

Decarbonization of Livestock

Supply Chains in Brazil

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FGV Agro Decarbonization Projects

Building the Evidence Base for 2050 Trajectories

ABIEC Partnership

2025

Decarbonization trajectories for Brazilian beef cattle 2025-2050. Four scenarios modeled: up to 85.4% net emission reduction and 92.6% intensity reduction per kg of meat.

Banking Sector

2024

Soy, corn & beef decarbonization trajectories 2023-2050 with Itaú BBA, Santander, Bradesco & Banco do Brasil. Aligned with NZBA and SBTi-FLAG methodologies for portfolio emissions monitoring.

China Platform

2025 - ongoing

Brazil–China Green Food Value Chain platform, co-led with CAAS and funded by **NICFI**. Focus on sustainable soy & beef traceability, climate modeling, and green finance instruments with a 2050 horizon.

Agenda 2050

Ongoing

Long-term prospective studies integrating climate modeling for agri-food chains, trade barrier impact analysis, and development of traceability systems and green finance tools. Partners: SP Agriculture Secretary, Esalq/USP, MAPA.

Science-based pathways connecting Brazilian agriculture to global sustainability demands

Brazilian Beef: Scale & Significance

194M

Cattle herd
(11.6% of global)

2.89M

Tons exported
in 2024

732

MtCO₂e emissions
in 2023

29%

Share of national
GHG emissions

Brazil is the world's largest beef producer and a key player in global climate action

