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A blade of grass: Livestock and just transition in Africa

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Abstract: In recent times, just transition has emerged as the ideal conceptual framework for capping greenhouse emissions. Seeking for low carbon future while meeting growing demand for food is a dilemma. That is the conundrum confronting many continental bodies and states. The African Union (AU) is not exempt. While the regional body has codified just transition in its climate strategies, its utility has been compromised. The AU has mainly applied the framework to the energy sector, to the exclusion of other high-emitting sectors. Although the livestock industry is a substantial emitter of greenhouse gases, it is rarely mentioned in just transition debates and policy discourse. The relatively low discussion in this arena has fostered a culture of indifference to the prevailing uncertainties in the industry. It is against this backdrop that the article asks: How can Africa transition to a sustainable livestock industry? In response to the inquiry, the article adopts a social justice lens to explore avenues that will aid the industry to eco-friendlier practice.

Key words: Africa; climate change; livestock; greenhouse emissions; just transition

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1 Introduction

The onset of climate change highlights the urgency for Africa to transition to a more sustainable way of meat production.[1] However, without due diligence, one could inflict irreparable damage on farmers whose livelihoods depend on the industry. It is for this reason that just transition becomes a continental ideal. The article construes just transition as a gradual shift from an unsustainable way of production to an eco-friendly one, without jeopardising the livelihood of communities.[2] As a continental body, the African Union (AU) has codified just transition in a plethora of legal instruments. Nonetheless, it rarely applies this concept to livestock.[3] It is likely that this lacuna will hinder the overarching aspiration of attaining net-zero emissions.[4] Similarly, contemporary literature on just transition in Africa rarely addresses the livestock sector as a concern. This article aims to remedy that shortfall by examining ways in which the sector could mitigate and adapt to climate change. A central discursive question of the article is: How can just transition be attained in the livestock industry? In response to the inquiry, the article explores ways of capping livestock-related emissions in a way that is equitable, humane and socially just. Drawing from existing literature, it suggests ways of rehabilitating 'just transition' as a framework for empowering actors in the livestock industry.

The article is split into four parts, excluding the present introduction. The next part aims to understand why it is urgent to transition from conventional ways of meat production. It is anticipated that the discussion will help the reader to appreciate the ecological impact of the livestock on the ecosystem. Part 3 analyses the AU's legal frameworks on livestock and their shortcomings. The merit of this discussion is to understand the nuances of this legislation and how they (fail to) respond to emerging climate concerns. Part 4 provides suggestions on how to diversify meat production to an eco-friendly practice. These recommendations are offered bearing in mind the unique vulnerabilities of farmers to radical change in production. As a consequence, it applies the three principles of justice in order to arrive at a more feasible remedy. Part 5 five serves as the conclusion, summarising the findings of the article, including its policy recommendations.

1 H Alae-Carew and others 'The role of plant-based alternative foods in sustainable and healthy food systems: Consumption trends in the UK' (2022) 807 *Science of the Total Environment* 2.

2 I Velicu & S Barca 'The just transition and its work of inequality' (2020) 16 *Sustainability* 267; T Kortetmäki and others 'Just transition boundaries: Clarifying the meaning of just transition' (2025) 55 *Environmental Innovation and Societal Transitions* 2.

3 AU 'Climate Change and Resilient Development Strategy and Action Plan (CCRDSAP 2022-2032)', https://au.int/sites/default/files/documents/41959-doc-CC_Strategy_and_Action_Plan_2022-2032_08_02_23_Single_Print_Ready.pdf (accessed 30 March 2026).

4 I Scoones 'Livestock, methane, and climate change: The politics of global assessments' (2023) 14 *Climate Change* 2.

2 Livestock and climate change

The aim of this part is to examine why Africa ought to transition from its traditional means of meat production. It is hoped that such an analysis will enable one to appreciate the link between livestock sector and climate change, because, to some agrologists, the livestock industry accounts for 51 per cent of total greenhouse gas emissions.[5] This projection, however, is disputed by the Food and Agriculture Organisation (FAO). According to the organisation, the industry is the second-highest emitter with an annual 14,5 per cent (7,1 GT CO_2) of global emissions.[6] The differences in data notwithstanding, emissions from the livestock industry may be categorised into three key layers. These classifications are based on the quantity of gas released per annum and their respective duration in the atmosphere (upon emission).

The first is carbon dioxide (CO_2). This gas has a long duration. When released, it can suspend in the atmosphere for over 150 years.[7] Its longevity is concerning as it can fester climate change for many decades.[8] The livestock industry is estimated to generate 7 516 million tons of CO_2 annually.[9] The second is enteric methane (CH_4). The gas has a shorter lifespan in the atmosphere.[10] Once emitted, it rapidly breaks down in the atmosphere.[11] However, it absorbs energy and warms up quickly in the atmosphere. Also, it has 28 times global warming potential as opposed to CO_2.[12] As a consequence, it is responsible for 64 per cent of global methane emissions.[13] As a potent greenhouse gas, methane is produced by ruminants during digestion.[14] While cattle are responsible for more than 60 per cent of this emission, pigs run second with 37 per cent.[15] Harmsen and others assert that operating within the safe zone of 1,5C requires capping of methane. This admonition implies offsetting methane by ~47 per cent over the next two decades.[16]

