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COMMITTEE ON AGRICULTURE

SUB-COMMITTEE ON LIVESTOCK

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Integrating the livestock sector into national climate actions by considering its adaptation and resilience to climate change, and contribution to biodiversity and ecosystem services

Executive Summary

Recent technological, innovation and management progress in the livestock sector has made it possible for governments, producers and the private sector to advance the contributions of the sector to climate action ranging from assessing climate co-benefits of livestock best practices in production and animal health to including commitments such as reduction of methane emissions or climate neutrality. A variety of approaches for climate action exist in livestock systems, including low-emission practices, One Health, circular bioeconomy and soil organic carbon sequestration. These approaches build on the rich diversity of livestock production systems around the world. Building these systems' resilience and adaptation to climate change is key to achieving food security and other socio-economic functions of the livestock sector. There is considerable scope for livestock systems to engage in climate action, enhance biodiversity and ecosystem services, and to enhance its overall contribution to Sustainable Development Goals (SDGs) 13 and 15. FAO supports its Members to raise their climate ambitions and in building resilient agrifood systems as part of their climate actions and sustainable development of the livestock sector.

Suggested action by the Sub-Committee

The Sub-Committee is invited to recommend COAG to:

- recommend FAO to continue its support to Members to conduct, as appropriate, capacity development programmes on establishing greenhouse gas emissions inventories, and develop methods and metrics for monitoring mitigation progress based on accelerators of data, technology and innovation that support evidence-based policy development in the livestock sector;
- recommend FAO to support Members, as appropriate, to integrate livestock-related mitigation and adaptation targets into national climate actions and policies, and to conduct regional and national consultations to develop regional strategies and livestock climate change action plans, and national feasibility studies to reduce enteric methane;

Documents can be consulted at www.fao.org.

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- call on Members to include sustainability, productivity, competitiveness and resilience aspects of livestock systems in the policy agenda and formulate development programmes and strategies that favour the adoption of low-emission practices, while considering biodiversity and ecosystem services; and
- call on donors and investors to support Members through investment programmes and projects aiming at reducing greenhouse gas emissions and adapting to climate change, including the development of Nationally Appropriate Mitigation Actions and National Adaptation Plans in the livestock sector.

Queries on the substantive content of the document may be addressed to:

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I. Introduction

1. There is evidence that anthropogenic activities have caused the current climate change which is warming the atmosphere, ocean and land, exacerbating the occurrence of more frequent and intense catastrophic weather events, and threatening life and future of our planet.¹ An increasing number of Members and other livestock stakeholders are making efforts to tackle climate change and its impacts to achieve the Sustainable Development Goals (SDGs) and the Paris Agreement.

2. The Paris Agreement is a legally binding international treaty on climate change. Its goal is to limit the global temperature increase to 2 °C compared to pre-industrial levels, preferably to 1.5 °C. Parties committed to reducing greenhouse gas (GHG) emissions from all sectors of the economy and to increasing climate resilience without threatening food security and nutrition. Each Party is required to set its GHG emission-reduction and adaptation targets in Nationally Determined Contributions (NDCs) and the long-term low GHG emission development strategy.

3. The United Nations Framework Convention on Climate Change (UNFCCC) synthesis report on NDCs (FCCC/PA/CMA/2021/8) found that commitments of different Parties to reduce GHG over time are off track. Parties are therefore encouraged to urgently redouble efforts to enhance and implement their commitments to limit global warming by targeting all sectors of the economy, including the livestock sector.

4. Raising the ambition of climate action is reinforced by the FAO Strategic Framework 2022-31, to support the transformation to more efficient, inclusive, resilient and sustainable agrifood systems under the *four betters* – *better production, better nutrition, a better environment and a better life*, leaving no one behind.²

¹ Intergovernmental Panel on Climate Change (IPCC). 2021. Summary for Policymakers. In V. Masson-Delmotte, P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu & B. Zhou, eds. *Climate Change 2021: The Physical Science Basis*. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press. In Press. (also available at <https://www.ipcc.ch/report/ar6/wg1/#SPM>).

² FAO. 2021. *Strategic Framework 2022-31*. Rome. 40 pp. (also available at <http://www.fao.org/3/ne577en/ne577en.pdf>).

