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**SUMMARY AND RECOMMENDATIONS OF THE HIGH LEVEL
PANEL OF EXPERTS ON FOOD SECURITY AND NUTRITION (HLPE)
REPORT ON SUSTAINABLE AGRICULTURAL DEVELOPMENT FOR
FOOD SECURITY AND NUTRITION: WHAT ROLES FOR
LIVESTOCK?**

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Secretariat HLPE c/o FAO
Viale delle Terme di Caracalla
00153 Rome, Italy

Website: www.fao.org/cfs/cfs-hlpe
E-mail: cfs-hlpe@fao.org

High Level Panel of Experts on Food Security and Nutrition

Extract from the Report¹

Sustainable agricultural development for food security and nutrition: what roles for livestock?

Summary and Recommendations

In October 2014, the Committee on World Food Security (CFS) requested its High Level Panel of Experts for Food Security and Nutrition (HLPE) to prepare a report on sustainable agricultural development for food security and nutrition, including the role of livestock, to be presented in its 43rd Plenary Session in October 2016. This topic is highly relevant to the Sustainable Development Goals (SDGs) as well as to the implementation of the 2014 Rome Declaration on Nutrition and to the fulfilment of the universal Human Right to Food.

Agricultural² development is critically important to improving food security and nutrition. Its roles include: increasing the quantity and diversity of food; driving economic transformation; and providing the primary source of income for many of the world's poorest people. Numerous empirical studies across many countries over many years show that both agricultural development and economy-wide growth are needed to improve food security and nutrition, and that the former can reinforce the latter.

The livestock³ sector is a powerful engine for the development of agriculture and food systems. It drives major economic, social and environmental changes in food systems worldwide, and provides an entry point for understanding the issues around sustainable agricultural development as a whole. As reflected in its title, this report is focused on livestock because of the importance and complexity of its roles and contribution to sustainable agricultural development for food security and nutrition.

¹ HLPE, 2016. Sustainable agricultural development for food security and nutrition: what roles for livestock? A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome 2016. Full report forthcoming at www.fao.org/cfs/cfs-hlpe.

² Agriculture is interpreted in this report in the narrower sense of crops and livestock. Fisheries and aquaculture were treated in a dedicated HLPE report in 2014, while forestry will be covered in a report to be released in 2017.

³ In this report, livestock is used to designate domesticated terrestrial animals raised for food production. Bees, insects and wild foods are not covered.

The report is structured as follows. Chapter 1 elaborates a *conceptual framework* and a typology of livestock farming systems, which are used to structure the report. Chapter 2 describes the main *drivers and trends of agricultural development*. Chapter 3 identifies the main *sustainability challenges for agricultural development, with a focus on livestock*. Chapter 4 proposes *pathways and responses* to address those challenges, both globally and in specific farming systems. The report concludes by providing a set of action-oriented *recommendations* addressed to states and other stakeholders.

