Re-WIRE

Agri-Food Value Chains

Analysis for the transition to more Regenerative, Equitable, Wholesome, Inclusive, Resilient, and Economically viable Agri-food Value Chains

September 2025

For consultation

The Food and Land Use Coalition

SYSTEMIQ

in collaboration with

WBCSD World Business Council for Sustainable Development

Contents

Acknowledgements

This publication is funded by NICFI and NORAD.

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The authors would also like to thank all the individuals who have generously contributed time and energy through interviews and written feedback, all of which substantially enriched this work.

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NORAD

Jing Chen,
WBCSD

Mari Martinsen,
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Mauricio Bauer,
Gordon and Betty Moore Foundation

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Glossary

Value chain	The sequence of value-adding farming and business enterprises that transform seeds, soil, water, energy, and chemicals into food. In this report, based on one agricultural product or commodity that often flows from one country of production to one country of consumption.
Transition	The process of moving from business-as-usual value chains to more regenerative, resilient, and economically viable value chains.
Transition plan	A science-based, value-chain-specific plan to shift a value chain to a more sustainable system of production, developed with input from businesses, farmers, and governments. This plan should describe and quantify how different solutions for transforming farming, trade, and consumption will achieve a shared vision for a resilient and sustainable value chain. A transition pathway will also define key milestones and credible time frames to reach them.
Regenerative and productive approaches to farming	Agricultural practices that regenerate ecosystem health, reduce pressure on land expansion by improving productivity on existing land, and produce positive outcomes for climate, nature, and people. The definition is purposefully broad to include a range of approaches, including agroecology, regenerative agriculture, and sustainable intensification.
Deforestation- and conversion-free agriculture (often shortened to "DCF")	Production which, through a variety of traceability and assurance systems or jurisdictional approaches, is accepted not to have driven the conversion of forests or natural vegetation, based on an agreed cut-off date for land conversion.

Executive Summary

Introducing a new framework to guide value chain transitions

Value chains are the arteries of food systems. Over the past 50 years, they have funneled innovation and finance to deliver historic gains in productivity, food security, and economic growth. Yet most value chains face major physical risks, generate unsustainable social and environmental impacts, and are vulnerable to long-term declines in productivity. Climate change threatens to slash global crop yields by up to 35% by 2050.[1] And the same value chains that once created abundance now contribute to nature loss, climate breakdown, poverty, and poor health. As a result, food and agriculture businesses face a mounting array of reputational, legal, and business continuity risks.

These challenges have been known for some time. Still, progress in making value chains more resilient and less risky has been extremely slow. Early adopters have shown what is possible through deforestation- and conversion-free (DCF) sourcing, regenerative agriculture, and investments in alternative proteins. But deeper, structural shifts are needed to move beyond incremental change and accelerate the transition to regenerative and resilient value chains.

Geopolitical shifts and shrinking public finance make private sector leadership more vital than ever. Tariffs are rising, development budgets are under pressure, and roughly USD $9 trillion in private capital is tied up in the food system.[2] Companies now face a choice: continue investing in brittle models or redirect capital into regenerative systems that build resilience, competitiveness, and human capital. A new approach is needed if companies are to manage risk and stay competitive.

Everything starts with a clear, shared understanding of the problems and realistic routes to reduce risk while sustaining economics. To this end, Re-WIRE consolidates evidence on risks, impacts, finance, and transition feasibility into a clear, comparable fact base. Its primary audience is business leaders in procurement and sustainability who need to understand systemic risks and identify practical procurement and finance levers (see especially chapters 3 and 4 on soy and beef). However, it is designed to be useful across stakeholder groups throughout the food system. Above all, Re-WIRE identifies opportunities and tests the feasibility of transitioning towards value chains that are better for business, farmers, local communities, governments, and consumers.

The Food and Land Use Coalition's Re-WIRE analytical framework for agri-food value chains

1 Economic and social value

Global dashboard

1.1 Production

- Annual volume of production in top five producing countries.
- Productivity per hectare in top five producing countries.
- Value of gross production in top five producing countries.

1.2 Trade flows and food loss

- Top trade flows by volume and value.
- Share of production lost after production and before consumption.

1.3 Consumption

- Consumption volumes in top-consuming countries.
- Nutrient value score of commodity.
- Contribution to global calories.

2 Risks and impacts

2.1 Risks index

- **Physical climate risks:** the extent to which production volumes and suitable areas of production will be reduced by physical climate impacts.
- **Human rights risks:** the vulnerability to risks of child labor, forced labor or land rights violations.
- **Regulatory risks:** the extent to which incoming regulation could impact business operations; based on materiality, compliance readiness, and exposure.

2.2 Impacts index

- **Climate:** the extent to which emissions from production and land use change impact climate.
- **Biodiversity:** the extent to which production practices impact on-farm biodiversity and land use change impacts off-farm biodiversity.
- **Soil health:** the extent to which production practices negatively impact soil health.
- **Water:** the extent to which a value chain has negative impacts on water use and water pollution.
- **Social:** the extent to which a value chain negatively impacts decent work and pesticide exposure.
- **Societal health:** the impact of production on air quality, anti-microbial resistance, and the nutritional diversity of production.

3 State of the transition

3.1 Transforming production index

- Share of sustainable production today.
- Holistic impact assessment of more regenerative and sustainable production approaches.

3.2 Transforming consumption index

- Implication of existing reference diets on consumption shifts.
- Feasibility of consumption shift in key consumption markets.

4 Economic feasibility of the transition

4.1 Economic feasibility of production transition index

- Farm profitability.
- Productivity of core and diverse products.
- Time to recover or improve profitability.

4.2 Landscape of existing initiatives

- Compilation of certification schemes, sectoral agreements, value chain collaborations, finance mechanisms, landscape initiatives or advocacy efforts.

