



Somalia's Livestock Sector

Improving Trade Standards, Regulatory Frameworks and Insurance Options

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1. Executive Summary

The livestock sector in Somalia is a vital contributor to livelihoods and food security but faces numerous challenges, including a lack of resilience, inadequate import and export standards, and a lack of regulatory frameworks and livestock insurance options. This policy paper explores the current state of the livestock production system, trade, regulatory frameworks, and insurance policies. It proposes strategies for improvement to ensure the prosperity of pastoralists in the face of evolving environmental, economic, and geopolitical dynamics.

We employed a mixed-methods approach, combining quantitative and qualitative analyses, to comprehensively examine the livestock production system, trade, regulatory frameworks, protocols, and insurance options. Data collection included key informant interviews (KII) and focus group discussions (FGDs) to complement the data gathered through interviews and analysis of domestic market trends spanning from 2012 to 2022.

To supplement limited data sources, a validation approach was conducted to better understand the identified challenges and gaps associated with livestock production, the trade sector, and regulatory frameworks and assessed the potential for implementing livestock insurance in Somalia. The analyses of these data sets and insights informed the development of policy recommendations grounded in research findings, stakeholder input, international best practices, and the specific needs of Somalia.

Our findings showed a multitude of challenges in livestock production, trade, and regulatory frameworks. They ranged from ecological issues in production to intricate obstacles within the livestock trade, insufficient regulatory frameworks, policy deficiencies, and difficulties in implementing livestock insurance.

Our study revealed significant challenges, including overstocking and overgrazing intensified by droughts, altered disease transmission, conflicts, geopolitical instability, weak state capacity, and a lack of development schemes for nomadic pastoralists.

Challenges associated with livestock trade included insufficient quarantine facilities, investment and financing issues, market access barriers, certification and quality standards concerns, security challenges, governmental coordination issues, climate change, technology adoption challenges, capacity building needs, and political and regulatory instability.

The study found the legal oversight bodies and institutional frameworks governing livestock-related activities in Somalia included the Ministry of Livestock, Forestry, and Range, livestock marketing boards or authorities, and parliamentary committees.

However, substantial challenges within existing regulatory frameworks were identified, including the lack of documentation such as National Veterinary Accreditation Program (NVAP) Standards and Guidelines for the Land Transport of Livestock Export Control.

For policy and protocol gaps, we identified a lack of essential documents such as disease control policies; animal welfare policies; export and import regulations; national livestock policies; regional harmonization agreements; quality assurance and certification; pharmaceutical regulations; and certification processes ensuring exported meat products, meet safety and quality standards.

Gaps were also identified in livestock insurance options, such as affordability, lack of information, basis risk, policy design complexity, infrastructure and logistical challenges, climate change uncertainty, and data privacy concerns.

In conclusion, these findings underscored the need for comprehensive interventions and strategic policies to enhance the resilience and sustainability of Somalia's livestock trade and production sector. Proposed strategies include sustainable livestock management, trade enhancement measures, regulatory framework strengthening, livestock insurance implementation, and stakeholder collaboration. Our recommendations provide a roadmap for policymakers, stakeholders, and international partners to address the challenges and foster a more resilient and prosperous livestock sector.

2. Introduction

Somalia's livestock sector is a key component of the nation's socio-economic fabric. For centuries, it has played a central role in the lives of the Somali people, contributing significantly to food security, livelihoods, and economic stability.¹



In the 1980s, livestock accounted for 40% of the nation's gross domestic product (GDP) and it remains the primary driver of export earnings

As a predominantly arid and semi-arid country, Somalia's unique ecological landscape has naturally evolved to be conducive to nomadic pastoralism.² Prior to the civil war, livestock was the cornerstone of the Somali economy, with a substantial proportion of the population (55%) engaged in nomadic pastoralist activities.³ In the 1980s, livestock accounted for 40% of the nation's gross domestic product (GDP) and it remains the primary driver of export earnings.⁴ The sector has played a pivotal role in ensuring food security and served as a vital source of income for a substantial number of households, particularly those in rural areas.

Despite the prolonged civil conflict and insecurity, the livestock sector has displayed a remarkable degree of resilience.^{5,6} Somalia is a major hub for live animal trading and export, with more than five million live animals traded in 2015 through the ports of Mogadishu, Berbera, and Bosaso across the Gulf of Aden. A significant portion of this trade (90%) is directed to the Middle East, notably for events such as the Hajj.



Beyond its economic importance, the live animal export industry holds strategic significance and is intertwined with security considerations

Beyond its economic importance, the live animal export industry holds strategic significance and is intertwined with security considerations. A notable example was the aftermath of the Rift Valley Fever (RVF) outbreak in Jizan in 2000 when Saudi Arabia imposed import bans on Somali livestock, creating a ripple effect on the nation's economy⁷. This restriction not only impacted livelihoods but also played a role in some Somalis turning to piracy and militarism as alternative sources of income.⁸

Health security concerns within Somalia become evident as Somali recently prioritized seven zoonotic diseases including Middle East respiratory syndrome (MERS-CoV), Rift Valley fever (RVF), anthrax, trypanosomiasis, brucellosis, zoonotic enteric parasites (including giardia and cryptosporidium), and zoonotic influenza viruses.⁹

As Somalia continues on a path of recovery and reconstruction, understanding and revitalizing the livestock sector is not only an economic imperative but also a means of restoring food security, livelihoods, and social stability.

1. Too, R., Masake, R., Oyoko, G., & Onyango, D. (2015). The contribution of livestock to the Somali economy. IGAD Centre for Pastoral Areas and Livestock Development (ICPALD).
2. Davies, J., Niamir-Fuller, M., Kerven, C., & Bauer, K. (2013). Extensive livestock production in transition. *Livestock in a Changing Landscape: Volume One*, 285-308.
3. Osman, A. Y., Mohamed, H., Mumin, F. I., Mahrous, H., Saidouni, A., Elmi, S. A., ... & Mor, S. M. (2023). Prioritization of zoonoses for multisectoral, One Health collaboration in Somalia, 2023. *One Health*, 17, 100634.
4. Majid, N. (2010). *Livestock trade in the Djibouti, Somali and Ethiopian borderlands*. London: Chatham House.
5. Ahmed, M., Mohamed, M. D., & Muhammad, F. (2023). *Pastoralists Adaptation Strategies, and Resilience Capacity to Climate Change in Somalia: A Scoping Review*.
6. Ncube, N. Q. O. B. I. L. E. (2019). *Measuring resilience in Somalia: an empirical approach*. University of South Africa.
7. Dar, O., McIntyre, S., Hogarth, S., & Heymann, D. (2013). Rift Valley fever and a new paradigm of research and development for zoonotic disease control. *Emerging infectious diseases*, 19(2), 189.
8. Chalk, P. (2010). Piracy off the Horn of Africa: Scope, dimensions, causes and responses. *The Brown Journal of World Affairs*, 16(2), 89-108.
9. Mumin, F. I., Fenton, A., Osman, A. Y., & Mor, S. M. (2023). Zoonoses research in Somalia: A scoping review using a One Health approach. *One Health*, 100626.

