external organizations to its deliberations (Fahey 2007).

Livestock services and roles in the public sector are organized across federal, state, and local levels. The primary responsibilities for policy and regulation at each level are as follows:

- **Federal level: Ministry of Animal Resources and Fisheries:** The Federal Ministry is responsible for leading the development of the livestock and fisheries sectors, including the sustainable development of range and pasture. It sets national strategies, policies, and development goals for the sectors and provides services, such as disease control and vaccine production. These services are extended to state governments (USAID 2022).
- **State-level ministries:** At the state level, ministries have similar structures to the federal level, either as a separate State Ministry of Animal Resources or as a Directorate for Animal Resources within a broader agricultural sector ministry for the state. These decentralized governance structures ensure that federal policies are implemented in alignment with the national vision and goals for sustainable sector development (Ibrahim and Hutur 2022). The state agency for livestock is responsible for all livestock-related matters at the state level and coordinates closely with the federal level livestock agencies, including tasks like vaccine distribution or providing extension services (USAID 2022).
- **Local level:** At the local level, livestock services are managed by a General Manager or Director for livestock. Local authorities provide direct livestock health services, including vaccination campaigns, and also deliver veterinary extension services. The local livestock officers report to both the locality head and indirectly to the state Director of Livestock (USAID 2022).

Local Native Administrations maintain a strong presence in local communities, including among pastoral communities, and interact with the public administration systems. With regards to livestock, these traditional authorities assist in enforcing regulations on water and pasture access and support the local government in the taxation of herds.

4.2 Current regulatory environment and policy directives

Sudan faces numerous interlinked economic development challenges, including high poverty rates, poor access to services, declining agricultural and livestock productivity, environmental degradation, climate change, conflicts, and social unrest. These issues are most pronounced in rural areas, particularly those reliant on traditional rainfed agriculture. The poverty rate in rural areas stands at 68 percent, compared to 49 percent observed in urban areas. Food insecurity is prevalent, particularly in regions reliant on rainfed agriculture (IMF 2013; World Bank 2021; IPC 2019).

Several national policies and strategies aim to create a sustainable and commercially valuable livestock sector. However, many development programs have disrupted traditional pastoral routes and contributed to pastureland degradation. The dual land tenure system, which combines federal legislation and customary rights, complicates land claims. The tenure system should be reviewed and revised to accommodate current realities (Wilson 2018; Manger 2005; Hassan and D'Silva 2022).

Some government actions, such as abolishing traditional institutions and nationalizing unregistered land, have negatively impacted pastoralism and livestock resource management. Additionally, the productivity of Sudanese livestock is considered low, primarily due to poor

input supply, extension, and veterinary services. Efforts at genetic improvement have focused on short-term market demands rather than long-term sustainable breeding programs (Wilson 2018; Olesen et al. 2000; Ayantunde et al. 2007; Kosgey and Okeyo 2007).

The political system in Sudan, dominated by a small elite, formulates development policies without considering the needs of poor livestock owners. The abolition of Native Administrations in the northern provinces in the 1970s and the subsequent oil discovery and extraction have disrupted pastoral livelihoods and diminished the livestock sector's importance to the national economy (El Arifi 1985; MONEC 2003). These changes, along with flawed development policies, political instability, and weak administrative capacities, have negatively impacted the sector (Osman and Ali 2021). Efficient policy implementation is also hindered by under-resourced institutions, insufficient data, and a lack of inclusive policy design (Fahey 2007; Ibrahim and Hutur 2022).

4.3 Key policies, laws, and strategies in livestock and linked sectors

Property rights in Sudan encompass private, communal, or state ownership and unrestricted access to resources. While livestock are privately owned, land and other natural resources often involve a mix of ownership types—both formal, based on rules and laws, and informal, based on customary social norms and conventions. The resultant institutional constraints adversely influence the development of the sector (North 1994).

Many of the more general laws, regulations, and government programs affecting livestock producers that have been created or implemented over the past 70 years are listed in Annex Table 8. Land-specific laws are listed in Annex Table 9 . In both annex tables, brief annotations on each piece of legislation or program are provided.

A key legal intervention that should affect the livestock sector is UN Convention 107, which emphasizes that the state must respect the laws of indigenous populations and integrate them into social, economic, and cultural development structures and processes. However, most land policies and development strategies implemented in Sudan in the past displaced pastoralists and disrupted their traditional grazing routes (Hassan and D’Silva 2022).

Other policies, programs, and initiatives in the past that had or were designed to have an impact on the development of Sudan’s livestock sector include:

- The 1970 Unregistered Land Act expanded large-scale mechanized farming at the expense of pastoralists (Egemi 2008).
- The Structural Adjustment policies of the International Monetary Fund in the 1990s, which privatized government corporations and removed veterinary drug subsidies, negatively affecting animal health and pastoral livelihoods (Egemi 2008).
- The 1970 Land Act and the "Breadbasket" strategy, both of which focused on horizontal crop expansion, leading to large tracts of land being allocated to private corporations. This resulted in massive land seizures, displacing pastoralists and disrupting their migratory routes.
- The Amendment to the Civil Transactions Act in the early 1990s further eroded the control by pastoralists of the land that they traditionally had used for pasture.