4.3 Value chain structure

- Market concentration, market power; trade practices; state influence.

4.4 Financial flows analysis

- Breakdown of public and private sources of external finance to the value chain.
- Breakdown of in-value-chain flows of finance.

Global findings from analysis of risks, impacts, and the state of the transition

Chapter 2 applies the Re-WIRE indices on risk, impacts, and state of the transition to eight commodity-country value chains based on soy, beef, cocoa, and wheat. The analysis reveals:

Escalating risks: Six of the eight value chains assessed face significant to high climate risks. Human rights violations remain widespread, particularly in cocoa (child labor and forced labor in West Africa), beef (unsafe working conditions in Brazil and the United States (US), and wheat (exploitative migrant labor in India). Regulatory exposure is intensifying: cocoa is highly dependent on European Union (EU) markets and therefore exposed to new deforestation and due diligence laws; US soy is vulnerable to tariff escalation; and Indian wheat faces politically driven export bans.

Broadening impacts: Beef has the most severe footprint across climate, nature, health, and livelihoods. Beyond deforestation, soy creates public health risks in the US and Brazil through pesticide exposure and water pollution. Cocoa highlights the difficulty of tackling entrenched social issues: despite two decades of company commitments and certification programs, child labor remains widespread, and most smallholders earn below a living income. Wheat in India highlights severe air pollution from stubble burning, while US wheat has lower impacts but a heavy dependence on agrochemicals that drives water pollution and pesticide exposure.

Incremental transition: Regenerative and productive approaches remain marginal. 2025 commitments to deforestation-free soy and beef are at risk. Cocoa has the highest uptake of certification (around 30%), but evidence suggests this uptake has had only a modest impact relative to the scale of risks. Wheat and soy lag far behind, with regenerative adoption at 1% or less in India (wheat) and the US (both wheat and soy). Soy and beef initiatives have slowed land-use change through DCF sourcing, but approaches such as sustainable intensification or regenerative crop-livestock-forestry integration that improve the impact of farming have not scaled significantly.

Together, these findings show why systemic transition is urgent: risks are material today, and viable solutions exist but have failed to scale.

Lessons for Business Action: Applying the full framework to soy and beef

Chapters 3 and 4 apply the full framework to Brazil–China soy and Brazilian beef—two globally significant value chains.

Deep Dive: Soy in the Brazil–China corridor

Soy is one of the world's most strategically concentrated crops. Brazil and the US produce 68% of global supply, while China is the dominant buyer, sourcing 60% from Brazil and 32% from the US.

- **Progress:** The five largest traders now report 93–99% DCF sourcing from Brazil, covering at least 37% of national production. Improved mapping and traceability systems have lowered costs, making verified DCF competitive.
- **Risks:** DCF gains remain politically fragile and insufficient to address the broader pressures of climate volatility, soil degradation, biodiversity loss, and poor livelihoods. Low-carbon credit lines exist but remain negligible, representing just 2% of rural finance in Brazil.
- **Opportunities:** Crop-livestock-forestry integration soy delivers a broader set of positive impacts on soil, biodiversity, productivity, and profitability for farmers. However, it currently accounts for only 3-4% of production by volume, in part held back by 3-5 year payback periods. Mid-sized producers (50–1,000 ha), which account for around a third of Brazilian soy production and are prevalent in high-risk regions, are the pivot point. Redirecting rural credit and intra-value-chain finance toward them—backed by blended finance—could unlock regenerative models that improve yields, restore soils, and diversify incomes, such as crop-livestock-forestry integration.
- **Next steps:** Consolidate DCF as the market baseline; embed traceability into contracts and pre-finance; and build a shared vision framed around resilience, sovereignty, and competitiveness.

For business leaders, this means embedding traceability into contracts and targeting finance to mid-sized producers.

For governments, it means aligning rural credit and trade policy with resilience goals.

For civil society, it means helping broker a Brazil–China narrative rooted in sovereignty, competitiveness, and resilience.

Deep Dive: Beef in Brazil

Brazil is the world's second-largest producer of beef, accounting for 15% of global output, and the largest supplier to China. Over 80% of its beef is consumed domestically, embedding the value chain deeply in local diets and national politics.

- **Progress:** DCF commitments are limited and rarely cover indirect suppliers. Traceability remains nascent, with full coverage of indirect suppliers remaining elusive, even for the big three meatpackers. Domestic demand is strong, but sustainability requirements are minimal.
- **Risks:** Climate exposure, degraded pastures, methane emissions, water pollution, and human rights violations create systemic vulnerabilities. Finance overwhelmingly favors large ranchers, excluding 98% of Brazil's 2.5 million producers. Informality and weak enforcement allow deforestation to persist.
- **Opportunities:** Sustainable intensification and crop–livestock–forestry integration are viable but constrained by 3-8 year payback periods. Expanding access to conditional rural credit for small and mid-sized ranchers and aligning intra-value-chain finance with traceability could unlock transformation. On the demand side, reducing ultra-processed beef consumption offers a politically feasible lever aligned with national health goals.
- **Next steps:** Build robust traceability systems; redirect finance toward mid-sized ranchers; and frame reform around profitability, modernization, resilience, and public health.

For business leaders, this means demanding traceability and supporting co-investment in rancher productivity.

For governments, it means redesigning rural credit and enforcement systems to reward resilience.

For civil society, it means reframing the beef transition around public health, modernization, and rural prosperity to secure legitimacy.

Next steps

The evidence is clear: food systems face escalating risks, but also a historic opportunity. Protecting forests, raising productivity, and strengthening farmer livelihoods are not mutually exclusive. They can—and must—be pursued together.