FGV Agro Study Methodology

Integrated Assessment: 2025-2050 Trajectories

Analytical Dimensions



Spatial Analysis

Geospatial land-use dynamics with temporal emission allocation



Economic Modeling

MDS-CARNE model calibrated 2019-2024, projected to 2050



Technology Scenarios

ABC+ practices, zootechnical efficiency, pasture recovery

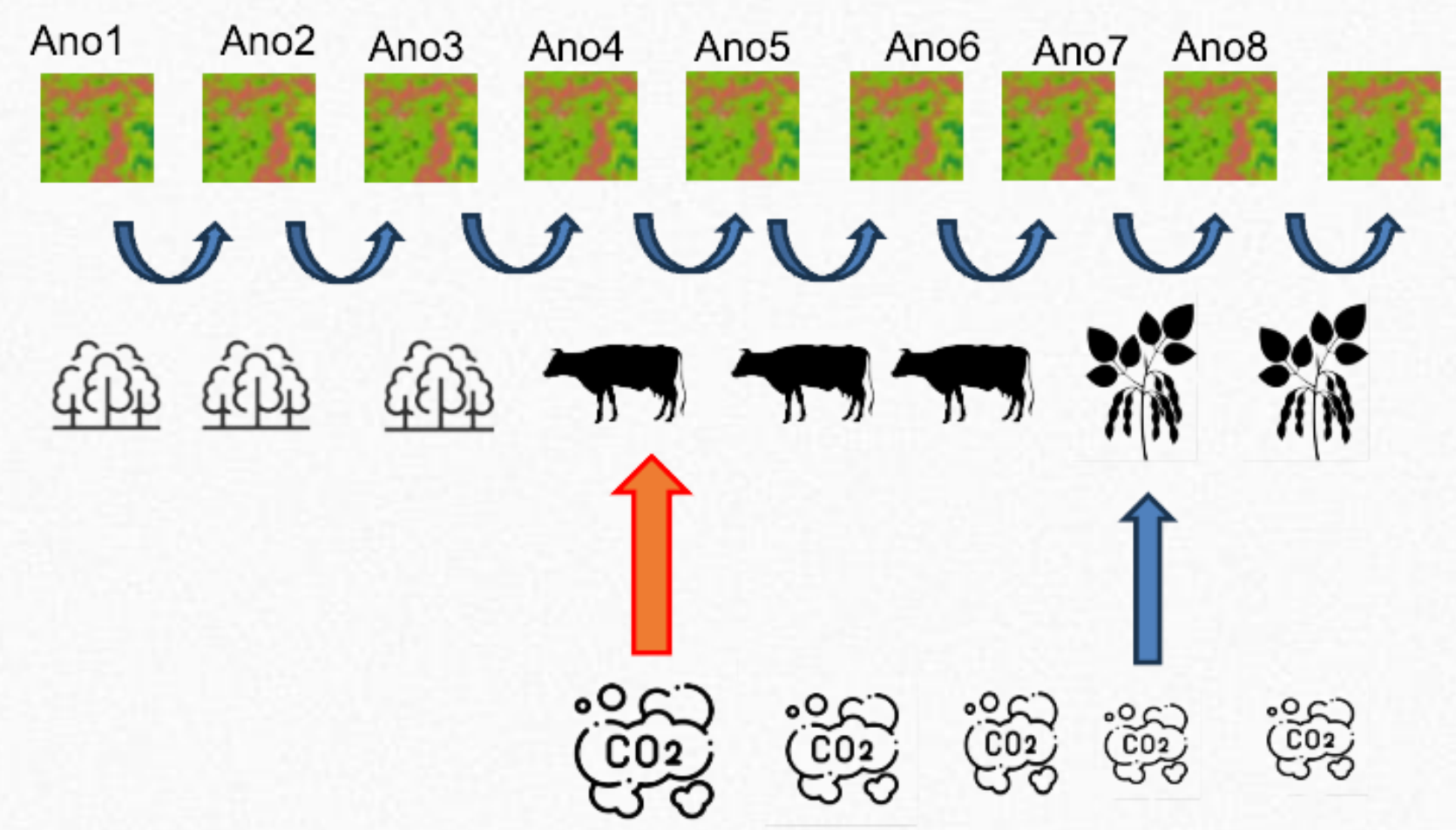
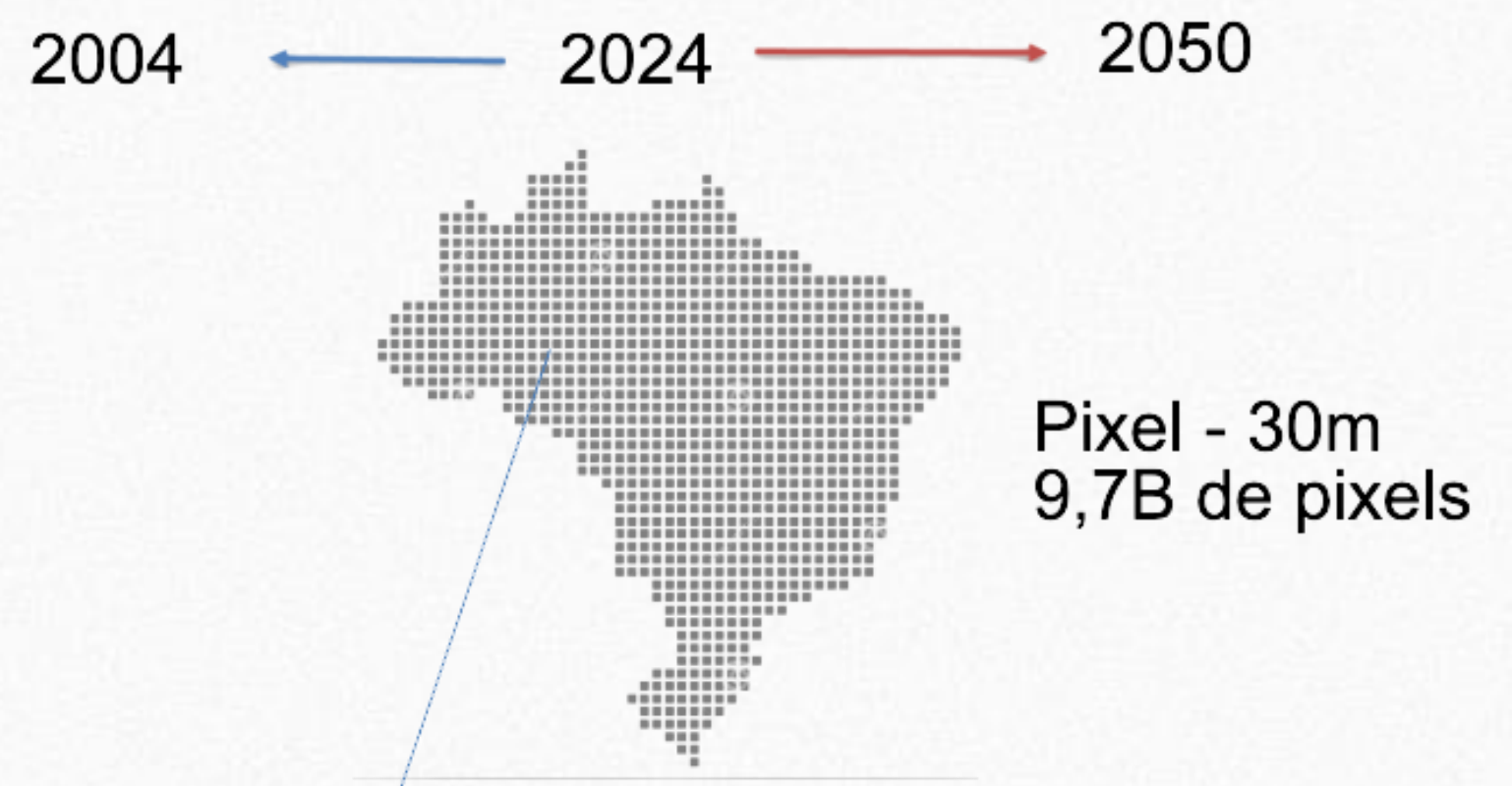
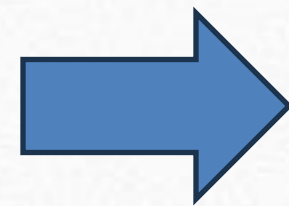
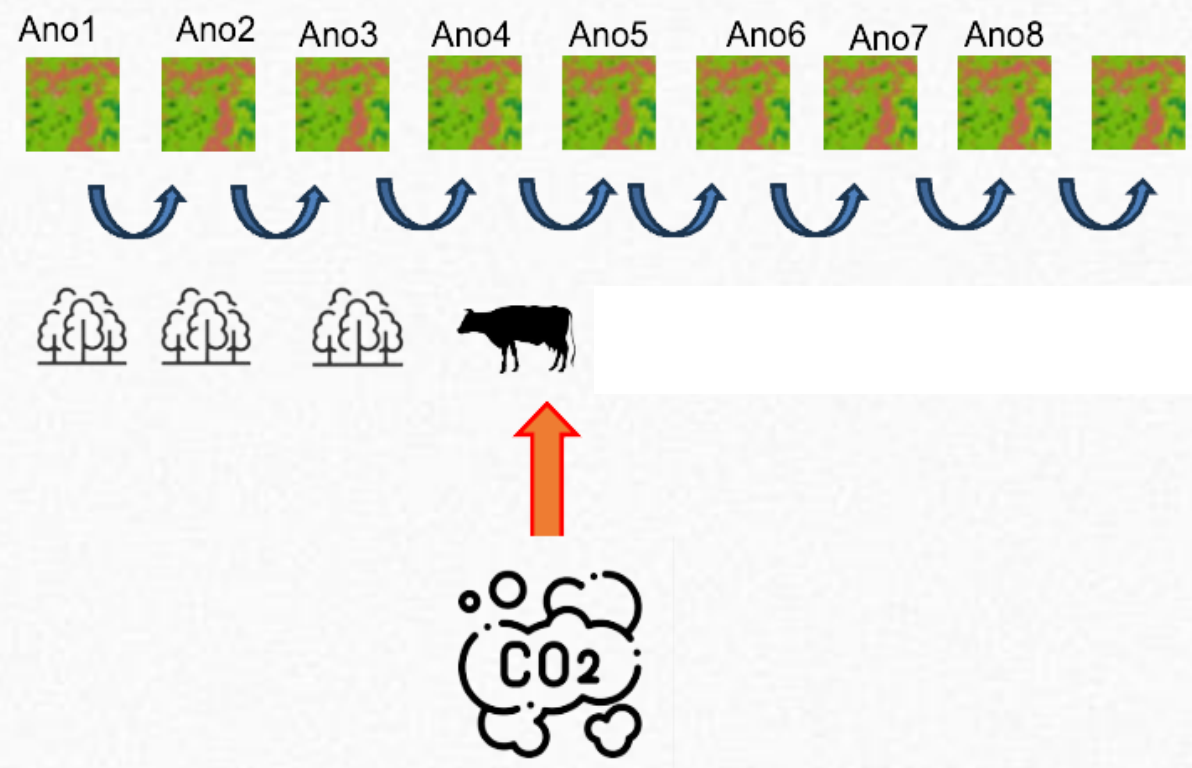
Methodological Innovation