- The South Kordofan Organization of Agriculture and Grazing Act 2001 delineated the responsibilities of farmers and pastoralists in South Kordofan, with significant adverse impacts on the use of grazing corridors by pastoral herders (Egemi 2008).
- The Comprehensive National Strategy, 1992-2000, covered livestock development priorities. It aimed to improve pastures, control animal diseases, provide water supplies to livestock, and facilitate livestock marketing systems. However, its implementation and monitoring were a challenge, and it was not very successful.
- The Pastoralists Union was created in 1995 and was intended to represent and promote livestock keepers' interests. However, it is not clear whether the organization has registered any successes in advancing efforts to boost the livestock sector in Sudan, so further study is required to evaluate its effectiveness.
- The Endemic Diseases Act of 2001 addressed animal and human health issues, specifying responsibilities for managing infected animals and carcasses.
- The Animal Welfare Act of 2015 focused on the basic care of livestock, including export requirements, which is related to animal welfare.
- The recent Investment Encouragement Act of 2021 offers incentives for domestic and foreign investors, including tax exemptions and land acquisition benefits, encouraging private sector investment in livestock.

Several multi-sectoral development efforts for Sudan touch on livestock. Among these is the Sudan National Agricultural Investment Plan, 2016–2020, which aimed to increase agricultural productivity by 50 percent by 2020. The Poverty Reduction Strategy Paper, 2004–2006 and the Comprehensive Africa Agricultural Development Program (CAADP) of 2013 highlighted the role that livestock development can play in poverty alleviation in Sudan. However, other programs of this sort, like the Green Alert Program, 2006–2010, may have marginalized livestock producers by allocating pasture lands to agricultural projects.

Several of the peace agreements that have ended some of the conflicts in Sudan created land commissions to review past land seizures and clarify land use rights. These include the Comprehensive Peace Agreement of 2005 and the Juba Peace Agreement of 2020. These agreements also emphasized the development of pastoralists, small farmers, and nomadic groups, with a focus on establishing land commissions and developing policies to meet pastoralists' needs.

The government of Sudan's engagement in the livestock sector has had some successes. Notably, the live animal quarantine system has helped Sudan retain a significant share of the global sheep export market (DTIS 2008). The quarantine system's credibility has benefited Sudanese sheep producers, traders, and exporters, particularly with recurrent outbreaks of Rift Valley Fever affecting livestock exports of live animals from other countries in the Horn of Africa.

4.4 Challenges and policy implications for the livestock sector

Some of the key challenges facing livestock policy formulation and implementation include:

- **Governance challenges:**

- High turnover in leadership results in inconsistent direction and policies.
- Poor coordination between federal, state, and local levels, as well as with the private sector engaged in livestock-related activities (USAID 2022).
- Seizure of rangelands—Successive governments have seized large areas of rangeland and pasture to promote irrigated and mechanized rainfed production, causing social, political, and economic disruption in pastoralist communities throughout the country (Wilson 2018).
- Non-inclusive policy design—Polices are often designed without adequate stakeholder involvement, leading to outcomes in the livestock sector that only benefit some, but not all, livestock producers (El Sammani and Salih 2006).
- Inadequate staff training in policy formulation, strategic planning, and data collection, which results in poorly designed livestock-focused policies and programs and hampers the planning process.

♦ **Research and development challenges:**

- Lack of evidence-based knowledge on livestock systems.
- Insufficient policy evaluation—There is a need for more thorough policy evaluation to ensure equitable and sustainable growth in Sudan's livestock sector (Casciarri and Ahmed 2009).
- Need for comprehensive research across the livestock sector, including in animal health, fodder crops, animal husbandry, livestock production systems, and the socioeconomic aspects of livestock production.

♦ **Financial resources challenges:**

- Anti-livestock and anti-agriculture bias in Sudan's economic policy—There is a consistent anti-agricultural bias in the economic policies formulated by the succession of leadership regimes in Sudan. Livestock suffers more than crop agriculture from this lack of attention to the strategic development needs of the agricultural sub-sectors (Behnke 2011; 2012).
- Unmet investment needs in livestock trade, pricing, institutional development, research, and technology to enhance livestock sub-sector, agricultural sector, and overall national revenues and foreign exchange income, as well as rural poverty alleviation.

4.5 Impact of conflicts on livestock health

Conflicts between nomads and farming communities over land and grazing routes are major causes of friction in Sudan. Since the 1960s, large-scale mechanized farming schemes have encroached on traditional grazing areas, aggravating these conflicts. The conflict between the Sudanese Armed Forces and the Rapid Support Forces that started in 2023 has further disrupted livestock production, promoted mass displacement, and limited veterinary services. This disruption increases the risk of zoonotic disease outbreaks and negatively impacts animal health and productivity (Hassan and D'Silva 2022; Shuaib 2024).