This policy paper delves into the current state of the livestock sector, the challenges, and the opportunities it presents for sustainable development and resilience building. More specifically, we examine the intricate interplay between the livestock production system, market access and international trade. We also highlight that existing policy gaps and inadequate access to livestock insurance options have hindered for decades investment in the livestock sector. Finally, we will propose strategies for improvement to ensure the prosperity of pastoralists in the face of evolving environmental, economic, and geopolitical dynamics.

3. Methodology

A detailed review of published and grey literature preceded fieldwork and focused on the current state of the livestock production system, trade, regulatory frameworks and insurance policies.^{10, 11} To produce a narrative account of livestock policies related to trade, regulations, protocols and insurance, along with the existing gaps and associated challenges, we employed qualitative research methods: key informant interviews (KIIs) and focus group discussions (FGDs).

Data was analysed using a deductive analytical approach. Information from transcribed daily reports was categorized by subject and topics based on predetermined research questions. Categorised information was then assigned to each research objective before being further summarised into emerging patterns, validated and assessed. The participants were selected based on the purposive sampling strategy.

We also collected data from government policy documents on current import and export standards and the livestock insurance landscape and conducted an in-depth analysis to identify gaps and inconsistencies at the national level. This was achieved through stakeholder engagement in which we conducted KIIs drawn from regulatory agencies (n=5), community-based organizations (CBOs) (n=5), national program managers and policymakers (n=5) and veterinary healthcare workers (n=5). We further conducted two FGDs with regulatory agencies (n=5), international organizations (n=5), livestock associations (n=5), academic partners (n=5), and the private sector.

Existing data sources from government institutions were identified, such livestock populations, trade systems including the number and types of animals exported, flock structure and dynamics, and market channels. The analyses of these sources led to comprehensive policy recommendations based on research findings, stakeholder input, international best practices, and the specific needs and contexts of Somalia.

10. Ahmed, M. M. (2020). Analysis of institutional dynamics and their influence on livestock export trade in the Berbera corridor of Somaliland (Doctoral dissertation, University of Nairobi).

11. Ng'asike, P. O. A., Stepputat, F., & Njoka, J. T. (2020). Livestock trade and devolution in the Somali-Kenya transboundary corridor. *Pastoralism*, 10(1), 27.

Due to the limited availability of secondary information, we also opted to employ a validation approach involving a diverse group of stakeholders. This was employed to gather information concerning existing gaps and associated challenges. This aimed to enrich and validate the data by incorporating insights from veterinary officers, veterinarians, public health professionals, and academics and to facilitate a debate on the current state of livestock exports and imports. The primary focus was on evaluating regulations, policies, and protocols. The validation session explored challenges and gaps within the livestock health and trade sector, along with the potential for implementing livestock insurance.

Study limitations included a short research timeframe and limited information and expertise, which was compounded by a degree of caution by government officials. To mitigate these challenges, we engaged local field researchers with in-depth knowledge of the local context, the nature of the study, and local culture.

4. Ethical Considerations

The researchers gained informed consent for interviews from all the participants who were given the option to opt-out at any time. They were adults and able to consent to their own participation. The relevant government authorities were also informed about the study.

5. Results and Discussion

Livestock production

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Our study revealed that livestock production remains the principle economic activity in Somalia, accounting for approximately 50% of GDP and more than 80% of export revenue

Our study revealed that livestock production remains the principle economic activity in Somalia, accounting for approximately 50% of GDP and more than 80% of export revenue. Historical evidence suggested that 55% of the population were engaged in nomadic pastoralism, with 80% involved in diverse forms of livestock raising. However, due to the lack of recent census data exacerbated by climate change, civil unrest, a surge in internally displaced persons (IDPs) and rural-urban migration, the accuracy of these figures is uncertain.

Despite enduring challenges posed by prolonged conflict, insecurity, and environmental stressors, the sector exhibits a remarkable degree of resilience. This resilience is evidenced by the diverse composition of livestock populations, as illustrated in Figure 1. The substantial presence of these livestock species underscores the importance of the sector in Somalia's economy and livelihoods. Despite facing adversities, pastoralists maintain significant livestock populations, showcasing their adaptability and resourcefulness in harsh environments.¹²

12. Ncube, N. Q. O. B. I. L. E. (2019). Measuring resilience in Somalia: an empirical approach. University of South Africa.

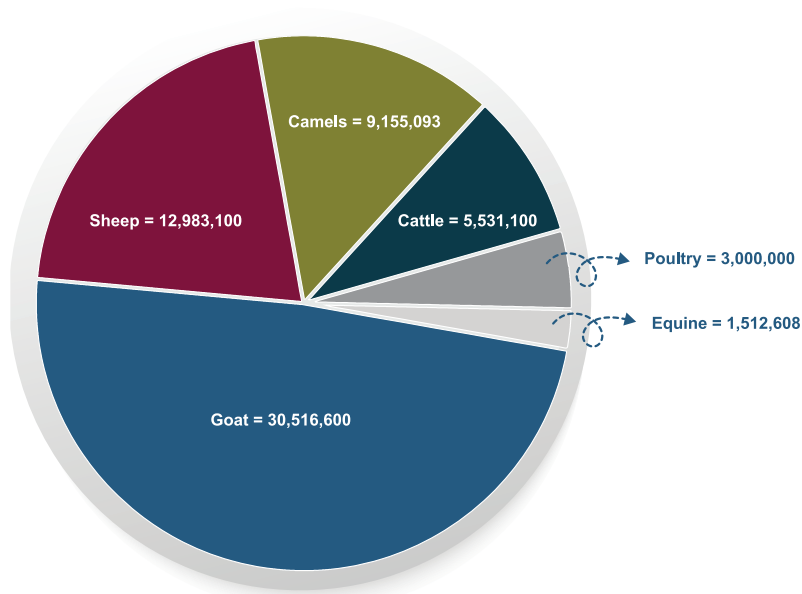


Figure 1: Livestock populations (Source: Ministry of Livestock, Forestry and Range as of 5 February 2023)

According to our analysis, the pastoral system accounted for a significant portion of meat production, with 40% of camel meat, 30% of goat meat, 20% of cattle, and 10% of sheep (Figure 2). These figures highlighted the pivotal role of pastoralism in meeting the protein needs of the population and supporting food security. Our study revealed that agropastoral systems also played a notable role in meat production and household income generation. Approximately 12% of the cattle population, along with 15% of goats and 7% of sheep, are attributed to agropastoral systems (Figure 2). The pastoral and agropastoral systems contributed between 10% and 50% of household income, underscoring their significance in supporting livelihoods and economic stability in rural areas. (Figure 2).