Improved Emission Allocation:

Emissions from land conversion are allocated proportionally over 20 years after deforestation, not immediately.

This avoids distortions from attributing all conversion emissions to cattle at once.

Result: More accurate representation of livestock's actual carbon footprint.



Decarbonization Scenarios: 2025-2050

BAU

Business as Usual

Continuation of current trends, moderate productivity gains, no new restrictions on forest conversion.

287.5 MtCO₂e (-60.7%)

MUT30

Zero Deforestation by 2030

Complete end to forest conversions by 2030, aligned with NDC goals.

191.9 MtCO₂e (-73.8%)

MUT30ABC+

Zero Deforestation + ABC+ Plan

MUT30 + pasture recovery, crop-livestock integration, low-carbon practices.

118.1 MtCO₂e (-83.9%)

MUT30ABC+AAP

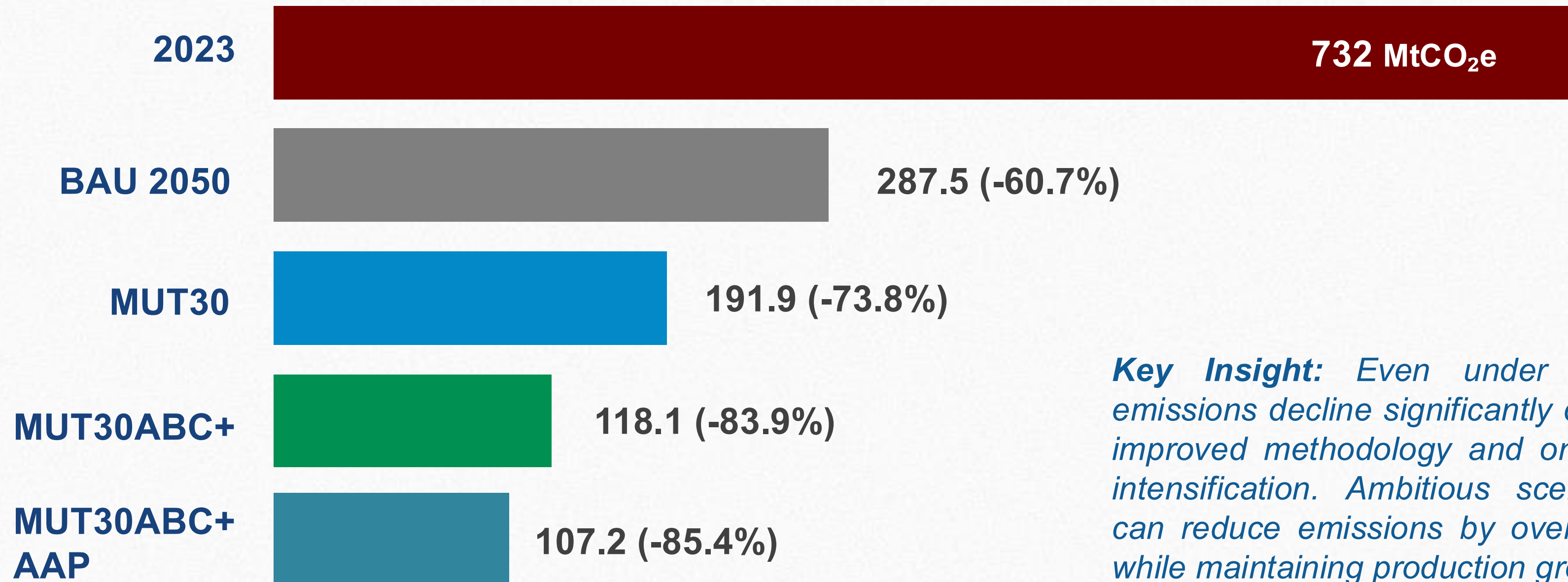
Most Ambitious Scenario

All above + zotechnical efficiency + enteric emission reduction technologies.

107.2 MtCO₂e (-85.4%)

Emission Reduction Trajectories

Total Net Emissions (MtCO₂e)



Key Insight: Even under BAU, emissions decline significantly due to improved methodology and ongoing intensification. Ambitious scenarios can reduce emissions by over 85% while maintaining production growth.

Carbon Intensity: Major Gains

Emissions per Ton of Carcass (tCO₂e/t)