5 K Dopelt, P Radon & N Davidovitch 'Environmental effects of the livestock industry: the relationship between knowledge, attitudes, and behavior among students in Israel' (2019) 16 *International Journal of Environmental Research and Public Health* 1359.
6 FAO 'Livestock solutions for climate change', https://www.fao.org/family-farming/detail/en/c/1634679/ (accessed 30 March 2026). The highest emitter is coal (responsible for 25% of emissions).
7 As above.
8 As above.
9 As above.
10 FM O'Connor 'Why methane matters' (2024) *2 Frontiers in Science* 2.
11 A Reichwald and others 'Insights into sex chromosome evolution and aging from the genome of a short-lived fish' (2015) 163 *Cell* 1528.
12 AJ Severinsky & AL Sessoms 'Methane versus carbon dioxide: Mitigation prospects' (2021) 15 *International Journal of Energy and Environmental Engineering* 214; AR Moss and others 'Methane production by ruminants: Its contribution to global warming' (2000) 49 *Annales de Zootechnie* 241.
13 Dopelt and others al (n 5).
14 E Roques and others 'Recent advances in enteric methane mitigation and the long road to sustainable ruminant production' (2024) 12 *Annual Review of Animal Biosciences* 321.
15 FAO (n 6).
16 M Harmsen and others 'The role of methane in future climate strategies: Mitigation potentials and climate impacts' (2020) 163 *Climatic Change* 1409, 1413.

Finally, ammonia (NH_3). Farmers use ammonia to treat poor-quality forage. Capstaff and Miller observe that ammonisation helps transform low-quality grass hay or wheat straw into highly digestible feed.[17] The process involves breaking down lignin-carbohydrate bonds in the cell wall of the plant. Nonetheless, Ghavam and others moot that the conventional way for ammonia production is through the Haber-Bosch process.[18] Given the high pressure and temperature required, the energy used for the process exceeds 30 GJ/tonne NH3. As a result, the livestock industry contributes to ~81 per cent of global ammonia (NH_3) emissions.[19] Like methane, ammonia has a short life span. The two gases are reactive and typically lasts for about a week in the atmosphere. Moreover, because they are highly soluble in water, they are rapidly washed out of the air by fog, snow or rain.

From the analysis above, it is evident that the three greenhouse gases jointly pose a considerable threat to the livestock industry.[20] While the longevity of carbon dioxide is the obvious threat, methane and ammonia have the potential to warm up quickly in the atmosphere. The effects of these gases on livestock could be direct or indirect. The former signifies immediate impact, whereas the latter implicates prolonged and general impact on the livestock industry. One crucial direct effect is heat stress.[21] Animals born six decades ago will witness approximately four major heat waves in their lifetime.[22] The same cannot be said of those born in the 2020s. Even if state parties meet the 1,5°C target set by the Paris Agreement, animals born in this decade will witness about 18 such heat waves.[23] Rising temperatures are projected to intensify heat stress. This condition occurs when the body of animals cannot get rid of heat faster than it generates. The body's dysfunction emanates from prolonged exposure to extreme temperatures.[24]

Heat stress could be split into two camps: first, chronic heat stress. This phenomenon is associated with prolonged exposure to heat waves. The duration

17 NM Capstaff & AJ Miller 'Improving the yield and nutritional quality of forage crops' (2018) 9 *Frontiers in Plant Science* 1. Ammonisation implies the process of treating forages with ammonia.

18 Ghavam and others 'Sustainable ammonia production processes' (2021) *9 Frontiers in Energy Research* 1.

19 S Wyer and others 'Ammonia emissions from agriculture and their contribution to fine particulate matter: A review of implications for human health' (2022) 301 *Journal of Environmental Management* 3.

20 GA Bogale & ZB Erena 'Drought vulnerability and impacts of climate change on livestock production and productivity in different agro-ecological zones of Ethiopia' (2022) 50 *Journal of Applied Animal Research* 471.

21 MA Abeyta and others 'Effects of dietary antioxidant supplementation on metabolism and inflammatory biomarkers in heat-stressed dairy cows' (2023) 106 *Journal of Dairy Science* 1441.

22 A Anuta and others 'The impacts of climate change on livestock: An interdisciplinary, scoping review of health, production, and adaptation strategies' (2025) 2 *Climate Smart Agriculture* 1.

23 K Tanaka & BC O'Neill 'The Paris Agreement zero-emissions goal is not always consistent with the 1.5 C and 2 C temperature targets' (2018) 8 *Nature climate change* 3.

24 B Parkes, JR Buzan & M Huber 'Heat stress in Africa under high intensity climate change' (2022) 66 *International Journal of Biometeorology* 1535.