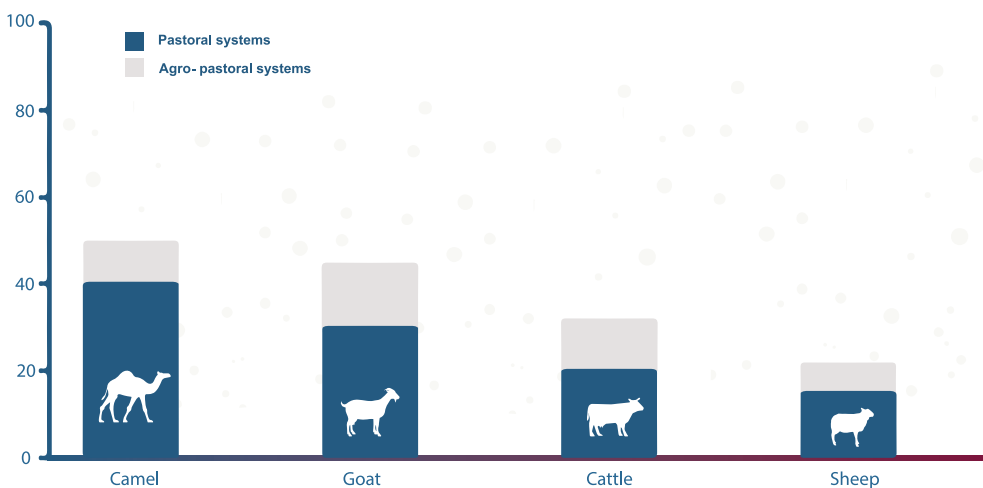


Figure 2: National meat production (Source: Ministry of Livestock, Forestry and Range as of 5 February 2023)

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As a major hub for live animal trading, Somalia exported more than five million live animals in 2015 through strategic ports such as Berbera, Bosaso, and Mogadishu (Figure 3)

Rain-fed agriculture dominates the southern region, while pockets of irrigated lands along the Shebelle and Jubba Rivers are used to harness water resources for agricultural productivity.¹³ However, the dependence on rain-fed agriculture underscored the vulnerability of this sector to climate variability, highlighting the need for resilient farming practices and water management strategies.¹⁴

Disruptions to traditional nomadic pastoralist activities, displacement of communities, and challenges to animal health services have collectively contributed to a fluctuating livestock population. As a major hub for live animal trading, Somalia exported more than five million live animals in 2015 through strategic ports such as Berbera, Bosaso, and Mogadishu (Figure 3). The breakdown of the number of livestock by species exported from Somalia between 2012-2022 is given in Figure 3. The Middle East, during events like the Hajj, is a major destination for Somali livestock exports. The substantial economic value of livestock exports, estimated at \$360 million in 2015, underscored the significance of this sector to Somalia's economy and the livelihoods of its people.

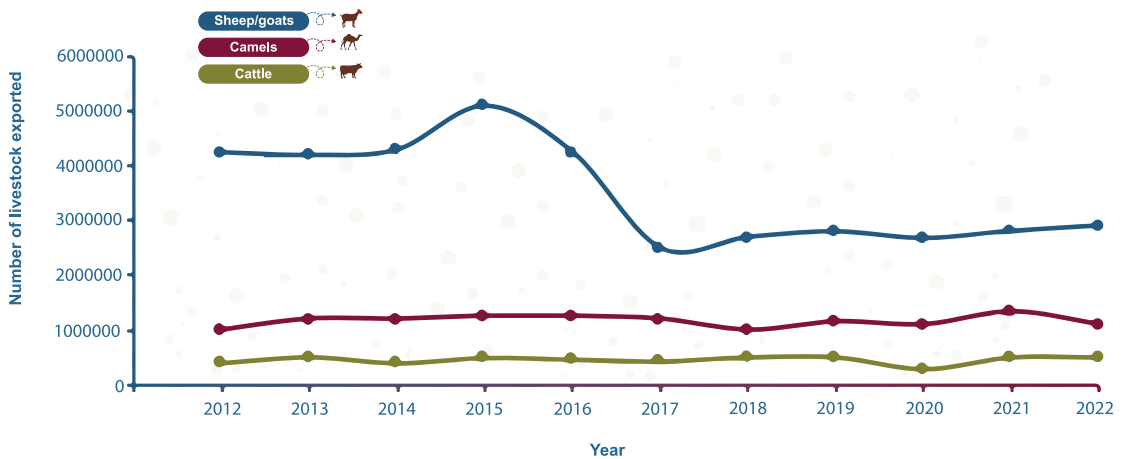


Figure 3: Heads of livestock exported from Somalia, 2012-2022 (Ministry of Livestock, Forestry and Range, Somalia)

For decades, pastoralism has begun to exert adverse effects on local range resources, primarily attributed to overstocking and overgrazing. These impacts have been exacerbated by climatic disasters including frequent droughts, altered infectious disease transmission, conflicts, geopolitical instability, weak state capacity, disruption of international trade, and the lack of development schemes and policies imposed on nomadic pastoralists.

13. Rees, D. J., Omar, A. M., & Rodol, O. (1991). Implications of the rainfall climate of southern Somalia for semi-mechanized rain-fed crop production. *Agricultural and forest meteorology*, 56(1-2), 21-33.

14. Olayide, O. E., & Alabi, T. (2018). Between rainfall and food poverty: Assessing vulnerability to climate change in an agricultural economy. *Journal of Cleaner Production*, 198, 1-10.

Addressing the complex challenges facing Somali pastoralism demands collaborative and innovative solutions to enhance the resilience and sustainability of pastoral livelihoods amidst changing environmental, socio-economic, and political dynamics. Empowering pastoral communities to engage in decision-making processes is essential for fostering resilience and inclusivity, paving the way for sustainable development in Somalia.¹⁵

Livestock trade

The livestock trade presents a complex array of challenges and gaps that demand urgent attention and comprehensive interventions. Key challenges include production and access issues, processing limitations, geographical hurdles, and infrastructure deficiencies (Table 1).

