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Livestock, natural resource use, climate change and environment

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I. Challenges

1. Livestock are raised in many forms, including pastoralist and grazing systems, mixed crop-livestock and industrial systems. They support the livelihoods of hundreds of millions of people in all types of agroecosystems in the world. They also help poor people survive in marginal areas, withstand climate shocks and adapt to climate change.
2. Climate change can have devastating impacts on the health of livestock. It can also affect disease patterns (e.g. incidence, spread and predictability of livestock and zoonotic diseases) making outbreaks harder to control and increase associated losses.
3. Livestock have the potential to contribute to the conservation of biodiversity and genetic resources for food and agriculture. Grazing lands, including dryland rangeland biomes, host more than a third of world's ruminants. If managed sustainably, livestock can contribute to important ecosystem functions, nutrient cycling, soil organic carbon sequestration and maintain agricultural landscapes.
4. Livestock are the biggest user of agricultural land for feed, including forages. Permanent meadows and pastures cover about one quarter of the Earth's land area and account for some 70 percent of agricultural land. While a large proportion of pastures cannot be cropped, inadequate grazing management is causing land degradation and contributes to biodiversity loss. The large majority of plants consumed by livestock are roughages (grass and crop residues). However, approximately one-third of the cereals produced globally are used as feed. In some areas, the expansion of arable land at the expense of forest is driven by feed production.
5. Livestock contribute to Greenhouse Gas (GHG) emissions directly, mostly through enteric fermentation and manure, and indirectly through the production of feed (crops and forages). Livestock systems generate large volumes of manure and by-products and leak nutrients into water and air.
6. The effects of COVID-19 on the livestock sector are largely unquantified and yet to be fully felt. Current observations reveal severe disruptions to livestock value chains along with their dire food security and socio-economic consequences. This could result in less efficient livestock production in some cases and reduced investments in improving the environmental impact of the sector.

II. Solutions

7. The negative environmental impacts of livestock can be reduced, and the delivery of ecosystems services enhanced by adopting nature-based solutions, best practices and innovations. Livestock are particularly key to climate solutions in agriculture.
8. Diversification in terms of incomes, resources, genetics and production systems is key to resilience: keeping animals of different species and breeds can help producers be less vulnerable to climate change and other shocks. Animal mobility within and between agroecosystems transfers nutrients, biomass and water in the form of animal manure, contributes to biodiversity by connecting ecosystems and moves people's assets in times of disasters such as floods or drought. Mobility is particularly important for pastoralists as a key strategy to manage environmental variability. Adapted veterinary services to mobile pastoral livelihood is an essential need to prevent diseases spread as well as to increase livestock performance and animal welfare.
9. Improving productivity is key to reducing the negative impact of the sector. In particular, low carbon livestock and higher resource use efficiency can be achieved by better management at herd or flock and individual animal level. For example, improving feed quality, reproduction practices, prevention and early detection/response to animal disease threats as well as improving the management of animal genetic resources could improve efficiency of land and water use and reduce emissions from the sector by up to 30 percent.
10. Soil carbon sequestration through regenerative grazing practices and restoring degraded rangelands can help put carbon back in the ground, while also improving biodiversity and water quality, especially in extensive grazing systems. This can be done by adjusting grazing pressure, managing nutrient cycles, nitrogen fixing introducing species (e.g. legumes), supporting safe mobility

of animals and the integration of trees with crops and pastures (agro- and silvopastoralism). Trees can also reduce heat stress and produce fodder.

11. In large scale ruminant or monogastric production where animals are kept in stables, manure management can be improved to avoid nutrient losses. Manure is rich in nutrients and organic matter, which are key to the physical, chemical and biological properties of healthy soils. Manure, but also waste from slaughterhouses and dairy plants, can be used to generate biogas and energy through anaerobic digestion.

12. Halting expansion into forests for feed production and pasture is an effective way for livestock systems to tackle climate change and revert biodiversity losses. This can be achieved by conserving and utilizing alternative feed material, giving preference to underutilized crop residues, food waste, agro-industrial by-products, insects and algae and strengthening communal management of natural resources. Environmental impacts of feed traded on international markets, through deforestation and synthetic fertilizers in the producing countries and through nutrient leakages from manure in importing countries, should also be reduced by policy and regulatory measures implemented by importing countries.