SUMMARY

SUSTAINABLE AGRICULTURAL DEVELOPMENT FOR FOOD SECURITY AND NUTRITION: APPROACH AND CONCEPTUAL FRAMEWORK

1. The report defines sustainable agricultural development (SAD) for food security and nutrition (FSN) as follows: “Sustainable agricultural development is agricultural development that contributes to improving resource efficiency, strengthening resilience and securing social equity/responsibility of agriculture and food systems in order to ensure food security and nutrition for all, now and in the future.”
2. Importantly, FSN and the progressive realization of the right to adequate food do not depend only on global *availability* of food but also on *access, utilization* and *stability*. Indeed, *access* to food, but also to productive assets, markets and services are all critical for FSN. *Utilization* of food, and particularly of animal-sourced foods (ASF), from evolving and increasingly complex food supply chains, is having profound effects on human health and well-being, in some cases supplying much needed nutrients but in others giving rise to dietary concerns, for example over excessive meat intake. Finally, conflicts and extreme climate events increasingly threaten the *stability* of FSN for all now and in the future.
3. The report acknowledges the wide diversity of farming and food systems, each of which can and should improve its contribution to SAD for FSN. To sustainably supply nutritious food to a world population that is expected to reach 9.7 billion people by 2050, the report proposes the adoption of context-specific pathways to enable the transition towards more sustainable agricultural and food systems for FSN. Despite wide acceptance of the imperative of achieving food security and better nutrition for all, the multiplicity of possible entry points, perspectives and objectives has led to a coexistence of many narratives and conflicting evaluations about the state of agricultural development and, most importantly, on the directions and policy instruments required to improve sustainability.
4. The livestock sector is central to food systems’ development. It is a particularly dynamic and complex agriculture sector, accounting for around one-third of global agricultural GDP, with implications for animal-feed demand, for market concentration in agricultural supply chains, for the intensification of production at the farm level, for farm income, for land use and for human and animal nutrition and health. Livestock has often set the speed of change in agriculture in recent decades. Livestock is the largest user of land resources; permanent meadows and pastures represent 26 percent of global land area and feed crops account for one-third of global arable land. Livestock is strongly linked to the feed crop sector, generates co-products including manure and draught power, and in many economies acts as a store of wealth and a safety net. It is integral to the cultural identity, traditional practices, values and landscapes of many communities across the world. Livestock has profound effects on the environment, particularly when indirect land-use changes and feed crop production effects are taken into account.
5. Livestock production takes place in a wide range of farming systems: extensive (e.g. grazing in the case of ruminant livestock or foraging in the case of poultry and pigs); intensive (in which thousands of animals are fed with concentrated feed rations in confined facilities); and in the many intermediate systems that exist between the two.
6. Critical issues to be addressed by SAD for FSN are global in nature but the ways by which they manifest themselves or can be dealt with are very diverse in different livestock systems and across countries. In order to value and address this diversity of farming systems and their distinct challenges, the report considers four broad classes of livestock rearing: smallholder mixed farming; pastoral; commercial grazing; and intensive livestock systems.

TRENDS AND DRIVERS OF AGRICULTURAL DEVELOPMENT

7. According to FAO (2012) projections, growth trends in global population and incomes will require global agricultural production in 2050 to be 60 percent higher in volume than in 2005–2007. This increase would come mainly from an increase in crop yield (80 percent of the world production increase), in cropping intensity (10 percent) and the rest from a limited expansion of land use. Consumption of ASF is expected to rise till 2050, faster in developing countries.
8. Yet, such a need for increase will be subject to variation. Over the next several decades, population increase and income growth (both of which trends are more pronounced in emerging and developing countries) are expected to drive increased demand for ASF. Population growth has been the main demand driver in agriculture and food systems in the past but its weight is declining relative to other drivers such as increasing per capita incomes, urbanization and changing dietary preferences and patterns. Much of the increased crop demand in the period to 2050 will be for feedstuffs for livestock.
9. The increasing consumption of ASF in emerging and developing countries has the potential to significantly improve FSN in many cases. However, the consensus of expert medical advice is that, in developed and some emerging countries, people should reduce their consumption of a number of ASF, in particular of red and processed meats. If there were to be a significant reduction in overall consumption of ASF in richer areas, it would have important implications on production levels and practices, on land use, and on the geographical distribution of livestock production. In general, consumption levels of some ASF needs to contract in some places and/or among some populations, while increasing in others. Such a shift would allow greater convergence of consumption at the global level.
10. International trade volumes of most agricultural commodities are projected to expand over the next several decades. While a very high proportion of ASF is produced and consumed locally, the importance of international trade in the distribution of ASF is increasing. Staple dairy products (in particular milk powder) are the most traded livestock products; more than 50 percent of total production is exported. According to OECD–FAO projections, beef will continue to be the most traded meat in the next decade. At the same time, dairy and beef products are among the commodities most affected by government policies across the world – the volume and direction of trade flows, as well as the products traded. Sanitary standards, environmental regulations, animal welfare rules and certification measures, as well as geographical indications, are all increasingly important in influencing international trade of agricultural products.
11. The food supply chain has experienced fundamental changes during the last two decades. It has become more globalized, and the scale of production and economic concentration have both increased. A shrinking number of firms dominate both the distribution and the input side of the agri-food chain. For example, four agri-business firms are estimated to control 75–90 percent of the global grain trade, raising concerns about barriers to entry, information flows and the potential for oligopolistic companies to abuse their dominant market position. Concentration among multinational companies is increasingly evident in a number of agriculture sectors, including inputs (e.g. seeds, plant and animal protection products), marketing, food processing and food retail.
12. According to OECD–FAO Outlook, real world prices of agricultural commodities and food have followed a long-term declining trend, albeit coupled with significant levels of short-term price volatility. The latter has been especially marked since the 2007–2008 food price spikes when compared with the previous two decades. Nonetheless, the underlying downward price trend is widely projected to continue for the short and medium terms.

