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Subsidiary Body for Scientific and Technological Advice

Subsidiary Body for Implementation

Improved livestock management systems, including agropastoral production systems and others

Workshop report by the secretariat*

Summary

The in-session workshop on improved livestock management systems, including agropastoral production systems and others, was held in conjunction with the UNFCCC Climate Dialogues 2020. Experts from Parties, international organizations, the private sector, research organizations, civil society and constituted bodies under the Convention as well as farmers presented experience and challenges and barriers in relation to achieving a transformation in agriculture that leads to improving livestock management systems, and engaged in in-depth discussion on the potential, co-benefits and synergies with multiple objectives involved in improving such systems. The workshop provided the opportunity to begin discussing options for increasing synergy and collaboration among stakeholders, while highlighting that farmers must be at the centre of all discussions and decision-making on climate change, agriculture and livestock management.

* This document was submitted after the due date owing to human resource constraints partly created by the pandemic.

Abbreviations and acronyms

CO_2	carbon dioxide
COP	Conference of the Parties
COVID-19	coronavirus disease 2019
CTCN	Climate Technology Centre and Network
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG	greenhouse gas
GTP	global temperature potential
GWP	global warming potential
IPCC	Intergovernmental Panel on Climate Change
KJWA	Koronivia joint work on agriculture
NDC	nationally determined contribution
NGO	non-governmental organization
SB	session of the subsidiary bodies
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SDG	Sustainable Development Goal

I. Introduction

A. Mandate

1. The COP requested the SBI and the SBSTA to jointly address issues related to agriculture, including through workshops and expert meetings, working with constituted bodies under the Convention and taking into consideration the vulnerabilities of agriculture to climate change and approaches to addressing food security.[1]

2. The SBI and the SBSTA requested the secretariat, subject to the availability of supplementary resources, to organize six workshops to be held in the lead-up to COP 26 (November 2021) under the KJWA,[2] as outlined in the Koronivia road map.[3] They encouraged admitted observers to participate in these workshops.

3. The SBI and the SBSTA requested the secretariat to organize the fifth workshop in conjunction with SB 52 on the subject of improved livestock management systems, including agropastoral production systems and others. They also requested the secretariat to prepare a report on the workshop for their consideration at SB 53.[4] They further requested the secretariat to invite representatives of the constituted bodies to contribute to the work and attend the workshops.[5]

4. The SBI and the SBSTA invited Parties and observers to submit via the submission portal[6] their views on the subject of the workshop referred to in paragraph 3 above.[7] They took note of the importance of issues, including but not limited to farmers, gender, youth, local communities and indigenous peoples, and encouraged Parties to take them into consideration when making submissions and during the KJWA workshops.[8]

B. Possible action by the Subsidiary Body for Implementation and the Subsidiary Body for Scientific and Technological Advice

5. The SBI and the SBSTA may wish to consider this report when reviewing the KJWA and preparing a report to COP 26 on the progress and outcomes of the work, including on potential future topics.[9]

II. Proceedings

6. Owing to the circumstances related to COVID-19, the workshop referred to in paragraph 3 above was convened by the secretariat virtually on 24 and 25 November 2020. It was open to all Parties and observers attending the UNFCCC Climate Dialogues 2020.

7. On behalf of the SBI and SBSTA Chairs, the SBI Chair, Marianne Karlsen (Norway), delivered opening remarks and detailed the mandate and objectives of the workshop. She invited Monika Figaj (Poland) and Milagros Sandoval (Peru) to co-facilitate the workshop.

8. The workshop was organized in four sessions:

(a) Country presentations;

(b) Expert panel discussion;

(c) Presentations on work undertaken by constituted bodies and financing entities;

[1] Decision 4/CP.23, para. 1.
[2] FCCC/SBI/2018/9, para. 39, and FCCC/SBSTA/2018/4, para. 61.
[3] FCCC/SBI/2018/9, annex I, and FCCC/SBSTA/2018/4, annex I.
[4] FCCC/SBI/2018/9, para. 41, and FCCC/SBSTA/2018/4, para. 63.
[5] FCCC/SBI/2018/9, para. 42, and FCCC/SBSTA/2018/4, para. 64.
[6] https://www4.unfccc.int/sites/submissionsstaging/Pages/Home.aspx.
[7] FCCC/SBI/2018/9, para. 43, and FCCC/SBSTA/2018/4, para. 65.
[8] FCCC/SBI/2018/9, para. 40, and FCCC/SBSTA/2018/4, para. 62.
[9] As mandated in decision 4/CP.23, para. 4.

(d) Plenary discussion.

9. In their feedback on the organization of the workshop, Parties expressed their satisfaction with the fruitful, substantive discussions held, but raised concerns about the following related to the virtual format: connectivity and technology issues, preventing full and inclusive participation; difficulties with time management and scheduling taking into account different time zones, particularly in relation to the workshop running over time; and challenges related to coordinating groups of Parties, all of which may have had a negative impact on delegates' effective participation in the workshop.

10. Further information on the workshop, including the agenda, presentations and links to the recordings, is available on the UNFCCC website.[10]

III. Summary of presentations

A. Keynote presentations

11. A scientist[11] gave a keynote presentation on the role of livestock management systems in relation to sustainability. Such systems consist of a diverse range of activities undertaken around the world and contribute significantly to the global economy. In many parts of the world, livestock also has high socioeconomic importance and may be used, for example, as a form of security. In relation to livestock management, reducing negative externalities such as GHG emissions, and improving the sustainability and productivity of the management systems must be considered a priority in the agriculture sector. The scientist explained that carbon neutrality could be achieved if livestock and cropland systems were recoupled, with more rotational systems deployed between cropland and pasture.