Re-WIRE provides a framework to help companies, governments, and civil society align around a shared fact base and begin making value chains more resilient. It can help identify the value chains where more regenerative and productive approaches deliver sufficient impact and are commercially viable today, and value chains where more work is needed to develop impactful solutions or tackle economic feasibility. It clarifies risks, identifies feasible solutions, and supports consensus-building on what credible transition pathways could look like.

For businesses, these findings signal where future procurement risk lies, and can help identify the value chains where commercially viable approaches to transitioning agriculture exist today.

For governments, they show where fiscal and regulatory reform could unlock competitiveness.

For civil society, they provide the evidence base to convene companies and ministries around systemic solutions.

This report is the first step in that process. The Food and Land Use Coalition (FOLU) and its partners—Systemiq, the World Business Council for Sustainable Development (WBCSD), the World Resources Institute (WRI), and the World Farmers Organization (WFO)—are now consulting businesses, farmers, and food systems experts to test and refine the Re-WIRE approach.

For the remainder of 2025 and into 2026, we will:

- Invite feedback on the framework and its value to decision makers;
- Explore opportunities to expand the Re-WIRE framework to cover a broader set of value chains and geographies
- Explore opportunities to deepen the analysis to subnational territories and unpack the economics of the transition in priority value chains; and
- Identify how Re-WIRE can complement and strengthen existing initiatives.

Stakeholders—from business leaders to governments, farmers, and civil society—can test the framework in their own value chains, share insights, and help shape a credible roadmap for resilient and regenerative food systems.

Section 1:
The case for Re-WIRE

1 Introduction: The need for a shared truth

Value chains are arteries of food systems. Over the past 50 years, they have funneled innovation and finance to deliver historic gains in productivity, food security, and economic growth. Yet most value chains face major physical risks, generate unsustainable social and environmental impacts, and are vulnerable to long-term declines in productivity. Climate change threatens to slash global crop yields by up to 35% by 2050.[3] And the same value chains that once created abundance now contribute to nature loss, climate breakdown, poverty, and poor health. As a result, food and agriculture businesses face a mounting array of reputational, legal, and business continuity risks.

These challenges have been known for some time. Still, progress in making value chains more resilient and less risky has been extremely slow. Early adopters have shown what is possible through deforestation- and conversion-free (DCF) sourcing, regenerative agriculture, and investments in alternative proteins. But deeper, structural shifts are needed to move beyond incremental change and accelerate the transition to regenerative and resilient value chains.

Geopolitical shifts and shrinking public finance make private sector leadership more vital than ever. Tariffs are rising, international development budgets are under pressure, and roughly $9 trillion in private capital is tied up in the food system[4]—spanning seed and fertilizer companies, traders, processors, manufacturers, and retailers. Many solutions, from traceability technology to innovative food products, are available and economically feasible.

Re-WIRE analysis shows that the transition to regenerative, deforestation- and conversion-free agriculture is not happening at scale—not because the solutions don't exist, but because the incentives don't align and stakeholders lack a common vision for change. With targeted finance and the right incentives, these solutions can be scaled. Our analysis of production approaches identifies at least one such solution within each value chain and finds that several farming transitions create long-term economic value for farmers.

The importance of the private sector's role in this transition cannot be understated—but unlocking business leadership at scale requires solving four roadblocks.

1. **Weak commercial incentives.** The cost of action is not the main barrier: achieving science-based climate targets across the food sector would require ~$205 billion annually—less than 2% of projected food sector revenues for 2025–30.[5] Yet commercial signals to reward action remain weak. Price premiums for deforestation-free or low-emission products are small or highly volatile; consumer demand is limited in many domestic markets; and financial flows continue to favor high-risk land-use expansion over regenerative production. Policy frameworks also allow laggards to compete on lower cost, eroding the business case for leaders. As a result, only a minority of companies have gone beyond compliance to set and deliver robust science-based targets.[6,7,8]
2. **We lack a shared vision.** Climate and nature targets are vital, but they cannot resolve trade-offs across productivity, land use, health, and nutrition. DCF initiatives have reshaped norms and improved traceability, but remain disconnected from broader systemic reforms and often lack legitimacy in producing countries. Compliance alone cannot deliver resilience, farmer prosperity, or food security.

3. **Value chains lack a common fact base.** Data is patchy, partial, and complex, especially at farm level. Deforestation risk data is comprehensive and spatially explicit, but major gaps remain in food loss, waste, and livelihoods. Where simplified analysis exists, it is often driven by vested interests. Research is abundant and spans diverse production systems, biomes, and countries, but is also fragmented, leaving decision-makers without a coherent synthesis.

4. **Missing value chain transition pathways.** Unlike the energy sector, which has specific, science-based decarbonization pathways that lay out the technical feasibility of solutions, the finance required, and time-bound targets and milestones,[9] food systems lack clear roadmaps that clearly describe what needs to change, what it will cost, and how risks and benefits will be distributed within each value chain. Without integrated pathways that embed DCF within broader, science-based approaches that balance livelihoods and resilience, corporate engagement and supportive policy risk stalling.

The Food and Land Use Coalition (FOLU) is introducing **Re-WIRE**, an analytical framework and multi-stakeholder engagement approach to support the end-to-end transition of agri-food value chains. FOLU is consulting on the utility of the Re-WIRE analytical framework to:

1. **Build a common fact base** by synthesizing risks, impacts, trade-offs, market structure, financial flows, and the economic feasibility of different solutions.

2. **Enable private sector leadership** through simple indices that engage a broader set of companies and enable them to:

    - Identify and prioritize risks
    - Strengthen and communicate the commercial case for action
    - Inform investment strategies and new product development
    - Support cross-value chain collaboration and advocacy

3. **Deepen consensus and strengthen collaboration** between businesses, farmers, governments, and civil society to co-develop credible transition plans.