SUSTAINABILITY CHALLENGES FOR LIVESTOCK IN AGRICULTURAL DEVELOPMENT

13. Some of the challenges impeding the realization of SAD for FSN for all now and in the future concern all livestock systems. Others are specific to one or more of the four broad categories of livestock systems described in the report.

14. The overarching goal for sustainable agricultural development is to ensure FSN for all now and in the future, in the context of climate change and increasing scarcity of natural resources, given the rapidly evolving and changing food demand, the growing and more urbanized human population and the need to “leave no one behind”.

Food security and nutrition

15. While food security concerns historically focused on total calorie intake, today they encompass the so-called “triple burden” of malnutrition: hunger (deficiencies in dietary energy intake), estimated by FAO to affect some 792 million people worldwide; micronutrient deficiencies (such as iron, vitamin A, iodine and zinc), which, according WHO, affect some two billion people; and increasing overnutrition that now affects more people than hunger does. In 2014, WHO estimated more than 1.9 billion (39 percent) adults, aged 18 years and over, were overweight, of which over 600 million (13 percent) were obese. The relationships between food systems and nutrition will be explored in depth in a forthcoming HLPE report (2017).

Environment

16. In a context of increasing resource scarcity, and with the urgent need to reduce greenhouse gas (GHG) emissions and adapt to climate change, numerous studies have identified livestock as a key area for action.
17. Resource efficiency in livestock production will have to be improved in order to: maintain production systems within critical planetary limits; preserve the ecosystem services on which agricultural production relies; and reduce land degradation, biodiversity loss and pressure on water use and quality. As a driver of deforestation, demand for feed, and transportation and processing infrastructure, the livestock sector is directly and indirectly responsible for 14.5 percent of GHG emissions. At the same time, some livestock systems are among the most vulnerable to climate change (particularly those in dry areas) and to new environment-related emerging diseases. These challenges are huge but the livestock sector also has huge potential for improvement, if the best existing practices in a given system and region can be shared and learned from more widely.

Economic

18. Livestock plays a crucial economic role in many food systems: providing income, wealth and employment; buffering price shocks; adding value to feedstuffs; providing a source of fertilizer and draught power. Agricultural markets face three challenges: (i) imperfect competition, due to lack of information, barriers to market entry, infrastructure constraints; (ii) externalities that create significant costs not borne by producers; and (iii) market distortions arising from poor public policies, including subsidies and taxes that reward unsustainable practices. More specifically, agricultural markets are subject to unpredictable forces, such as the weather, and to time lags between investments in production and readiness to sell that encourage producers to be risk averse unless they are supported by safety nets. International trade has introduced opportunities but also new challenges, including an increased potential for diseases to spread. International trade has also been accompanied by a growing role for multinational private actors in making investment decisions in agricultural systems. Concentrated corporate control of agriculture has also increased in the face of uneven access to market information and technologies, undermining competition.
19. Different livestock systems face different economic risks and opportunities in this more general context. Determining factors include: the degree of integration into international markets and urban distribution systems; the level of dependence on external inputs (such as feed); and the degree of concentration in the markets upstream and downstream from livestock producers.