12. The scientist also explained that the sustainability of livestock systems varies significantly depending on how they are managed: increasing the number of calves produced per cow could significantly reduce the number of animals required, while grazing intensity significantly affects below-ground carbon and nitrogen cycling in grassland ecosystems. New technologies are expected to play a major role in measuring true GHG balances (and not only emissions) resulting from livestock management systems and in helping farmers to manage cows individually instead of herds and pastures as a whole.

13. An expert[12] from the Food and Agriculture Organization of the United Nations gave a keynote presentation on adapting livestock management systems to climate change. Livestock is vulnerable to direct and indirect climate change impacts, such as drought, floods, thermal stress, water unavailability, poor-quality forage, and pests and diseases. This vulnerability is compounded by non-climate stressors, including rangeland degradation, water pollution, market shocks and insecure land tenure. Therefore, adaptation strategies must comprise context-specific adaptation options, while prioritizing measures that strengthen the role of livestock management systems as providers of ecosystem services. This can contribute to sustainable development and poverty reduction, as well as integrating work under the three Rio Conventions with that towards achieving the SDGs.

14. The barriers to successful implementation of adaptation measures are higher in low- and middle-income countries, where demand for food and animal products is expected to grow. Livestock management often fulfils essential sociocultural and economic functions, such as contributing to risk and vulnerability management. It is therefore essential to build farmers' capacity to implement adaptation practices with food security and mitigation co-benefits. At the same time, gaps in knowledge need to be addressed to facilitate decision-making, especially considering the high uncertainty associated with future climate scenarios, the limited evidence of the costs and benefits of adaptation, and questions related to trade-offs.

[10] https://unfccc.int/event/koronivia-workshop-on-improved-livestock-management-systems.
[11] Anibal Pordomingo.
[12] Carolyn Opio.

15. An IPCC lead author[13] explained that the role of livestock in global warming is the subject of intense polarized debate around the world. While improved animal diet and health, for example, have increased livestock efficiency and reduced emissions per unit of product, absolute methane and nitrous oxide emissions from livestock rose by around 15–20 per cent from 1990 to 2017, with enteric fermentation being the most significant source. Other negative impacts of livestock management systems include deforestation, reduced water and air quality, land degradation and increased risk of zoonoses. The scientist explained that the ambitious mitigation potential of livestock management systems presented in IPCC publications has not been realized because it depends on countries introducing a price on carbon, and he is not aware of any country having done so for agriculture. While there are studies that argue that dietary changes have the potential to reduce livestock emissions by 20–30 per cent, whether achieving this theoretical mitigation potential is feasible in economic, social and political terms has not been systemically analysed. The scientist added that most of the mitigation potential lies in soil carbon sequestration, which can be increased by improving grazing practices and land restoration. He sees a role in mitigation also for new technologies currently under development, such as inhibitors, vaccines and feed additives, but the systems in which these could be used may be limited by regulations and costs.

16. While noting that it will be difficult to meet the temperature goals of the Paris Agreement without reducing emissions from livestock, the scientist questioned whether it would be possible to abandon livestock management as an activity altogether. It is necessary to recognize the broad role that properly managed livestock systems play, beyond climate change mitigation, particularly in relation to global food and nutrition security (especially in terms of micronutrients), livelihoods, nutrient cycling and carbon storage, biodiversity, and landscape design and maintenance. One difficulty is the high uncertainty associated with livestock emission estimates as many countries do not have exact data on livestock numbers, diet characteristics and animal performance. Emission factors are also highly uncertain; for example, nitrous oxide emissions are strongly influenced by local climatic and soil conditions. The scientist presented the scientific debate on how best to compare the average warming effect of different GHG emissions over a given time frame using metrics such as GWP or GTP values over a 100-year time-horizon or GWP*[14] values to express the warming potential in CO_2 equivalent. In general, he cautioned against complex accounting with poor-quality data, emphasizing that the focus should be on improving data, developing national GHG inventories, and experienced practitioners working in tandem with policy and science to improve data quality and availability.

B. Country presentations

17. Representatives of six Parties made presentations, in which they responded to the following questions:

(a) What is your country's experience of improving livestock management systems, including agropastoral production systems and others?

(b) How does your country address co-benefits and synergies with multiple objectives in improving livestock management systems?

(c) How does your country set goals and measure progress in improving livestock management systems?

(d) Which challenges has your country faced in improving livestock management systems, and how can the KJWA and UNFCCC constituted bodies help to address these challenges?

18. A representative of Bhutan presented the country's goal to maximize production from its limited land resources while minimizing environmental impacts. The expected benefits include enhancing rural income and livelihoods and peoples' nutritional intake, providing ecosystem services and opportunities for employment, and reducing GHG emissions from

[13] Harry Clark.