    - **For governments:** sharpen understanding of risks to critical exports and imports, solutions to access new markets, and the potential for domestic subsidies and private sector finance to support value chain transitions.
    - **For civil society organizations:** strengthen value-chain-specific programs of engagement and convene businesses, farmers, and governments to agree on value-chain-specific shared visions and transition plans.

About the Re-WIRE analytical framework

Re-WIRE is designed for decision-makers, especially for heads of procurement, risk, and sustainability, in large food companies. It generalizes information at a value-chain and country level to provide a bird's-eye view of risks, impacts, and the economic feasibility of transition. It complements, but is no replacement for, granular and spatially explicit data (i.e., GHG emissions, soil health, etc.). The framework helps system change leaders understand the state of value chains and identify opportunities for collective action.

Figure 1. *The Food and Land Use Coalition's Re-WIRE analytical framework for value chains*

1 Economic and social value

Global dashboard

1.1 Production

- Annual volume of production in top five producing countries.
- Productivity per hectare in top five producing countries.
- Value of gross production in top five producing countries.

1.2 Trade flows and food loss

- Top trade flows by volume and value.
- Share of production lost after production and before consumption.

1.3 Consumption

- Consumption volumes in top-consuming countries.
- Nutrient value score of commodity.
- Contribution to global calories.

2 Risks and impacts

2.1 Risks index

- **Physical climate risks:** the extent to which production volumes and suitable areas of production will be reduced by physical climate impacts.
- **Human rights risks:** the vulnerability to risks of child labor, forced labor or land rights violations.
- **Regulatory risks:** the extent to which incoming regulation could impact business operations; based on materiality, compliance readiness, and exposure.

2.2 Impacts index

- **Climate:** the extent to which emissions from production and land use change impact climate.
- **Biodiversity:** the extent to which production practices impact on-farm biodiversity and land use change impacts off-farm biodiversity.
- **Soil health:** the extent to which production practices negatively impact soil health.
- **Water:** the extent to which a value chain has negative impacts on water use and water pollution.
- **Social:** the extent to which a value chain negatively impacts decent work and pesticide exposure.
- **Societal health:** the impact of production on air quality, anti-microbial resistance, and the nutritional diversity of production.

3 State of the transition

3.1 Transforming production index

- Share of sustainable production today.
- Holistic impact assessment of more regenerative and sustainable production approaches.

3.2 Transforming consumption index

- Implication of existing reference diets on consumption shifts.
- Feasibility of consumption shift in key consumption markets.

4 Economic feasibility of the transition

4.1 Economic feasibility of production transition index

- Farm profitability.
- Productivity of core and diverse products.
- Time to recover or improve profitability.

4.2 Landscape of existing initiatives

- Compilation of certification schemes, sectoral agreements, value chain collaborations, finance mechanisms, landscape initiatives or advocacy efforts.

4.3 Value chain structure

- Market concentration, market power; trade practices; state influence.

4.4 Financial flows analysis

- Breakdown of public and private sources of external finance to the value chain.
- Breakdown of in-value-chain flows of finance.

This analytical framework assesses value chains based on their economic value, impacts, risks, and the state and economic feasibility of the transition to more sustainable and resilient production and consumption. Value chains are assessed based on the agricultural product or commodity in key countries of production and consumption. While the current approach reflects national-level conditions and trends, it could be expanded to capture sub-national variations.

The four value chains analyzed—soy, beef, cocoa, and wheat—were selected because of their global significance for food security, national Gross Domestic Product (GDP), GHG emissions, farmer livelihoods, and nature.

② Risks and Impacts: Pressures converging on value chains

Value chains face escalating risks and impacts that are already material to business and society. Regulatory shifts are tightening compliance requirements; human rights violations continue to surface across multiple commodities; and physical climate risks are projected to reduce yields sharply in key production regions. At the same time, the impacts of prevailing production systems on nature, soil, water, health, and livelihoods are creating reputational, regulatory, and financial liabilities for companies, while eroding food security and farmer resilience. Together, these pressures underscore the urgency of transition and form the basis of the Re-WIRE indices on risk and impacts presented in this section.

2.1 Risks

The risk index, illustrated below in Figure 2, assesses the vulnerability of value chains to three categories of risk with immediate business relevance: physical climate risk, human rights risk, and regulatory risk. These risks were prioritized as they have near-term material impacts on the business and can be assessed consistently across countries and value chains.[10] The scoring thresholds are designed to work across agri-food value chains. Methodological detail on scoring thresholds and calibration is provided in the technical appendix.

Figure 2. *Re-WIRE risk index for selected commodities*

	Cocoa		Beef		Soy		Wheat	
	West Africa	Indonesia	U.S.	Brazil	U.S.	Brazil	U.S.	India
Bio-physical risks Climate risk	2	3	4	2	3	3	4	2
Social risks Human rights risk	1	3	2	2	4	3	4	2
Regulatory risks Regulatory change risk	1	4	4	4	2	3	4	2

Key	Physical climate risk	Social risks	Regulatory risks
1 **Severe risk**	By 2050, over 40% yield reduction, majority of production regions have limited suitability	High risk of child or forced labor AND land rights violations	High risk of impact (high likelihood of regulatory change + low readiness) across 100% of the value chain
2 **High risk**	By 2050, 20-40% yield reduction, over half of existing production regions have limited suitability	High risk of child or forced labor OR land rights violations	Medium risk of impact (high likelihood of regulatory change + moderate readiness / Medium likelihood + low readiness) across 100% of value chain, or high risk of impact across 50%
3 **Significant risk**	By 2050, 10-20% yield reduction, significant changes to suitability of production regions	Moderate risk of either child and forced labor OR land rights violations.	High risk of impact across 10-30% of value chain and / or medium risk of impact for up to 50% of value chain
4 **At risk**	By 2050, up to 10% yield reduction, some changes to suitability of production regions	Low risk of both child and forced labor AND land rights violations.	Medium risk of impact for up to 30% of the value chain or high risk in up to 10% of value chain
5 **Low risk**	By 2050, no or positive impact on yields, no changes in production region suitability	No documented child, forced labor OR land rights risks.	Low risk of impact (low likelihood + high readiness) across 100% of the value chain or medium risk of impact in up to 10% of value chain

Regulatory risks are significant across several value chains, driven by a mix of trade, sustainability, and policy factors. Globally traded commodities face exposure not only to domestic legislation but also to shifting rules in key import markets. For example:

- West African cocoa faces severe regulatory risks due to its vulnerability to EU deforestation laws and dependence on European buyers.
- Indian wheat faces growing exposure from politically driven export bans and changing domestic support.
- US soy is vulnerable to escalating tariffs.