Social

20. According to the World Development Report (IBRD/World Bank, 2007), agriculture provides employment to 1.3 billion people worldwide, 97 percent of them in developing countries. Agriculture and food systems are among the sectors where informal jobs are the most common, without adequate work safety, in unhealthy working conditions and for low wages. Children are also disproportionately employed in agriculture, including in ways that violate their rights. Many

agricultural systems face a serious demographic challenge in failing to attract and maintain the interest of young people. Conflicts and protracted crises, such as droughts and epidemic outbreaks, strongly impinge on agriculture and livestock production, affecting feed crop production, the productivity of rangelands and access to pastures, rangelands, feed and forage.

Gender

21. Women play a vital role in the management of many livestock systems, especially poultry and pigs. Women's roles within livestock production systems differ from region to region, and the distribution of ownership of livestock between men and women is strongly related to social, cultural and economic norms. Too often, however, women face multiple forms of discrimination, from lack of access to education and productive resources to discriminatory political and legal systems that together limit their ability to benefit from the livestock sector. Not enough gender-disaggregated data are available to fully understand the specific challenges faced by women in this sector.

Animal health and welfare

22. Animal diseases are a major cause of productivity and economic losses in developing countries. The rapid expansion of the sector as well as increased movements of animals and products within countries and across borders make it all the more urgent to address infectious diseases. Even more since the majority of emerging and re-emerging human diseases are zoonotic – they come from animals and are transmitted to humans. The critical linkages between human health, animal health and ecosystems are encompassed in the concept of *One Health*, which highlights the need for collaboration across sectors.
23. Animal welfare is an increasing public concern, raised by consumers and often by retailers who are responding to consumer demand. In many countries, legislation provides for a minimum standard of animal welfare. Where this legislation does not yet exist, the World Organization for Animal Health (OIE) provides guidelines.

System specific challenges

24. These global challenges concern the different livestock systems to various degrees. Each system is also confronted with specific challenges.
 - *Smallholder mixed farming systems* face limited access to resources, markets and services, variable resource efficiency and big yield gaps, and have little capacity to adapt to deep and rapid structural transformation in the agriculture sector and in the wider economy.
 - *Pastoral systems*: in addition to the challenges they share with smallholders, pastoral systems must cope with conflicts for land and water, economic and political exclusion, social (including gender) inequity, poor animal health and high risks of zoonotic diseases.
 - *Commercial grazing systems* face the degradation of the natural grasslands they depend upon, conflicts with other sectors over land and resource use, poor conditions for workers and, in some cases, technical inefficiencies.
 - *Intensive livestock systems* face environmental challenges resulting from intensification (land and water use; water, soil and air pollution); the harm to human and animal health created by antimicrobial resistance, the emergence of new diseases; the social consequences of intensification (rural abandonment, poor working conditions, low wages, vulnerability of migrant labour, occupational hazards); and economic risks in the form of dependence on external inputs, including feed and energy, market concentration, price volatility, inequitable distribution of value added, as well as the difficulty of internalizing externalities in price signals.