[14] GWP* is an alternative usage of GWP that relates cumulative CO_2 emissions to date with the current rate of emissions of short-lived climate pollutants.

livestock through improved manure management and enhanced feed efficiency, as well as contributing overall to gross national happiness and achievement of the SDGs. Progress of implementation is regularly measured using indicators related to food self-sufficiency and nutrition security. The representative highlighted that the KJWA could help countries to overcome existing challenges by recognizing the importance of livestock farming, facilitating development and implementation of climate-resilient livestock technologies, helping to strengthen national capacity to manage animal genetic resources, upscaling support for adoption of water and pasture management technologies, combating emerging and transboundary pests and diseases, and developing a methodological framework for monitoring and responding to climate change impacts.

19. A representative of the European Union presented its objective of Europe being the first climate-neutral continent by 2050. To achieve this, food systems need to be made more sustainable; but it still might not be possible to reduce GHG emissions to zero given the biological processes involved in agricultural production. Also, changes in the diffuse site- and context-specific emissions are difficult to measure. Novel feeding approaches offer promising opportunities for reducing the emission intensity of livestock products. The European Union is making efforts to foster collaboration and exchange of knowledge and best practices to improve implementation of climate action in agriculture, including through international partnerships. A representative of Ireland described the country's efforts to address declines in biodiversity, water quality and soil fertility and increasing emissions from livestock. Many existing options for GHG emission abatement are cost-saving or cost-neutral over a period of 10 years, with some offering co-benefits for ammonia reduction.

20. A representative of New Zealand presented on the country's extensive outdoor pastoral grazing systems. New Zealand's agricultural emissions, accounting for 48 per cent of its total emissions, have been stable since 2005 despite increasing production overall. Its NDC target is to reduce GHG emissions by 30 per cent below the 2005 level by 2030. In addition, CO_2 and nitrous oxide emissions should reach net zero by 2050 and methane emissions are to be reduced by 10 per cent by 2030 and 24–47 per cent by 2050. The representative emphasized that farmers and growers need a range of options for responding to climate change that consider the overall farm system, including related value chains and consumers. Interactions between farmers, government and research programmes focusing on productivity and monitoring GHG emissions are critical. New Zealand is aiming to improve its agricultural GHG inventory on an ongoing basis.

21. A representative of Uruguay explained that the country is working to implement productive and resilient livestock systems that offer socioeconomic benefits on the basis of more efficient feed conversion, higher biodiversity, enhanced carbon sinks, lower emission intensity and better animal welfare. Overgrazing, land degradation, lack of shade and shelter, and poor-quality water sources are persistent issues. Climate change adaptation is a priority for Uruguay as more frequent severe drought is resulting in high accumulated economic losses at the farm level. The country recognizes that many effective adaptation activities have co-benefits for mitigation, such as increased soil carbon sequestration, improved manure management and enhanced nutrient circularity. It has already made improvements to herd management, where emission efficiency per unit of product has increased by about 1 per cent annually since 1990. However, Uruguay faces challenges, compounded by the COVID-19 pandemic, in strengthening technology transfer and providing finance and extension services to small family farmers, and improving decision support systems in relation to climate risk management and drought index insurance.

22. A representative of Indonesia highlighted the challenges associated with a country having many different livestock management systems, ranging from traditional smallholder grazing systems on public land to improved systems using high-quality grasses and concentrates to improve feed quality. Better feed leads to increased livestock body weight, milk production and population, and may also have the co-benefits of reducing methane emissions from enteric fermentation by about 3.5–4.5 per cent and indirectly reducing demand for land for grazing or feed production owing to increased efficiency. Deploying best practices such as applying manure to agricultural land has been found to improve soil structure, soil organic matter content and soil fertility, which helps to increase crop production and resilience to climate extremes. Biodigestion of manure can be used as an

energy source on farms, while enhancing breeding strategies has been observed to increase the overall efficiency and resilience of herds. A particular challenge lies in increasing farmers' capacity to adopt necessary technology as well as their access to capital, as low-income farmers do not have the means to invest in expensive technology.

23. A representative of Egypt described the challenges facing the country with regard to livestock management systems, which include loss of agricultural land due to desertification and environmental factors such as drought and salinity. Water scarcity and food security must be considered holistically in agriculture. Egypt is below the water poverty line, making it difficult for the country to meet its water demand for agriculture. Adverse global climate change effects on water resources may further reduce the quantity and quality of accessible water. The increases in the productivity of Egypt's livestock management systems achieved so far are not sufficient to meet the increasing demand from its growing population. To enhance production, the agriculture sector needs to be expanded, including by further developing agribusiness and irrigated farming techniques and improving water management.

C. Presentations by expert panellists

24. In the panel discussion, experts representing non-State actors responded to the following questions:

(a) What are the key challenges and barriers in relation to achieving a transformation in agriculture that leads to improving livestock management systems, including agropastoral production systems and others?

(b) How can the KJWA, UNFCCC constituted bodies and other actors help to address these challenges?

25. A farmer from Uganda, on behalf of farmers and agricultural NGOs, explained that integrating crop and livestock farming makes it possible to close nutrient cycles, reduce on-farm waste and lower dependency on external inputs for fertilization, resulting in benefits for poverty reduction, ecosystem services, food security and nutrition. Pastoralism provides several co-benefits related to socioeconomic services in drylands and highlands where crop cultivation is not suitable. Further, the efficiency of meat and dairy production can be increased by, for instance, improving animal health, avoiding feed losses, increasing feed testing and reducing nitrogen in feed. Animal breeding plays a fundamental role in animal health, robustness and productivity as well as overall resilience. The farmer emphasized that farmers, alongside increased ambition in NDCs, are essential to making progress towards the SDGs. In her view, promoting sustainable consumption patterns, reducing food waste, improving grazing management, increasing nitrogen use efficiency, reducing deforestation and improving manure storage and processing are key.