Displacement and interaction between animals and people are key drivers of disease transmission. The violence of the current conflict has resulted in the displacement of millions

of livestock, forcing their owners to change their traditional migratory routes in search of fresh grazing sites. This has led to new or increased contact between livestock producers and farmers in different areas, potentially increasing zoonotic disease transmission. With the conflict disrupting veterinary services critical in preventing zoonotic diseases, Sudanese livestock are now at a significant risk of experiencing widespread disease transmission (UNHCR 2024).

Sudan also faces transboundary animal diseases, in addition to endemic ones. These include yellow fever and Crimean-Congo hemorrhagic fever. The destruction of key laboratories and equipment at Sudan's Central Veterinary Research Laboratory (CVRL) and other state laboratories in the early months of the current conflict in 2023 has contributed to the spread of zoonotic diseases. The laboratory in Khartoum played a critical role in disease control. Moreover, damage to its cold storage facilities containing pathogenic isolates, such as the Rift Valley fever virus, also poses significant animal health risks (Shuaib 2024).

To minimize the conflict's impact on zoonotic disease management, focused interventions are needed, such as improving disease surveillance and reporting and undertaking awareness campaigns. Furthermore, fostering collaboration with the Food and Agriculture Organization of the United Nations (FAO), the World Organization for Animal Health, and the World Health Organization is critical for obtaining vital resources, expertise, and training to develop the veterinary sectors in all conflict-affected areas. Overall, the ongoing conflict in Sudan has had a severe impact on veterinary services and zoonotic disease management, posing significant health hazards to both animals and humans. To successfully address potential issues, a coordinated One Health strategy, targeted interventions, and emergency response techniques are required. The international community can help Sudan rebuild its veterinary services and infrastructure, without which the animal health systems will be further strained in the event of an outbreak (Shuaib 2024).

In sum, there is a pressing need for a reevaluation of livestock policy in Sudan. Recent peace agreements provide opportunities for creating new policies and practices to guide Sudan towards peace and prosperity, even as the current conflict poses a challenging context within which to do so. Building new pro-poor initiatives and participatory processes can help formulate equitable and just policies, addressing the needs of pastoralists and promoting sustainable livestock sector development.

5) CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1 Conclusions

Sudan has a large livestock sector, ranking it among the top three African countries in livestock numbers. The sector plays a critical role in the economic well-being of both rural and urban populations. It significantly boosts Sudan’s economy through exports and its contribution to overall GDP. Livestock provide essential food products year-round, including meat, eggs, milk, and dairy products, assist in agricultural processes by providing draught power and manure, and, particularly in rural areas, offer transportation (horses, donkeys, oxen, and camels). Approximately 40 percent of the Sudanese population relies on the livestock sector for full or part-time employment.

Despite its importance, the livestock sector has received minimal financial support from Sudan's government. Successive regimes have prioritized irrigated agricultural schemes at the expense of the livestock sector, which, nonetheless, has continued to be productive with minimal budgetary support. Key inputs for livestock production include pastureland—over three-quarters of Sudan's livestock is owned by pastoralists who traditionally raise their herds in a mobile fashion, requiring vast areas of land. However, the expansion of irrigated agricultural schemes, rapid urbanization, increased mining and oil extraction activities, and increased drought and floods associated with climate change have squeezed pastoralists into drier lands and exacerbated conflicts between herders and farmers and among herders themselves.

The government needs to prioritize several activities related to livestock production. For example, financing a national livestock census, which was last conducted in the 1970s (with an aerial survey in 1975), requires substantial capital, well-equipped human resources, and political will. Additionally, funding for livestock research is meager despite the need for long-term studies in various livestock fields, including socioeconomic studies among pastoralists and other livestock-producing households. Updated statistics and studies reflecting current conditions for livestock producers are essential for Sudan's decision-makers as they engage in strategic planning and policy design for the development of the country's livestock sector. Engaging with different livestock owners to investigate their problems, views, and aspirations is crucial for developing pro-poor strategic plans and policies that regulate the sector effectively.

5.2 Policy recommendations and future directions

To address the challenges faced by the livestock sector and to harness its full potential, this study proposes a comprehensive set of policy recommendations is essential. These aim to enhance institutional capacities, ensure sustainable development, and foster inclusive growth within the sector.

- **Establish the National Livestock Policy Hub:** Strengthen veterinary institutional capacities, review livestock policies, and update veterinary legislations through establishing the proposed hub.
- **Allocate more funds:** Increase funding to implement activities required for formulating the National Livestock Policy Hub and executing its proposed activities, including capacity building on policy and planning issues at all levels.
- **Reform existing policies:** Review and update current livestock policies and strategies based on evidence-based data. Future policies should target both agro-pastoral (sedentary) and pastoral (mobile) livestock producers and encourage joint projects, such as providing feedlots in mixed-farming areas for the animals of pastoralists.
- **Enhance data collection and documentation:** Support and encourage technical capacity-building for data collection and documentation regarding livestock production systems. Reliable data is essential for sustainable livestock development planning and policy formulation.
- **Encourage stakeholder participation:** Promote greater participation of different livestock stakeholders in policy formulation, decision-making processes, and strategic

planning. This includes continuous technical consultation and training on dynamic policy issues involving all relevant stakeholders.

