



Tropentag, September 16-18, 2026, hybrid conference

“Towards multi-functional agro-ecosystems
promoting climate resilient futures”

Carbon finance potential for climate-smart pastoral livestock systems in Mongolia

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Abstract

Pastoral livestock systems are central to livelihoods, land stewardship, and ecosystem functioning in Mongolia, but they are increasingly challenged by climate change, rangeland degradation, and rising greenhouse gas emissions. Identifying viable financing mechanisms to support sustainable transitions is therefore critical. This study evaluates the potential of carbon finance to support climate-smart transformation in Mongolia's livestock sector by linking mitigation practices in pastoral systems with voluntary carbon markets, carbon accounting frameworks, and projected economic returns. The analysis integrates three components. First, it reviews Mongolia's evolving carbon market and policy landscape. Second, it maps priority mitigation practices identified in the Mongolia Green Livestock Action Plan (GLAP), including sustainable grassland management, improved feeding strategies, silvopastoral approaches, and herd management, against existing carbon accounting methodologies under leading standards such as Verra, Gold Standard, and Plan Vivo. Third, using GLAP-based business-as-usual and intervention pathways for cattle, goats, and dairy systems over 2025–2040, it estimates mitigation potential and the associated market value of carbon credits. Emissions are compared at the production level achieved under intervention scenarios to isolate productivity effects, while revenue projections vary according to carbon price trajectories and the share of mitigation that can be commercialised. Results indicate that several priority interventions are already compatible with recognised carbon accounting frameworks, providing a strong basis for market integration. Total annual mitigation potential is projected to increase from 5.24 Mt CO₂-eq in 2025 to 13.14 Mt CO₂-eq by 2040. Goats account for the largest share (59.9 %), followed by cattle (39.5 %) and dairy systems (0.6 %). Depending on carbon price trajectories and commercialisation assumptions, annual carbon revenues could range from US\$13–210 million by 2040. These findings suggest that voluntary carbon markets could become a meaningful complementary source of finance for climate-resilient pastoral development in Mongolia. However, realising this potential will require strengthened monitoring, reporting, and verification systems, clearer regulatory frameworks, and market designs that account for pastoral mobility, communal land governance, and ecosystem co-benefits. Carbon finance offers a promising pathway to align climate mitigation with sustainable pastoral livelihoods, provided that enabling institutional and technical conditions are in place.

Keywords: Carbon credits, climate finance, climate-smart agriculture, greenhouse gas mitigation, livestock systems, pastoral systems, rangeland management, voluntary carbon markets

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