spans from three weeks and beyond. Chronic heat stress leads to a reduction in feed intake, poor fertility and lower milk production; second, acute heat stress. The condition is tied to intense heat exhaustion that spans from a few days to a week. The intensity may result in oxidation stress, organ damage and, in extreme cases, animal collapse.[25] The ability to adapt to heat differs greatly among livestock:[26] (i) those with efficient sweat glands;[27] Mota-Rojas and others intimate that horses and rabbits adapt well to heat stress due to their well-vascularized skin;[28] (ii) second, animals with limited sweat glands.[29] This feature compromises the efficient functioning of their thermoregulatory system. Animals in this camp include pigs, goats, sheep and cattle. As a warm-blooded species, their endothermy stabilises their internal temperature by warming or cooling the body.[30] However, this coordination is truncated under extreme temperatures. This results in decreased feed intake.[31] In the case of commercial farmers that keep cattle in barns, the cost for installing misting systems (for cooling) could hike their expenditure;[32] and (iii) the third category of animals do not have sweat glands. This trait compromises their thermoregulatory mechanism.[33] A common example is poultry. They cool down by staying in coops or perching to stay off cold ground. Poultry also relies on behavioral mechanisms, such as increased blood flow to the wattles and comb, and gular flutter (panting).[34] Notwithstanding their variations, livestock share a common fate of facing prolonged timespan of heat stress, which could undermine their ability to withstand.[35]

The long-term effect of emissions is drought. It is expected that drought will have different effects on the carrying capacities of rangelands and production systems.[36] The carrying capacity will decrease by 12 to 24 per cent depending

25 PK Thornton and others. 'Impacts of heat stress on global cattle production during the 21st century: A modelling study' (2022) 6 *The Lancet Planetary Health* e193.
26 J Sarubbi and others 'Hypothalamic neuromodulation and control of the dermal surface temperature of livestock during hyperthermia' (2024) 14 *Animals* 4.
27 H Kang and others 'Heat stress in horses: A literature review' (2023) 67 *International Journal of Biometeorology* 959.
28 D Mota-Rojas and others 'Thermal imaging as a method to indirectly assess peripheral vascular integrity and tissue viability in veterinary medicine: animal models and clinical applications' al (2023) 14 *Animals* 12.
29 J Vasconcelos and others 'Neoplasms in domestic ruminants and swine: A systematic literature review' (2023) 10 *Veterinary Sciences* 163.
30 AO Bakhraibah 'Warm-blooded animal toxoplasmosis and its connection to COVID-19: A review' (2022) 7 *Microbial Biosystems Journal* 19.
31 I Belhadj Slimen and others 'Heat stress effects on livestock: Molecular, cellular and metabolic aspects, a review' (2016) 100 *Journal of Animal Physiology and Animal Nutrition* 405.
32 As above.
33 DM Jenkinson & PS Blackburn 'The distribution of nerves, monoamine oxidase and cholinesterase in the skin of poultry' (1968) 9 *Research in Veterinary Science* 429.
34 S Yadav and others 'Thermoregulation in layer poultry' (2022) 1 *Trends in Agriculture Science* 325.
35 PK Thornton and others 'Increases in extreme heat stress in domesticated livestock species during the twenty-first century' (2021) 27 *Global Change Biology* 5765.
36 Carrying capacities implies the maximum number of cattle, sheep, goats or pigs that a particular area of land can support.

on the climate scenario.[37] The onset of prolonged drought will lead to a rise in animal mortality and a decline in productivity.[38] Reduced precipitation reduces water availability and damages pastures. The condition will threaten grass availability, especially as grasslands suffer encroachment by shrubs and trees. Then again, drought will decrease groundwater resources and intensify plant evapotranspiration.[39] Deprecating rainfall pattern results may be tied to poor water quality, which will result in poor animal health. Moreover, alterations in rainfall and temperature will exacerbate the spread of diseases and parasites into new forages and rangelands.[40] In sum, the future of the livestock industry is bleak given fluctuations in the weather patterns. It is against this backdrop that the article turns to examine the legal provisions that exist to guide the region to transition into a sustainable means of livestock rearing.

3 African Union and the livestock industry

Over the last two decades, the AU has adopted a plethora of policies and strategies to foster agriculture.[41] These encompass model laws that seek to guide member states in the framing of policies. The AU's primary agricultural framework is the Comprehensive African Agricultural Development Programme (CAADP).[42] Launched in 2003, the programme aims to promote nutrition, food security, and the livelihood of farming communities. These aspirations are to be attained by increasing government funding and technical support for farmers.[43] African states affirm their commitment to pursue 'a 6 per cent average annual agricultural sector growth rate'.[44] They also concurred on the 'allocation of 10 per cent of the national budgets to the agricultural sector'.[45] The funding was to (i) research of sustainable food production; (ii) agricultural technologies; (iii) food and nutrition security; (iv) market access and rural development; and (v) water management and sustainable land use. A decade later, the Malabo Declaration (2013) reaffirmed the commitment to attain 6 per cent growth and to allocate 10 per cent of the national budget to the agricultural sector.[46] While

37 C Duku and others 'Climate change impacts livestock carrying capacity in East Africa' (2025) 25 *Regional Environmental Change* 110.
38 JM Rust & T Rust 'Climate change and livestock production: A review with emphasis on Africa' (2013) 43 *South African Journal of Animal Science* 260.
39 DS Osiru 'Climate smart agriculture-A comprehensive scoping and assessment study with particular reference to Uganda' (2023) *Bishop Stuart University Journal of Development, Education & Technology* 39.
40 Rust & Rust (n 38).
41 https://au.int/en/pressreleases/20250113/african-union-adopts-ten-year-strategy-and-action-plan-transform-africas-agri (accessed 30 March 2026).
42 NEPAD 'CAADP' https://www.dai.com/our-work/projects/africa-comprehensive-africa-agriculture-development-programme-caadp (accessed 30 March 2026).
43 M Brüntrup 'The Comprehensive Africa Agriculture Development Programme (CAADP) – An assessment of a Pan-African attempt to revitalise agriculture' (2011) 50 *Quarterly Journal of International Agriculture* 81.
44 NEPAD 'CAADP' 8, https://www.resakss.org/sites/default/files/pdfs/comprehensive-africa-agriculture-development-progr-39420.pdf (accessed 30 March 2026).
45 As above.
46 AU 'Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared. Prosperity and Improved Livelihoods' 3, https://www.resakss.org/sites/default/files/