PATHWAYS TOWARDS SUSTAINABLE LIVESTOCK DEVELOPMENT

25. The report proposes a common approach to elaborate pathways for SAD comprised of eight steps. These steps *de facto* outline a process around which to design national SAD strategies:
 - i. Describe the current situation in a specific context.
 - ii. Agree on the long-term FSN goals and targets at the national level, in line with the SDGs.
 - iii. Identify the challenges to be addressed to move towards SAD for FSN.
 - iv. Define a set of operational priorities among these challenges.
 - v. Identify available solutions that can be mobilized by stakeholders at different levels.
 - vi. Define the context specific responses and technical solutions.
 - vii. Set in place an appropriate political and institutional environment at the national level to enable the choice of priority actions at the farm level and along the food chain.
 - viii. Set in place methods to monitor and evaluate progress, to continue to identify constraints, and to allow for a dynamic and iterative process of learning by doing.
26. Pathways combine technical interventions, investments, and enabling policies and instruments. They involve a variety of actors, operating at different scales, all working towards SAD for FSN. The pathways need to be specific to national and local contexts, and to particular scales and time periods. They can be grounded on very different narratives, each of which drives a selection of options. Amid this specificity, three interlinked principles help shape those pathways towards SAD for FSN:
 - *Improve resource efficiency.* Considerable potential exists to improve resource efficiency through the transfer and adoption of best available practices and technologies in a given context and through the adoption of diverse approaches (including “sustainable intensification”, “save and grow”, “ecological intensification”, and “agroecology”), all with a growing emphasis on ecosystem services. This would make it possible to simultaneously increase productivity, to preserve and make better use of limited resources, and to reduce GHG emissions. Resource efficiency can be improved through different technical means including: improving livestock management, careful breeding, health and feed efficiency; closing the nutrient cycle; and reducing food losses and waste.
 - *Strengthen resilience.* To address changing risks and shocks, whether environmental, economic, financial, or related to human and animal health, requires building resilience in livestock systems. The diversification of production and integration of crops and livestock at all levels – from farm to landscape, community, territory and region – will contribute to strengthen resilience and improve resource efficiency.
 - *Improve social equity/responsibility outcomes.* The failure to protect social equity and cultural integrity raises some of the most wide-ranging and politically sensitive challenges for sustainability. The norms, practices and priorities of social equity/responsibility, the property rights and land tenure laws and customs, all differ across countries and communities and change over time. Working conditions need to be improved at all levels of food value chains. In line with the SDGs, national SAD strategies will have to prioritize the needs and interests of the most vulnerable populations (which typically include women, children, migrants, and indigenous peoples).
27. The report notes the need for appropriate, and where relevant gender disaggregated, data to enable stakeholders to identify priorities and monitor progress.
28. The report highlights the need for coherence and integration among agriculture, economic, nutrition, education and health policies at the national level, and to improve the international coordination across these sectors as well, so as to address sustainability and FSN challenges.
29. The twin problems of under- and overnutrition require local and national governments to coordinate policies pertaining to nutrition, health and SAD goals, taking into account the level of socio-economic development and their cultural and religious contexts. The regulation of agrifood industries and their cooperation are also necessary.

30. While recognizing that farm level is at the heart of decision-making processes, enabling environments, including good governance and effective institutions, will be critical for an effective implementation of pathways and for the success of SAD strategies. The framework for developing strategies needs to ensure that actions taken at a particular level of organization (local government, territory, value chain, country, region, international) are consistent with actions taken at other levels and with other non-agriculture sectors, in order to allocate needed resources for facilitating pathways, to strengthen synergies and to address trade-offs to best achieve SAD for FSN. In addition, pathways are needed for all farming systems and one of the critical challenges is to consistently manage the co-existence of systems and their pathways at supra levels.
31. Agriculture merits increased public and private investment and R&D for SAD: this should be a political and economic priority. This had also been shown by the World Development Report, which emphasized the specific role of agriculture as a powerful driver of growth and poverty reduction. SAD strategies must take into consideration: the role and limits of markets; the universal human right to food; and the challenge presented by the principle of “food sovereignty”, which emphasizes the importance of subsidiarity and democratic voice in making decisions that affect food systems.
32. Appropriate technologies for sustainable agriculture need to be made available for all farming systems and be tailored to particular circumstances and contexts. In all cases, technological choices must be informed by solid risk assessment and impact evaluations. The application of information and communications technology (ICT) in agriculture is increasingly important, especially in the development of new innovations that can empower farmers – including smallholders – and the value chains that support them. The rapidly declining costs of ICT can make it an attractive tool for poorer farmers, extending its reach.
33. Genetic resources are a key asset for SAD. They need to be sustainably managed and appropriately conserved, in situ and ex situ, together with the knowledge associated with them, including traditional and indigenous knowledge. The means and mechanisms to facilitate access of smallholders to genetic resources as well as benefit sharing are particularly important. Such mechanisms are much more developed for plants than for animals.

Operational priorities for action

In addition to these more general principles, orientations and actions, each category of livestock system has some priority areas of intervention that better take into account its specificities.