- **Increase funding for research:** Boost funding for livestock research, emphasizing socioeconomic studies and research into current production systems. Prioritize a research agenda that is producer-driven to ensure the utilization and adoption of research results, including new and adapted production technologies.
- **Engage multi-stakeholder solutions:** Involve all actors—livestock-producing communities, the private sector engaged in livestock activities, non-governmental organizations, finance institutions, research, and academic institutes—early in livestock development planning processes. Consult fully with indigenous groups that pursue livestock-based livelihoods. Promote evidence-based advocacy and innovative cross-sectoral approaches in planning to support people-centered, economically viable, environmentally friendly, and sustainable outcomes.
- **Improve coordination:** Enhance coordination between federal and state ministries and agencies involved with livestock. Advocate for better collaboration between governmental bodies, non-governmental organizations (national and international), and the private sector to fill knowledge gaps and upgrade governmental staff at all levels.
- **Demarcate livestock routes:** Include stakeholders and traditional leadership in dialogues about land management planning and agreements. Traditional leaders should play a role in regulating and formalizing transhumance corridors.

Pastoralists are economically disadvantaged not necessarily because government policies target or ignore them, but due to their characteristics as small, numerous, geographically dispersed, and politically marginalized producers engaged in traditional rainfed livestock production systems (Behnke 2011). Sudan's vision of development for its livestock sector should not discard traditional methods but rather seek to integrate them with new, globally competitive practices that can be profitable for all involved. Focused planning and efforts in the livestock sector can significantly improve the livelihoods of rural communities, thereby benefiting the entire country (Ibrahim et al. 2020).

6) ANNEXES

Annex Table 1 Livestock population by state, 2009 estimates, millions

States	Camels	Goats	Sheep	Cattle	Total
North Kordofan	1.18	3.59	7.15	0.94	12.86
South Kordofan	0.51	3.35	3.08	7.34	14.28
North Darfur	0.57	2.88	3.72	0.68	7.85
South Darfur	0.15	2.88	3.08	4.17	11.11
West Darfur	0.41	4.37	3.87	4.01	12.66
El-Gedaref	0.33	1.05	2.10	1.03	4.51
Kassala	0.66	1.66	2.00	0.84	5.16
Red Sea	0.27	0.71	0.36	0.13	1.47
Blue Nile *	0.01	4.50	3.91	2.00	10.42
Sennar	0.11	1.62	1.36	1.57	4.66
El Gezira	0.12	2.13	2.44	2.46	7.15
White Nile	0.04	2.53	2.50	3.46	8.53
Northern	0.05	1.14	0.97	0.25	2.41
River Nile	0.10	1.20	1.02	0.10	2.42
Khartoum	0.01	0.64	0.44	0.24	1.33
Total	4.52	34.36	38.72	29.22	106.82

Source: FAO and WFP (2011).
Note: In 2009, the number of states was fifteen before the subdivision of Greater Kordofan into three states from two and Greater Darfur into five states from three.
*In 2010, livestock estimates were available only for Blue Nile state—0.01 million camels; 4.57 million goats; 3.94 million sheep; and 2.04 million cattle (Gebru et al. 2013).

Annex Table 2 Livestock population by state and region, 2016 estimates by Fadlullaha et al. (2018), thousands

States	Camels	Goats	Sheep	Cattle	Total
North Kordofan	923.3	2,654.3	4,141.6	759.4	8,478.7
South Kordofan	248.1	2,123.4	2,171.3	4,444.0	8,986.9
West Kordofan	630.0	2,373.3	4,282.4	3,402.1	10,687.7
White Nile	36.1	2,614.9	2,620.1	3,599.6	8,870.6
Western Region	1,837.5	9,765.9	13,215.4	12,205.1	37,023.9
North Darfur	601.6	2,962.3	3,860.6	707.8	8,132.3
South Darfur	89.1	1,690.0	2,171.3	2,389.1	6,339.6
East Darfur	72.9	1,382.7	1,773.3	1,954.7	5,183.6
Central Darfur	195.7	2,040.0	1,809.5	1,877.2	5,905.9
West Darfur	239.0	2,476.3	2,203.5	2,296.4	7,132.3
Darfur Region	1,132.8	10,534.9	11,818.1	9,225.2	32,776.6
El Gedaref	348.2	1,082.5	2,192.3	1,069.2	4,692.2
Kassala	701.6	1,710.6	2,074.7	868.8	5,355.6
Red Sea	291.4	735.0	427.8	139.7	1,593.9
Eastern Region	1,027.9	3,528.1	4,694.7	2,077.7	11,641.8
Blue Nile	14.4	463.3	4,010.3	2,074.7	6,562.7
Sennar	118.8	1,674.9	1,411.6	1,628.2	4,833.5
El Gezira	125.5	2,191.7	2,539.9	2,554.6	7,411.7
Central Region	258.7	4,329.9	7,961.8	6,257.5	18,807.9
Northern	50.0	1,176.0	1,005.3	258.2	2,489.5
River Nile	116.4	1,233.9	1,058.7	103.3	2,512.3
Khartoum	6.7	659.3	454.5	249.1	1,369.6
Northern Region	339.5	3,069.2	2,518.5	610.6	6,371.4
Total	4,809.0	31,228.0	40,208.5	30,376.0	106,621.5

Source: Fadlullaha et al. (2018).