26. A representative of business and industry NGOs emphasized that, given the considerable diversity of application of livestock agriculture globally, specific solutions will differ for each business. Exchanging knowledge is critical; but, in order for them to apply this knowledge to their livestock systems, farmers need to have confidence in the solutions. Further, climate action must not be at the expense of ending poverty and must take into account the contribution of livestock to meeting the nutritional needs of a growing global population, with the aim of increasing livestock's contribution towards achieving the SDGs. Implementing simple solutions to improve cattle health makes economic sense and reduces GHG emissions. The representative encouraged collaboration with businesses, which have the capacity to put science and knowledge into practice and upscale solutions. Businesses can also encourage and support the development and adoption of methodologies for quantifying emissions.

27. A representative of environmental NGOs stated that the greatest challenge in improving livestock management systems is overcoming the dominance of industrial animal agriculture, which is crowding out more sustainable systems and practices. She added that mass production and overconsumption of animals for food in certain regions have led to dramatic increases in the number of these animals and the related GHG emissions. The applied industrial model with long supply chains has not only contributed to emission

increases due to land-use change and non-CO_2 gases, but also to biodiversity loss, nitrate pollution, dead zones, increased incidence of zoonotic diseases, and public health impacts such as antimicrobial resistance and cardiovascular disease. In the view of environmental NGOs, the KJWA should explore ways to facilitate a shift towards less and better livestock production. Parties and the KJWA can help to address associated challenges and catalyse a transformational shift in livestock systems, taking into consideration the role of diets in livestock management systems, through NDCs, national climate and adaptation plans, and the GCF. The representative added that it is critical for livestock-related climate action to be assessed on the basis of resulting reductions in absolute emissions rather than reductions in emission intensity.

28. A representative of research and independent NGOs presented research on the relationship between land, livestock and livelihoods in livestock-dominated dryland areas in Kenya and Uganda, which are characterized by rapid population growth and a livestock-dominated agriculture sector. In these areas, a transition from pure pastoralism to more intensive agropastoralism is taking place. Many of the farm systems in these areas fall somewhere between free-ranging pastoralism and crop agriculture, rather than focusing on one or the other, which represents a key challenge: traditional knowledge systems and policies tend to be geared towards either pastoralism or crop-based systems, but not towards systems combining aspects of both, resulting in gaps in knowledge and experience in relation to the current shift in production systems. The representative added that more research is required on how to improve efficiency and sustainability in these environments, for example using a land degradation surveillance framework combined with experimental data. The representative emphasized the importance of communicating the findings to end users and livestock farmers to make the research more immediately useful.

29. A representative of the women and gender constituency explained that discussions surrounding agriculture in the context of climate change have long focused on massification and technological approaches to increasing unsustainable food production without sufficient consideration of how inequalities affect access to land and other resources needed for productive, healthy, sustainable and resilient livelihoods, particularly for women, or how climate change is exacerbating the already unequal access to adequate, nutritious food for all. She added that food sovereignty, gender equality, agrobiodiversity and human rights should guide and underpin the KJWA. Policies and measures relating to small-scale agriculture, livestock farming and climate change need to take gender into consideration. Unsustainable intensive large-scale livestock farming results in land degradation, rural depopulation, deforestation, and depletion and pollution of water and soils, and has significant negative impacts on human health, both directly as a result of agrochemical contamination and inappropriate use of fertilizers, and indirectly by producing unhealthy and nutritionally unbalanced food. The currently prevalent large-scale livestock and agro-industrial model has also failed to address persistent and often chronic malnutrition and starvation, especially among economically marginalized women and children in the global South. In the view of the constituency, Parties should be assisted in integrating food-related and agricultural objectives into their NDCs, such as reducing food loss and waste and promoting plant-based diets. Another important step is identifying and removing or redirecting perverse subsidies and incentives that jeopardize achievement of the Paris Agreement goals.

30. A representative of youth NGOs highlighted financial and knowledge barriers preventing farmers from taking effective climate action. For example, farmers face difficulties accessing funding or loans for long-term measures such as improving production practices, and the price of food does not reflect the environmental and human health costs of its production. In addition, farmers are not adequately encouraged or incentivized through subsidies and agricultural development funds to improve their production practices: only 1.5 per cent of agricultural aid globally is being allocated to supporting agropastoral practices. This, in the view of the constituency, needs to be changed, and true-cost accounting adopted. In terms of knowledge barriers, the benefits of improving livestock management systems are not clearly communicated to farmers, and those benefits may still be considered controversial in some settings. The constituency believes that this lack of consensus on the benefits may be because there is no conflict of interest policy for industry involvement in the KJWA and UNFCCC activities. The representative added that lack of adequate land tenure rights for farmers in many regions often represents an additional barrier, which discourages long-term

investment in improving practices. Furthermore, female farmers do not necessarily have the same access as male farmers to education, loans and funding. The constituency therefore recommends promoting gender equality in this regard and addressing the issue of land tenure rights.

D. Presentations on work undertaken by constituted bodies and financing entities

31. Seven experts made presentations on the work of their respective body or organization, guided by the following questions:

(a) What work is your body or organization undertaking to improve livestock management systems, including agropastoral production systems and others?