Table 1: Livestock trade challenges for Somali pastoralists

Key Findings	Description
Production	The reliance on pastoral systems leads to irregular milk production, especially during the short rainy season. Insufficient poultry production in both pastoral and pre-urban areas due to absence of government support.
Access issues	Poor market access is characterized by limited infrastructure and transportation systems, hindering market reach.
Processing limitations	Inadequate processing facilities, particularly for milk, contribute to spoilage during periods of abundance.
Geographical hurdles	The wide geographical dispersion of markets and pastoral communities results in logistical challenges and increased costs.
Droughts	Frequent droughts lead to increased livestock mortality and reduced productivity, causing economic losses for pastoralist families who heavily rely on their animals for sustenance and income. Scarcity of water and pasture forces pastoralists to migrate in search of resources, often resulting in conflicts and displacement.
Infrastructure deficiencies	Lack of transport infrastructure, cold storage, and processing facilities results in animals being traded without value addition.

One of the primary challenges is the irregular production of milk, particularly within the pastoral system. The reliance on climatic patterns, such as the short rainy season, results in inconsistent supply, posing a significant hurdle for meeting the demands of a dynamic market.¹⁶

15. Barasa-Mang'eni, E. (2014). Peace and Conflict Impact Assessment in Somalia: Opportunities for empowerment of ethnic minorities. *Journal of Peacebuilding & Development*, 9(1), 59-73.

16. Ogallo, L. A., Omondi, P., Ouma, G., & Wayumba, G. (2018). Climate change projections and the associated potential impacts for Somalia.

Frequent droughts lead to increased livestock mortality and reduced productivity, causing economic losses for pastoralist families who heavily rely on their animals for sustenance and income.¹⁷ Scarcity of water and pasture forces pastoralist communities to migrate in search of resources, often resulting in conflicts and displacement.¹⁸

Other production challenges include insufficient poultry and milk production, primarily due to limited support from the government. The absence of substantial backing for these enterprises hampers their growth and sustainability, posing a threat to diversifying the livestock trade landscape.



Despite Somalia's self-sufficiency in livestock products, there is a notable reliance on imports for poultry products, indicating an imbalance in trade that warrants attention

Despite Somalia's self-sufficiency in livestock products, there is a notable reliance on imports for poultry products, indicating an imbalance in trade that warrants attention. The vulnerability of such dependencies in the global market underscores the need for a more resilient and diversified trade strategy.

Poor market access compounds the challenges with limited infrastructure and inadequate transportation systems hindering the efficient flow of livestock products both within the country and for international trade. The wide geographical dispersion of markets and pastoral communities exacerbates the logistical complexities, leading to increased transaction costs and hindering the optimization of market opportunities.¹⁹



Inadequate facilities for processing livestock products, particularly milk, contribute to spoilage during periods of abundance

The absence of sufficient processing opportunities further amplifies these challenges. Inadequate facilities for processing livestock products, particularly milk, contribute to spoilage during periods of abundance. This not only results in economic losses for producers but also limits the value addition to products before reaching the market.

The lack of formal contractual agreements between milk processors and pastoralists is an additional challenge. Establishing clear and formalized arrangements could provide stability fostering a more predictable and mutually beneficial trade relationships between the involved parties.

Infrastructure deficiencies, including inadequate transport systems, and lack of cold storage and processing facilities, contribute to the prevalent trade of live animals without significant value addition. This not only limits economic gains for producers but also raises concerns regarding hygiene and product quality.

The pricing dynamics in the livestock trade pose another challenge with the prevalent use of bargaining approaches rather than liveweight-based methods. The involvement of numerous intermediaries further complicates pricing, resulting in inflated costs that affect both producers and consumers.

17. Ifejika Speranza, C. (2010). Drought coping and adaptation strategies: Understanding adaptations to climate change in agro-pastoral livestock production in Makueni district, Kenya. *The European Journal of Development Research*, 22, 623-642.

18. Ayana, E. K., Ceccato, P., Fisher, J. R., & DeFries, R. (2016). Examining the relationship between environmental factors and conflict in pastoralist areas of East Africa. *Science of the Total Environment*, 557, 601-611.

19. Biénabe, E., Coronel, C., Le Coq, J. F., & Liagre, L. (2004). Linking small holder farmers to markets: Lessons learned from literature review and analytical review of selected projects.

Furthermore, the absence of institutional support and targeted government policies for strengthening local and external markets adds to the existing challenges. A strategic and coordinated effort is imperative to establish the necessary frameworks that facilitate market access for producers and enhance the overall trading environment.

Addressing the multifaceted challenges and existing gaps in Somalia's livestock trade requires a comprehensive and collaborative approach and strategic interventions. As Somalia charts its course toward a more robust and sustainable future in livestock trade, the time is ripe for concerted efforts to unlock the full potential of this vital sector.

Informal livestock trade dynamics

The informal livestock trade plays a vital role in the supply chain for meat and other animal products, although its magnitude is not captured in official statistics and therefore remain largely unknown.²⁰ Operators navigate international and regional borders, transporting livestock from pastoral areas to urban centres in Somalia, Kenya and Ethiopia for consumption and redistribution.

Major themes emerging from the existing gaps in informal livestock trade dynamics are summarised in Figure 4. Our results revealed that management and regulation of the trade are complex due to administrative boundaries and varying policy and regulatory frameworks. The process is further complicated by the interplay between formal state regulations and clan-based trust systems.²¹ Conveyance of livestock through trust-based networks that provide contacts, conflict mediation and access to (some) security, water, pasture, information and (informal) credits are essential in livestock trade dynamics.



Trilateral agreements with Kenya and Ethiopia which would address cross-border trade challenges including disease control are lacking

Federal member state boundaries have sparked conflicts over land and pastures, obstructed trade routes, and increased taxation burdens.²² The majority of federal member states have limited resources and are struggling to develop trade regulations, market infrastructure, and veterinary services. Trilateral agreements with Kenya and Ethiopia which would address cross-border trade challenges including disease control are lacking.

20. Ng'asike, P. O. A., Stepputat, F., & Njoka, J. T. (2020). Livestock trade and devolution in the Somali-Kenya transboundary corridor. *Pastoralism*, 10, 1-14.

21. Ssereo, F. (2003). Clanpolitics, clan-democracy and conflict regulation in Africa: The experience of Somalia. *The Global Review of Ethnopolitics*, 2(3-4), 25-40.

22. Ali, A. Y. S., Dahir, A. H., & Hersi, Z. D. (2019). Federalism in post-conflict states: Assessing Somalia's challenges and the way forward. *Perspectives on Federalism*, 11(2), 4.

Livestock traders reported that they were suffering from poor road infrastructure, non-state actor roadblocks, unauthorized charges from non-state actors, and lack of government leadership in drought response efforts and support for small and medium enterprises. Our results also revealed that there is no coordination between national and state-level administrations, or collaboration with local organizations such as livestock associations. Therefore, establishing veterinary and sanitary control systems is key to supporting the cross-border livestock trade's sustainability and efficiency.

