Food and Agriculture Organization of the United Nations

Livestock impacts on biodiversity

Positive contributions and quantitative assessment

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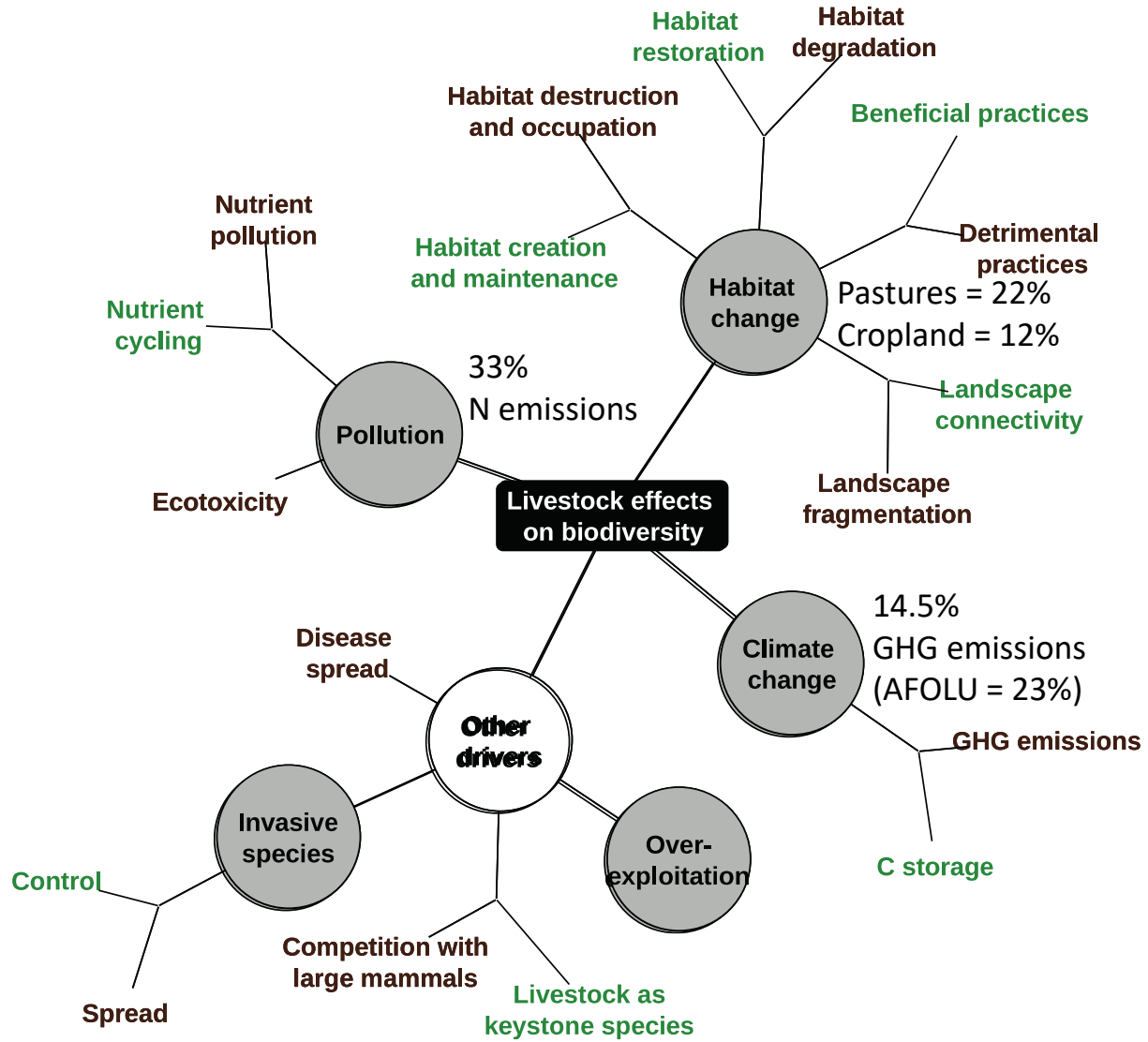
Livestock & biodiversity: a big picture

