SECTION B: DRIVERS OF CHANGE IN THE LIVESTOCK SECTOR

1. Introduction

Agrifood systems are shaped by interacting demographic, economic, technological, institutional and environmental drivers, including population dynamics, economic growth, cross-country interdependencies, innovation, market concentration, consumption patterns, natural-resource scarcity, epidemics, geopolitical instability and climate change (FAO, 2022). The livestock sector, including the diversity of animal genetic resources (AnGR), is shaped by these same dynamics. The Second Report on the State of the World's Animal Genetic Resources for Food and Agriculture (second SoW-AnGR) addressed five broad drivers of livestock-sector change: (i) rising demand for animal-source foods; (ii) changes in trade and retailing: (iii) changes in the natural environment: (iv) advances in technology; and: (v) the evolving policy environment (FAO, 2015). These drivers remain central and operate in a more interconnected and uncertain global context than ever before.

In the livestock sector, these forces manifest in several interrelated ways. Demand growth and dietary change are reshaping both production systems and commodity composition, with most of the additional future consumption of agricultural and fish products projected to occur in low- and middle-income countries, where rising incomes and urbanization are driving increased demand for animal-source foods (OECD/FAO, 2025). At the same time, evolving trade patterns, processing industries, retail expansion and stricter standards are transforming the conditions under which livestock producers access and participate in markets. Environmental pressures are also intensifying; climate change is affecting feed availability, water resources, animal health and productivity, while mitigation efforts are increasing the demand for more efficient and lower-emission production systems (FAO, 2023). Disease risks and biosecurity requirements further shape production trajectories, influencing management practices, market access and restocking decisions, particularly in contexts where intensification, globalization and changing ecological conditions alter disease dynamics (FAO, 2013). In addition, other drivers, including conflicts, policy shifts and evolving cultural preferences, can disrupt livestock systems directly or amplify the effects of other stressors. For AnGR, the central issue is how these interacting drivers reshape incentives, constraints and decision-making processes, ultimately influencing which production systems expand, which breeds are maintained or displaced, and which traits are prioritized by farmers, breeders, markets and policymakers.

This chapter examines the main drivers of livestock transformation and their implications for the sustainable use, development and conservation of AnGR. It focuses on demand transitions and production responses, trade and value-chain restructuring, climate and environmental pressures, disease risks and biosecurity, insecurity and finally policy and institutional factors.

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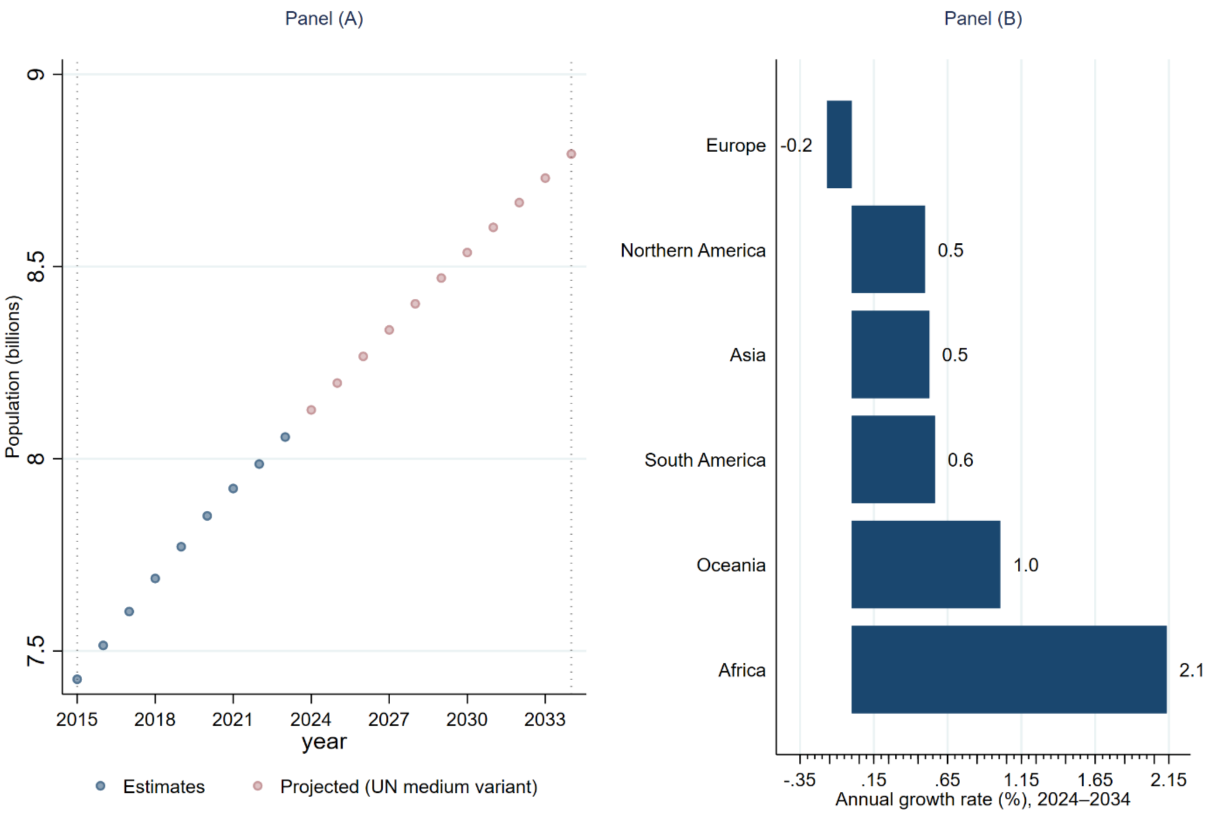
2. Demand transitions and production responses

Demand for animal-source foods remains one of the main forces shaping livestock transformation. However, the current demand transition is not simply a story of aggregate growth in consumption of meat, milk and eggs. It is increasingly differentiated by region, income level, product type and consumer preference. Population growth, rising incomes, urbanization, relative prices, nutrition needs, health concerns, environmental awareness and animal welfare expectations are changing not only how much livestock product is demanded, but also which species, production systems, breeds and traits are favoured.

The OECD–FAO Agricultural Outlook 2025–2034 (Outlook) projects total consumption of agricultural and fish commodities to increase by 13 percent by 2034, with nearly all additional consumption expected to occur in low- and middle-income countries. In middle-income countries, growth is driven partly by rising per capita consumption, while in low-income countries it is driven mainly by population growth (Figure 1B1). Rising disposable incomes and urbanization are expected to shift diets towards more diverse and nutrient-rich foods, including livestock and fish products (OECD/FAO, 2025).