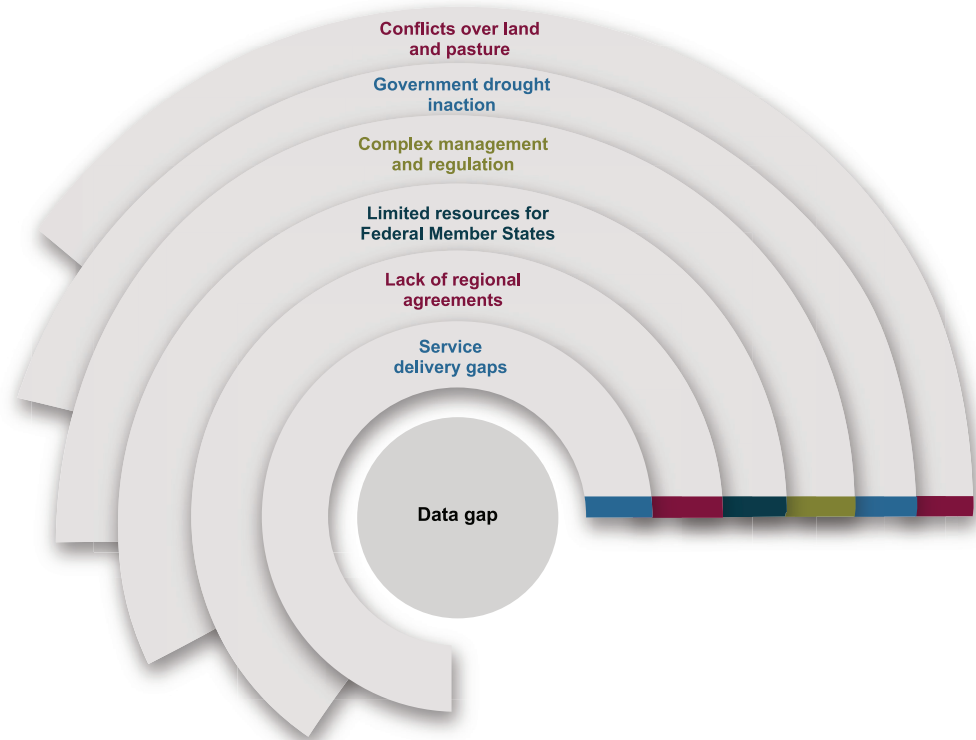


Figure 4: Gaps in informal livestock trade dynamics in Somalia

Key role of Somali ports

Our analysis revealed four key ports including Mogadishu, Berbera, Bosaso, and Kismayo have played a key role in shaping the dynamics of livestock trade in for decades. They have been central to the trade of Somalia's livestock, experiencing notable economic fluctuations influenced by internal power struggles and intricate interactions with regional players such as Ethiopia and Kenya, as well as the Gulf States. A comprehensive summary of the gaps and challenges associated with the livestock trade ports is given in Table 3.

Our analysis revealed varied economic fluctuations, international investment challenges, and regional establishment dynamics. Mogadishu demonstrated relative stability but faced competition despite being well-established. Berbera experienced significant fluctuations and struggled to attract international investments, impacting its competitiveness. Bosaso's economic shifts were influenced by power struggles, leading to limited investor interest and trade infrastructure deficiencies. Kismayo had economic and political instability, insufficient funding for infrastructure, and limited interest, resulting in inadequate trade efficiency and posing risks to trade operations.

Table 2: Gaps and challenges in livestock trade ports

Port	Economic Fluctuations	Lack of International Investments	Level of Establishment
Mogadishu	Relatively stable compared to others	Attracts international investment but faces competition	Well-established
Berbera	Significant fluctuations	Attracts international investment but faces competition	developed, hindering competitiveness may have an impact on local competitors
Bosaso	Economic shifts influenced by power struggles	Limited interest	Lacks a robust system affecting trade
Kismayo	Economic instability	Insufficient funding for infrastructure, limited investments, limited interest	Inadequate, impacting trade efficiency.

Other major gaps are summarized in Table 4. They include infrastructure deficiencies, insufficient quarantine facilities, limited investment and financing, challenges in market access, certification and quality standards issues, security concerns, governmental coordination challenges, climate change impact, limited technology adoption, and capacity-building needs. Addressing these gaps requires a comprehensive and collaborative effort involving stakeholders to improve infrastructure, enhance regulatory frameworks, and promote sustainable and resilient livestock trade practices.

Table 3: Livestock trade port challenges

Area of Concern	Specific Challenges
Infrastructure deficiency	Inadequate transport infrastructure Limited or poorly maintained roads
Quarantine facilities	Lack of well-equipped facilities at major ports, increasing disease risk
Investment and financing	Limited investment Insufficient financing for operations
Market access	Challenges in accessing international markets Limited export market diversification
Certification and quality standards	Inconsistent implementation of certification systems Limited adherence to international standards
Security concerns	Ongoing security challenges and conflicts disrupting trade routes
Governmental coordination	Lack of effective coordination among regulating agencies
Climate change impact	Vulnerability to climate change, affecting water and pasture
Technology adoption	Limited adoption of modern technologies
Capacity building	Insufficient training programs
Political and regulatory instability	Political instability creating an unpredictable environment

Assessment of Legislative and Regulatory Frameworks for Livestock Health

The Federal Ministry of Livestock, Forest and Range serves as the central authority overseeing animal health policies and programs in the country. This institution has been instrumental in formulating and executing regulations and veterinary services vital for the livestock sector (Table 5). The Department of Animal Health holds responsibility for overseeing disease control, surveillance, and the implementation of measures to ensure the health of livestock across the country. A summary of the regulations, policies, and protocols governing livestock health and trade is presented in Table 5. Other key international organizations instrumental in establishing standards and guidelines for livestock health and trade are outlined in Table S1 at the end of this report.

Our investigation revealed a notable deficiency in the laws and regulations related to livestock such as the Animal Health Protection Act, the National Veterinary Accreditation Program (NVAP), and the Animal Welfare Standards and Guidelines for the Land Transport of Livestock. This absence underscored the inadequacy of legal safeguards for animal health and welfare.²³

There are also a lack of substantial guidelines and principles such as disease control policies, animal welfare policies, export and import regulations (export certification and import requirements), national livestock policies, and livestock development plans. This hampers strategic planning and development initiatives and efforts to effectively manage disease outbreaks, and regulate international trade in livestock.^{24,25}

Our assessment revealed a lack of regulatory frameworks, including those related to Regional Economic Community (REC) Regulations, and quality assurance and certification, with a particular emphasis on pharmaceutical regulation and certification processes for ensuring that exported meat products meet specific safety and quality standards.