agriculture has witnessed a steady growth over the last decades, it still lingers behind the 6 per cent projection.[47] The shortfall is underpinned by the failure of states to meet the terms of the framework. At the time of writing, only four states had allocated 10 per cent of national budget to agriculture.[48] In contrast, the allocations from the 50 states range from 2,1 per cent to 2,5 per cent of the national budget.[49] The non-compliance of states to this commitment raises concern about the priorities of African rulers.

A more specific instrument to the present discussion is the Livestock Development Strategy for Africa.[50] Adopted in 2015, the instrument stipulates that 'by the year 2025, at least 30 per cent of our farm, pastoral, and fisher households are resilient to climate and weather-related risks'.[51] Ironically, it recognises looming climate uncertainties but retracts from setting out how to implement mitigation strategies.[52] This oversight is replicated in the omission of livestock from the continental climate strategy. In the Climate Change and Resilient Development Strategy and Action Plan (AfCFTA), the strategy calls for green jobs, inclusive economic development and resilient agriculture.[53] It highlights the susceptibility of women in light of limited access to resourced and overreliance on rain-fed farming.[54] The strategy calls for strategic alignment to national development policies. Still, its prime aspiration remains '[s]upporting renewable energy, energy efficiency'.[55] For this reason, there are no regional indicators or targets tailored to cap livestock-related emissions. Since the AU shapes the conduct of states, it is not ironic that livestock is omitted from nationally determined contributions of many African states.[56]

Reasons for the limited focus on livestock in climate mitigation strategies abound. From the onset, there is a lack of data. Accurate and recent data on the livestock industry could be an entry point towards the framing of a proposal for green investors.[57] Although the livestock industry in the region has received

Malabo%20Declaration%20on%20Agriculture_2014_11%2026-.pdf (accessed 30 March 2026).

47 As above.

48 These were Malawi, Lesotho, Ethiopia and Benin. See M Diallo & F Wouterse 'Agricultural development promises more growth and less poverty in Africa: Modelling the potential impact of implementing the Comprehensive Africa Agriculture Development Programme in six countries' (2023) 41 *Development Policy Review* 3.

49 As above.

50 AU 'The Livestock Development Strategy for Africa (LiDeSA)' 3, https://faolex.fao.org/docs/pdf/au196356ENG.pdf (accessed 30 March 2026).

51 As above.

52 AU (n 50) 21.

53 AU 'Climate Change and Resilient Development Strategy and Action Plan (2022-2032)' AfCFTA 7, https://au.int/sites/default/files/documents/41959-doc-CC_Strategy_and_Action_Plan_2022-2032_08_02_23_Single_Print_Ready.pdf (accessed 30 March 2026).

54 AU (n 53) 17.

55 AU (n 53).

56 P Antwi-Agyei and others 'Alignment between nationally determined contributions and the sustainable development goals for West Africa' (2018) 18 *Climate Policy* 1296.

57 Green investors are entities that funds projects that are environmentally friendly.

considerable scholarly attention, concise data remain elusive.[58] There is a paucity of data on the types of breeds, the mortality or natality rate of animals.[59] Moreover, it remains uncertain about the number of farm owners, managers, farmhands, breeders, feed producers, abattoir operatives and meat packers operating in the region. The dearth may be tied to the vast, yet decentralised nature of the industry.[60] This phenomenon is a hindrance to the development of concise initiatives and investment at the sub-national level. Accurate data could assist in contrasting the differences or similarities at the national in terms of livestock population, feed (in)efficiencies, biomass use.[61] Also, there is widespread apathy among livestock farming.[62] Emerging researchers in Africa could be instrumental in directing their work towards bridging the data gap in the livestock industry. However, there is a growing indifference among young researchers on the theme of livestock and agriculture more broadly. In the words of Van der Merwe, the continent's young people perceive farming as a 'backward sector that is home to an ageing cohort'.[63] Unless this pejorative sentiment is reversed, it will continue to ward off prospective livestock researchers.

Perhaps the most dominant reason for the AU's limited interference in this industry is the social significance of livestock. In many African communities, animals are seen as symbols of sanctity, status and wealth.[64] The sheep is a very meek animal and, as such, believers in traditional African religions (TAR) sacrifice it to appease deities.[65] Their perceived innocence makes sheep ideal substitutes for human sacrifice.[66] Animal sacrifice is not limited to TAR, but is pervasive in contemporary religions, among others, Islam. During Eid al-Adha, animals (cows, camels, goats and sheep) are sacrificed to commemorate Qurban (the willingness of Prophet Ibrahim to sacrifice his son Ismail for Allah).[67] The practice and subsequent sharing of the meat demonstrate obedience, devotion, and sharing of blessings with the needy. In Eastern and Southern Africa, agricultural and pastoralist communities have another perception of animals. Among the Dinka, Mundari, Xhosa and Zulu tribes, livestock – particularly