Figure 1B1. Population growth, 2015–2034



Note: Panel A shows global population estimates and projections. Panel B shows average annual population growth rates by region.
Source: Authors' elaboration based on United Nations population data (UN, 2024) and OECD/FAO (2025).

This transition has an important nutrition dimension. The Outlook projects the dietary contribution of livestock and fish products to increase by 6 percent globally by 2034 (OECD/FAO, 2025). In lower-middle-income countries, the increase is projected to be much stronger, reaching about 25 percent and bringing average daily per capita intake of nutrient-rich animal foods to 364 kcal. By contrast, low-income countries are projected to reach only 143 kcal per person per day, below half of the 300 kcal value used in FAO's Healthy Diet Basket (Herforth *et al*., 2025). This highlights a central policy challenge: in many low-income settings; the issue is not excessive consumption of animal-source foods, but insufficient access to affordable, nutrient-rich foods (OECD/FAO, 2025).

As shown in Table 1B1, projected consumption growth differs substantially across regions and products. Africa is expected to record the strongest growth in meat consumption, while Asia shows the strongest projected growth in milk consumption. By contrast, growth in Europe and Northern America is modest, with milk consumption projected to decline slightly. These differences matter for AnGR because they imply different pressures across livestock systems: expansion and intensification in some regions, demand saturation and product differentiation in others.

Table 1B1. Average annual growth in livestock-product consumption by region, 2025–2034

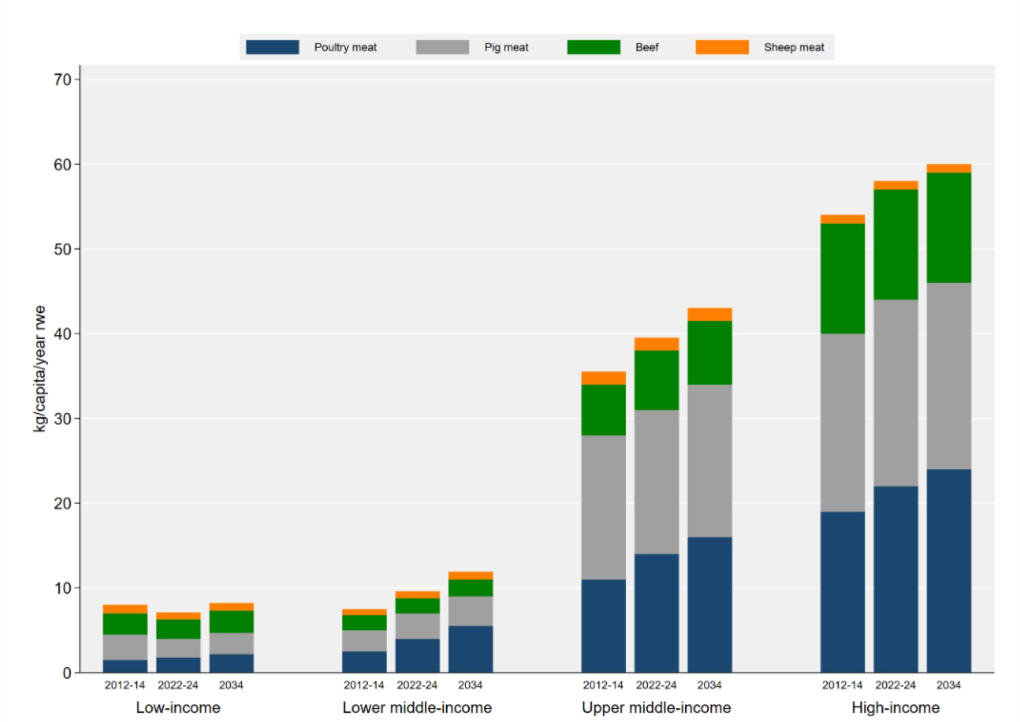
Region	Average annual growth (%), 2025–2034		
	Eggs	Meat	Milk
Africa	2.03	2.75	2.08
Asia	1.13	1.17	3.11
Europe	0.32	0.09	-0.35
South America	1.06	1.27	0.78
North America	1.12	0.60	-0.08
Oceania	1.30	1.00	0.10
World	1.07	1.05	2.08

Note: Growth rates are computed from projected consumption using log differences.
Source: Authors' calculation based on OECD/FAO (2025).

For AnGR, these demand patterns matter because they shape the economic incentives facing livestock keepers, breeders and value-chain actors. Where demand growth is strong and markets are expanding, producers may respond through herd and flock expansion, intensification, crossbreeding and the wider use of specialized commercial breeds and lines. Where per capita consumption is already high, future demand is more likely to be shaped by health, environmental, animal welfare and quality considerations. These different demand pathways create different pressures on AnGR. Standardization may increase the risk of genetic erosion, while differentiated markets may create opportunities for locally adapted breeds linked to origin, quality, resilience and cultural identity.

Meat demand illustrates this uneven transition. In most high-income countries, growth in per capita meat consumption is expected to slow, with consumers gradually shifting away from beef and pork towards poultry and showing greater attention to health, environmental and animal welfare attributes (Figure 1B2). By contrast, meat demand is foreseen to continue to expand in many emerging and developing economies. Poultry is the most dynamic component of this transition. Global poultry consumption is projected to reach 173 million tonnes by 2034, accounting for 62 percent of the additional meat consumed globally. By 2034, poultry is projected to provide 45 percent of the protein consumed from all meat sources, reflecting its relative affordability, short production cycle, favourable feed conversion, higher protein-to-fat ratio and broad cultural acceptability (OECD/FAO, 2025).