The findings underscored the urgent need for comprehensive reforms in Somalia's legislative and regulatory frameworks for livestock health. Addressing the identified deficiencies is imperative to promote the health, welfare, and sustainability of the livestock industry.

Priority areas for reform include the enactment of key laws and regulations including the Animal Health Protection Act, and the National Veterinary Accreditation Program (NVAP), as well as the establishment of robust policies and protocols including export and import regulations (export certification and import requirements), national livestock policies, and (livestock development plans). The strengthening of regulatory bodies and enforcement mechanisms is also required.

23. Bayne, K., Howard, B. R., Kurosawa, T. M., & Nájera, M. E. A. (2021). An Overview of Global Legislation, Regulations, and Policies. *Handbook of Laboratory Animal Science*, 899-922.

24. Bekele, A., Alemu, D., Teklewold, T., Moore, H. L., Hodge, C., & Berg, S. (2018). Strategies for animal disease control in Ethiopia: A review of policies, regulations and actors. *Journal of Veterinary Medicine and Animal Health*, 10(12), 256-265.

25. Scoones, I., & Wolmer, W. (2006). Livestock, disease, trade and markets: policy choices for the livestock sector in Africa.

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The current landscape highlights significant gaps in legislative and regulatory frameworks essential for promoting and safeguarding the health and welfare of livestock in Somalia

The current landscape highlights significant gaps in legislative and regulatory frameworks essential for promoting and safeguarding the health and welfare of livestock in Somalia. Addressing these deficiencies is imperative to bolster the resilience and sustainability of the livestock industry.

Table 4: General laws and regulations, policies and protocols, legal and institutional oversight bodies

Laws and Regulations	Policies, Protocols, Guidelines and Principles	Legal Oversight Body/ Institutional Oversight Body
Animal Health Protection Act (governs the prevention, detection, control, and eradication of diseases affecting livestock)	Disease control policies (surveillance protocols, vaccination programs, quarantine procedures)	Ministry of Livestock, Forestry and Range
National Veterinary Accreditation Program (NVAP) (standards for accredited veterinarians involved in interstate and international movement of animals)	Animal welfare policies (transportation standards; handling guidelines)	National Veterinary Authority
Animal Welfare Standards and Guidelines for the Land Transport of Livestock (outlines standards for transporting livestock)	Export and import regulations (export certification; import requirements)	Livestock marketing boards or authorities
Export Control (Animals) Order 2004 (regulates the export of live animals)	International standards and agreements (OIE Standards; WTO agreements)	Environmental agencies
Animal Diseases Act, 1984 (addresses the control and eradication of animal diseases)	National livestock policies: (livestock development plans; regulatory frameworks)	Customs and Border Protection
	Regional Economic Community (REC) regulations (regional harmonization: an agreement among neighbouring countries to standardize veterinary procedures for cross-border livestock trade)	Parliamentary committees
	Quality assurance and certification (pharmaceutical regulation: guidelines specifying approved veterinary medicines and their proper usage) Certification processes (procedures ensuring that exported meat products meet specific safety and quality standards)	

Livestock Insurance

Our investigation delved into the landscape of crisis risk financing (CRF) programs and policy and regulation documents for livestock insurance. Despite the recognized potential of CRF programs to mitigate the impacts of crises such as frequent droughts, our research revealed that Somalia has yet to implement these programs. This absence leaves Somali pastoralists vulnerable to the devastating consequences of natural disasters, impeding efforts to promote welfare and economic development in the region.

Our assessment uncovered notable deficiencies in the policy and regulation landscape governing livestock insurance (Table 6). Specifically, we identified a lack of key documents essential for the effective implementation and regulation of livestock insurance schemes. These included national insurance laws and regulations; agricultural insurance frameworks; guidelines from insurance regulatory authorities; product guidelines for livestock insurance; risk management policies; and climate change and disaster management policies.

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Absence of international agricultural insurance guidelines, public-private partnership agreements, microinsurance regulations, government subsidy programs, and codes of conduct or ethics further compounds the challenges facing livestock insurance

Moreover, the absence of international agricultural insurance guidelines, public-private partnership agreements, microinsurance regulations, government subsidy programs, and codes of conduct or ethics further compounds the challenges facing livestock insurance. The absence of these foundational documents hinders the development of a robust and sustainable livestock insurance market, limiting the ability of pastoralists to protect their assets and livelihoods against the risks inherent in their occupation.^{26, 27, 28}

Table 5: Policy and regulation documents for livestock insurance

Document Type	Description
National insurance laws and regulations	National laws and regulations governing insurance activities, including livestock insurance
Agricultural insurance frameworks	Policies or frameworks addressing agricultural and livestock insurance at the national level
Insurance regulatory authority guidelines	Guidelines issued by national insurance regulatory authorities covering agricultural or livestock insurance
Livestock insurance product guidelines	Guidelines specifying features, terms, and conditions of livestock insurance products
Risk management policies	National or regional policies related to agricultural risk management related to livestock insurance
Climate change and disaster management policies	Policies addressing climate change impact and disaster management, including insurance for livestock
International agricultural insurance guidelines	Guidelines from international organizations promoting best practices in agricultural and livestock insurance
Public-private partnership agreements	Agreements between governments and private insurers outlining collaboration in providing livestock insurance
Micro-insurance regulations	Regulations specific to micro-insurance initiatives that may include livestock insurance
Government subsidy programs	Documents outlining government subsidy programs for livestock insurance, making it more affordable for farmers
Insurance code of conduct or ethics	Industry-wide codes of conduct or ethical guidelines for insurers promoting fair practices in livestock insurance

26. McPeak, J. G., Little, P. D., & Doss, C. R. (2011). Risk and social change in an African rural economy: livelihoods in pastoralist communities (Vol. 7). Routledge.

27. McPeak, J., Chantarat, S., & Mude, A. (2010). Explaining index-based livestock insurance to pastoralists. *Agricultural Finance Review*, 70(3), 333-352.

28. Fava, F. P., Nathaniel, D. J., Sina, J., Andrew, G. M., & Maher, B. (2021). Building financial resilience in pastoral communities in Africa: Lessons learned from implementing the Kenya Livestock Insurance Program (KLIP).

We outlined the benefits of livestock insurance including risk mitigation, improved resilience, incentive for investment, financial stability, access to credit, community welfare, and environmental conservation (Table 7). However, challenges such as affordability, information gaps, basis risk, policy design complexity, and infrastructure limitations pose significant barriers to the effective implementation of livestock insurance programs. (Table 7).