III. What FAO is doing to help countries

13. FAO is developing tools, methodologies and guidelines to assess the environmental impacts of livestock systems and to identify best practices¹ and governance.

14. FAO is building the capacities of governments, livestock farmers, private sector and funding institutions to use these tools and methods for national GHG inventories, access to climate finance, and investments plans for the adoption of best practices and responsible governance. This includes projects with the World Bank, the International Finance Corporation (IFC), International Fund for Agriculture Development (IFAD) as well as national development banks. FAO is also supporting farmers apply good animal husbandry practices through farmer field schools programs and other technology transfer and information sharing methods.

15. FAO is strengthening the knowledge and evidence base by developing baseline assessments and evaluating the impacts of technical options to improve the environmental performance of the sector. This includes publications², policy briefs³, but also contributions to the Intergovernmental Panel on Climate Change (IPCC) and to United Nations Framework Convention on Climate Change (UNFCCC) processes like the Koronivia Joint Work on Agriculture. FAO is also coordinating the Pastoralist Knowledge Hub.

16. FAO pilots and validates best practices to improve livestock-environment interactions through projects and support to up-scaling and investments. This includes projects funded by the Climate and Clean Air Coalition (CCAC), Global Environment Facility (GEF), the Green Climate Fund (GCF), the World Bank and the European Commission.

17. FAO, in collaboration with the World Organization for Animal Health (OIE), the World Health Organization (WHO), the International Atomic Energy Agency (IAEA) and with the United Nations Environment Programme (UNEP) champions programmes and strategies for the control, elimination and eradication of economically important animal diseases, such as the global Foot and mouth disease (FMD) control strategy, the Global Strategy for the Eradication of the Peste des Petits Ruminants (PPR), the Programme Against African Trypanosomosis (PAAT), and other food-borne,

¹ FAO. *Tool for Agroecology Performance Evaluation (TAPE)* <http://www.fao.org/agroecology/tools/>; *the Global Livestock Environmental Assessment Model (GLEAM)* <http://www.fao.org/gleam/en/>; *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests* <http://www.fao.org/tenure/voluntary-guidelines/en/>

² FAO. *Tackling Climate Change Through Livestock* <http://www.fao.org/3/a-i3437e.pdf>; *More Fuel for the Food/Feed Debate* http://www.fao.org/ag/againfo/home/en/news_archive/2017_More_Fuel_for_the_Food_Feed.html

³ FAO. 2018. *Shaping the future of livestock* <http://www.fao.org/publications/card/en/c/I8384EN/>; *Livestock and agroecology* <http://www.fao.org/3/I8926EN/i8926en.pdf>; *Five practical actions towards low-carbon livestock* <http://www.fao.org/3/ca7089en/ca7089en.pdf>

zoonotic and newly emerging diseases, including at the animal-human-wildlife-ecosystem interface, as well as for Antimicrobial Resistance (AMR).

18. FAO provides convening platforms⁴ for intergovernmental processes and multi-stakeholder partnerships for better integration of environment with broader sustainability objectives, such as food and nutrition security, livelihoods and economic growth, animal health and welfare and related public health.

IV. Conclusions

19. Solutions for reducing livestock's negative environmental impacts require coordinated action, incentives and adequate policies, including regulations and market measures. FAO has a key role to play in this coordination, while supporting the necessary balance with other dimensions of sustainability. FAO is also in a unique position to provide an adequate support to countries ensuring they are capable of implementing and enforcing their policies and regulations.

⁴ For example: the Intergovernmental Working Group on Animal Genetic Resources (ITWG AnGR), the Committee on World Food Security (CFS); the Global Agenda for Sustainable Livestock Model (GASL); the Global Soil Partnership (GSP), the Global Framework on Water Scarcity in Agriculture (WASAG), the Pastoralist Knowledge Hub (PKH), the Committee on Forestry Working Group on Dryland Forest and Agrosilvopastoral Systems.