Figure 1B2. Per capita meat consumption by income group and meat type, 2022–24 and 2034

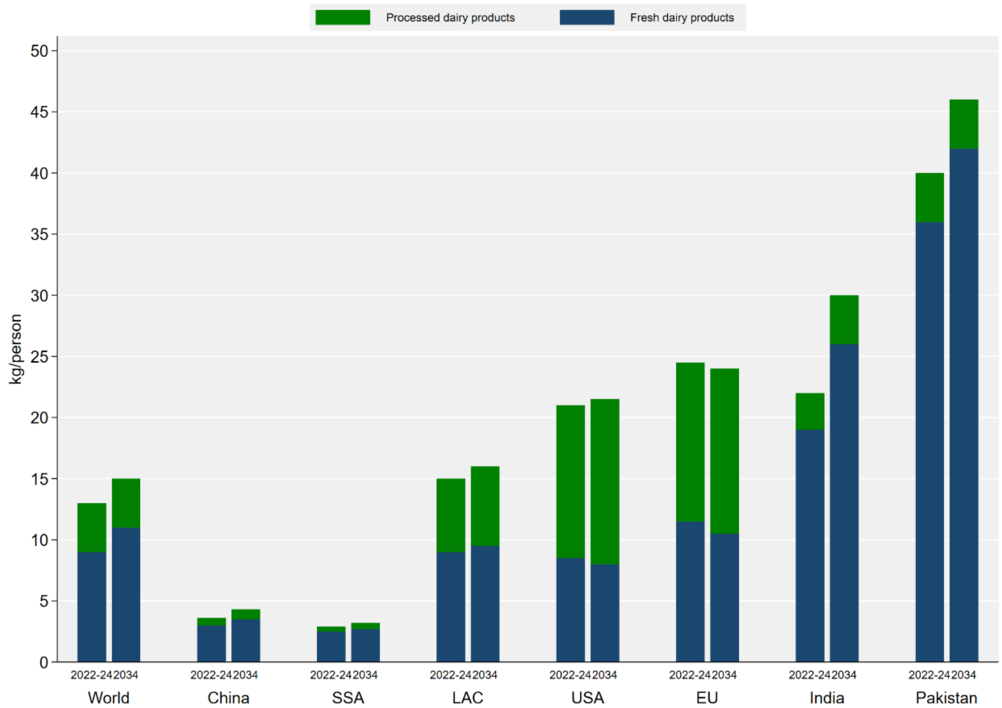


Note: Values are expressed in kilograms per person per year, retail weight equivalent.
Source: OECD/FAO (2025).

This shift has direct implications for production systems and related AnGR. Poultry expansion is closely associated with intensification of production systems, requiring high production efficiency and uniformity of production, more compatible with specialized commercial lines than with local breeds (Pym, 2013). Similar pressures may arise in pig production, particularly where higher biosecurity standards and commercial restructuring accelerate the transition from backyard or small-scale systems to larger commercial units. Ruminant systems do not necessarily follow the exact same pathway. Beef production is projected to increase through heavier carcass weights, genetic improvement and better herd management, while sheep and goat meat will likely remain smaller in global volume but be nonetheless important for specific regions, cultures and grazing systems. These trends matter because cattle, sheep and goats are often embedded in grazing, mixed and pastoral systems where locally adapted breeds contribute not only to meat and milk production, but also to mobility, heat tolerance, disease resilience, use of marginal feed resources and livelihood security (OECD/FAO, 2025; FAO, 2015).

Dairy demand adds another layer to the transition. In low- and lower-middle-income countries, most dairy production is consumed as fresh dairy products and the share of fresh dairy products in global consumption is expected to increase over the next decade, mainly because of stronger demand growth in India and Pakistan (Figure 1B3). Per capita consumption of milk solids is projected to increase to 30 kg in India and 46 kg in Pakistan by 2034.In high-income regions, particularly Europe and North America, overall per capita demand for fresh dairy products is declining and demand has shifted towards dairy fat, including full-fat drinking milk and cream. Processed dairy products, especially cheese, remain closely associated with greater income levels, urbanization, local preferences and dietary habits (OECD/FAO, 2025).

Figure 1B3. Per capita consumption of fresh and processed dairy products in milk solids, 2022–24 and 2034

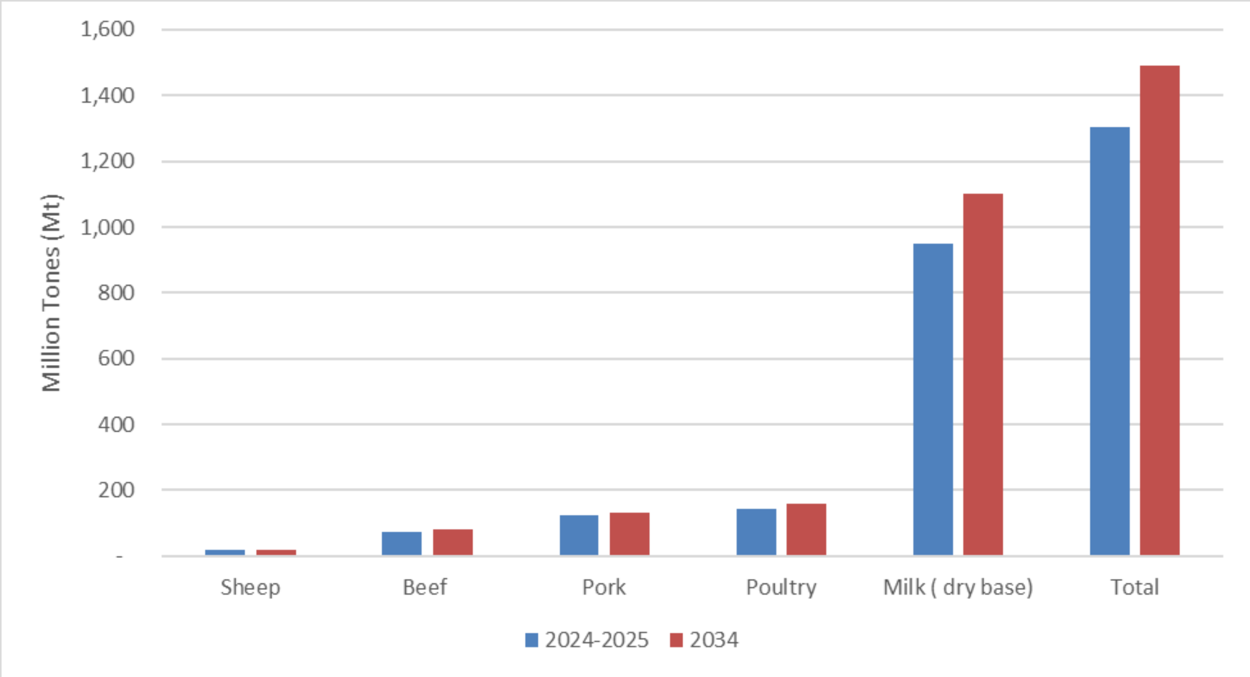


Note: Processed dairy products include butter, cheese, skim milk powder and whole milk powder. Milk solids are calculated by adding fat and non-fat solids for each product.
Source: OECD/FAO (2025).