II. Livestock and climate change as part of a broader sustainability agenda

5. Livestock systems are embedded in the economy and culture of societies. They contribute to rural development, human diets, trade balances, biodiversity, risk management and other sustainable development outcomes.
6. Livestock provide resilient livelihoods to families and communities around the world, thereby contributing to the reduction of poverty, food insecurity and malnutrition. Demand for terrestrial animal source food is projected to increase with a growing global and urbanized human population. Demand for animal source food in low- and middle-income countries has quadrupled in the past decades and is predicted to increase by 35 percent between 2012 and 2030, with great variability between countries.³
7. Livestock are key to food security and animal source foods contribute to healthy diets by providing protein, energy and micronutrients that are essential to the nutrition and cognitive development of children and adults. Consumption of animal source food among young children is low in most low- and middle-income countries.⁴
8. The livestock sector contributes significantly to SDG 13, which calls for urgent action to combat climate change and its impacts, by formulating evidence-based mitigation and adaptation targets. SDG 13 cannot be achieved in isolation: food security and nutrition, in particular, remaining priorities, as recognized by the Paris Agreement and the Koronivia Joint Work on Agriculture⁵ during the 26th Conference of the Parties (COP26) to the UNFCCC.⁶
9. Livestock systems, including extensive grazing systems and pastoralism, can have negative impacts on biodiversity through the unsustainable use of land for grazing and feed production. However, if well managed, they also provide valuable services that protect, restore and promote sustainable use of terrestrial ecosystems, combat desertification, reverse land degradation and halt biodiversity erosion.
10. Addressing these issues requires recognizing multiple trade-offs and synergies between livestock development strategies, biodiversity protection and sustainable use, climate change mitigation and adaptation and the achievement of other sustainability goals, particularly ending hunger and poverty, but also removing inequalities and developing sustainable production and consumption.
11. Assessing the multifunctionality of livestock offers insights on the environmental, social and economic dimensions to support decision-making. Such assessment requires the development of multi-criteria assessment tools that consider the specificities of different livestock systems.
12. The COVID-19 pandemic has also revealed some limits of livestock supply chains. In particular, the disruption of supply chains and producers' limited access to inputs, services and markets has heightened the importance of resilient supply systems.

³ FAO. 2018. *The future of food and agriculture – Alternative pathways to 2050*. Rome. 224 pp. (also available at <http://www.fao.org/3/I8429EN/i8429en.pdf>).

⁴ FAO, International Fund for Agricultural Development (IFAD), United Nations Children's Fund (UNICEF), World Food Programme (WFP) & World Health Organization (WHO). 2020. *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets*. Rome, FAO. 320 pp. (also available at <https://doi.org/10.4060/ca9692en>).

⁵ UNFCCC. 2021. Issues related to agriculture. In: *United Nations Climate Change* [online]. Bonn. [Cited 13 December 2021]. <https://unfccc.int/topics/land-use/workstreams/agriculture#:~:text=23%20on%20the%20%22Koronivia%20joint,of%20agriculture%20to%20climate%20change>.

⁶ UNFCCC. 2021. *Koronivia joint work on agriculture. Draft conclusions proposed by the Chairs*. FCCC/SB/2021/L.1*.

III. Climate change challenges and opportunities in the livestock sector

13. Livestock contributes about 14.5 percent of global anthropogenic GHG emissions⁷ in the forms of methane (44 percent), nitrous oxide (29 percent) and carbon dioxide (27 percent). These emissions are associated with beef and dairy cattle (61 percent). Pigs and chicken contribute 17 percent, whereas small ruminants and buffalo systems contribute 4 percent. Enteric fermentation is a major source of methane, which is a short-lived climate pollutant. Reducing methane would enable climate goals to be reached faster.

14. The report of the Intergovernmental Panel on Climate Change on climate change and land⁸ showed that a growing global population and increasing demand for agrifood products, combined with unsustainable agricultural practices, increase the pressure on land. Land-use changes and land degradation can reduce the potential of carbon sinks, have cascading negative impacts on ecosystem services and reinforce climate change⁹. Better grazing management of grasslands can enhance carbon sequestration and improve biodiversity.