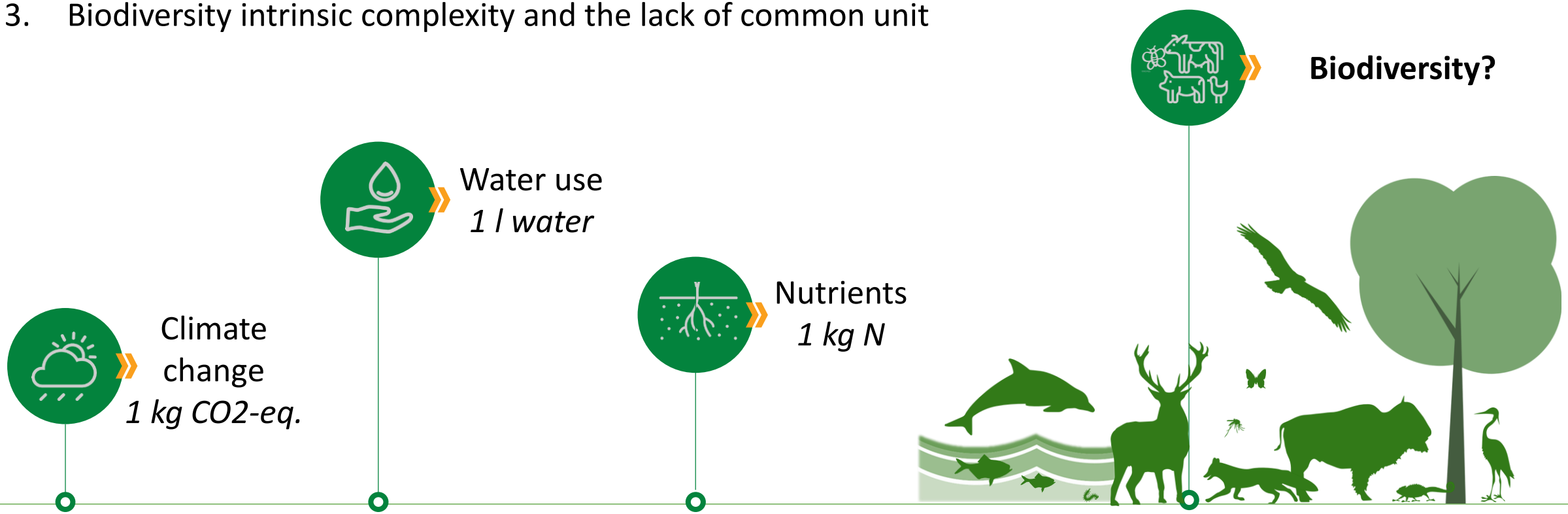
- Livestock contributes to all 5 global drivers of biodiversity loss
- Within each driver, a number of livestock-specific pressures on biodiversity exist
- At the same time, sustainably managed livestock systems can be of high nature value - in boosting plant species richness, maintaining open habitats that host a unique pool of species, supporting healthy grassland ecosystems providing a range of services…
- Most pressures can turn into benefits for biodiversity depending on livestock management and on the context



MEA 2005, Ramankutty et al. 2008, Gerber et al. 2013, Mottet et al. 2016, Teillard et al. 2016, IPCC 2019, Uwizeye et al. 2020

Three main challenges to biodiversity assessments in the livestock sector

1. A diversity of impacts, ranging from negative to positive
2. Globalized supply chains with on-farm and off-farm impacts
3. Biodiversity intrinsic complexity and the lack of common unit



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Taking on the challenge: LEAP biodiversity guidelines

leap | LIVESTOCK ENVIRONMENTAL ASSESSMENT AND PERFORMANCE PARTNERSHIP

Development process

- 25 international and multi-disciplinary experts
- Sector-level consensus (multi-stakeholder partnership)
- Multi-step review process

Scope

- Local to global scale
- Upstream to downstream of the farm
- Positive to negative impacts
- Diversity of objectives, users, regions, production systems

www.fao.org/partnerships/leap

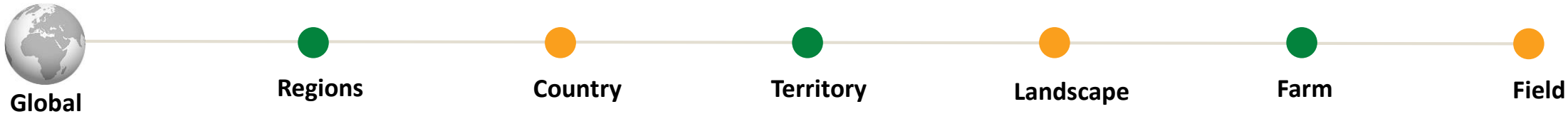
Biodiversity and the livestock sector | LEAP Guidelines for assessment

Life Cycle Assessment (LCA)

- Adapted to larger scales (territory to global) and globalized supply chains
- Suitable for baseline, scenario or hotspot analyses using already available impact factors
- Limited in scope (focus on impact of land use on potential species extinctions, no positive impacts)

Ecological indicators

- Adapted to smaller scales (field to territory)
- Suitable for customized assessments defining conservation priorities through stakeholder engagement
- Constrained by important data collection effort