The implications for production systems and AnGR are context-dependent. Rising demand may create strong incentives for the use of specialized dairy breeds and for crossbreeding strategies aimed at increasing milk yields, particularly where feed systems, veterinary services, cold chains and formal market infrastructure are expanding. However, dairy development is not solely a question of productivity. A wide range of dairy products, including fresh milk, fermented products, cheese, butter, ghee and reconstituted products, are associated with diverse value chains, consumer preferences and production environments. As a result, different production models and breed types may be required to meet these varied demands, underscoring the continued importance of maintaining diverse AnGR.

The production response to rising demand will therefore be uneven across regions and commodities (Figure 1B4). The Outlook projects global agricultural and fish production to expand by 14 percent over the next decade, with middle-income countries remaining the main source of global agricultural expansion. Growth is expected to come mainly from productivity gains, but expansion of cropping area and livestock herds is also expected, particularly in Africa and South Asia, where access to modern farming technologies remains more limited (OECD/FAO, 2025).

Figure 1B4. Projected global production of selected livestock products, 2022–24 and 2034



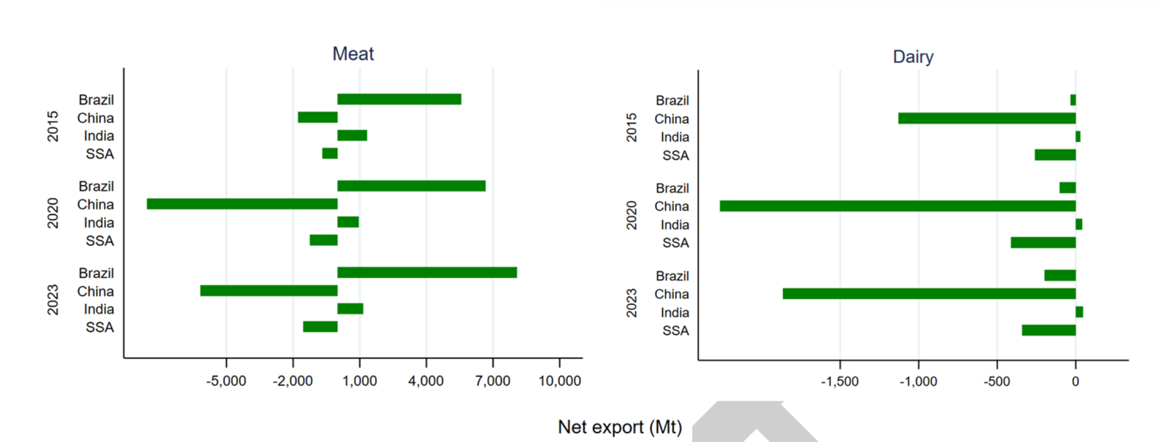
Note: Values are expressed in million tonnes.
Source: Authors' calculation based on OECD/FAO (2025).

Demand transitions should be treated as both a driver of livestock-sector change and a force shaping the future valuation of production and related AnGR. Where demand is met primarily through standardized high-output systems, locally adapted breeds may be displaced and the genetic base of production may narrow. Where markets, policies and breeding programmes recognize resilience, adaptation, quality and territorial identity as sources of value, demand growth can support the sustainable use of livestock diversity. The central policy task is not only to respond to rising demand for animal-source foods, but to shape livestock development pathways that improve nutrition, support livelihoods, reduce environmental pressures and maintain the genetic diversity needed for future adaptation.

3. Trade, standards and value-chain restructuring

Trade, standards and value-chain restructuring are reshaping the geography and organization of livestock production. For meat and dairy, trade does more than move products across borders. It connects regions with surplus production to regions where demand exceeds domestic supply, exposes producers to international prices and sanitary requirements, and influences the type of production systems, breeds and value-chain arrangements that become commercially viable.

Figure 1B5. Net trade positions in meat and dairy products, selected economies and regions (SSA=Sub-Saharan Africa), in 2015, 2020 and 2023.



Note: Net trade is calculated as exports minus imports. Positive values indicate net exports and negative values indicate net imports. Values are expressed in thousand tonnes. Meat and dairy products are shown separately for 2015, 2020 and 2024. Source: Authors' calculation based on FAOSTAT Detailed Trade Matrix.

Figure 1B5 illustrates contrasting positions in global meat and dairy trade in some countries and regions. Brazil is a net exporter of meat, reflecting its role as one of the major suppliers to international markets. China, by contrast, has routinely been a major net importer of livestock products, reflecting the gap between domestic demand and supply. India shows a different pattern, with a limited net trade exposure in the products shown, as its substantial livestock production is balanced by its large human population. Sub-Saharan Africa remains import-dependent, especially for dairy and increasingly for meat. These cases are not intended to represent the whole global market; they illustrate four different trade positions: a major exporter, a major demand-driven importer, a large domestic market, and an import-dependent region.

Trade positions are critical, as they shape domestic production incentives. Export-oriented systems are under pressure to deliver predictable volumes, standardized quality, traceability and compliance with sanitary and phytosanitary requirements. Import-dependent systems face a different dynamic, where domestic producers must compete with internationally supplied products while responding to growing demand. In both contexts, deeper trade integration tends to encourage specialization, investment in commercial production systems and greater reliance on breeds or lines adapted to standardized, high-output value chains. The Outlook projects that global meat trade will continue to expand, albeit at a slower pace than in the previous decade, with Brazil, the European Union and the United States of America expected to remain key exporters by 2034 (OECD/FAO, 2025). In the dairy sector, trade plays a more differentiated role. Fresh dairy products are typically produced and consumed domestically, reflecting perishability, consumer preferences and cold-chain requirements. In contrast, processed products such as milk powders, butter and cheese are more tradable and increasingly important in balancing regional deficits and surpluses.

Value-chain restructuring reinforces these trade effects. Processing capacity, cold chains, logistics, retail expansion, certification and food-safety systems increasingly determine who can participate in meat and dairy markets. FAO's work highlights that agricultural exports have grown faster than production and that global value chains have expanded alongside stricter product and process standards, food-safety requirements and stronger coordination by the key private sector actors (FAO, 2022). It also notes that standards have shifted from border inspection towards process-based quality assurance, private standards and stronger value-chain governance by the private sector (FAO, 2022).