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The development of innovative drought index insurance solutions such as the Somali Livestock Insurance Program (SLIP) presents a promising pathway to resilience

The development of innovative drought index insurance solutions such as the Somali Livestock Insurance Program (SLIP) presents a promising pathway to resilience. However, the successful implementation of SLIP requires collaborative efforts from a wide range of stakeholders including international organizations, local institutions, and private partners.²⁹ By working together, stakeholders can tailor innovative solutions that address the unique challenges faced by pastoralists, enhancing the sustainability of the livestock sector.

The absence of comprehensive policy and regulation frameworks poses a significant barrier to the development and uptake of livestock insurance. To address this gap, concerted efforts are needed to formulate and implement robust policies and regulations that facilitate the growth of the livestock insurance market. This includes the establishment of national laws and regulations specific to livestock insurance, the development of agricultural insurance frameworks tailored to Somali contexts, and the issuance of guidelines by insurance regulatory authorities to govern livestock insurance operations.

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By investing in early response and resilience measures, leveraging anticipatory financial instruments, and fostering collaboration, Somalia can navigate the challenges posed by recurrent droughts and build a more resilient future for its pastoralists

The absence of CRF programs and deficiencies in policy and regulation documents have presented significant challenges to the development of livestock insurance in Somalia. Addressing policy gaps and implementing livestock insurance programs are critical steps towards building resilience. The introduction of SLIP and the collaborative efforts of stakeholders are essential to provide financial protection to vulnerable communities and align with global efforts to enhance the sustainability of the livestock sector. By investing in early response and resilience measures, leveraging anticipatory financial instruments, and fostering collaboration, Somalia can navigate the challenges posed by recurrent droughts and build a more resilient future for its pastoralists.

29. Mills, C. J., Jensen, N. D., Barrett, C. B., & Mude, A. G. (2016). Characterization for index based livestock insurance. ILRI Research Report.

Table 6: Benefits and Challenges of Livestock Production Insurance

Benefits	Challenges
Risk mitigation: Provides financial protection against losses due to events such as drought, disease, or natural disasters	Affordability: Cost considerations may limit accessibility for small-scale farmers or pastoralists
Improved resilience: Enhances the resilience of livestock-dependent communities by minimizing economic shocks during adverse events	Information gaps: Lack of accurate data on livestock populations, health, and value may hinder accurate risk assessment
Incentive for investment: Encourages farmers to invest in improved livestock management practices, knowing that losses are mitigated through insurance coverage	Basis risk: Potential mismatch between the insured peril and actual losses, leading to discrepancies in pay-out accuracy
Financial stability: Provides a financial safety net, reducing the vulnerability of farmers to sudden income fluctuations caused by livestock losses	Policy design complexity: Complex insurance policies may pose challenges in comprehension and effective utilization by farmers
Access to credit: Facilitates access to credit as insured farmers are perceived as lower-risk borrowers by financial institutions	Infrastructure and logistical challenges: Limited infrastructure may impede the efficient implementation and administration of insurance programs
Community welfare: Promotes community welfare by preventing large-scale economic distress in the aftermath of catastrophic events	Climate change uncertainty: Changing climate patterns pose challenges in accurately assessing and pricing risks associated with livestock insurance
Government support: Can serve as a tool for government initiatives in poverty alleviation and agricultural development	Limited product customization: One-size-fits-all insurance products may not address the diverse needs of different livestock keepers
Market development: Fosters the growth of insurance markets, attracting insurers to expand services in agricultural sectors	Claims processing delays: Lengthy and bureaucratic claims processing may hinder the timely disbursement of pay-outs to affected farmers
Environmental conservation: Encourages sustainable farming practices by providing a safety net for farmers transitioning to environmentally-friendly methods	Data privacy concerns: Collection and use of personal and farm data may raise privacy and security concerns among farmers

Proposed Livestock Insurance

The Somali Livestock Insurance Program (SLIP) would be a pioneering initiative aimed at tackling the pressing issue of forage scarcity in arid and semi-arid regions. By harnessing the power of cost-effective and accessible satellite indicators, particularly the Normalized Difference Vegetation Index (NDVI), SLIP would revolutionize the resilience of pastoral communities in the face of climatic uncertainties.

SLIP would utilize NDVI as a reliable proxy for vegetation conditions. High NDVI values signify robust vegetation health, forming the basis for the program's area-aggregated index of relative seasonal forage availability. This advanced satellite technology enables real-time monitoring and assessment, providing a comprehensive understanding of forage conditions. A distinctive feature of SLIP is the integration of local knowledge from pastoral communities, agro-ecological maps, and administrative borders in the determination of Unit Areas of Insurance (UAIs). This collaborative approach ensures a nuanced and context-specific understanding of grazing and migratory patterns, enhancing the accuracy of risk assessment.

SLIP employs a dynamic payout mechanism triggered when the NDVI index falls below a predefined threshold. Pay-outs increase proportionally with the severity of estimated forage scarcity, reflecting a commitment to early intervention in the face of emerging drought conditions.

SLIP caters to the unique challenges posed by two seasonal rainfall periods. The primary risk period, known as "Gu," spans from April to June, followed by a dry period, "Xagaa," from June to October. The second rain season, "Deyr," occurs from October to December, while December to March is marked as "Jilaal," typically dry. Potential payouts are strategically triggered at the end of wet months during these risk periods based on temporally averaged NDVI values.

The Ministry of Livestock, Forestry, and Range would play a pivotal role in providing essential guidance on critical parameters for SLIP implementation. This collaboration would involve determining UAIs, pay-out triggers, and severity-based payout scaling. The partnership would foster precision in policy formulation, aligning the program with broader national strategies and goals. The graphic picture of institutional interaction of SLIP implementation is given in Figure 5.

SLIP represents a paradigm shift in sustainable livestock insurance, utilizing satellite technology, local knowledge, and dynamic pay-out mechanisms to empower pastoralists against the impacts of drought. This paradigm shift in livestock insurance holds promise for building resilience and sustainability in the face of climate-related challenges.