Among these, regulatory preparedness is emerging as a proxy for resilience. As rules tighten, the ability to demonstrate compliance will become a competitive differentiator. Companies investing early in due diligence and legal readiness will be better equipped to adapt. For example, deforestation- and conversion-free (DCF) commitments have helped companies improve legal readiness, anticipating import regulations and reducing reputational exposure.

Human rights risks remain widespread. Six of the eight commodity-country value chains show significant to high risk, based on documented allegations of child labor, forced labor, and land rights violations. These risks are most acute in:

- West African cocoa, where child labor remains a persistent challenge despite long-standing efforts to address it.
- Brazilian beef, where land tenure disputes and allegations of human rights abuses in the meat-packing industry persist.
- US beef, with growing scrutiny over child labor and vulnerable migrant workers.
- Indian wheat, where structural issues in the agriculture sector heighten the risk of exploitative labor.

Physical climate risks are escalating across all eight value chains, with six showing significant to high vulnerability. The outlook is most severe for Indian wheat, Brazilian beef, and West African cocoa, where, by 2050, yields are projected to fall by 20-40%, and more than half of current production areas may no longer be suitable. Cocoa in Indonesia and soy in the US and Brazil also face yield declines of 10-20% and significant shifts in the suitability of production regions.

These risks are compounded by unpredictable interactions between climate and nature. In 2024, Ghana's cocoa harvest fell by around 40% due to both an unusually wet season and a spike in swollen shoot virus, an outbreak likely intensified by climate stress. Relocation of sourcing regions is no longer a reliable strategy. Companies must invest in strengthening farm-level resilience within priority value chains. Agroforestry cocoa systems, for example, can shade cocoa trees, enabling them to tolerate up to 2°C of additional heat. But these systems account for less than 5% of production. With targeted investment and capacity building, such practices could be scaled.

2.2 Impacts

The impacts index, illustrated below in Figure 3, evaluates value chains across a holistic set of farm-level[11] outcomes[12] including climate, biodiversity, soil health, water, social conditions, and human health. Data availability on the farm-level impacts of different value chains is patchy, both in terms of impact areas, geographic coverage, and the differences between different farming systems. To enable comparison between mainstream and emerging approaches, we assessed value chains based on available data on impacts and common agricultural practices and made evidence-based inferences about outcomes. Land-use change from deforestation and conversion was captured both as a driver of climate impacts and as a driver of off-farm biodiversity loss. Assessing the full impacts of changes to production on deforestation and land conversion also depends on productivity. If production approaches improve on-farm social and environmental outcomes but reduce productivity, and demand remains the same, there is a risk that leakage could drive land conversion elsewhere. Our framework assesses productivity in the economic feasibility indices contained in chapters 3 and 4. Full details of scoring, calibration, and evidence are available in the technical appendix.

Figure 3. *Re-WIRE Impact index for selected commodities produced under conventional practices*

Key — Severe impact 1 2 3 4 5 Minimal impact

Impact area	Scoring definition	Cocoa		Beef		Soy		Wheat	
		West Africa	Indonesia	U.S.	Brazil	U.S.	Brazil	U.S.	India
Climate & biodiversity	**Climate** – Presence of significant emitting factors including land use change, enteric fermentation, manure and use of chemical fertilizers, and any common mitigating actions.	2	2	2	1	4	2	4	3
	Off-farm biodiversity – Impact of current land use change on habitat loss.	1	2	2	1	4	2	4	5
	On-farm agricultural biodiversity – Diversity of on-farm agricultural production and presence of native vegetation.	2	2	1	3	2	2	2	2
Soil	**Soil health** – Presence and degree of practices that degrade or enhance soil.	2	2	1	2	2	3	3	2
Water	**Water use** – Typical water use, extent of irrigation or water-saving practices, and water scarcity of production geography.	5	5	4	5	4	4	3	2
	Water pollution – Presence of nutrient and agro-chemical effluents and any mitigating actions.	3	3	1	2	3	3	3	3
Social	**Decent work** – Labor standards, including average income, rights, working conditions and equality—in most affected segment of value chain.	1	2	1	2	4	3	4	2
	Pesticide exposure – Intensity & type of pesticide exposure and degree to which personal protective equipment is used.	2	2	2	3	2	2	2	2
Societal health	**Air quality** – Volume and type of air pollutant generated by production.	3	3	1	1	3	3	3	1
	Anti-microbial resistance – Extent of use of antibiotics.	n/a	n/a	1	3	n/a	n/a	n/a	n/a
	Nutritional diversity of production – Diversity of species produced across ten FAO food groups.	1	1	2	2	2	2	2	2

Beef has the most material negative impacts across climate, nature, health, and livelihoods. Its environmental footprint is severe, driven by GHG emissions, deforestation, and water pollution. Beef production also harms human health through water pollution, air quality impacts from manure, and the widespread use of antibiotics that contribute to antimicrobial resistance. While DCF approaches in Brazil have curbed illegal deforestation, they have not yet reduced water pollution or improved worker livelihoods. The intensity of US beef production yields one of the lowest GHG footprints per ton globally, but conventional systems rely heavily on prophylactic antibiotics.