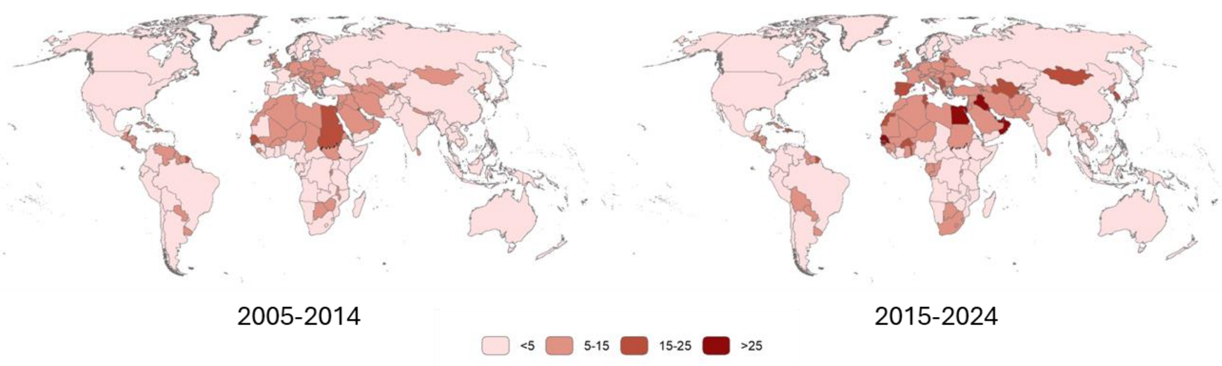
This result has direct implications for livestock producers. More formal and integrated meat and dairy chains can improve market access, food safety, traceability and investment. However, they can also raise entry barriers for smallholders, pastoralists and producers using locally adapted breeds if they lack access to finance, veterinary services, cold chains, producer organizations, certification systems or reliable market outlets. As value chains become more coordinated, competitiveness is often defined by regular supply, uniform product characteristics and compliance capacity. These requirements may favour specialized commercial breeds and lines that perform well under standardized production conditions.

4. Climate and environmental pressures

Climate and environmental pressures are increasingly reshaping livestock systems. These pressures operate in two directions. On the one hand, livestock systems are exposed to climate-related shocks, including severe drought, heat stress, changing rainfall patterns and shifts in feed and water availability. On the other hand, livestock systems are under growing pressure to reduce greenhouse gas emissions and thus contribute to climate change mitigation.

Severe drought is one of the most prominent climate-related stressors affecting livestock systems. It directly constrains pasture productivity, feed availability, water access, animal health and reproduction, and shapes herd mobility and household management decisions. Analysis based on the Standardized Precipitation Evapotranspiration Index (SPEI) indicates a marked increase in exposure to severe drought between 2005–2014 and 2015–2024. Using the average country as a proxy, exposure rose from 7.1 to 10.3 severe drought months per decade, representing an increase of approximately 45 percent, or about three additional months per country over the most recent decade. As illustrated in Figure 1B6, this increase is unevenly distributed but shows a clear expansion of severe drought conditions across major livestock-dependent drylands, including parts of Africa, the Near East, Central Asia, Southern Europe, the Caribbean and other arid and semi-arid regions.

Figure 1B6. Frequency of severe drought conditions, 2005–2014 and 2015–2024



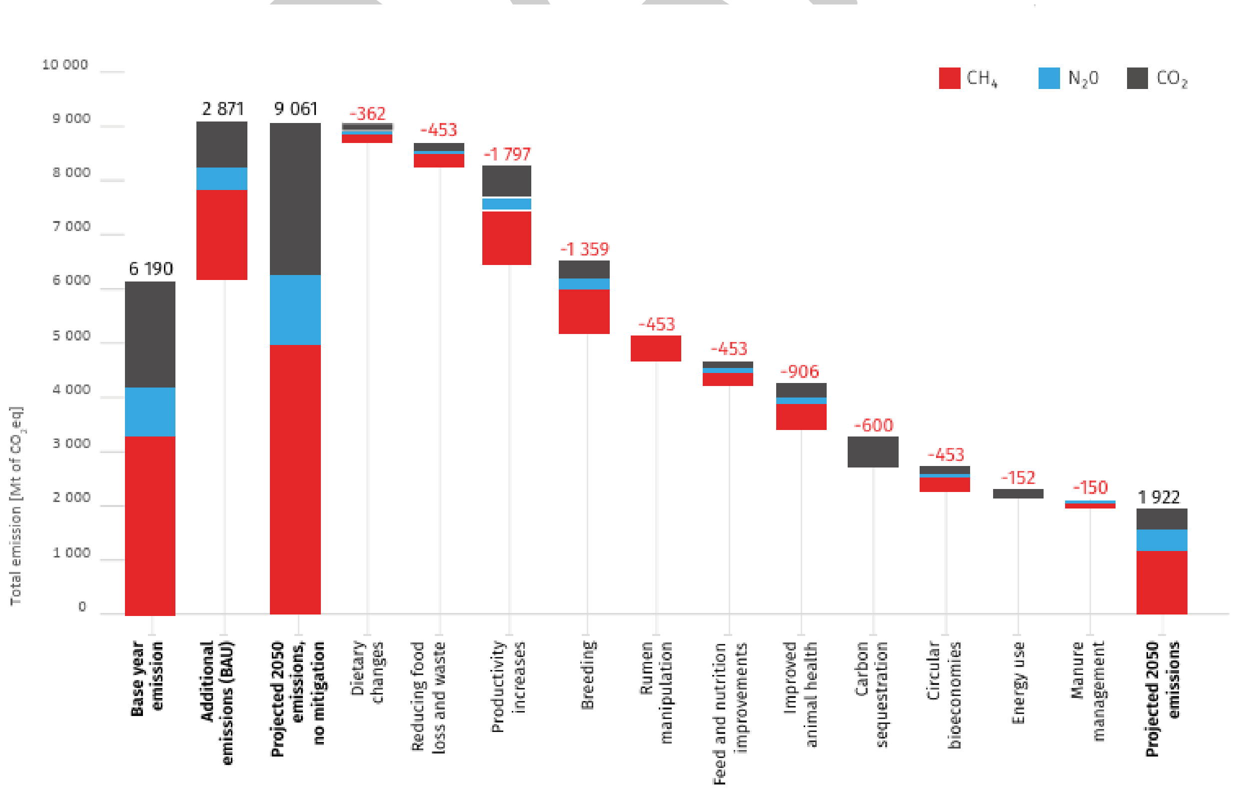
Note: Severe drought is defined as SPEI ≤ -1.5. The maps show the number of months in each decade classified as severe drought. Darker colours indicate a higher frequency of severe drought months. Values reported in the text are unweighted country averages.
Source: Authors' calculation based on SPEI data (SPEI Global Drought Monitor, 2025).