Annex Table 3 Livestock population by state, 2016 estimates by Ministry of Livestock, thousands

States	Camels	Goats	Sheep	Cattle	Total
North Kordofan	927.4	2,675.9	4,183.0	765.8	8,552.1
South Kordofan	249.2	2,140.7	2,193.0	4,481.5	9,064.4
West Kordofan	632.7	2,392.6	4,325.2	3,430.8	10,781.2
North Darfur	604.2	2,986.4	3,899.2	713.7	8,203.6
South Darfur	89.5	1,703.8	2,193.0	2,409.2	6,395.5
East Darfur	73.2	1,394.0	1,791.0	1,971.2	5,229.4
Central Darfur	196.6	2,040.0	1,827.5	1,893.1	5,957.1
West Darfur	240.1	2,496.4	2,225.5	2,315.8	7,277.8
El Gedaref	349.7	1,091.3	2,214.2	1,078.2	4,733.4
Kassala	704.7	1,724.5	2,095.4	876.1	5,400.7
Red Sea	292.7	741.0	432.0	140.9	1,606.6
Blue Nile	14.5	467.1	4,050.4	2,092.2	6,624.1
Sennar	119.3	1,688.6	1,425.7	1,641.9	4,875.5
El Gezira	126.1	2,209.5	2,565.3	2,576.2	7,477.0
White Nile	36.2	2,636.1	2,646.3	3,629.9	8,948.5
Northern	50.2	1,185.6	1,015.3	260.4	2,511.5
River Nile	116.9	1,244.0	1,069.3	104.1	2,534.3
Khartoum	6.8	664.6	459.0	251.2	1,381.6
Total	4,830.0	31,481.0	40,612.0	30,632.0	107,555.0

Source: Ministry of Livestock (2021).

Annex Table 4 Livestock population by state, 2017 estimates by Ministry of Livestock, thousands

States	Camels	Goats	Sheep	Cattle	Total
North Kordofan	931.2	2,691.0	4,197.5	773.2	8,592.8
South Kordofan	250.3	2,152.8	2,200.6	4,524.5	9,128.2
West Kordofan	635.4	2,406.1	4,340.1	3,463.7	10,845.2
North Darfur	606.7	3,003.3	3,912.6	720.6	8,243.3
South Darfur	89.9	1,713.4	2,200.6	2,432.3	6,436.2
East Darfur	73.6	1,401.9	1,797.2	1,990.1	5,262.7
Central Darfur	197.4	2,051.5	1,833.8	1,911.2	5,994.0
West Darfur	241.0	2,510.6	2,233.2	2,338.0	7,322.8
El Gedaref	351.1	1,097.5	2,221.9	1,088.6	4,759.0
Kassala	707.6	1,734.2	2,102.6	884.5	5,429.0
Red Sea	293.9	745.2	433.5	142.3	1,614.9
Blue Nile	14.6	469.7	4,064.4	2,112.2	6,660.8
Sennar	119.8	1,698.1	1,430.7	1,657.6	4,906.2
El Gezira	126.6	2,222.0	2,574.1	2,600.9	7,523.6
White Nile	36.4	2,651.0	2,655.4	3,664.7	9,007.5
Northern	50.4	1,192.3	1,018.8	262.9	2,524.4
River Nile	117.4	1,251.0	1,073.0	105.1	2,546.5
Khartoum	6.8	668.4	460.6	253.6	1,389.4
Total	4,850.0	31,659.0	40,752.0	30,926.0	108,187.0

Source: Ministry of Livestock (2021).

Annex Table 5 Livestock population by state, 2018 estimates by Ministry of Livestock, thousands

States	Camels	Goats	Sheep	Cattle	Total
North Kordofan	935.4	2,706.1	4,207.1	780.6	8,629.3
South Kordofan	251.4	2,164.9	2,205.7	4,567.9	9,189.9
West Kordofan	638.2	2,419.6	4,350.1	3,497.0	10,904.9
North Darfur	609.5	3,020.2	3,921.7	727.5	8,278.8
South Darfur	90.3	1,723.0	2,205.7	2,455.7	6,474.7
East Darfur	73.9	1,409.7	1,801.3	2,009.2	5,294.1
Central Darfur	198.3	2,063.0	1,838.1	1,929.6	6,029.0
West Darfur	242.1	2,524.7	2,238.4	2,360.5	7,365.6
El Gedaref	352.7	1,103.6	2,227.0	1,099.1	4,782.4
Kassala	710.8	1,744.0	2,107.5	893.0	5,455.3
Red Sea	295.2	749.4	434.5	143.6	1,622.8
Blue Nile	14.6	472.3	4,073.7	2,132.5	6,693.2
Sennar	120.3	1,707.7	1,434.0	1,673.6	4,935.5
El Gezira	127.2	2,234.5	2,580.0	2,625.9	7,567.5
White Nile	36.5	2,666.0	2,661.5	3,699.9	9,063.9
Northern	50.7	1,199.0	1,021.2	265.4	2,536.2
River Nile	117.9	1,258.0	1,075.5	106.2	2,557.6
Khartoum	6.8	672.2	461.7	256.0	1,396.7
Total	4,872.0	31,837.0	40,846.0	31,223.0	108,778.0

Source: Ministry of Livestock (2021).

