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“Reconcile land system changes  
with planetary health”

## Sustainable livestock and the 2030 agenda: mapping synergies and trade-offs across global practices

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### Abstract

The Sustainable Development Goals (SDGs) provide a comprehensive framework to guide global development efforts. The livestock sector, while vital to food security, rural livelihoods, and economic growth, remains a major contributor to environmental degradation, biodiversity loss, and greenhouse gas emissions. This study examines how sustainable livestock practices interact with the SDGs implementation, aiming to identify critical synergies, trade-offs, and spillover effects in order to support more integrated and coherent policy responses. A four-step systematic literature review (SLR) was conducted to analyse global experiences with sustainable livestock interventions. The review focused on four strategic practices: wastewater treatment, biofuel production, and silvopastoral systems for both timber and fruit production. Using a systems theory-informed framework, we categorised the nature and direction of SDG interactions as synergy multipliers, trade-off multipliers, and buffers, while distinguishing intra-linkages, inter-linkages, and external dependencies among goals. Results show that livestock systems have a particularly strong impact on SDGs Zero Hunger (SDG2), Good Health and Well-being (SDG3), Clean Water and Sanitation (SDG6), Responsible Consumption and Production (SDG12), Climate Action (SDG13), and Life on Land (SDG15). Sustainable practices offer potential to reduce trade-offs and amplify synergies—e.g., silvopastoral systems enhance carbon sequestration while diversifying rural income, and biofuel production can reduce pollution and generate renewable energy. However, implementation barriers persist, particularly in low-income contexts: lack of institutional coordination, insufficient financing, and fragmented technical assistance are key constraints. To operationalize these findings, we recommend: (i) integrating SDG impact assessments into livestock policy design, (ii) establishing cross-sectoral platforms for stakeholder dialogue and co-management, (iii) scaling context-specific sustainable practices through targeted subsidies and incentives, and (iv) strengthening monitoring systems to detect unintended trade-offs early. Achieving SDG coherence in livestock systems demands not only technical solutions but also negotiated governance processes that balance competing interests and ensure inclusive participation. This study contributes actionable insights to bridge the gap between sustainability rhetoric and real-world transformation in livestock governance.

**Keywords:** Environmental trade-offs, silvopastoral systems, sustainable development goals, sustainable livestock, systems thinking

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