The spatial pattern shown in Figure 1B6 is particularly relevant for grazing, mixed crop–livestock and pastoral systems, where livestock production depends heavily on seasonal rainfall, pasture availability, water points and mobility. In these systems, severe drought can quickly translate into feed shortages, declining animal body condition, reduced reproductive performance, higher mortality risk and increased pressure on household assets. It can also force producers to sell animals under distress conditions, reduce breeding herds, change species composition or abandon traditional mobility routes. Repeated severe droughts may therefore produce long-term effects that go beyond temporary production losses. They can alter herd structures, weaken local breeding systems and reduce the capacity of communities to maintain locally adapted animal populations.

At the same time, livestock systems are increasingly central to climate change mitigation debates. FAO estimates that livestock agrifood systems, including farm-gate emissions, land-use change and supply-chain processes, accounted for 6.2 Gt CO_2eq in 2015, or approximately 12 percent of anthropogenic greenhouse gas emissions (FAO, 2023). Cattle account for the largest share of livestock emissions, while meat production accounts for about two-thirds of emissions allocated to edible animal products. Emission intensity, which considers emissions per unit of product, varies substantially across species, countries and production systems, reflecting differences in breeds, management practices, feed quality and environmental conditions.

This emissions challenge adds another layer to livestock transformation. Production systems are increasingly expected to produce more animal-source food with lower emissions per unit of output. As shown in Figure 1B7, FAO’s lower-emission pathway analysis (FAO, 2023) indicates that, without mitigation, rising demand for animal-source foods could increase livestock-system emissions substantially by 2050. However, a combination of interventions, including productivity gains, breeding, improved animal health, better feed and nutrition, manure management, carbon sequestration, circular bioeconomy approaches and reductions in food loss and waste, can bend the emissions pathway while still meeting growing demand. The figure should be interpreted as an illustration of technical potential, since it assumes full adoption and cumulative impacts across interventions.

Figure 1B7. Projected livestock emissions and mitigation pathways to 2050



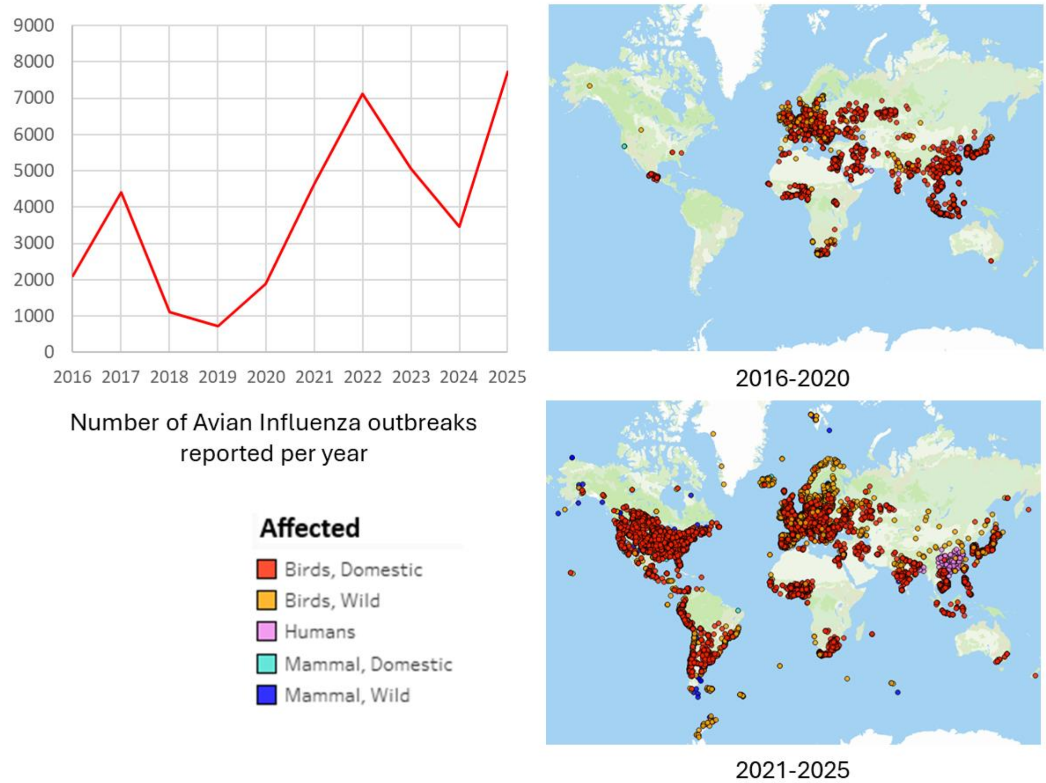
Note: The figure shows base-year and projected livestock-system emissions under a business-as-usual pathway and the technical mitigation potential of selected interventions. Interventions are assumed to have cumulative impacts and 100 percent adoption; results should therefore be interpreted as illustrative technical potential rather than expected outcomes. Source: FAO (2023)

A balanced approach is required. Productivity gains, improved animal health, enhanced feeding practices, manure management and selective breeding can all contribute to lower-emission livestock systems. However, these strategies should not focus exclusively on maximizing output per animal under optimal conditions. They must also take into account performance under heat stress, drought, disease pressure, feed scarcity and low-input production environments. In many regions, particularly drylands, mountains, marginal areas and pastoral systems, resilience-related traits may be as important as yield-related traits for long-term sustainability. The policy challenge is therefore to better align climate adaptation and drought preparedness efforts with climate-smart livestock development, including the sustainable management and use of AnGR.