(b) How does your body or organization address co-benefits and synergies with multiple objectives in improving livestock management systems?

(c) How does your body or organization set goals and measure progress in improving livestock management systems?

(d) Which challenges has your body or organization faced in improving livestock management systems, and how can the KJWA, UNFCCC constituted bodies and other actors help to address these challenges?

32. A representative of the Facilitative Working Group of the Local Communities and Indigenous Peoples Platform presented an example of indigenous livestock management systems in the Sahel, where agropastoral systems have been developed over centuries and are based on long-term considerations with a view to achieving ecosystem equilibrium, with seasonal migration often also taken into account. These systems are carbon-neutral and contribute to food production, adaptation, mitigation and biodiversity. The representative explained that indigenous communities do not use a system of goals or metrics to measure carbon levels, focusing instead on nutrient cycling and resilient crops, which results in synergies between agropastoralism and biodiversity. Studies regularly point to the significant outcomes of such approaches, such as that indigenous peoples are protecting 80 per cent of biodiversity by applying traditional knowledge. There are challenges in relation to these systems, however, concerning the rights of indigenous peoples, including land rights, sharing of benefits and intellectual property rights.

33. A representative of the CTCN presented on its work relating to livestock management systems. The CTCN promotes accelerated development and transfer of climate technologies for energy-efficient, low-carbon and climate-resilient development by providing technical assistance and training to developing countries to help them to fulfil their NDCs. For example, the CTCN is designing and upscaling climate-resilient waste management and energy capture technologies at livestock farms in Ecuador with the aim of gathering experience for development of a national biomass programme. The mitigation benefits of the project are reduced energy consumption and reduced use of nitrogen fertilizers, while the adaptation benefits include securing the distribution chain and reducing production costs, while initiating the application of more resilient agroecological practices. The representative added that possible co-benefits of the project include improved water quality due to less liquid waste being discharged into nearby rivers, increased energy sovereignty, and lower production costs and increased income resulting from lower synthetic fertilizer costs.

34. A representative of the GEF highlighted that 1.7 billion people worldwide depend on livestock systems, which account for 40 per cent of global agricultural gross domestic product. Livestock management is eligible for GEF support through several funding windows addressing environmental impacts, such as mitigation, adaptation, biodiversity and land degradation. The aim is to support large-scale transformation towards sustainability, while prioritizing approaches that achieve multiple environmental benefits and demonstrate synergies with the objectives of the three Rio Conventions. Co-benefits must also be considered, such as diversified income for smallholder pastoralists and farmers, which can enhance the resilience of their livelihoods. Key project activities funded by the GEF include reforming policy and legislation relating to livestock and pasture management; integrated

land-use planning; capacity-building for institutions, communities and stakeholders; measurement, reporting and verification; sustainable management of crop–livestock systems; land restoration; promoting technology use at the farm level; making supply chains more sustainable; diversifying agroecological food production systems; and generating and diversifying rural income. The Least Developed Countries Fund and the Special Climate Change Fund provide support specifically for ensuring sufficient water supply for pastures, increasing resilience to drought, and monitoring and implementing early warning systems for disasters.

35. A representative of the Adaptation Fund explained that projects in the livestock-related sectors of agriculture, rural development and food security account for around 40 per cent of its funding portfolio. About 20 such projects are aimed at improving livestock management directly through specific adaptation action, such as improving livestock productivity, husbandry practices, pasture species and the forage mix, reproductive efficiency and access to finance and markets. The projects also offer multiple co-benefits, such as improved crop productivity through manure and animal traction; circular economy, including producing energy from biogas; local job creation; and improved nutrition and thus health. However, the full extent of environmental co-benefits is not always tracked, such as the effect of better grassland management on soil carbon sequestration. The representative presented details and experience of three projects, in Costa Rica, Rwanda and Uzbekistan. Key challenges in adapting livestock management systems include limited and unpredictable funding; addressing increasing adaptation needs with very limited resources; the multisector dimension of livestock management, which requires stronger coordination efforts at all levels; and lack of dissemination of available solutions and best practices.

36. A representative of the GCF described the Fund's role in financing the improvement of livestock management systems, using two specific examples. The aim of one GCF project in Mongolia is to strengthen the resilience of resource-dependent herder communities to climate change through an integrated end-to-end approach that ranges from climate forecasting and climate-informed planning to implementation of ecosystem-based adaptation for land and water, value chain development, gaining market access and policy transformation. The project is focused on adaptation in a key sector identified as requiring adaptation assistance in Mongolia's NDC and technology needs assessment. Since the project is focused on adaptation, potential mitigation outcomes are not being measured. Another cross-cutting project is focused on ecosystem-based adaptation and mitigation in communal rangelands in a country in sub-Saharan Africa. Its objectives are to reduce GHG emissions from cattle and land use by restoring rangelands and introducing private sector incentives for establishing sustainable livestock value chains; and to increase the resilience of communal rangeland communities to more frequent and intense drought. By improving rangeland conditions, the aim is to enhance forage quality and improve the health and herd characteristics of livestock, while achieving important co-benefits such as job creation, emission reduction and increasing household income.