34. *For smallholder mixed farming systems, the priorities include:* ensure better access to markets and more choice of markets; secure tenure rights and equitable access to land; design feasible growth pathways taking into consideration available resources; recognize, empower and enable the role of women; improve animal health management; encourage the use of local, more resistant, breeds; implement appropriate, tailored and participatory programmes that respond to farmers’ needs; facilitate smallholders’ participation in political processes; provide good quality training programmes and information; and redirect development policies and tax incentives towards the design of diversified and resilient farming and food systems.
35. *For pastoral systems, the priorities include:* improve governance and security by involving pastoral societies in participatory governance mechanisms; improve connections to markets and market choices; provide and protect access to public services, including for animal and human health, and access to pastoral resources (water and land); implement a fairer taxation system to enhance value-added activities through the processing and marketing of pastoral products; better target emergency assistance; and devise development strategies that take into account the specific needs of pastoral systems, including mobility.
36. *For commercial grazing systems, the priorities include:* the maintenance and improvement of grassland management practices to improve resource efficiency and contribute to climate change mitigation and adaptation; the development of integrated crop–livestock–forestry systems that enable several kinds of production on the same land and allow synergies between those productions; and the protection of native forests from deforestation.

37. *For intensive livestock systems, the priorities include:* investment in R&D along the complete food chain to strike a balance between increasing production and reducing environmental harm, including food losses and waste; the expansion of precision livestock farming; action to reduce the prophylactic use of antibiotics in animal care and to improve animal welfare; policies to reduce the environmental impact of intensive systems including systems that promote more recycling of animal waste to promote efficiency and reduce the harm caused by unbalanced nutrient cycles (too much depletion where the feed crops are grown and too much addition where livestock are raised and fed); and increase the sustainable production of feed while improving the ratio of feed to animal conversion.

These means can be mobilized, as appropriate, to answer the priorities determined according to each specific situation, in the pursuit of a common objective of SAD.

RECOMMENDATIONS

The following recommendations have been elaborated building upon the main findings of the report on *Sustainable agricultural development for food security and nutrition: what roles for livestock?* They aim to strengthen the contributions of the livestock sector to sustainable agricultural development (SAD) for food security and nutrition (FSN). They are directed at different categories of stakeholders as appropriate: states, intergovernmental organizations (IGOs), the private sector and civil society organizations, and other stakeholders. They should:

1. ELABORATE CONTEXT-SPECIFIC PATHWAYS TO SAD FOR FSN

States and other stakeholders should:

- a) Use the common approach presented in this report to elaborate, at all appropriate levels, context-specific pathways towards SAD. Such pathways should aim to strengthen synergies and limit trade-offs between the different dimensions of sustainability through improving resource efficiency, strengthening resilience and securing social equity/responsibility. They could draw on initiatives such as the Global Agenda for Sustainable Livestock and the Global Research Alliance on agricultural greenhouse gases. In that respect, in line with SDGs, all stakeholders should support initiatives that involve multi-stakeholders dialogue, consultation and collaboration.

2. STRENGTHEN INTEGRATION OF LIVESTOCK IN NATIONAL SAD STRATEGIES

States should:

- a) Ensure that their SAD strategies and plans incorporate the integrated approach to FSN advocated by the CFS and are in line with the SDGs. States should better integrate into their SAD strategies the contributions that livestock systems make to the achievement of FSN. Policies, strategies and programmes need to take into account the interlinkages between different farming systems and their dynamic nature. They should in particular promote crop–livestock integration at a scale and through means that are adapted to the diversity of systems.

3. FOSTER COHERENCE BETWEEN SECTORAL POLICIES AND PROGRAMMES

States and IGOs should:

- a) Foster greater coherence between sustainable agricultural development, food systems, health, social protection, education and nutrition policies and programmes, as well as between their respective institutions, agencies and ministries.