58 K Marshall and others 'Livestock genomics for developing countries – African examples in practice' (2019) 10 *Frontiers in Genetics* 5.
59 M Balehegn and others 'Livestock sustainability research in Africa with a focus on the environment' (2021) 11 *Animal Frontiers* 48.
60 O Opoola and others 'Current situations of animal data recording, dairy improvement infrastructure, human capacity and strategic issues affecting dairy production in sub-Saharan Africa' (2019) 51 *Tropical Animal Health and Production* 1699.
61 L Fadul-Pacheco and others 'Addressing data bottlenecks in the dairy farm industry' (2022) 12 *Animals* 721.
62 U Chipfupa & A Tagwi 'Youth's participation in agriculture: A fallacy or achievable possibility? Evidence from rural South Africa' (2021) 24 *South African Journal of Economic and Management Sciences* 1.
63 M van der Merwe 'How do we secure a future for the youth in South African agriculture?' (2024) 63 *Agrekon* 3.
64 K Horsthemke 'Animals and African ethics' (2017) 7 *Journal of Animal Ethics* 121.
65 P Bukuluki & CM Mpyangu 'The African conception of sacrifice and its relationship with child sacrifice' (2014) 41 *International Letters of Social and Humanistic Sciences* 15.
66 M Jackson 'Sacrifice and social structure among the Kuranko' (1977) 47 *Africa* 129.
67 C Brooke 'Sacred slaughter: The sacrificing of animals at the Hajj and Id al-Adha' (1987) 7 *Journal of Cultural Geography* 68.

cattle – are the primary measure of wealth and status in these societies.[68] As such, cattle are traditionally used as a form of symbolic payment (*lobola* or bride price) from the family of the groom to the bride's family.[69] The payment plays a dual role in fostering respect and formalising the union between the families.[70]

It is imperative to mention here that the cultural and religious significance of livestock is buttressed by the prevailing notion of cultural food practices (CFP).[71] Across the region, different communities eat different kinds of meals. Food is perceived as a symbol of heritage, identity and self-expression. CFP recognises the entitlement of communities to choose their food without government interference.[72] Arguably, this entitlement serves as a hindrance to political debate or strategy that will curtail people's access to food cultural preferences. To that end, swaying communities from meat cannot be attained through government regulation, but through personal choice. Nonetheless, a critic could counter this observation that if the right to food choice is upheld, then the right to choose coal as a preferred energy source ought to be respected. Such criticism may be justifiable. For instance, there has been frequent litigation seeking for the impact assessment of coal power plant.[73] However, litigants rarely approach a court for an order requiring an assessment of the impact of livestock on the environment. Using litigation to curb the environmental effects of one and not the other seems lopsided.

Containing the adverse effects of rising emissions, calls for proportionality in mitigation strategies.[74] The need for equal treatment is essential considering that livestock (such as coal) leaves a substantial degree of carbon footprints. Without a proportional intervention, attempts at mitigating emissions will be counterproductive. The persistence of livestock-related emissions will negate the gains that may be attained by capping coal-related emissions. This is particularly so, as alternatives to meat exist, but rarely to coal. Although renewable energy is gaining a foothold in urban centres, the spate of poverty in rural communities will hinder a radical transition from coal. The upfront cost of solar panels and related equipment makes coal the ideal energy source for cooking in rural communities.

68 S Shava & S Masuku 'Living currency: The multiple roles of livestock in livelihood sustenance and exchange in the context of rural indigenous communities in Southern Africa' (2019) 35 *Southern African Journal of Environmental Education* 2.

69 RD Coertze 'Livestock in the social and cultural life of African communities' (1986) 9 *South African Journal of Ethnology* 131.

70 G Parker 'The practice of lobola in contemporary South African society' (2015) 32 *Journal of Third World Studies* 179.

71 CH Feldman & S Wunderlich 'Cultural food distancing: A conceptual discourse on the evolution of seminal to present and future models of traditional food practices' (2023) 125 *British Food Journal* 1936.

72 JJ Boutaud, A Becuț & A MarinescuBoutaud 'Food and culture. Cultural patterns and practices related to food in everyday life: Introduction' (2016) 6 *International Review of Social Research* 2.

73 *Earthlife Africa Johannesburg v Minister of Environmental Affairs & Others* [2017] ZAGPPHC 58; [2017] 2 All SA 519 (GP); L Chamberlain & M Fourie 'Using climate litigation to strengthen advocacy strategies: The Life After Coal Campaign in South Africa' (2024) 16 *Journal of Human Rights Practice* 248.

74 B Nkrumah 'Street food: Urbanisation and agriculture in Africa' (2026) 10 *Urban Science* 7.

It is against this backdrop that the next part turns to examine how livestock-related emissions could be reduced. This assessment is conducted through the lens of just transition.