37. Two representatives of the World Bank presented its perspective on improving livestock management systems. Increasing populations and incomes drive growth in demand for animal products, and the environmental impacts of this will increase proportionally unless changes are made to the production systems. Rangeland and feed productivity are already being negatively affected by climate change across the world, with severe consequences for 200–500 million pastoralists, who are among the most vulnerable to climate change impacts. The livestock sector needs to be sufficiently resilient to absorb the impacts of adverse events and have the capacity to adapt to and minimize risk. The main entry points for reducing GHG emissions from the livestock sector are through increasing productivity and decreasing GHG emission intensity, for example by improving livestock management practices, enhancing soil carbon sequestration through improved grazing management practices, deploying energy-efficient equipment and replacing fossil fuel energy consumption with renewable energy use. The principles are commonly known, but pursuing a resilient, low-carbon path in the livestock sector requires further knowledge, investment and an adequate institutional and policy environment. The World Bank focuses on projects where investing in adaptation and mitigation makes economic sense, supporting countries in transforming high-level commitments relating to sustainability, mitigation and adaptation, such as those included in their NDCs, into action. It does this, for example, by building countries' confidence to take

action, such as by providing them with technical assistance, and analysing and proposing options. Coherence must then be developed between the various triggers of change in livestock value chains, such as incentives, extension services, conditionality of public support and access to land. Support is required for developing metrics and collecting data for extension and advisory services in order to gather evidence of the need to adjust public expenditure.

IV. Summary of discussions and way forward

A. Summary of discussions

38. The plenary discussion was guided by three questions:

(a) How could the UNFCCC constituted bodies be further involved and synergies be enhanced in improving livestock management systems, including agropastoral production systems and others?

(b) Which modalities would be useful for implementing activities for improving livestock management systems?

(c) How is improving livestock management systems linked to other KJWA topics, and how can synergies be achieved?

1. Practices and approaches

39. Participants greatly appreciated the detailed presentations of specific examples of improving livestock management systems and possible trade-offs and synergies. They agreed that, to ensure successful implementation of climate action in livestock management, the benefits and co-benefits, including socioeconomic and food security dimensions, must be considered holistically. Activities that offer benefits for adaptation, mitigation and food security simultaneously were considered the best options.

40. Participants agreed that it is easy to prioritize options that offer benefits for both adaptation and mitigation, but more complicated where there are trade-offs; for example, if a mitigation option would lead to reduced adaptive capacity. Experts discussed that both adaptation and mitigation are required in the agriculture sector in all countries, but the interplay between them will depend on local conditions. One expert mentioned that the more mitigation action, the less adaptation is required; but mitigation cannot be achieved by the agriculture sector alone, and adaptation has already been necessary in the sector as the impacts of climate change are being observed and felt by farmers in many regions. Farmers tend to be more immediately interested in adaptation than in mitigation, as they are already feeling the effects of climate variability. The lack of tools and models for measuring the impacts of climate change and adaptation measures on livestock was noted.

41. Participants discussed intervention options for improving livestock management systems, such as grazing management, improving feed quality and enhancing animal health, which are often interrelated; for example, higher-quality feed can lead to better animal health, enhancing in turn the resilience and productivity of the animals. Investing in animal health can also be very economical for farmers. Furthermore, research demonstrates that modest improvements in feed use efficiency can reduce land expansion. Socioeconomic and ecological sustainability and resilience need to be at the centre of considerations on improving livestock systems.

42. Several experts emphasized that evaluations and policies must be adequately tailored to the wide variety of production systems, climates and local and regional contexts, considering the large diversity of livestock management systems worldwide, and take into account traditional and local knowledge. Approaches to livestock management will continue to vary in different environments; they will not be replaced by one single global system. In addition, variations across climate zones need to be taken into account: not all solutions that are practical and economical in temperate regions can be used in tropical regions, and vice versa.

43. The benefits of integrated systems for crop and livestock agriculture were discussed. They offer considerable potential to increase the sustainability of livestock management systems and deliver environmental services and benefits beyond meat and dairy production; the challenge is in designing systems to suit local environmental, socioeconomic and cultural conditions. To fully understand the benefits – such as for adaptation – additional indicators may be required, and further research is needed into how integrated systems could be most beneficial overall.

44. There is ongoing research into how to reduce methane emissions from enteric fermentation using different methodologies, such as methane inhibitors or vaccines, to influence the bacteria in the rumen. Participants raised concerns about putting the animals and ecology at risk. Experts agreed that long-term studies are required to assess the feasibility and impacts on animal health of such emission reduction options.

45. An expert explained that, while all emission pathways towards the temperature goals of the Paris Agreement involve reducing CO_2 emissions to zero, there is a range of scenarios for reducing methane emissions, with a mid-range reduction of 30 per cent by 2050. While aiming for net zero methane emissions by 2050 may not be realistic, it may also not be necessary given the short-lived nature of the GHG in the atmosphere. Moreover, while the warming effect of methane in the atmosphere does not differ depending on the emissions source, some participants noted that it makes a difference whether a gas molecule is constantly moving through the cycle – from atmosphere to animals to plants and then back into the atmosphere – or whether it is an additional molecule added to the atmosphere from fossil fuels captured millions of years ago.

46. Some participants emphasized that the application of fewer and better livestock systems should be considered, and that reducing total livestock numbers and emissions merits further discussion under the KJWA because of the potential to underpin transformational change in agriculture. One expert emphasized that such considerations must be context-specific and differentiate between developed and developing countries. Several participants emphasized that access to food resources and food security should be a priority for a growing population. One participant added that countries with good growing conditions could be considered to have a moral obligation to produce more food and contribute to global food security. It was concluded that it is difficult to strike a balance between emission reduction targets for livestock systems and food security at the global level, as trade-offs may differ by region.