4. DEVELOP GENDER-SENSITIVE LIVESTOCK POLICIES AND INTERVENTIONS

States, IGOs and other stakeholders should:

- a) Collect gender-disaggregated data on women's roles in livestock production to understand where gender asymmetries persist in the livestock sector;
- b) Adopt and ensure implementation of legislation to provide women equal access to and control of land and resources at the community and household levels;
- c) Ensure that women, in particular smallholders, have access to credit and develop specific financial products for women, in order to facilitate the diversification of their economic activities;
- d) Improve women's labour conditions in the livestock sector, including at the processing stage;
- e) Take measures at the local level to ensure the inclusion of women at every stage of the livestock value chain, taking account of their productive and reproductive roles;
- f) Take measures to enhance women's skill and knowledge by providing inclusive training and capacity building activities including when introducing new technologies.

5. BETTER INTEGRATE SAD ISSUES FOR FSN IN TRADE POLICIES

States and IGOs in relation to stakeholders should:

- a) Better integrate agriculture, including livestock, feed and related technical issues, into national, regional and multilateral trade rules and policies in order to improve SAD for FSN;
- b) Establish appropriate national and international food safety and quality standards and ensure their implementation through capacity building and appropriate resources for compliance.

Governments, producer organizations, the private sector and civil society should:

- c) Consider all dimensions of SAD in the development and implementation of standards for animal-sourced foods and livestock feed.

6. LIMIT AND MANAGE EXCESSIVE PRICE VOLATILITY

States, producer organizations and other stakeholders should:

- a) Develop tools to limit and manage excessive price volatility, including through the use of grain storage facilities, insurance programmes and other public policy instruments and private initiatives. In particular, these tools should address the risks posed by import surges and volatility in feed markets, and the specific vulnerabilities of smallholders.

7. PROTECT, PRESERVE AND FACILITATE THE SHARING OF LIVESTOCK GENETIC RESOURCES

States, IGOs, food producers, the private sector and research organizations should:

- a) In order to support SAD, increase cooperation and ensure dissemination, distribution and creation of knowledge and transfer of appropriate technologies to characterize, conserve and manage livestock genetic resources both *in situ* and in germplasm stores and related facilities;
- b) Act to minimize genetic erosion of the remaining biodiversity both *in situ* and in gene banks, as well as to recognize and protect traditional and indigenous knowledge linked to livestock genetic resources;
- c) Create conditions to facilitate access to livestock genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising from their use;

- d) Consider the establishment of dedicated international mechanisms to realize these objectives;
- e) Promote the recognition and protection of smallholders and indigenous peoples' livestock genetic resources as well as the associated knowledge of those resources;
- f) Recognize and protect the rights of smallholders and indigenous peoples to determine access to their livestock genetic resources including their right to determine who should have access to them and to a fair and equitable share of the benefits that arise from their use.

8. IMPROVE SURVEILLANCE AND CONTROL OF LIVESTOCK DISEASES

States and IGOs should:

- a) Implement *One Health* approaches to improve the surveillance and response for diseases emerging from livestock systems;
- b) Cooperate to provide transparent reporting for early warnings on transboundary diseases and emerging zoonosis;
- c) Provide adequate means to ensure compliance to international and national laws and rules;
- d) Provide financial and technical support for improved animal health and welfare in agricultural development, including for capacity building programmes.

9. PROMOTE RESEARCH AND DEVELOPMENT

States and IGOs should:

- a) Integrate a participatory approach when designing an agenda and allocating resources for R&D, and focus on technologies, practices, metrics and institutions needed to improve resource efficiency, strengthen resilience and secure social equity/responsibility in diverse livestock farming systems;
- b) Enable participatory research in order to promote the integration of diverse knowledge systems about livestock keeping, including animal breeding;
- c) Promote the collaboration of researchers in livestock keepers' and other stakeholders' innovation processes and platforms to ensure dissemination of research findings and sharing of good practices.

States, IGOs and the private sector should:

- d) Leverage the potential of information and communication technologies (ICT) in order to gather, share and use information in different livestock systems, ensuring broad access, in particular by women, vulnerable and marginalized communities.