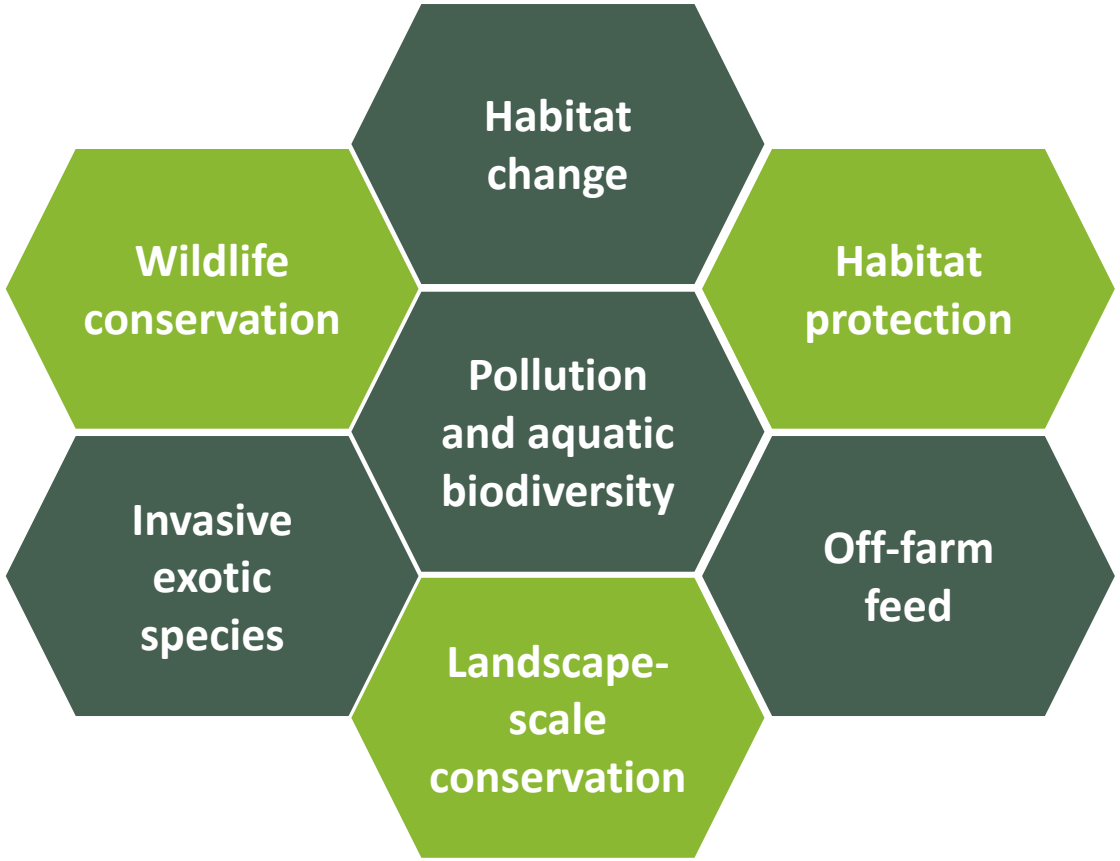


Ecological indicators

Indicator checklist

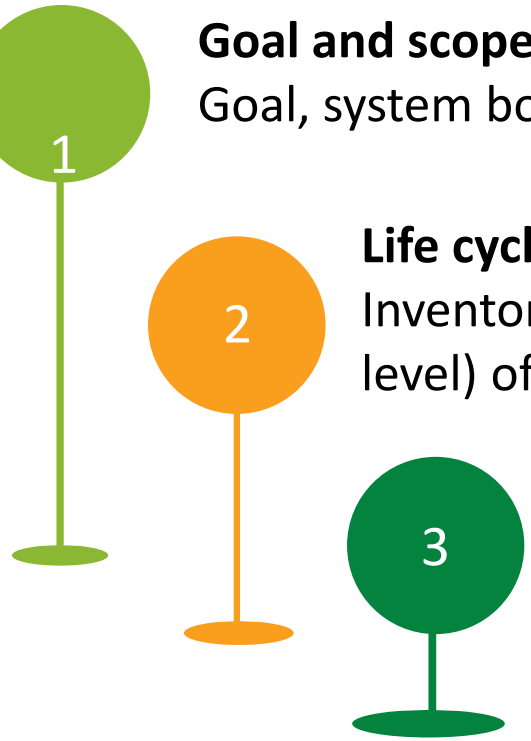
- ✓ The goal of the assessment is defined
- ✓ A scoping analysis is conducted
- ✓ Regulatory constraints and the extrinsic value of biodiversity are considered
- ✓ Key stakeholders are involved at the various assessment steps
- ✓ A plan to monitor biodiversity over time is established
- ✓ Data quality is ensured
- ✓ Results are communicated with transparency