15. Livestock production systems emit around one-third of human-induced nitrogen emissions¹⁰ and contribute to phosphorus losses. They also provide manure, useful in mixed farming systems but that cannot always be recycled in areas with high livestock concentrations. These nitrogen and phosphorus losses exacerbate climate change impacts and result in eutrophication or acidification of ecosystems. Scaling up existing technical solutions and transfer of technology and knowledge across all systems can reduce these challenges and provide economic returns to producers.

16. Small-scale livestock production systems provide draft power and multiple socio-economic benefits to millions of families, together with ecosystem services and climate change resilience. These systems are vulnerable to climate events such as droughts, which can lead to heat stress in livestock, and consequently low productivity and poor animal welfare. Climate change can also affect animal disease patterns, making outbreaks harder to control. Considering the One Health approach across all livestock development programmes can help to build resilience.

17. It is expected that extreme heat and cold stress will increase for all livestock species in the coming decades across many agroecological zones. Establishing early warning systems based on reliable information on climate, water, pasture, seasonal feed balances and livestock mobility, especially in extensive grazing systems, will enhance the adaptation and resilience of livestock systems.

18. In the updated NDCs submitted by Parties in 2020, only 36 percent of Parties mentioned specific livestock mitigation and adaptation commitments. For instance, some African and Latin American countries identified limited capacity to quantify climate co-benefits and GHG emissions,

⁷ Gerber, P.J., Steinfeld, H., Henderson, B., Mottet, A., Opio, C., Dijkman, J., Falcucci, A. & Tempio, G. 2013. *Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities*. Rome, FAO. 139 pp. (also available at <http://www.fao.org/3/a-i3437e.pdf>).

⁸ IPCC. 2019. *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*. In press. 906 pp. (also available at <https://www.ipcc.ch/srccl/>).

⁹ IPCC. 2018. *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. In press. 630 pp. (also available at <https://www.ipcc.ch/sr15/>).

¹⁰ Uwizeye, A. et al. 2020. Nitrogen emissions along global livestock supply chains. *Nature Food*, 1(7): 437–446.

including the measurement, reporting and verification framework and enhanced transparency framework, as a significant barrier to integrating the livestock sector into climate actions.^{11, 12}

19. The diversity of livestock systems offers an opportunity to scale up climate solutions. Wider adoption of existing best practices and technologies in feeding, health, husbandry and manure management could help cut GHG emissions by as much as 30 percent. If managed sustainably, livestock production systems can contribute to the conservation of biodiversity and important ecosystem functions, including nutrient cycling, carbon capture and seed dispersal, maintaining agricultural landscapes and avoiding wildfires.

20. Restoring grasslands and rangelands through better grazing management to enhance soil carbon sequestration, preventing encroachment by invasive species, and controlling the expansion of pasture and feed crop production into forests are all ways to reduce GHG emissions. Policies can be directed towards addressing illegal land-use change, and protecting core emergency grazing reserves.

21. Climate finance directed at improving livestock production, developing value chains and enhancing biosecurity is relatively low at 2 percent of total climate finance directed towards agrifood systems.¹³ It is crucial to increase investment in the sector, supporting producers through access to innovative technologies, market opportunities and infrastructure, in order to accelerate progress towards more resilient and productive livestock production systems.

22. Context-specific policy measures can contribute to the reduction of GHG emissions in the livestock sector. These measures can include (i) restoration of grasslands and carbon crediting schemes, (ii) zero-deforestation policies, (iii) incentives to adopt innovative technologies that enhance productivity and resource use efficiency, (iv) recoupling of livestock and crop production (e.g. through relocation grants), (v) better integration of livestock production into circular bioeconomy, and (vi) policies to support producers in enhancing market competitiveness and risk mitigation schemes to protect the livelihoods of small-scale producers.