47. Several participants suggested that making dietary changes, particularly in developed countries where overconsumption is prevalent, is a quick and effective way of reducing emissions from livestock, while simultaneously reducing pressure on land and ecosystems. This would involve encouraging shifts away from consumption of animal products, while ensuring that livestock continues to fulfil important functions for ecosystems, nutrition and livelihoods. One expert countered that the simple solution of making dietary changes may have been overblown, particularly given that some high estimates of its mitigation potential do not seem to have been based on thorough analysis of cultural, social, political and economic realities. Several participants agreed, adding that the discussions fall outside the remit of the UNFCCC.

2. Measurement and data

48. Several participants emphasized the importance of reliable data and suitable monitoring methodologies for setting targets and guiding transformational climate action in the livestock sector. Ex ante and ex post indicators may be used to measure the design quality and performance of a project, respectively. While general guidelines on measuring mitigation effects exist, indicators for measuring adaptation and resilience are more diverse and complex. In general, participants agreed that measurement efforts should be based on countries' existing systems, data and capacity.

49. While priorities may differ by project, the basic data requirements are largely the same whether the objective is adaptation or mitigation, with information on livestock numbers, animal health and feed quality required in any case. Participants agreed on the importance of building national capacity to acquire necessary data and build data systems, highlighting that

countries have different starting points with regard to measurement, and that institutions and projects should build on existing national data and indicators and efforts to develop them. Representatives of several institutions indicated that they are carefully examining existing national experience with a view to upscaling efforts that have proven effective thus far.

50. In this context, discussions also addressed private sector involvement, such as active private company investment in climate action in the agriculture sector on the basis of the potential increase in its profitability indicated in pilot studies. One expert mentioned that the private sector could also play a significant role in providing data, as it often has access to the most frequently updated, granular and diverse data. Improving the accuracy of national GHG inventories was highlighted as being in the interest of the private sector.

51. Often, metrics are used to calculate the warming effect of non-CO_2 GHGs in CO_2 equivalent as it is easier to use a single measurement unit for all emissions. The choice of metrics has significant implications for the weight of the calculated contribution of methane emissions to global warming. While the standard approach is to use IPCC GWP values with a 100-year time-horizon, participants discussed the advantages and disadvantages of other metrics, such as GTP and GWP* values. Some participants considered that using a 100-year time-horizon for methane emissions is unfair since methane stays in the atmosphere for a much shorter period of time. Other participants cautioned that discussions on metrics would be better held by the IPCC itself. One expert explained that most climate models do not use such metrics for conversion but consider the individual behaviour of the given gas in the atmosphere, which may be the most accurate way of looking at warming effects and could also be useful for setting separate targets by gas in long-term strategies without using metrics to convert to CO_2 equivalent.

52. Participants emphasized the importance of determining how livestock interacts with multiple socioeconomic and environmental factors. Improving livestock management systems can be an important part of the solution for mitigation, with many potential co-benefits beyond adaptation and mitigation, including contributing to achievement of the SDGs. As such additional benefits are often not easy to measure, several participants suggested that the KJWA could raise awareness of the importance of measuring co-benefits, as well as provide space for further discussion on the matter.

53. For estimating emissions from livestock, many countries use default IPCC emission factors and tier 1 methodologies, which results in comparatively large uncertainties. Participants highlighted the need to use better data and higher-tier methodologies adjusted to local circumstances, which will require a lot of work for many countries. Climate change impacts may also affect the uncertainty of emission factors and estimated mitigation potential, but this requires further research.

54. One participant questioned how to measure emissions from imported and exported livestock products fairly. Other participants emphasized that such consideration is not limited to livestock or agricultural products, as Parties are required to report emissions on the basis of production rather than consumption. While data on consumption could be used for reporting, this would be extremely complicated.

3. Support

55. Participants noted that it is often not clear how much funding developing countries can expect for agricultural projects, particularly those related to livestock and climate change. They discussed how to unlock means of implementation for livestock projects and how to use existing support more effectively.

56. The representatives of financing entities emphasized that the success of livestock projects strongly depends on project ownership and coordination at the country level. This is important as often the priorities for country support are determined during discussions between the financing entity and the Government, for example for allocations through the GEF System for Transparent Allocation of Resources. Financing entities often have readiness programmes aimed at improving countries' access to climate finance. The GCF, for example, allocates up to USD 1 million per country per year for a wide variety of readiness activities, including feasibility studies, project preparation facilities, adaptation planning, capacity-

building for measurement, reporting and verification of mitigation effects, and measurement and evaluation of adaptation effects.

57. Regarding specific barriers to the provision of support for livestock projects, one challenge is that livestock is often not classified as a project category in itself, but included within agriculture, where it may be overlooked. The GEF representative highlighted that the negotiations to begin in 2021 on the next replenishment of the GEF could provide an opportunity for Parties to discuss this matter with financing entities.