Non-prescriptive list of 50 indicators and detailed guidelines for their selection and application



Life Cycle Assessment

LCA is a standardized tool to support decision making, it is widely used for other environmental criteria (GHG emissions) and follows 3 main steps:



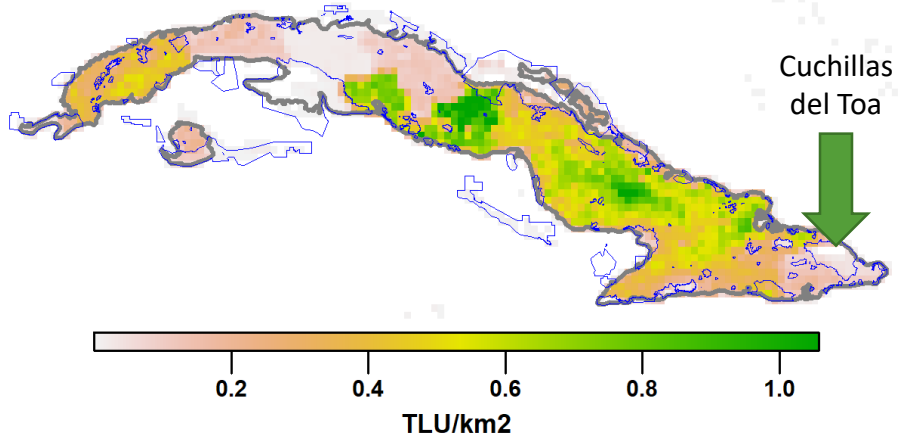
Goal and scope definition
Goal, system boundaries functional unit

Life cycle inventory
Inventory data collected by the user = **land use area and location** (at ecoregion level) of different categories (3 grassland intensity classes of pasture and crops)

Life cycle impact assessment
An existing characterization model (Chaudhary 2018) is used to translate land use into an impact on **Potential Disappeared Fraction** of species (PDF)

Snapshot example 1 on assessment and positive impacts:
baseline vs. project scenario using LCA in Cuba

- LCA was used to compare the effect of land use scenarios on biodiversity
- Current LCA methods cannot reflect absolute positive impacts of livestock, only positive impacts compared to a baseline



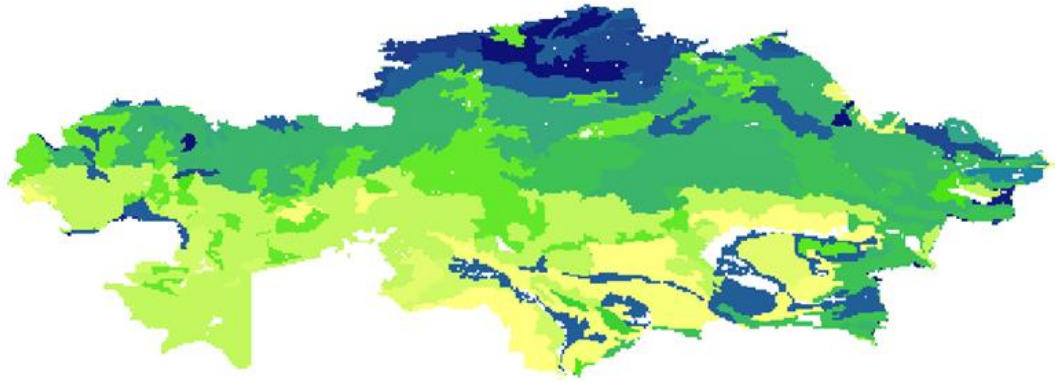
	Land use (km2)			CF
	Baseline	BAU int.	Sust. Int.	(Global PDF/km2)
Minimal use pasture	6	2	18	3.02E-06
Light use pasture	64	69	56	3.22E-06
Intensive pasture	8	24	3	3.39E-06
Current feed	69	92	0	1.05E-06
Sustainably-sourced feed	0	0	96	5.18E-08

Global potentially disappeared fraction of species compared to baseline

- BAU intensification scenario = 8.25E-04 (+25%)
- Sustainable intensification scenario = -1.57E-04 (-48%)

Snapshot example 2: ex ante assessment of a 500 million USD World Bank investment in Kazakhstan using LEAP SOC guidelines