IV. How FAO is supporting Members to integrate the livestock sector into national climate actions

23. FAO provides tools, methodologies and protocols to assess GHG emissions. These include global and national assessments of livestock emissions using the Global Livestock Environmental Assessment Model (GLEAM)¹⁴ and its interactive version (GLEAM-i), through which the impacts of technology and policy options to reduce GHG emissions can also be assessed; the Self-evaluation and Holistic Assessment of climate Resilience of farmers and Pastoralists (SHARP) tool; the EX-Ante Carbon Balance Tool (EX-ACT);¹⁵ the Livestock Sector Investment and Policy Toolkit (LSIPT), and the Tool for Agroecology Performance Evaluation (TAPE).¹⁶

¹¹ Uwizeye, A., Reppin, S., Opio, C., Teno, G., Lopes, J., Dondini, M. & Langston Diagne, M. 2021. *Boosting Koronivia in the livestock sector – Workshop report*. Rome, FAO. 68 pp. (also available at <https://doi.org/10.4060/cb4348en>).

¹² FAO, Climate and Clean Air Coalition, New Zealand Agricultural Greenhouse Gas Research Centre and Global Research Alliance on Agricultural Greenhouse Gases. 2021. *Ambición climática en el sector ganadero de América Latina y el Caribe – Construcción de redes para su revisión e implementación*. Rome, FAO. 12 pp. (also available at <https://doi.org/10.4060/cb7332es>).

¹³ Buto, O., Galbiati, G.M., Alekseeva, N. & Bernoux, M. 2021. *Climate finance in the agriculture and land use sector - global and regional trends between 2000 and 2018*. Rome, FAO. 60 pp. (also available at <https://doi.org/10.4060/cb6056en>).

¹⁴ FAO. 2021. Global Livestock Environmental Assessment Model (GLEAM). In: *FAO* [online]. Rome. [Cited 13 December 2021]. <http://www.fao.org/gleam/resources/en/>

¹⁵ FAO. 2021. Economic and Policy Analysis of Climate Change. In: *FAO* [online]. Rome. [Cited 13 December 2021]. <http://www.fao.org/in-action/epic/ex-act-tool/overview/en/>

¹⁶ FAO. 2021. Tool for Agroecology Performance Evaluation (TAPE). In: *FAO* [online]. Rome. [Cited 13 December 2021]. <http://www.fao.org/agroecology/tools-tape/en/>

24. FAO supports Members, the private sector and other stakeholders to assess and take action on GHG emissions and other environmental impacts of livestock systems, through the FAO Livestock Environmental Assessment and Performance (LEAP) Partnership.¹⁷
25. FAO supports Members to:
- Build capacity for addressing climate change in the livestock sector, in particular for using tools and methodologies for monitoring and evaluating the impact of practical solutions.
 - Develop comprehensive baselines for GHG emissions inventories and identify mitigation strategies for updated NDCs.
 - Identify, pilot and validate technical and policy options to reduce GHG emissions and conduct regional consultations to identify opportunities to reduce methane emissions, in collaboration with the Climate and Clean Air Coalition, Global Research Alliance on Agricultural Greenhouse Gases and New Zealand Agricultural Greenhouse Gas Research Centre in 17 countries.¹⁸
 - Measure the sustainability of agricultural systems with TAPE, which is based on the 10 Elements of Agroecology,¹⁹ evaluating their performance for economic, environmental, social, health and governance dimensions. TAPE has been applied in more than 30 countries.²⁰
 - Access climate finance, through the Global Environment Facility (GEF), Green Climate Fund (GCF), World Bank, International Finance Corporation (IFC), International Fund for Agricultural Development (IFAD) and other financial institutions, to promote low-carbon options for livestock sector development.
 - Identify opportunities to integrate more livestock-specific interventions into climate action through policy analysis in eight countries in Africa and Latin America and the Caribbean.²¹
 - Formulate, in close collaboration with United Nations Development Programme (UNDP), IFAD and national stakeholders, Nationally Appropriate Mitigation Actions and National Adaptation Plans in the livestock sector.
 - Provide a space for countries to exchange experiences and discuss how the Koronivia process can support climate actions on livestock while delivering the 2030 Agenda for Sustainable Development in 35 countries.²²
 - Develop sustainable pastoralism through the adaptation of policies, methodologies and tools to fit the specificities of the mobile livestock system, giving special attention to improving governance of, and ensuring access to, natural resources, and by promoting a better understanding of its multifunctionality and the ways in which pastoralists manage climate variability.²³

¹⁷ See COAG:LI/2022/INF/14.

¹⁸ Argentina, Bangladesh, Benin, Burkina Faso, Costa Rica, Ethiopia, Kenya, Malaysia, Mali, Niger, Philippines, Senegal, Sri Lanka, Tanzania, Thailand, Uganda and Uruguay.