10. REVIEW AND IMPROVE INDICATORS AND METHODOLOGY AND IDENTIFY DATA GAPS

FAO, in coordination with relevant international and national agencies and other relevant stakeholders, should:

- a) Review the data sets, indicators and methodologies that are needed to monitor and evaluate SAD for FSN, using such tools as the World Agricultural Census and the preparation of indicators for the SDGs, and identify data gaps;
- b) Consider ways to improve the monitoring of changes in grasslands and their biodiversity, and to report on their global state;
- c) Make available online an inventory of evidence-based policy measures as well as producer organizations, the private sector and other stakeholders actions that contribute to SAD for FSN.

RECOMMENDATIONS RELATED TO SPECIFIC LIVESTOCK SYSTEMS

States, IGOs and other stakeholders should consider the roles of different livestock systems in all agricultural, food security and nutrition policies and promote SAD-oriented efficiency and sustainability pathways that are adapted to the specificity of each of the systems. In particular, they should:

11. RECOGNIZE THE IMPORTANCE OF SMALLHOLDER MIXED FARMING SYSTEMS FOR FSN AND SUPPORT THEM BY:

- a) Enhancing economic viability and access to markets; prioritizing fairer markets and measures to overcome obstacles faced especially by women, marginalized and vulnerable groups engaged in managing small-scale livestock operations;
- b) Creating an enabling environment for collective organizations and actions of smallholders; investing in market information and infrastructure (including informal markets);
- c) Strengthening security, tenure and title of customary lands, property rights and governance of common natural resources building on the CFS Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests, and other relevant instruments in the international legal framework;
- d) Leveraging the potential of livestock as a means for sustainable livelihoods in smallholder mixed farming systems.

12. RECOGNIZE AND SUPPORT THE UNIQUE ROLE OF PASTORAL SYSTEMS BY:

- a) Strengthening the role of local pastoralist organizations in adaptive land management and governance in order to increase the resilience of pastoral systems and households, in particular with respect to climate change, conflicts and protracted crises, as well as price volatility;
- b) Considering the use of innovative financing mechanisms to invest in the provision of basic services adapted to the needs and ways of life of pastoralists, including culturally appropriate education, health, communications, drinking water and sanitation services, and renewable energy systems;
- c) Exploring ways to improve the connection of pastoralists to local, national and international markets;
- d) Strengthening security, tenure and title of customary lands, property rights and governance of grazing resources building on CFS Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests, and other relevant instruments in the international legal framework;
- e) Enabling the mobility of pastoralists, including transboundary passage, through appropriate infrastructures, institutions, agreements and rules.

13. PROMOTE THE SUSTAINABILITY OF COMMERCIAL GRAZING SYSTEMS BY:

- a) Supporting sustainable management of livestock, pastures and feed in order to minimize harmful environmental externalities, including by promoting models of production that preserve biodiversity and ecosystem services and reduce GHG emissions;
- b) Exploring context specific technical possibilities and policy initiatives for integration of plants and animals at diverse scales, such as, for instance, agro-sylvopastoral systems;
- c) Promoting practices that enhance resource efficiency and resilience of commercial grazing systems.

14. ADDRESS THE SPECIFIC CHALLENGES OF INTENSIVE LIVESTOCK SYSTEMS BY:

- a) Ensuring that the working and living conditions of workers, especially women and other vulnerable workers, including temporary and migrant workers, at all stages of production, transformation and distribution, meet international standards and are protected by domestic laws;
- b) Undertaking lifecycle assessment along the complete food chain to identify options for increasing production while minimizing negative environmental impacts and excessive use of energy, water, nitrogen and other natural resources;
- c) Improving technical efficiency by monitoring the individual performance of herds and animals;
- d) Supporting and improving animal health and welfare by promoting good practices and by establishing and enforcing robust standards for different species in intensive systems, building upon the World Organisation for Animal Health (OIE) guidelines and private sector initiatives;
- e) Exploring and implementing approaches for the reduction of antimicrobial use in livestock production;
- f) Developing innovative approaches, with farmers' organizations, at diverse scales, in order to facilitate the use of manure as organic fertilizer – and to promote the use of crop co-products or residues and waste as feed including through technical innovations.