Sequestration potential under improved grazing practices
0.4 t C / ha / year



	2021	2022	2023	2024	2025	Total
Growth in GHG emissions	0.6	1.2	1.8	2.4	3.1	9.2
Carbon sequestration	**1.0**	**2.1**	**3.1**	**4.1**	**5.2**	**15.5**
Fossil fuel displacement	0.01	0.03	0.04	0.05	0.07	0.20
Net emissions under the Program	-0.4	-0.9	-1.3	-1.7	-2.1	-6.4
Net ER (program vs. baseline)	1.4	2.8	4.2	5.6	7.0	20.9

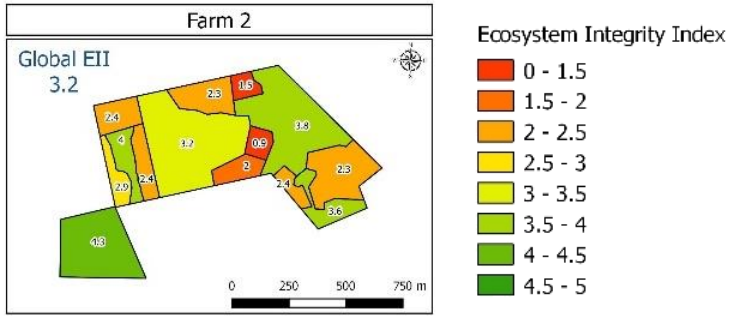
Snapshot example 3: biodiversity indicators for extensive livestock systems in Uruguay

Indicator checklist

- ✓ Scope: farm scale (7 farms), biodiversity at habitat and species level
- ✓ Key biodiversity areas and protected species in the study area are considered, species richness is the main conservation priority
- ✓ Farmers, local NGOs and research institute involved
- ✓ Researchers involved in monitoring plan and peer review process
- ✓ Peer reviewed publications and reports, restitution workshops with farmers, knowledge exchange on management practices

Indicator selection

1. **Habitat change** → **Livestock density, sward height, % bare soil.**
2. **Wildlife conservation** → Species richness and diversity (plants, birds and spiders).
3. **Invasive exotic species** → % cover of invasive plant species.



Conclusions

- LEAP guidelines can support assessments of biodiversity and SOC stock changes for the livestock sector, they are science based and reflect consensus
- The positive impacts of livestock on biodiversity could offer synergies with multiple international commitments on biodiversity and sustainable development
- In theory: large synergies exist between land restoration, grassland biodiversity, biomass productivity, SOC storage and livestock productivity
- In practice: we need more quantitative assessments integrating all these aspects

Thank you

LEAP Biodiversity TAG: The Biodiversity TAG was led by Tim McAllister (Agriculture and Agri-Food Canada and the University of Alberta), assisted by the technical secretary, Felix Teillard (FAO). Members of the TAG were Abhishek Chaudhary (ETH Zurich, Switzerland), Alejandra Martinez-Salinas (Tropical Agricultural Research and Higher Education Center – CATIE, Costa Rica), Arno Krause (Centre for Grassland, Germany), Assumpcio Anton (Institute of Agrifood Research and Technology – IRTA, Spain), Bai Yongfei (Chinese Academy of Sciences, China), Danielle Maia de Souza (Universite du Quebec a Montreal, Canada), David McCracken (Scotland's Rural College, United Kingdom), Eyob Tenkir (Ministry of Environment, Ethiopia), Felix Teillard (FAO, Italy), Fernando Aiello (Faculty of Agricultural Sciences, National University of the Littoral – UNL, Argentina), Greg Thoma (University of Arkansas, United States of America), Jason Sircely (International Livestock Research Institute – ILRI, Kenya), John Finn (Agriculture and Food Development Authority – Teagasc, Ireland), Mario Barroso (The Nature Conservancy, Brazil), Marta Alfaro (Agricultural Research Institute – INIA, Chile), Michael Scarsbrook (Fonterra Co-operative Group, New Zealand), Nico Polman (Wageningen University and Research – WUR, the Netherlands), Olga Barbosa (Austral University of Chile, Chile), Oscar Blumetto (INIA, Uruguay), Philippe Jeanneret (Agroscope, Switzerland), Suia Kafure da Rocha (Ministry of Environment, Brazil), Vania Proenca (University of Lisbon – ULisboa, Portugal), Vincent Manneville (French Livestock Institute – Idele, France). In addition, Sarah Pogue, Mohammad Reza (Agriculture and Agri-Food Canada) and Majid Iravani (Alberta Biodiversity Monitoring Institute, Canada) provided inputs on specific aspects of the document.

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Hosting of 2nd TAG workshop: International Livestock Research Institute, Nairobi, Kenya