The index highlights low-hanging opportunities to reduce impacts. Soil health scores are moderate to high across all value chains assessed in this draft framework, suggesting significant potential for low-tech practice changes for improvement. Wheat in India is typically grown in rotation with rice and linked to widespread stubble burning, a major source of air pollution. This practice is not typical in the US, indicating opportunities for practice changes to deliver immediate health and environmental benefits.

Across all the value chains, negative health and livelihood impacts create a compelling case for business action. Pesticide exposure, poor air quality, lack of dietary diversity, and antimicrobial resistance create staggering public health costs,[13] many of which are felt most acutely by farmers and local communities.[14] These impacts translate into reputational and regulatory risks for companies. But they also translate into opportunities: by engaging local stakeholders and policymakers, businesses can help drive improvements in public health while reducing risk exposure.

2.3 The state of the transition

In the food system, the pursuit of perfect solutions risks paralyzing meaningful action. Across the eight value chains assessed in this draft framework, regenerative and productive approaches remain a small fraction of production. What is needed is not consensus on specific practices or approaches, but agreement on a credible direction of travel that allows no-regret actions to be scaled quickly, even amidst uncertainty.

Transforming Production: Progress is incremental

Farmers, governments, and companies are experimenting with solutions that address environmental and social impacts, but their adoption remains limited and uneven. Our framework identifies the most widely recognized approaches to more regenerative and productive agriculture within each value chain, assesses them against our impact index, and compares the results to standard production. While this requires some simplification, it serves two purposes: first, to capture the current state of progress, and second, to support further alignment by identifying trade-offs between different approaches.

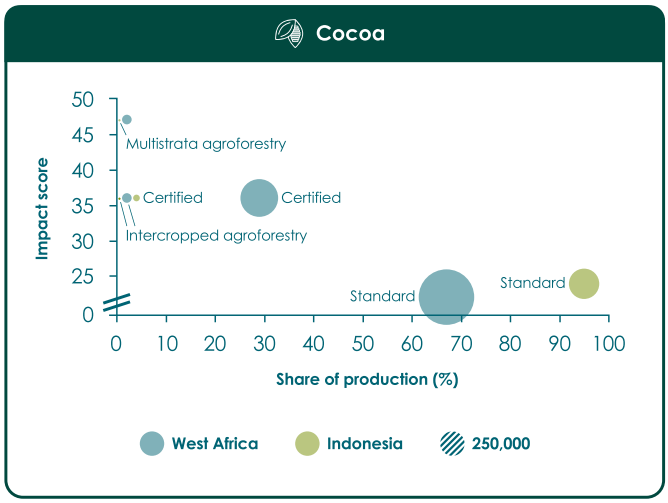
- **Cocoa** shows the most progress, with around 30% of production in West Africa certified. Yet our impact assessment suggests these schemes deliver only incremental improvements relative to the scale of the risks faced by these value chains.
- **Wheat** lags furthest behind, with regenerative practices covering at most 1% of production in the US and India.
- In **soy**, voluntary commitments to reduce or eliminate deforestation and conversion have resulted in at least a third of production in Brazil meeting DCF standards. But corporate targets to reach 100% DCF compliance by the end of 2025 are at risk. Efforts to transform soy farming are nascent, with only 7-8% of production meeting more regenerative and sustainable standards.
- In **beef**, there has been greater progress in transitioning production, with 15-20% of beef in Brazil produced through more regenerative and productive approaches. Despite promising progress from jurisdictional traceability programs, illegal deforestation is widespread, and corporate disclosure is limited. Consequently, reliable estimates of DCF beef production volumes are lacking.

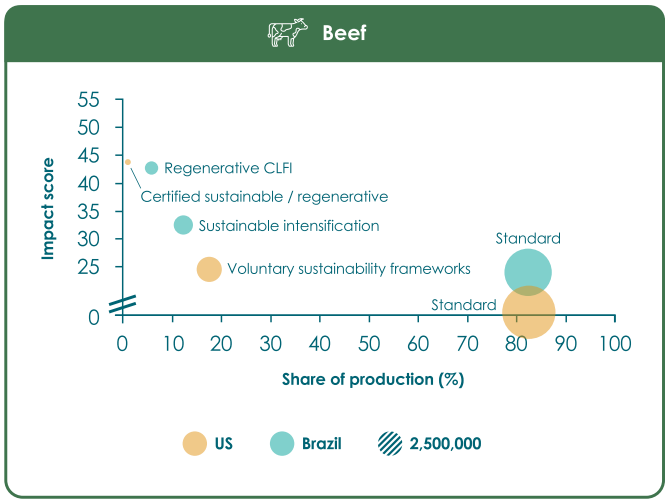
Overall, the share of DCF, regenerative, and productive agriculture remains too small to materially reduce systemic risks—as illustrated in Figure 4. Progress is evident, but production transitions remain incremental, with major gaps in resilience, farmer prosperity, and supply security.

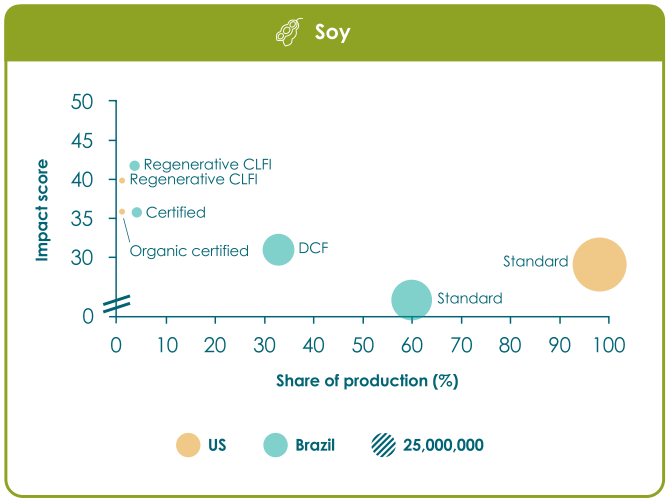
Figure 4. *The extent to which each value chain has transitioned to more regenerative and productive agriculture, assessed by the estimated volumes and aggregated impact score of each approach*

What volume of product in each value chain is produced to better standards?