58. The actual percentage of funding allocated to livestock-related climate action is often unknown. Participants acknowledged the difficulty of assessing this percentage, because livestock is a cross-cutting issue that is often integrated into other projects and the relevant data are not sufficiently disaggregated. Several also acknowledged that the focus on livestock under the KJWA could encourage advancement of the introduction of related taxonomy and disaggregation of data in relation to agricultural projects, which could facilitate assessment of available climate finance for livestock projects while avoiding double counting of support.

59. The complex interactions between livestock and the environment, and the different and complex resulting socioeconomic and environmental benefits, were seen as another barrier to provision of support for projects. The GCF representative explained that livestock projects have so far tended to focus on adaptation only, as it is difficult to measure mitigation effects of livestock projects addressing adaptation and mitigation simultaneously. The cross-cutting livestock project mentioned in the GCF presentation has not yet been approved by the GCF Board because GHG experts are still working on the methods, in particular for carbon sequestration over a 20-year period, for quantifying improvement in cattle health and reduction in enteric fermentation. One participant highlighted the difficulty of accessing funding for livestock projects focused on biodiversity, because the requirements of the funds are not well suited to projects that promote improvements in grassland management to restore biodiversity. On the question of whether the GCF accepts projects aimed at reducing emission intensity as a valid mitigation strategy for livestock, the GCF representative responded that the issue of measuring related mitigation effects is currently under discussion internally.

60. Regarding the types of funding available for improving livestock management systems, some participants shared their difficulties in accessing grants, highlighting that it appears to be easier to obtain loans with lower interest rates or longer terms. This could be particularly challenging given the impact of the COVID-19 pandemic, such as the limited capacity of Governments to take out loans against sovereign guarantees. The GCF representative emphasized that co-financing levels are an important factor in accessing grants, and how the GCF can support countries recovering from the effects of the pandemic is being discussed.

61. The representative of the CTCN responded to questions on its technology transfer activities for livestock projects. The CTCN does not have many livestock-specific projects because it bases its work on country requests, which are not often for assistance in the livestock sector. The representative encouraged entities to consider submitting requests for technical assistance relating to livestock and climate change, noting that the CTCN is working to improve its communication on the scope of the technical assistance that it provides. One participant highlighted that transferred technology needs to be adjusted to local circumstances; for example, raising resilient breeds of livestock with certain feed requirements may not be suitable in areas with low biomass productivity.

62. One participant suggested discussing overlaps between projects and how the impact of investment in improved livestock management systems can be maximized by enhancing collaboration. Representatives of several financing entities highlighted the important ongoing work under the operational framework on complementarity and coherence, where donor agencies, institutions and financing entities have the opportunity to learn from each other and harmonize methodologies.

4. Cooperation and partnerships

63. Participants emphasized that the KJWA provides a useful platform for multidirectional exchange of information. In this context, it would be very helpful to feed countries' and implementing entities' experience into the KJWA, which could inform the

discussion on collaboration, including on how to quantify the impacts of adaptation measures and how to address challenges and barriers to implementation.

64. Some participants emphasized that innovation is required to develop adaptation and mitigation solutions that are tailored to the diverse livestock management systems and concepts worldwide. The KJWA can highlight opportunities for developing agricultural innovation systems and reward innovation in both the public and private sector, including multi-stakeholder partnerships. Some partnerships for specialized technical work have already been launched by Parties, such as the Climate and Clean Air Coalition to reduce short-lived climate pollutants and the Global Research Alliance on Agricultural Greenhouse Gases. Such international collaboration can support raised global ambition for adaptation and mitigation in the agriculture sector.

B. Way forward

65. The livestock sector plays an important role in agriculture and global food security in the context of climate change. Workshop participants emphasized that the positive and negative effects of livestock management systems on livelihoods and the environment are complex and location-specific. Simple global solutions to livestock and climate change issues do not exist. Thus, Parties must continue to exchange knowledge and experience with a view to implementing policies at the regional and national level. The national level was considered to be the most appropriate setting for effectively evaluating local circumstances, needs and priorities for implementing scientifically supported action at the local level, taking into account the diversity of agricultural practices and systems, local populations and climate variation. Improving the sustainability and productivity of livestock management systems in order to achieve multiple benefits, including contributing to achieving the objectives of the three Rio Conventions and the SDGs, is a priority in the agriculture sector.

66. Improving livestock management systems in the context of a changing climate is a real challenge and targeted support is required to transform the sector while safeguarding food security. The KJWA can help Parties to create an enabling environment that allows donor agencies, institutions and financing entities to mobilize dedicated means of implementation for livestock projects, including climate finance, technology transfer and capacity-building. Several representatives of constituted bodies and financing entities highlighted that clear messages delivered under the KJWA on the needs and priorities of developing countries for support in relation to agriculture, livestock and climate change would be very helpful. Participants encouraged Parties to use the KJWA to strengthen national coordination at the strategic level, for example in the context of including holistic livestock activities and objectives in national strategy documents, such as national adaptation plans and NDCs.

67. Participants emphasized the need to expand knowledge on the complex range of advantages and disadvantages of livestock management systems and related interventions with multiple objectives. Some suggested that the KJWA could support the development of a methodological framework for monitoring mitigation and adaptation action in the area of livestock farming. Reliable data would help to determine what is and is not working, and to establish baselines for determining the way forward. The KJWA can also support countries in addressing technical, capacity and priority-setting bottlenecks in assessing and monitoring livestock resilience and GHG emissions, including through provision of guidance on how to accurately capture livestock-related emissions and removals in national GHG inventories.