4 Just transition and the livestock industry

The Preamble to the Paris Agreement entreats member states to entrench 'just transition' in their respective national development policies.[75] The Preamble articulates that member states must recognise 'the imperatives of a *just transition* of the workforce and the creation of decent work'.[76] In Africa, substantial interventions have been adopted at the (sub)-regional and (sub)-national in response to the global call for just transition.[77] However, the concept has rarely been applied to livestock. The closest term to 'just transition' in the livestock industry is 'sustainability'. Ultimately, both appreciate the interconnectedness of social and natural elements.[78] However, there is a stark distinction between the two. The latter refers to the practice of using natural resources without compromising the ability of future generations to harness similar resources.[79] The latter, however, has a broader appeal to workers' rights.[80]

To define it simply without equivocation, a 'just transition' is a shift to a greener economy through a fair process.[81] It demonstrates how humanity and Mother Nature are inherently connected. It implies how a shift to environmentally friendly practices will impact the living conditions of workers, and how the living conditions of workers impact the environment.[82] As a labour-oriented ideology, the notion is concerned with fairness in terms of who gets what, when and how in the evolving green revolution. Put differently, it is a golden thread that ties the otherwise disconnected layers of economic, social and environmental concerns of contemporary society.[83] It affirms that, whereas economic restructuring is inevitable, it is imperative that the people that will be affected are not left unprotected. The notion is groundbreaking as it is the first attempt that bridges the gap between labour and the natural environment. It calls for initiatives to safeguard the environment, without infringing on the rights of workers.[84]

75 United Nations Framework Convention on Climate Change. Paris Agreement, 12 December 2015, 3156 UNTS 145 (2016).
76 My emphasis.
77 F Obeng-Odoom 'Oil cities in Africa: Beyond just transition' (2021) 80 *American Journal of Economics and Sociology* 778.
78 Velicu & Barca (n 2).
79 T Kuhlman & J Farrington 'What is sustainability?' (2010) 2 *Sustainability* 3438.
80 X Wang & K Lo 'Just transition: A conceptual review' (2021) 82 *Energy Research & Social Science* 2.
81 Kortetmäki and others (n 2) .
82 Velicu & Barca (n 2).
83 AM Eisenberg 'Just transitions' (2018) 92 *Southern California Law Review* 273.
84 B Galgóczi 'Just transition on the ground: Challenges and opportunities for social dialogue' (2020) 26 *European Journal of Industrial Relations* 368.

Although there is consensus that just transition concerns labour, there is widespread contestation among authors when it comes to how it ought to be implemented. The contestation may be grouped into three camps: first, the *modus operandi*. There is discord on whether the shift to low-carbon economy ought to be radical transformation or a gradual economic restructuring;[85] second, the scope of the transition. There has not been a unitary voice on whether the different sectors of the economy ought to transition jointly or separately;[86] third, whom to prioritise. The economic sector is fraught with groups with different sensitivities and vulnerabilities. This disparity brings to bear the difference of opinion in terms of who ought to be the focus for government intervention. Where some authors agitate for women, indigenous people or historically disadvantaged, others call for equality regardless of a person's socio-economic background.[87] Fourth, the scale. There is a lack of agreement in terms of where the transition ought to begin. Should it spring from the grassroots to the global or *vice versa*? Responses to these queries may merit a separate article. As such, this article will disengage from these contestations.

Reducing livestock-related emissions can be attained through efficient farming systems and/or a gradual shift to plant-based meals. The transition to meatless diets will inadvertently lead to a reduction in animal production and the livelihood of livestock farmers.[88] This phenomenon may exacerbate the poverty and socio-economic plight of farmers, workers and their families. It is against this backdrop that the three types of just transition become imperative for the livestock industry.

The first is *distributive justice*. As its name implies, distributive justice relates to the equitable allocation of the benefits and burdens of society.[89] In the context of climate change, it recognises intra-generational equity and inter-generational equity. The former connotes a fair distribution of benefits and burdens within one generation. The latter, however, implies a fair distribution of benefits and burdens between generations. In essence, there ought to be equitable about allocation of the causes, impacts and opportunities that climate change brings.[90] An opportunity worth citing is technological assistance. Across the continent, there has been considerable technological advancement in the livestock industry.

85 D McCauley & R Heffron 'Just transition: Integrating climate, energy and environmental justice' (2018) 119 *Energy policy* 5; L Clarke & C Lipsig-Mummé 'Future conditional: From just transition to radical transformation? (2020) 26 *European Journal of Industrial Relations* 353.

86 Velicu & Barca (n 2); Eisenberg (n 83).

87 P Walk 'From parity to degrowth: Unpacking narratives of a gender-just transition' (2024) 112 *Energy Research & Social Science* 2; D Cambou & K Buhmann 'Indigenous peoples, business, and the struggles for justice in the green transition: Towards a rights-based approach to just transitions' (2025) 10 *Business and Human Rights Journal* 147.

88 Z Conrad and others 'Diet quality on meatless days: National health and nutrition examination survey (NHANES), 2007–2012' (2017) 20 *Public Health Nutrition* 1564.

89 R Nozick 'Distributive justice' (1973) *Philosophy & Public Affairs* 46.

90 KS Cook & KA Hegtvedt 'Distributive justice, equity, and equality' (1983) 9 *Annual Review of Sociology* 217.

Precision livestock technologies (PLTs) use artificial intelligence (AI) and sensors to provide farmers with adequate data.[91] The data is useful for more efficient, humane and sustainable practices. PLTs encompass virtual fencing. Schillings and others state that the technology provides audio and mild electric cues (through GPS-enabled collars) to guide livestock within digitally set boundaries.[92] This approach enables farmers to remotely manage grazing and pasture restoration without the need for physical fencing. Ultimately, such technologies ought to be accessible and user-friendly to traditional farmers. Yet, while some commercial farmers have access to these devices, they remain largely inaccessible to smallholders.[93] The high cost of digital tools has made them largely inaccessible to poor livestock farmers. This limitation demonstrates the need for government subsidies in accessing these logistics. If such interventions are to be just, then rural, small-scale farmers (as opposed to commercial farmers) ought to be prioritised in the allocation of assistance. It is important to reiterate that any logistical assistance ought to incorporate technical training. The training ought to empower farmers with skills on how to operate and take advantage of emerging technologies.