Annex Table 6 Livestock population by state, 2019 estimates by Ministry of Livestock, thousands

States	Camels	Goats	Sheep	Cattle	Total
North Kordofan	939.8	2,722.7	4,212.3	787.2	8,662.1
South Kordofan	252.6	2,178.2	2,208.4	4,606.8	9,246.0
West Kordofan	641.2	2,434.4	4,355.4	3,526.8	10,957.9
North Darfur	612.4	3,038.7	3,926.5	733.7	8,311.2
South Darfur	90.7	1,733.6	2,208.4	2,476.6	6,509.3
East Darfur	74.2	1,418.4	1,803.5	2,026.3	5,322.4
Central Darfur	199.2	2,075.7	1,840.3	1,946.0	6,061.2
West Darfur	243.3	2,540.1	2,241.1	2,380.6	7,405.1
El Gedaref	354.4	1,110.4	2,229.7	1,108.4	4,802.9
Kassala	714.2	1,754.7	2,110.1	900.6	5,479.5
Red Sea	296.6	754.0	435.1	144.8	1,630.5
Blue Nile	14.7	475.2	4,078.7	2,150.7	6,719.3
Sennar	120.9	1,718.1	1,435.7	1,687.8	4,962.5
El Gezira	127.8	2,248.2	2,583.2	2,648.2	7,607.4
White Nile	36.7	2,682.3	2,664.8	3,731.4	9,115.2
Northern	50.9	1,206.3	1,022.4	267.7	2,547.3
River Nile	118.5	1,265.7	1,076.8	107.1	2,568.0
Khartoum	6.9	676.3	462.3	258.2	1,403.6
Total	4,895.0	32,032.0	40,896.0	31,489.0	109,312.0

Source: Ministry of Livestock (2021).

Annex Table 7 Annual national livestock population, by type, 2000 to 2014, estimates from various sources, millions

Year	Camels	Goats	Sheep	Cattle	Total	Source
2000	3.00	36.50	42.40	34.60	116.50	HCENR 2000
2001	NA	NA	NA	38.33	NA	Abdel Rahman 2007
2002	3.03	41.49	48.14	38.82	158.78	FAO 2011
2003	3.50	42.03	48.44	39.76	133.73	FAO 2011
2003	3.50	42.00	48.40	39.70	133.60	ARSC 2004
	3.50	42.00	48.00	40.00	133.50	Mohamed 2011
2004	3.72	42.18	48.91	39.76	134.57	FAO 2011
	3.70	42.00	49.00	40.00	134.70	Mohamed 2011
2005	3.91	42.60	49.80	40.47	136.77	FAO 2011
	3.90	43.00	50.00	40.00	136.90	Mohamed 2011.
2006	4.09	42.76	50.39	40.99	138.23	FAO 2011
	4.00	43.00	50.00	41.00	138.00	Mohamed 2011
2007	4.25	42.99	50.99	41.10	139.33	FAO 2011
	4.00	43.00	51.00	41.00	139.00	Mohamed 2011
2008	4.40	43.10	51.10	41.40	140.00	FAO 2011
	4.40	43.10	51.10	41.40	140.00	Mohamed 2011
2009	4.52	43.27	51.56	41.56	140.91	FAO 2011
	4.50	43.30	51.60	41.60	141.00	Mohamed 2011
	4.52	43.27	51.56	41.65	141.00	Wilson 2018
	4.52	34.36	38.72	29.22	106.82	FAO and WFP 2011
2010	4.62	43.44	NA	41.76	NA	Alzubair 2018
	4.65	43.44	52.01	41.56	141.66	FAO 2011
2011	4.75	30.84	39.30	29.62	104.50	Alzubair 2018
	NA	30.65	39.30	29.62	NA	FAO 2011
	4.72	30.65	39.30	29.62	104.28	Ibrahim and Hutur 2022
2012	4.75	30.84	39.48	29.84	104.91	Alzubair 2018
	4.75	30.87	39.48	29.84	104.95	Ibrahim and Hutur 2022
2013	4.77	30.98	39.57	30.01	105.34	Al Zubair 2018
	4.77	30.98	36.97	30.03	102.75	MoAR 2018
	4.77	30.98	39.57	30.03	105.35	USAID 2022
	4.77	30.98	39.57	30.01	105.34	Ibrahim and Hutur 2022
	4.75	30.84	39.48	29.84	104.91	Gorish and Hassan 2013
2014	4.79	31.03	39.85	30.19	105.86	Al Zubair 2018
	4.78	31.03	37.16	30.24	103.22	MoAR 2018
	4.79	31.03	39.85	30.19	105.86	Ibrahim and Hutur 2022
	4.79	31.03	39.85	30.19	105.86	Ministry of Livestock 2016