2023 Baseline

80

tCO₂e per ton
of carcass

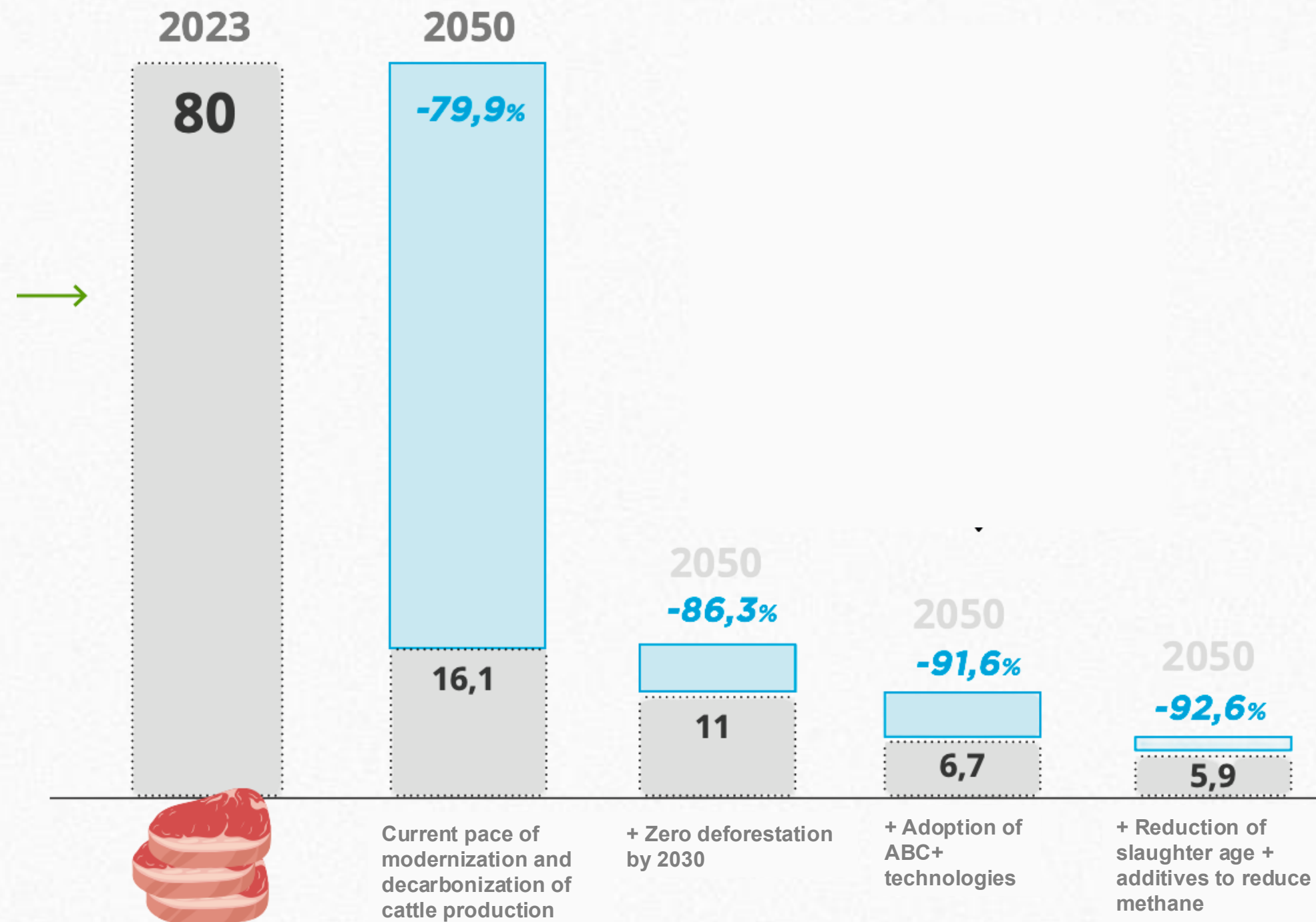
2050 Projections

BAU:	16.1	-80%
MUT30:	10.7	-87%
MUT30ABC+:	6.6	-92%
MUT30ABC+AAP:	5.9	-93%

Intensity improvements reflect both emission reductions and productivity gains

Carbon Intensity: Major Gains

REDUCTION OF EMISSIONS TO PRODUCE BEEF
kg of CO₂e to produce 1 kg of beef (carcass)