5. Disease risk and biosecurity

Animal diseases encompass a wide range of transmissible conditions, including African swine fever, avian influenza, contagious bovine pleuropneumonia, foot-and-mouth disease, peste des petits ruminants and Rift Valley fever, among others. Over recent decades, the reported frequency of animal disease outbreaks appears to have increased (Bernstein et al., 2022), with retrospective analyses suggesting that this trend reflects a genuine rise in disease emergence rather than improved detection alone (Goldstein et al., 2022). For instance, patterns observed for avian influenza are broadly consistent with this global trend. Between 2016–2020 and 2021–2025, the number of reported outbreaks increased markedly, from 10 217 to 28 002, accompanied by a significant geographic expansion of the disease (Figure 1B8). In addition to the progressive spread of outbreaks across the Americas over the past decade, avian influenza has increasingly been reported in latitudinal zones and ecological regions previously unaffected, or only sporadically affected, by the virus. This shift suggests an evolving epidemiological landscape characterized by wider environmental suitability, altered migratory interfaces, and sustained virus circulation across broader geographic ranges.

Figure 1B8. Number and distribution of Avian Influenza outbreaks worldwide between 2016 and 2025



Source: EMPRES-I (FAO, 2026)

Animal diseases are an increasingly important driver of livestock transformation. Their effects go beyond animal mortality. Disease events can reduce productivity, disrupt trade, restrict animal movements, increase production costs, weaken market access and trigger changes in biosecurity requirements. In economic terms, peste des petits ruminants, for example, is estimated to cause global losses of USD 1.4–2.1 billion annually (FAO & OIE, 2016). As livestock populations become more concentrated, production systems intensify, trade expands and climate and ecosystem changes alter disease ecologies, the conditions under which pathogens emerge, spread and are managed are also changing. FAO's *World Livestock 2013* framed this as a changing disease landscape driven by pressures such as intensification, globalization, climate change, land pressure, ecosystem change and weak health systems, requiring responses that integrate animal, human and environmental health. The relation is bi-directional, changes in the way animals are produced impact the disease landscape, but diseases can also trigger changes in the way animals are produced

Recent FAO work reinforces this point, identifying epidemics, ecosystem degradation and climate change as major drivers of agrifood-system risk. It notes that the intensification of livestock production, degradation and fragmentation of ecosystems, expansion into wild areas, antimicrobial resistance and increasing production and consumption of animal products can contribute to rising disease risks and food-safety threats. In livestock systems, these risks are increasingly visible through outbreaks of transboundary animal diseases such as African swine fever, highly pathogenic avian influenza and foot-and-mouth disease, as well as through the growing importance of surveillance, vaccination, movement control, traceability and farm-level biosecurity.

Animal-health shocks also have major livelihood and economic consequences. In many low- and middle-income countries, livestock are not only productive assets; they are also sources of food, income, savings, employment and resilience. Disease outbreaks can reduce herd assets, decrease productivity, disrupt market access and increase vulnerability among smallholders, pastoralists and value-chain actors (see Box 1B1). Strengthening veterinary services, surveillance, vaccination capacity and biosecurity systems is therefore essential not only for disease control, but also for protecting the livestock populations and production systems through which AnGR are maintained. For AnGR, disease pressure matters because it can reshape both production systems and breeding priorities. Disease outbreaks often lead to herd or flock losses, emergency culling, movement controls, restocking programmes and stricter biosecurity standards. These responses may strengthen disease control and improve food safety, but they can also accelerate structural change. In China, African Swine Fever episodes appear to have accelerated hog farming capitalization for instance (Hua *et al*., 2025). Where recovery strategies rely mainly on high-output commercial breeds or standardized production systems, locally adapted breeds may be displaced. Where smallholder and pastoral systems are excluded from formal value chains because they cannot meet new biosecurity, traceability or certification requirements, the production systems that maintain local breeds may become less viable.

Box 1B1. Impact of African Swine Fever on local swine production systems in Indonesia

African swine fever (ASF) is a highly lethal haemorrhagic disease of domestic and wild pigs caused by the African swine fever virus (ASFV), a double-stranded DNA virus of the genus *Asfivirus* (family *Asfarviridae*). The virus is transmitted through direct contact with infected animals, contaminated pork products, fomites, and, in some settings, soft ticks (*Ornithodoros* spp.). As no effective vaccine is available, control relies primarily on strict biosecurity measures. Although ASF poses no risk to human health, it causes severe economic losses due to high morbidity and mortality.

In Indonesia, African swine fever (ASF) was first detected in North Sumatra in 2019 and since then outbreaks have been reported across multiple regions of the country, including Sumatra, Java, Kalimantan, Bali, Nusa Tenggara and Papua.

Pig farming plays a critical role in rural livelihoods and local food supply chains in Indonesia, with small-scale producers, typically keeping fewer than 20 sows, accounting for around 80% of national pig production. Prior to the ASF outbreak, the national pig population was estimated at 8.9 million head in 2019 and was distributed across 34 of the country's 38 provinces. By 2025, this population had declined sharply to approximately 3.7 million head. This dramatic reduction is largely attributable to ASF, which has caused not only substantial direct losses through animal mortality but also significant indirect economic impacts, disrupting pig production, marketing activities and the livelihoods of the many actors involved along the swine value chain.

African swine fever (ASF) affects not only crossbred and imported pigs but also local swine breeds, underscoring the critical importance of strict biosecurity measures, appropriate waste management practices—particularly the control of swill feeding—effective quarantine procedures and robust surveillance systems to prevent further spread. At the same time, there is a strong need for nationwide studies to screen swine breeds and populations in order to identify individuals or breeds with greater resistance or resilience to ASFV. Such research could generate valuable insights into the genetic or immunological factors underlying tolerance to the virus and support the development of targeted breeding programmes aimed at enhancing herd resilience. In the longer term, this approach could complement immediate disease-control measures and contribute to a more sustainable strategy for mitigating the devastating impacts of ASF outbreaks and strengthening the stability of the swine industry.

Local signs of pigs infected with ASFV
Photo credit: Atik Ratnawati

Provided by Atik Ratnawati, Indrawati Sendow, and Bess Tiesnamurti

As animal disease outbreaks are becoming more frequent, more complex and increasingly difficult to contain, a key policy challenge is to better integrate livestock production, and AnGR in particular, into disease preparedness and biosecurity strategies (WOAH, 2026). Disease control approaches should not focus solely on reducing immediate outbreak risks, but also consider longer-term resilience by promoting management practices and breeding strategies that enhance the robustness and adaptive capacity of production systems, including through the conservation and sustainable use of genetic diversity. Despite the increased frequency of outbreaks, persistent funding gaps weaken veterinary services and surveillance systems, creating conditions that facilitate the spread and persistence of diseases (WOAH, 2026).