Bubble size is proportional to the absolute volume produced per production system. The Y-axis represents the sum of each production system's individual impact scores. The higher the point on the Y-axis, the more sustainable the production system. The maximum value of the Y-axis in each figure represents the best possible impact score for the commodity.







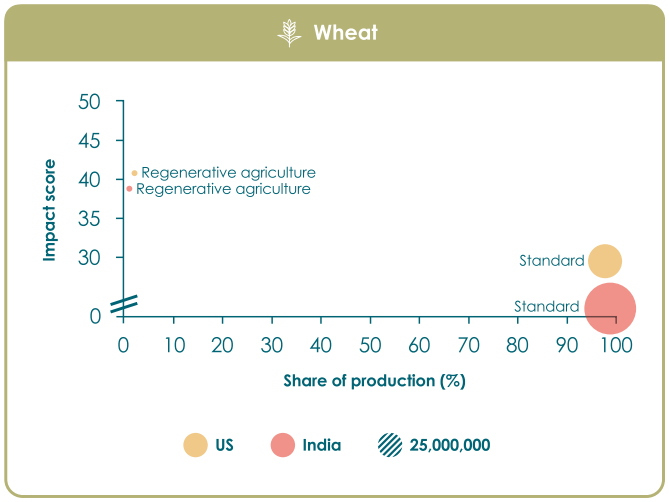


Table 1 illustrates the way in which Re-WIRE captures systems of production for a given commodity compared to standard approaches—in this case, for cocoa. Equivalent tables for all four value chains in this pilot are available in our technical appendix. For beef and soy, these can also be found in their respective deep dive chapters. Figure 5 illustrates the full index of transformed production for cocoa. Each identified system of production is scored against our defined impact parameters, such as climate impact and soil health, to be compared against standard practices as well as each other.

Table 1. *Illustrative example of approaches to more regenerative and productive agriculture in the cocoa value chain*

Summary table of production systems | Cocoa

Country / Region	Production systems and standards	Estimated share of production	Key characteristics	Level of detail and consistency	Key references
West Africa	Standard cocoa production	~41% in Ghana ~70-90% in Côte d'Ivoire	Smallholder cocoa grown in full-sun monoculture on farms under 5 ha, with aging trees rarely replanted. Limited crop diversity, low input use, and no mechanization. Rainfed systems contribute to soil degradation, high deforestation, and reduced climate resilience.	Implicit definition – based on dominant production methods in each country	World Bank, IISD, Rainforest Alliance, IMANI Centre
Indonesia	Standard cocoa production	95%	Monoculture full-sun cocoa grown by smallholders on farms under 2 ha, with aging trees and low-quality planting material. Inputs are limited, labor is manual, and irrigation is absent. Soil degradation, biodiversity loss, and low farm resilience stem from deforestation and lack of shade cover.	Implicit definition – based on dominant production methods in each country	University of Indonesia, Partnership for Indonesian Sustainable Cocoa, IISD
West Africa and Indonesia	Certified cocoa	34-58% in West Africa 2.5-5% in Indonesia	Incorporates environmental and social safeguards, varying by scheme, promotes crop diversification and incorporation of shade trees. Organic certification eliminates synthetic fertilizers and pesticides, Rainforest Alliance and UTZ allow some synthetic inputs but emphasize integrated pest management.	Standardized definition – in a variety of certification schemes	World Bank, IISD
	Intercropped agroforestry	1-3% in West Africa <1% in Indonesia	Cocoa grown with one other crop or shade layer (e.g., fruit, timber, or native trees) in simple 2-strata systems. Typically rainfed with minimal input use. Offers some biodiversity, soil, and water benefits, though poor shade management can increase disease risk.	Loose definition – defined in research but lacks policy standardization	World Bank, IISD, Tropenbos International
	Multistrata agroforestry	1-3% in West Africa <1% in Indonesia	Cocoa grown in four-layer systems with forest, fruit, cocoa, and soil crops. Organically managed with no synthetic inputs, these complex systems provide shade, biodiversity, and ecological services. Though labor-intensive, they offer resilient, multifunctional production with sustained yields and strong environmental benefits.	Loose definition – defined in research but lacks policy standardization	World Bank, IISD

Figure 5. *Illustrative Re-WIRE impact index - Transforming production - Cocoa*

Transforming cocoa production | Impact index

Key — Severe impact 1 2 3 4 5 Minimal impact

			West Africa				Indonesia			
		Production approach	Standard	Certified cocoa	Intercropped agroforestry	Multistrata agroforestry	Standard	Certified cocoa	Intercropped agroforestry	Multistrata agroforestry
		Definition type	Implicit	Standardized	Loose definition	Loose definition	Implicit	Standardized	Loose definition	Loose definition
		Share of production		34-58%	1-3%	1-3%	95%	2.5-5%	<1%	<1%
Impact	Climate	Climate impact	2	4	4	5	2	4	4	5
	Nature	Off-farm biodiversity	1	5	2	5	2	5	2	5
		On-farm agri. biodiversity	2	2	2	5	2	2	2	5
	Soil	Soil health	2	3	4	5	2	3	4	5
	Water	Water use	5	5	5	5	5	5	5	5
		Water pollution	3	4	4	5	3	4	4	5
	Livelihoods	Decent work	1	3	3	3	2	3	3	3
		Pesticide exposure	2	3	5	5	2	3	5	5
	Societal health	Air quality	3	5	5	5	3	5	5	5
		Anti-microbial resistance	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		Nutritional diversity of production	1	2	2	4	1	2	2	4
Aggregate impact improvement against the baseline			(22/50)	+14	+14	+25	(24/50)	+12	+12	+23