Another technological assistance that could be afforded to livestock farmers is solar panels. Africa has high solar radiance due to its equatorial location and low cloud cover.[94] The intense, year-round sunlight will provide unlimited access to energy, whether in rural or urban centres. Solar panels could be an ideal equipment for tapping renewable energy for feeding, lighting, ventilation, and milking livestock. [95] This device could be an entry point for efficient and sustainable livestock farming. However, although the falling costs of solar panels have made them increasingly common in residential areas, adoption in farms remains limited. For the transition to be just, there is a need for supportive policies that subsidise the device for smallholder farmers, particularly in rural areas. Solar panels are a sustainable means of production, as those mounted on land serve as barns or grazing areas between the devices. By providing shade during grazing, the devices safeguard animals from UV rays and heat stress.

The second type of transitional justice is *procedural justice*.[96] In many states, farm workers are exempted from the minimum wage and Fair Labour Practices Act.[97] For this reason, the relationship between commercial livestock farm

91 C Aquilani and others 'Precision livestock farming technologies in pasture-based livestock systems' (2022) 16 *Animal* 1.
92 J Schillings and others 'Exploring the potential of precision livestock farming technologies to help address farm animal welfare' (2021) 2 *Frontiers in Animal Science* 2.
93 As above.
94 L Diabate and others 'Solar radiation climate in Africa' (2004) 76 *Solar Energy* 737.
95 D Soto-Gómez 'Integration of crops, livestock, and solar panels: A review of agrivoltaic systems' (2024) 14 *Agronomy* 3.
96 LB Solum 'Procedural justice' (2004) 78 *Southern California Law Review* 181.
97 M Ngubane 'Immigrant farm workers, self-exploitation and social reproduction' (2025) 52 *Review of African Political Economy* 17.

owners and workers has been characterised, sadly, by unspoken discontent.[98] In cases where the rights of farmworkers are protected by statutes, the provisions rarely advance the well-being of workers on the ground.[99] In South Africa, the Basic Conditions of Employment Act affords a statutory-specific wage for livestock farm workers.[100] Section 3 of the part labelled 'Sectoral Determination 13' recommends setting the minimum hourly rate for farm workers at R5,34. While this figure has been adjusted to conform to the national minimum wage of R30,23/hour, farmworkers still face difficulty given the high cost of living.[101] Farm workers also face the potential risk of unlawful wage deductions or withholding by an employer. Beyond the socio-economic set-back, farm workers are susceptible to injuries or loss of life. While feeding a calf, moving cattle, they may be fatally trampled upon. Economic and health risks are associated with the trade position of livestock workers, who are among the endangered social groups in contemporary society.

Despite these challenges, livestock farm workers are often excluded from decision making. Overcoming the exploitation of livestock farm workers calls for the realisation of procedural justice. This aspect of transitional justice centres around the process that led to decision making. It calls for transparency and genuine participation. Procedural justice advocates consultation and participation by affected communities in all phases of the decision-making process. It transcends expert knowledge to indigenous knowledge. This programme ought to enhance the inclusion of farm workers in the design and operationalisation of mitigation and adaptation strategies. As livestock farms transition to low emissions, it will be imperative to reflect on financial and technical interventions that could assist labourers to cope with the shift in operations. A modest amount of social assistance could also cushion farmers from the loss of income. If carefully considered, procedural justice has the merit of addressing power imbalances in the livestock industry. It will facilitate the genuine participation of all actors, particularly under-waged labourers that suffer alienation in decision-making processes. These individuals could make substantial contributions in terms of framing solutions for mitigation, adaptation and resilient strategies for the livestock industries.

98 M Bolt 'Becoming and unbecoming farm workers in Southern Africa' (2017) 40 *Anthropology Southern Africa* 241.

99 B Nkrumah *Seeking the right to food: Food activism in South Africa* (2021) 78.

100 Government of South Africa. 'Basic Conditions of Employment', https://www.gov.za/sites/default/files/gcis_document/201409/28518.pdf (accessed 29 March 2026).

101 Department of Employment and Labour 'National Minimum Wage Act 9 of 2018' (2026) NO R 7083 https://www.gov.za/sites/default/files/gcis_document/202602/54075rg11941gon7083.pdf (accessed 28 October 2026); LK Moagi and others 'Exploring the impact of occupational hazards on the mental health of farmworkers: A qualitative study in Maruleng, Limpopo Province' (2026) 23 *International Journal of Environmental Research and Public Health* 6.