6. Conflict and displacement pressures

Armed conflict and forced displacement are increasingly significant pressures on livestock production systems, particularly in fragile and food-insecure regions. The incidence of violent conflict has risen markedly in recent years. For example, data from the Armed Conflict Location and Event Data Project (ACLED) indicate that more than 185 000 violent events occurred worldwide in 2025, nearly double the number recorded in 2021 (ACLED, 2025). Livestock systems are especially vulnerable to conflict-related shocks, as violence disrupts access to veterinary services, markets, and input and output value chains. These adverse impacts are particularly pronounced in pastoral and agro-pastoral systems, where livestock represents not only a primary source of food and income, but also a form of mobile capital (Catley *et al.,* 2016).

Restrictions on pastoral mobility are among the most immediate and consequential effects of conflict on livestock systems. Seasonal movements between grazing areas and water sources—particularly in pastoral regions of the Sahel and the Horn of Africa—constitute a fundamental risk-management strategy. Armed conflict and insecurity, however, increasingly constrain access to traditional grazing routes, water points, and cross-border migration corridors (Mkutu, 2018). In addition, heightened conflict incidence often forces livestock herders to concentrate in smaller, frequently degraded areas, intensifying pressure on rangelands, exacerbating competition over natural resources, and increasing the risk of disease transmission among animals and between herds (Brottem & McDonnell, 2020).

Addressing these complex challenges requires conflict-sensitive livestock policies that protect pastoral mobility, sustain veterinary services and safeguard the traditional production systems in which much of the world's remaining animal genetic diversity is concentrated. Given that conflict rates are highest and most persistent in many of the world's most livestock-dependent regions, including the Sahel, the Horn of Africa, the Great Lakes region of Africa and parts of the Middle East and South Asia, integrating conflict and displacement dynamics into livestock development policy and AnGR conservation strategies is a matter of considerable urgency (ACLED, 2025; Catley *et al.*, 2016).

7. Policy and institutional drivers

Public policies and institutional frameworks play a critical role in shaping the trends of livestock production systems, which in turnimpact the state of AnGR. As highlighted in the second SoW-AnGR (FAO, 2015), policy environments including decisions on public investment, subsidies, trade regulation, environmental standards and research strongly shape the direction of livestock-sector change. In recent years, emerging pressures, including pandemic outbreaks, climate change, and rising conflict incidence, have further accelerated change in the livestock sector, underscoring the critical importance of effective policy responses to safeguard livestock diversity and sustain production systems.

Trade policies and sanitary and phytosanitary (SPS) regulations play a significant role in shaping livestock value chains and sectoral competitiveness. Increasingly stringent standards on food safety, traceability, and animal health at both global and national levels can strengthen biosecurity; however, they may also disadvantage smallholder producers and livestock sectors in developing countries that lack the capacity to comply with these requirements (Indrawan & Daryanto, 2020; Mabunda *et al.*, 2025). Institutional arrangements governing land tenure systems, particularly in pastoral and agro-pastoral regions, represent another key driver of livestock production systems. Ambiguous land rights and competing land uses can constrain livestock mobility and undermine the functioning and resilience of pastoral production systems (Fernández-Giménez, 2002).

In recent years, livestock-sector policy frameworks have increasingly been embedded within broader agendas addressing food security, nutrition, climate change, and rural development across countries (HLPE, 2016). This integration has driven a shift toward balancing productivity objectives with environmental sustainability, animal welfare, and public health considerations, with direct implications for breed selection and the conservation of AnGR.

In parallel, evolving societal expectations, particularly in relation to animal welfare, environmental sustainability and ethical consumption, are increasingly shaping livestock policies and institutional frameworks, with significant implications for production systems and AnGR (FAO, 2024). In many regions, stricter animal welfare standards and consumer-driven regulations are influencing breeding objectives, favoring traits related to robustness, health and behaviour alongside productivity. For instance, in the EU pig sector, restrictions on routine tail docking introduced for animal welfare reasons have led to greater emphasis on management solutions (Menegon *et al.*, 2025), with potential for selection on associated traits (Aikins-Wilson *et al.*, 2021). At the same time, the rapid expansion of sustainability-oriented policy agendas, including climate and biodiversity strategies, is promoting transitions toward more resource-efficient and resilient livestock systems, often supported by public incentives and regulatory measures (OECD, 2023). These shifts may create new opportunities for locally adapted breeds but can also impose compliance challenges, particularly for smallholder producers, highlighting the need for inclusive policies that balance societal demands with equity, livelihoods and the conservation of animal genetic diversity.

Despite progress, significant governance and investment gaps persist. Limited and declining funding for animal health systems—often representing only a small fraction of global health expenditures—continues to constrain the capacity of veterinary services to prevent and respond effectively to disease outbreaks (WOAH, 2026). Weak surveillance and monitoring systems, as well as insufficient infrastructure, operational procedures and cross-sectoral coordination, further hinder effective policy implementation, particularly in low- and middle-income countries (FAO, 2025). In addition, gaps in knowledge systems and limited investment in research and innovation reduce the effectiveness of disease control strategies and policy design (Kappes *et al.*, 2023; Charlier *et al.*, 2022). Strengthening institutional capacity, improving policy coherence across sectors, and increasing sustained investment in animal health services and research therefore remain critical for ensuring that livestock systems, and the genetic resources on which they depend, contribute effectively to sustainable development.

8. Conclusions

The chapter shows that livestock systems are being reshaped by interacting drivers, including changing demand for animal-source foods, trade and value-chain restructuring, climate and environmental pressures, disease risks, conflict and displacement, and evolving policy and institutional frameworks. These drivers influence production systems, market access, management practices and breeding choices, with direct consequences for which AnGR are maintained, used or displaced.

Across the chapter, a clear pattern emerges. Rising demand, deeper trade integration and tighter standards can favour more specialized and standardized production systems, particularly in poultry, pigs and some dairy systems, increasing the risk of genetic erosion. At the same time, the chapter also shows that in grazing, mixed crop-livestock and pastoral systems, locally adapted breeds remain important because of their contributions to resilience, heat and drought tolerance, disease resistance, use of marginal resources and livelihood security.

Climate stress, disease outbreaks and conflict-related disruptions reinforce the need to maintain diverse AnGR as part of broader livestock resilience strategies. The policy challenge is to shape livestock development pathways that improve nutrition and livelihoods, respond to environmental and health pressures, and maintain the diversity needed for future adaptation. Coherent policies, when implemented can underlie stronger veterinary and monitoring systems, and sustained support for the production systems and livestock keepers that continue to manage diverse animal populations.

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