Land Use Transformation

Production Growth WITHOUT Area Expansion

Pasture Area

2024 168.2 M ha

2050
(Most Ambitious) 129.7 M ha

-23% area reduction

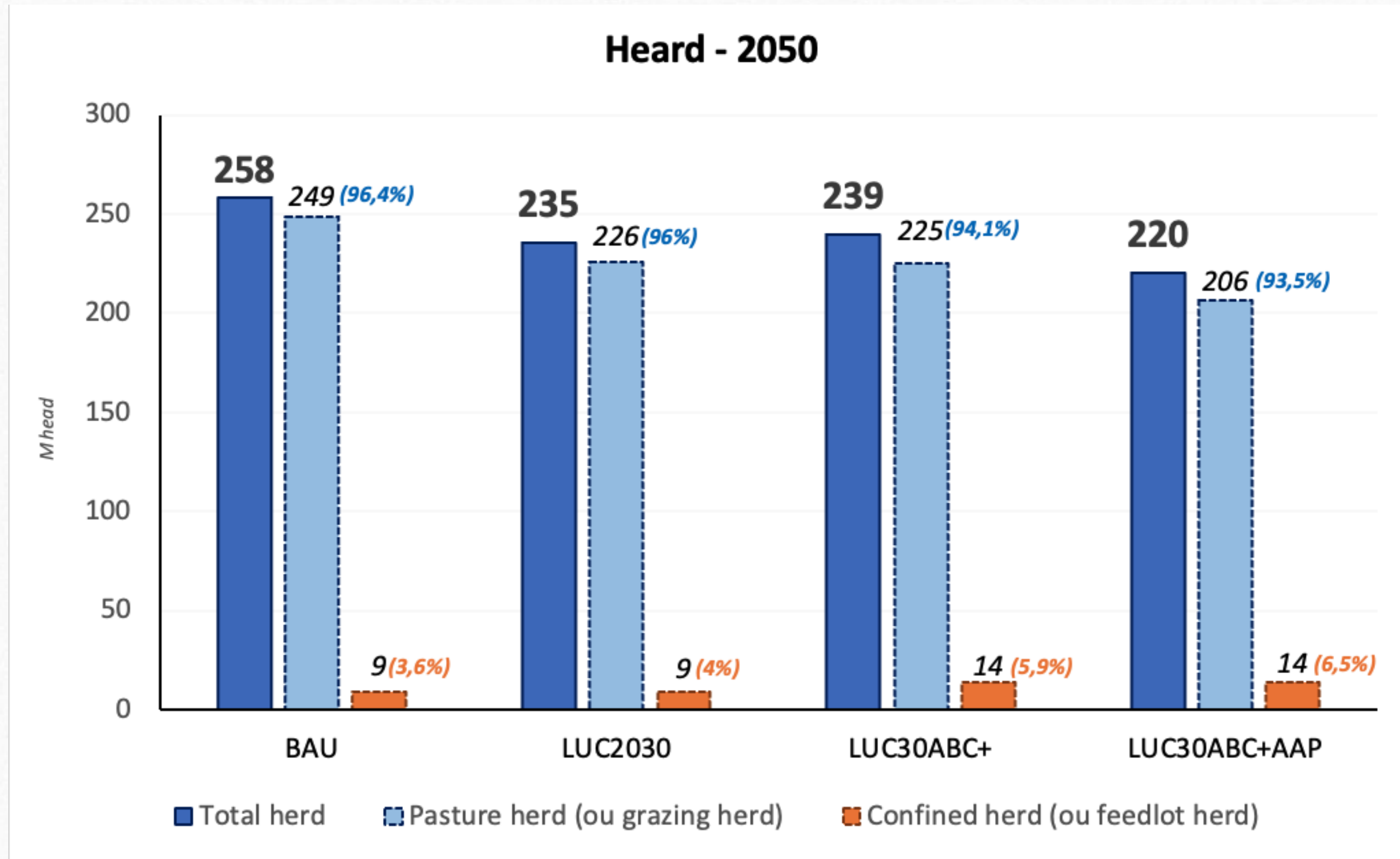
38.5 million hectares freed for:

- Forest restoration;
- Sustainable agriculture;
- Conservation.