Finally, *recognition justice* acknowledges the unique vulnerability and potential of relevant players.[102] Recognising the distinct trait of an actor affirms their dignity and a sense of ownership (of climate-related projects). At the regional level, whereas net-zero ought to be embraced by all AU member states, it is imperative that strategies are developed based on the specific conditions of each state. Put differently, target setting ought to be cognisant of local dynamics. Different strategies may be required for low- and middle-income economies. In savanna zones (with vast tropical grasslands), beef cattle are mainly grass-fed.[103] However, in the sub-tropics (such as South Africa), where there is poor rangeland management, beef cattle are grain-fed.[104] Grain-fed diets contribute to food insecurity. The latter emanates from competition between humans and livestock over sorghum, barley, corn, millet and soy. This phenomenon often leads to the expansion of grain farms to meet the needs of humans and livestock. In time, the expansion of farms will be accompanied by deforestation, biodiversity decline, releasing stored carbon dioxide and the disruption of water cycle. Different (feed) problems require different remedies. In savanna zones, rotational grazing may be encouraged. This practice will reduce overgrazing and desertification. In the sub-tropics, alternative feeds such as cloves may be recommended. Such a transition will avert competition and drive down the price of grain. In the long term, this approach will guarantee access to grains for indigent households. A few ways to attain this end is by highlighting the positive attributes of plant-based diets and promoting community supported agriculture (CSA).[105]

CSA is a programme that provides an opportunity for community members to purchase in advance a share of the harvest at the beginning of the planting season.[106] The farmer then cultivates the crops based on the needs of consumers. Purchasing crops upfront helps cover the start-up cost and operational expenses.[107] CSA has the prospect of fostering community resilience. Farmers and consumers collaborate in producing crops that align with their cultural identity and values. Through the programme, consumers may begin to reflect on and appreciate how their food choices foster eco-friendly practices. CSA could be an important exit strategy for livestock farmers who may seek to transition into horticulture. The gradual transition of farmers from degenerative (livestock-based) to regenerative (plant-based) cultivation has the potential to shape eating patterns. Limited

102 A Honneth 'Recognition and justice: Outline of a plural theory of justice' (2004) 47 *Acta Sociologica* 354.

103 I Amole and others 'Livestock feed resources in the West African Sahel' (2022) 114 *Agronomy Journal* 26; AT Adegoke & AA Abioye 'Improving livestock productivity: Assessment of feed resources and livestock management practices in Sudan-Savanna zones of West Africa' (2016) 11 *African Journal of Agricultural Research* 424.

104 T Monkwe and others 'Challenges and perception of communal farmers on cattle production in Ga-Matlala, Limpopo Province, South Africa' (2023) 9 *Heliyon* 2.

105 A Vasquez and others 'Community-supported agriculture as a dietary and health improvement strategy: A narrative review' (2017) 117 *Journal of the Academy of Nutrition and Dietetics* 84.

106 A Pole & M Gray 'Farming alone? What's up with the "C" in community supported agriculture' (2013) 30 *Agriculture and Human Values* 86.

107 L Egli and others 'A systematic review of the ecological, social and economic sustainability effects of community-supported agriculture' (2023) 7 *Frontiers in Sustainable Food Systems* 2.

availability of meat could nudge consumers to explore alternative food sources and/or reduce food waste. However, a successful CSA requires access to the market and affordable goods. The latter, however, remains the Achilles heel of traditional farmers. The influx of imported foods tends to make comparable local food seem expensive. This imbalance could cripple domestic production and stir tension.

On 11 November 2025, rice farmers in Ghana staged a protest.[108] The rank and file of the demonstrators were composed of farmers from the rice, maize and soya bean value chains. The diverse backgrounds of the protestors demonstrate a shared concern for the future of the country's agricultural sector. They expressed their discontent with years of unchecked food imports. The protestors chastised the state for subsidising (sub-standard) rice imports while abandoning domestic agriculture. With over 1 million metric tons of locally produced paddy rice lying unsold on farms and warehouses, this development gravely impacts the livelihoods of families in the grain value chain.[109] A protestor explained that they 'stand ready to feed our people, but we need a level playing field and policies that serve Ghanaian farmers first'.[110] The grievance of the protesters demonstrates leveraging existing mechanisms to connect producers directly to consumers. In essence, a supportive state and community are key in assuring a livestock farmer of an alternative source of livelihood in a post-transition era.

5 Conclusion

The article sets out to explore how Africa could transition to a more sustainable way of production. In response to the question, it divided the article into four parts, excluding the introduction. Part 2 explored why the livestock industry deserves consideration, particularly in the context of climate change. The part found that the industry is a major contributor to emissions. It argues that the short-term effect of methane, coupled with the long-term effect of CO_2, could have dire ramifications on the livelihood of pastoralists. Subsequently, part 3 examined the normative instruments of the AU to discern the strategies that the regional body has adopted to curb this growing concern. It found that there is a gap between policy and practice. The article found that a disproportionate number of climate-related instruments exclude livestock production as a concern. It is argued that the exclusion might be tied to the cultural relevance of meat in Africa. For this reason, part 4 explored interventions that could help farmers become sustainable. The role of the state in this context was discussed. To ensure that the interventions are just, equitable participation in decision-making processes was seen as paramount.

108 Millingmea 'Ghana's grain farmers sound alarm as over US$330M worth of paddy rice remains unsold', https://millingmea.com/ghanas-grain-farmers-sound-alarm-as-over-us330m-worth-of-paddy-rice-remains-unsold/ (accessed 30 March 2026).
109 As above.
110 As above.