¹⁹ FAO. *The 10 Elements of Agroecology Guiding the Transition to Sustainable Food and Agricultural Systems*. 15 pp. <https://www.fao.org/3/i9037en/i9037en.pdf>

²⁰ FAO-led main assessments have been finalized in Argentina, Burkina Faso, Cambodia, China, Dominica, Ethiopia, Guyana, Laos, Lesotho, Mali, Mexico, Mozambique, Nicaragua, Tanzania and Viet Nam. Other assessments are currently ongoing, planned or being finalized by other stakeholders.

²¹ Burkina Faso, Costa Rica, Kenya, Nicaragua, Rwanda, Senegal and Uruguay.

²² Africa: Benin, Botswana, Burkina Faso, Burundi, Cameroon, Côte d'Ivoire, Djibouti, Eritrea, Eswatini, Ethiopia, Guinea, Kenya, Lesotho, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Senegal, Somalia, South Africa, South Sudan and Zambia. Latin America and the Caribbean: Argentina, Brazil, Chile, Costa Rica, Dominican Republic, Mexico, Nicaragua, Panama, Paraguay, Peru and Uruguay.

²³ See www.fao.org/pastoralist-knowledge-hub/en/.

26. FAO endorsed the Climate and Clean Air Coalition 2030 Strategy,²⁴ which offers the opportunity to support countries to identify cost-effective mitigation options and create an enabling environment for transformative action to address short-lived climate pollutants, including methane.
27. FAO collaborates with the World Bank, IFAD and other international financial institutions to mainstream climate-smart livestock practices in their financing portfolio, focusing on climate and disaster risk screening, GHG quantification, accounting for carbon externalities in economic and financial analysis, and monitoring and tracking climate co-benefits in livestock project results.
28. FAO is committed to supporting the Pathways to Dairy Net Zero initiative,²⁵ a global movement to accelerate climate action and help reduce the dairy sector's GHG emissions through the development of methods and metrics, and the evaluation of mitigation options and accelerators of data, technology and innovation, and policies and institutions that create an enabling environment for sustainable agrifood systems.
29. FAO convenes intergovernmental bodies and facilitates multi-stakeholder partnerships for better integration of livestock and climate change in policies such as the Intergovernmental Technical Working Group on Animal Genetic Resources,²⁶ the Commission on Livestock Development for Latin America and the Caribbean,²⁷ and the Global Agenda for Sustainable Livestock.²⁸
30. FAO supports the Global Methane Pledge,²⁹ an initiative led by the United States of America and the European Union aiming to cut methane emissions by 30 percent by 2030. More than 109 countries, representing 70 percent of the global economy, have joined the initiative, pledging to cut methane across sectors including the livestock sector.³⁰ This pledge followed the United Nations Environment Programme (UNEP) and Climate and Clean Air Coalition Global Methane Assessment, which was based on FAO statistics, including the methane emissions from the livestock sector.

²⁴ Climate and Clean Air Coalition. 2020. The Coalition's 2030 Strategy. <https://www.ccacoalition.org/en/resources/climate-and-clean-air-coalition-2030-strategy>

²⁵ See <https://www.globaldairyplatform.com/pathwaystodairynetzero/>.

²⁶ FAO. 2021. Commission on Genetic Resources for Food and Agriculture [online]. In: *FAO* [online]. Rome. [Cited 13 December 2021]. <https://www.fao.org/cgrfa/meetings/itwg/wganr/en/>

²⁷ FAO. 2021. Commission on Livestock Development for Latin America and the Caribbean (CODEGALAC) [online]. In: *FAO Regional Office for Latin America and the Caribbean* [online]. Rome. [Cited 13 December 2021]. <https://www.fao.org/americas/codegalac/en/>

²⁸ See <http://www.livestockdialogue.org/>.

²⁹ See <https://www.globalmethanepledge.org/>.

³⁰ European Commission. 2021. Launch by United States, the European Union, and Partners of the Global Methane Pledge to Keep 1.5C Within Reach. Statement, Brussels, 2 November. https://ec.europa.eu/commission/presscorner/detail/en/statement_21_5766