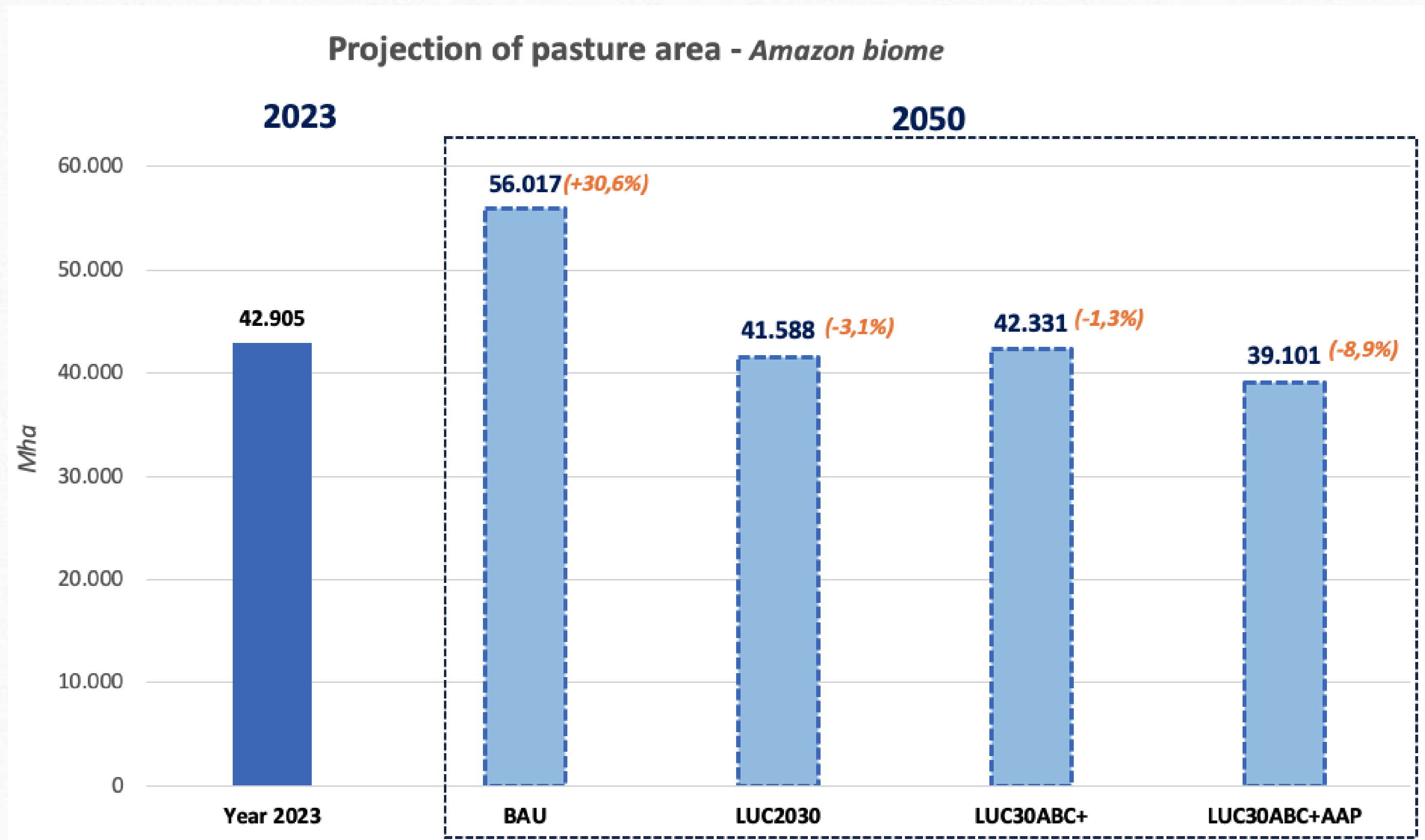
Productivity Boost

- **Pasture Recovery**
Degraded → productive systems
- **Stocking Rate**
More animals per hectare
- **Weight Gain**
Faster finishing times
- **Reproductive Efficiency**
Higher calf production

Cattle heard – pasture x confinement



Pasture area – Amazon Biome



Decarbonization Technology Pathways

Pasture Management

- Recovery of degraded pastures;
- Rotational grazing systems;
- Improved forage species;
- Strategic fertilization.

Integrated Systems

- Crop-livestock-forest integration (ICLF);
- Silvopastoral systems;
- Carbon sequestration in biomass;
- Multiple income streams.

Animal Efficiency

- Genetic improvement programs;
- Nutritional optimization;
- Early finishing protocols;
- Reproductive efficiency gains.

Enteric Emissions

- Feed additives (3-NOP, tannins);
- Diet optimization;
- Rumen modulation;
- Breeding for low emissions.

Economic Case for Decarbonization

Intensification Drives Competitiveness

Production Growth	Maintain output growth despite reduced land area through productivity gains
Export Competitiveness	Lower carbon footprint meets EU and global market requirements (EUDR)
Premium Markets	Access to low-carbon beef premiums and sustainable supply chains
Cost Efficiency	Reduced input costs per unit through intensified systems
Risk Mitigation	Reduced exposure to deforestation-linked market restrictions

Decarbonization aligns environmental and economic objectives

A Sustainable Future for Brazilian Livestock

Key Takeaways:

- Brazilian beef can reduce emissions by 85% by 2050 while maintaining production;
- Intensification enables land sparing: 38M ha freed for restoration;
- Technology pathways are economically viable and competitive;
- EU-Brazil cooperation critical: market access, technology, finance;
- Similar decarbonization pathways applicable to soy supply chains.

EU-Brazil Partnership Opportunities:

*Technology transfer • Sustainable finance • **Market incentives** • Research collaboration*

Decarbonization of Soy and Livestock

Supply Chains in Brazil

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