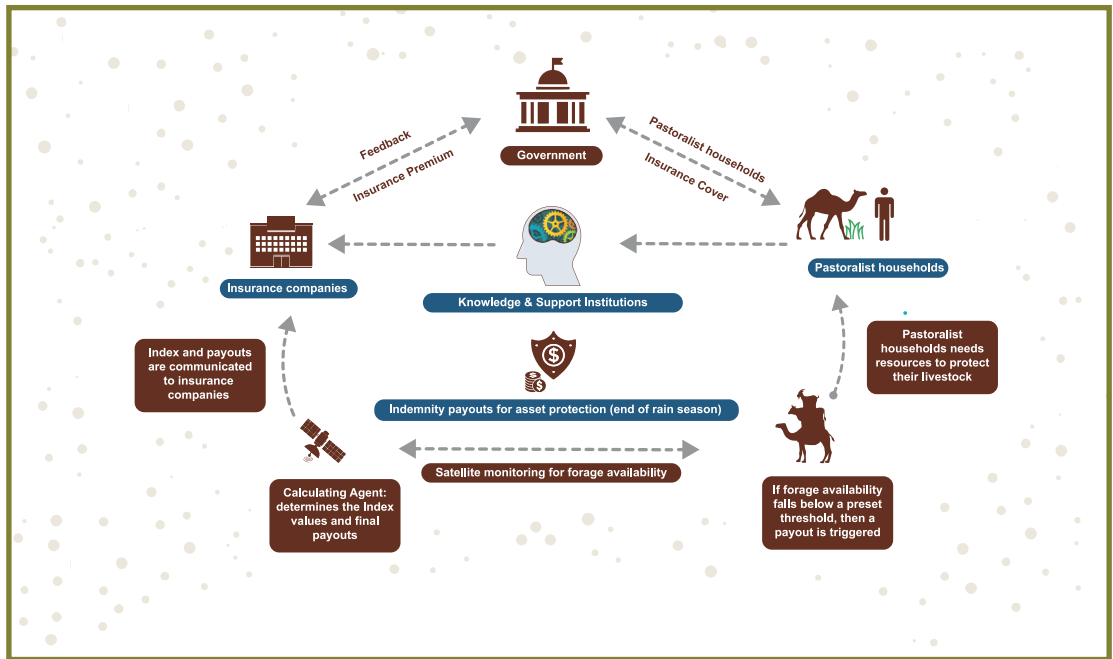


Figure 5: Schematic of SLIP's main stakeholders (above) and working mechanisms (below).

6. Conclusion

Our comprehensive assessment of the livestock sector in Somalia highlighted a multitude of challenges, encompassing ecological issues, trade obstacles, inadequate regulatory frameworks, policy gaps, and complexities in implementing livestock insurance.

The challenges in livestock production, particularly overstocking and overgrazing, are exacerbated by frequent droughts, conflicts, weak state capacity, and insufficient development schemes for nomadic pastoralists.

Similarly, challenges in livestock trade include inadequate quarantine facilities, financial barriers, market access issues, and regulatory and security concerns. The existing regulatory frameworks face substantial challenges, including documentation gaps and a lack of essential policies and protocols. The assessment of legislative and regulatory frameworks for livestock health in Somalia reveals significant gaps and deficiencies that pose challenges to the health, welfare, and sustainability of the country's livestock industry. The Federal Ministry of Livestock, Forest, and Range plays a pivotal role in overseeing animal health policies and programs, yet our investigation highlights a notable deficiency in the number of laws and regulations governing livestock health and trade.

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By implementing comprehensive reforms and prioritizing key areas for improvement, Somalia can strengthen its resilience and competitiveness in the global livestock market

Key legislative frameworks such as the Animal Health Protection Act and the National Veterinary Accreditation Program are notably absent, alongside substantial guidelines and principles in policies and protocols. Additionally, there are a lack of regulatory frameworks related to regional economic community regulations and quality assurance and certification, particularly in pharmaceutical regulation and certification processes for meat products. Addressing the identified deficiencies in legislative and regulatory frameworks is crucial for promoting the health, welfare, and sustainability of Somalia's livestock industry. By implementing comprehensive reforms and prioritizing key areas for improvement, Somalia can strengthen its resilience and competitiveness in the global livestock market while ensuring the well-being of its livestock and pastoral communities.

7. Recommendations

We propose a series of recommendations aimed at enhancing the resilience and prosperity of Somalia's livestock industry amid evolving environmental, economic, and geopolitical dynamics across livestock production management, livestock trade enhancement, regulatory framework strengthening, livestock insurance implementation and stakeholder collaboration.

These recommendations represent a roadmap for strengthening Somalia's livestock sector, promoting resilience, and fostering prosperity for pastoralists. By prioritizing sustainable production management, enhancing trade facilitation, strengthening regulatory frameworks, implementing livestock insurance, and fostering stakeholder collaboration, Somalia can unlock the full potential of its livestock industry and pave the way for a more resilient and prosperous future.

- To address the pressing issues of overstocking and overgrazing related to livestock production management, sustainable strategies must be developed to promote responsible land use and pasture management. Additionally, implementing measures for improved disease control and climate resilience, such as vaccination programs and sustainable water management practices, is essential for safeguarding the health and productivity of livestock herds.
- Enhancing the livestock trade requires improvements in quarantine facilities to ensure the safe movement of animals and prevent the spread of diseases. Facilitating investment and financing mechanisms for the livestock trade will foster economic growth and market development, while efforts to enhance market access and ensure adherence to quality standards will bolster Somalia's competitiveness in the global livestock market.

- Addressing the deficiencies in Somalia's regulatory frameworks is imperative for promoting the health, welfare, and sustainability of the livestock sector. This entails reviewing and updating existing regulations, establishing essential policies and protocols for disease control, animal welfare, and export-import regulations, and ensuring alignment with international standards and best practices.
- The introduction of affordable and accessible livestock insurance options is crucial for mitigating risks and providing financial protection to pastoralists. Efforts to address information gaps and basis risks associated with livestock insurance, as well as simplifying policy design and enhancing infrastructure, will contribute to building trust and confidence among stakeholders.
- Collaboration among governmental bodies, regulatory agencies, international partners, and pastoral communities is essential for coordinating efforts and implementing reforms effectively. Engaging pastoralists in the development and implementation of policies ensures that their perspectives and priorities are taken into account, ultimately leading to more inclusive and sustainable interventions.

Supplementary data

Table S1: Role of Somali Government and International Organizations in Livestock Regulation

Name	Description
Somali government	The government maintains its own set of regulations and policies governing livestock health and trade. They include import/export requirements, disease control measures, and standards for animal welfare
World Organisation for Animal Health (WOAH)	WOAH plays a pivotal role in setting international standards for animal health and welfare. It is responsible for publishing essential documents including the Terrestrial Animal Health Code and the Manual of Diagnostic Tests and Vaccines for Terrestrial Animals
Food and Agriculture Organization (FAO)	The FAO addresses global challenges related to agriculture and provides guidelines and recommendations on various aspects of livestock management and trade. Its influence extends to fostering sustainable and responsible practices within the livestock industry
World Trade Organization (WTO)	The WTO oversees international trade. WTO agreements encompass crucial aspects of agriculture and livestock trade such as the Agreement on the Application of Sanitary and Phytosanitary Measures which specifically addresses standards relevant to the livestock trade
Regional economic communities (RECs) and national governments	RECs, exemplified by the African Union, often have specialized regulations governing the livestock trade within their respective domains. These regulations complement broader international standards and contribute to regional harmonization



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