Note: NA = “Not available”

Annex Table 8 Policy and strategic intervention mandates in Sudan's livestock sector

Policy/strategies and interventions	Mandates and implications

Convention Concerning the Protection and Integration of Indigenous and Other Tribal and Semi-Tribal Populations in Independent Countries. (Convention No. 107 of the United Nations (under the International Labour Organization. Adopted 26 June 1957, came into force 2 June 1959).	• Article 2: Governments creating possibilities of progressive integration of the said populations into the life of their respective countries.
	  ○ Protection of the populations concerned *enabling them to benefit on an equal footing from the rights and opportunities that national laws or regulations grant to other elements of the population.
	  ○ Promote the social, economic, and cultural development of these populations and raise their standard of living.
	• Article 4: Policies aimed at mitigating the difficulties experienced by these populations in adjusting themselves to new conditions of life and work shall be adopted.
	• Article 5: Seek the collaboration of these populations and their representatives.
	  ○ Provide these populations with opportunities for the full development of their initiative.
	• Article 6: The populations concerned shall be given high priority in plans for the overall economic development of areas inhabited by them.
	  ○ Special projects for economic development of the areas in question shall also be designed so as to promote such improvement.
	• Article 7: In defining the rights and duties of the populations concerned regard shall be had to their customary laws.
	• Article 11: The right of land ownership, collective or individual, of the members of the populations concerned over which these populations traditionally occupy shall be recognized.
	• Article 13: This ownership should be respected within the framework of national laws and regulations, as far as they satisfy the needs of these populations and do not hinder their economic and social development.
	• Part VII. Administration: Planning, coordination, and execution of appropriate measures for the social, economic, and cultural development of the populations concerned
	  ○ Propose legislative and other measures to the competent authorities.
	  ○ Supervise the application of these measures (El Sammani and Salih 2006).

Breadbasket Strategy–1970	• Focused on the horizontal expansion of crops. • Large tracts of land were given or sold to private corporations. • Considerable displacement of pastoralists with their traditional migratory routes being blocked, leading to conflict (Fahey 2007).
Land Act–1970	• Enabled the government to claim expanses of pastureland, rangeland, and migratory routes. • Massive land seizures that resulted in population displacement (Fahey 2007).
Amendment to Civil Transactions Act–1990	• Confirmed that all non-registered land should be considered as if registered in the name of the State. • Prohibited appeal against land adjudications made by the government, including dismissal of all cases before courts at that time (Rahhal and Abdel Salam 2006).
Adoption of Structural Adjustment Policy of the International Monetary Fund (IMF)–early 1990s	• Privatization of government corporations like the Animal Resources Services Company. • Removal of veterinary drug subsidies. • Transfer of vaccination service funding from central government to states (MONEC 2003).
Pastoralists Union Creation–1995	• Represent and promote the interests of livestock keepers to the government and non-governmental organizations. • Initiate and influence livestock policies at national and state levels (Fahey 2007).
Comprehensive National Strategy, 1992-2000	• Poverty alleviation. • Protection of the environment; conservation of natural resources; establishment of protected areas; increased public and local communities' involvement in the realization of these objectives. • Improvement of pastures, control of animal diseases, and provision of water supplies. • Facilitation of marketing system (El Sammani and Salih 2006).
Environmental Policy Act–2000	• Protection of natural resources and pollution control. • Environmental impact assessment is required for projects likely to have a negative impact on the environment. • Capacity building (Fahey 2007).

Policy/strategies and interventions	Mandates and implications
Endemic Diseases Act–2001	• Notification of veterinary authority of disease outbreaks. • Isolation of infected animals from other healthy ones. • Prohibit slaughter, sale, or export of infected animals. • Prevent transference of any part of dead animal bodies or any infected animals by owner. • Veterinary authority is responsible for getting rid of infected animal bodies by burning and burying them in an isolated place not near people or animals (National Assembly 2001).
Sudan's Poverty Reduction Strategy paper, 2004–2006	• Improve the structure of incentives for producers and other stakeholders within the sector and related sectors • Reform credit and marketing institutions. • Rehabilitate and strengthen coordination between national agricultural and livestock research and extension centers. • Complementary policies in related sectors, including roads, storage, transportation, communication, education, and health. • Fiscal policies should include reductions of taxes and levies, price policies, and removal of administrative bottlenecks (Ali and Elbadawi 2002).
Comprehensive Peace Agreement–2005	• Created land commissions to arbitrate land conflicts. • Restructured political power and revenue sharing in Sudan. • Assessed compensation. • Developed new land policies and laws (Fahey 2007).
Green Alert Program, 2006–2010	A four-year development program aimed at: • Increasing crop production. • Reducing marginalization of poor livestock keepers in Sudan. • Promoting the settlement of migratory pastoralists. • Reviving the controversial Jonglei Canal (Fahey 2007).
Eastern Sudan Peace Agreement–2006	• Clarifies land use rights in Eastern Sudan. • State-level legislation to create commissions to review past land seizures. • Recommend appropriate compensation measures. • Clarification of migratory routes and pastureland and rangeland access, for example, in the Butana and Gash areas. • Prohibits cattle- and sheep-raiding along the border with Ethiopia (Fahey 2007).
Sudan's Poverty Reduction Strategy Paper, 2011–2016	Four pillars: • Strengthening governance and the institutional capacity of the public sector. • Reintegrating internally-displaced persons and other displaced populations. • Develop human resources; and • Promote economic growth and employment creation (HCENR 2016, 2019).
Animal Welfare Act–2015	• Protection of animals, particularly those used in transportation and those that are stray, from hunger, thirst, fear, and harassment. • Protect animals by providing treatment and medical care if exposed to disease. • Veterinary hospitals, farms, or animal houses should be comfortable and safe. • To use animals in scientific research, obtain permission from veterinary authorities. • Trucks and other transportation means—roads, trains, air, or sea—should provide safety and comfort to animals being transported. • Do not expose animals to genetic engineering, DNA restructuring, steroids, or other energetics. • Use euthanasia when applicable to reduce extreme suffering in animals. • Veterinary authorities have the right to check and monitor any of the above mentioned points at any time, in any place, and or take animal samples for laboratory checks. • Protect ill animals from been used in transporting loads and in exhibitions, racing, or any other activity. • Forbids staging animal fights against each other or any activity that leads to death. • Slaughterhouses should be constructed and operated according to scientifically sound designs and parameters. • Wild animals should live in their natural habitat. Any scientific trials on wild animals should be done under the authority of the National Parks and Games Protection Act (1986) (National Assembly 2015).
Five-year Development Strategy, 2015–2019	• Support the realization of a sustainable and stable economy and accordingly high comprehensive and sustainable growth. • Provide more employment opportunities. • Transform economy into an extensive and diversified production base (HCENR 2016, 2019).

Policy/strategies and interventions	Mandates and implications
National Biodiversity Strategy and Action Plan–2015	To fulfill the global biodiversity vision of living in harmony with nature by: • Conservation of biodiversity. • Sustainable use of its components. • Fair and equitable sharing of benefits arising out of their use (HCENR 2016, 2019).
Sudan National Agricultural Investment Plan	A five-year investment plan for agricultural development: • Promotion of export of livestock • Increase productivity and efficiency of Sudan's agricultural sector, including livestock, by 50 percent by 2020. • Generate job opportunities, especially for youth and women. • Development and protection of natural resources (Ibrahim and Hutur 2022).
Comprehensive Africa Agricultural Development Program–2013	Commits the government of Sudan to increase government spending on agriculture, including in the livestock sector, to 10 percent of total spending by 2020 (Ibrahim and Hutur 2022).
Investment Encouragement Act – 2021	• Provides grants and concessions for domestic and foreign investors. • Permission of employment for foreign labor, if required. • Provides various incentives, including customs tax exemption for capital and capital goods. • Free land acquisition or at reduced prices. • Grants the right to operate without a Sudanese partner. • Dispensation incentive for investors granted in the free zones areas of Suakin on the Red Sea near Port Sudan and Aljaily near Khartoum (Ibrahim and Hutur 2022).

Source: Authors' compilation.

Annex Table 9 Chronology of land acts in Sudan

Land Act	Mandate
Land Resettlement and Registration Act–1925	• All unoccupied land is presumed to be state land.
Land Acquisition Act–1930	• Provides procedures for the acquisition of land for public purposes and expropriation and compensation mechanisms
Unregistered Land–1970	• Government granted full ownership of unregistered lands, whether waste, forest, occupied or unoccupied, not registered before the commencement of the Act on 6 April 1970. • The law effectively abolished communal land ownership under customary practices. It abolished the rights of native authorities to allocate land.
Civil Transaction Act of 1984, 1991-1993, and amendments	• It continued to reflect the philosophy of the government of Sudan concerning land rights, particularly state ownership of public land.
Local Government Act–1998	• Identified territories of jurisdiction of local governance that coincide with customary land management territories. • Established functioning land management committees at state and locality (Mahaliya) levels. • Established processes for the development of local bylaws for the regulation of land management, including grazing lands and transhumance routes. • Asserted the active and legal involvement of customary authorities and land users in land management (De Wit 2001).
Comprehensive Peace Agreement–2005, section 2.5, Ownership of Land and Natural Resources	• Required the parties to "progressively develop and amend the relevant laws to incorporate customary laws and practices, local heritage, and international trends and practices."
Interim National Constitution–2005	• Article 43 recognizes the right to own property that may not be expropriated or confiscated without consideration for prompt and fair compensation. • Article 186 regulates land tenure, usage, and rights thereon to be exercised at the appropriate level of government. It requires all levels of government to institute a process to progressively develop and amend the relevant laws to incorporate customary laws, practices, local heritage, and international trends and practices.

Source: Adapted from Hassan and D'Silva (2022).

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