Data Opacity and Metrics: A barrier to scaling

Confidence in the transition is further undermined by weak data and inconsistent reporting. In part, this reflects intrinsic, science-based barriers to compiling evidence on the impacts of more sustainable and regenerative practices. Changes in practices contribute to changes in outcomes, such as soil health or water pollution, over long timeframes. Despite this, the variability of data across value chains suggests opportunities to strengthen the organization and production of data:

- Value-chain-specific standards and certification schemes for more regenerative and productive agriculture exist for some value chains, such as the Brazilian beef sector. However, the economic benefits of these approaches are not reported in ways that build confidence across the value chain.
- There is still no globally aligned framework for outcomes and metrics for regenerative and productive agriculture. Efforts by Regen10,[15] WBCSD's Regenerative Agriculture Metrics (RAM) framework,[16] and the SAI platform[17] are promising, but have not yet converged into widespread adoption or harmonized reporting.
- This data opacity limits learning, weakens the case for long-term investment, and erodes trust in market mechanisms designed to reward performance.

To benchmark progress and direct capital at scale, companies, investors, and policymakers need transparent, comparable data. More efforts are needed to strengthen the robustness of data and harmonize the way it is reported.

Transforming Consumption: Signals emerging, but uneven and contested

Consumption of all four of our selected value chains—wheat, cocoa, soy, and beef—could shift to better support nutrition and health while reducing pressure on land use and forests. Much of global wheat and most of global cocoa is consumed as part of ultra-processed, high-salt, high-fat, or high-sugar foods. However, in this analysis, we have focused on beef and soy because the end products (beef, chicken, and pork) are more likely to be covered in dietary guidelines and consumed as whole products. This makes it more straightforward to derive implications for demand.

In beef and soy, business-as-usual consumption far exceeds dietary recommendations. Rapid reductions are unlikely, but medium-term shifts are emerging. In China, innovations in animal feed could materially reduce soy demand. In Brazil, targeting ultra-processed beef products aligns with public health priorities. In the short term, businesses must focus on supply-side transitions that decouple production from land-use change, while governments and civil society can align dietary guidelines with health and sustainability evidence.

Advocating reduced consumption of high-impact commodities is politically and socially contested. Scientific consensus points to the need for lower animal protein consumption, but three concerns persist: equity (poorer populations already consume little), leakage (reductions in one market may be offset elsewhere), and timing (diet change is too slow to prevent near-term habitat loss). This analysis, therefore, focuses on consumption where it is highest: beef in Brazil and the US, and soy in China (pork) and the US (chicken).[18] [19] [20]

Our index on the state of the consumption transition (Table 2) compares current consumption with recommendations from three key categories: national dietary guidelines, the EAT-Lancet diet, and the World Cancer Research Fund (WCRF).[21] Following national dietary guidelines alone would reduce US beef and soy consumption by over 50% by 2050. Applying WCRF recommendations would cut beef and soy consumption in Brazil and China by over 50%.[22] [23] Deeper reductions under the EAT-Lancet diet are possible, but simply meeting existing guidelines would deliver significant gains in health alongside reductions in emissions and land use.

Table 2. *Re-WIRE index - State of the consumption transition - Soy and beef*

Value chain	Soy		Beef	
Producer country	Brazil	US	Brazil	US
Consumption market	China	US	Brazil	US
Demand reduction lever	Pork	Chicken	Beef	Beef
Business As Usual (BAU) to 2050	**+19%**	**+5%**	**+4%**	**+2%**
National dietary guidelines	**+17%**	**-68%**	n/a	**-68%**
World Cancer Research Fund in 2050	**-58%**	n/a	**-57%**	**-68%**
EAT-Lancet diet in 2050	**-92%**	**-82%**	**-94%**	**-93%**

Soy consumption in the Brazil-China corridor: China's 2023 Action Plan set national targets to diversify supply and reduce soybean meal in feed. [24] This spurred innovation and cut demand by 9 million tonnes in 2023.[25] China is also diversifying import sources, including a $900 million deal with Argentina and new approvals for rapeseed oil imports from Ethiopia.[26] Muyuan, China's largest pork producer, reformulated feed with synthetic amino acids, cutting costs by Renminbi (RMB) 234 million ($32.6 million) and saving 2 million tonnes of soy. Scaled nationally, such innovations could trim demand by ~20 million tonnes, nearly a fifth of annual consumption.[27] For Brazilian producers, this underscores the need to diversify production systems and prepare for structural demand shifts.

Beef consumption in the Brazilian beef value chain: Reducing beef consumption is politically sensitive and inequitable for low-income households. Alternatives remain costly and culturally constrained. Yet feasible entry points exist: ultra-processed beef (11–20% of consumption in 2018[28]) carries greater health risks and advocating for a reduction of this segment would be in line with the governments' public health priorities. Targeting this segment can build a mandate for action. Major Brazilian meatpackers, including JBS, Marfrig, and BRF,[29] have invested in alternative proteins,[30] though commercial traction has been limited.

Figure 6. *Re-WIRE economic feasibility index - Transforming consumption - Soy and beef*

Value chain	Soy		Beef	
Producer country	Brazil	US	Brazil	US
Consumption market	China	US	Brazil	US
Demand reduction lever	Pork	Chicken	Beef	Beef
Availability of alternatives	2	3	2	3
Price elasticity	2	2	2	2

Key — Least favorable 1 2 3 4 5 Most favorable

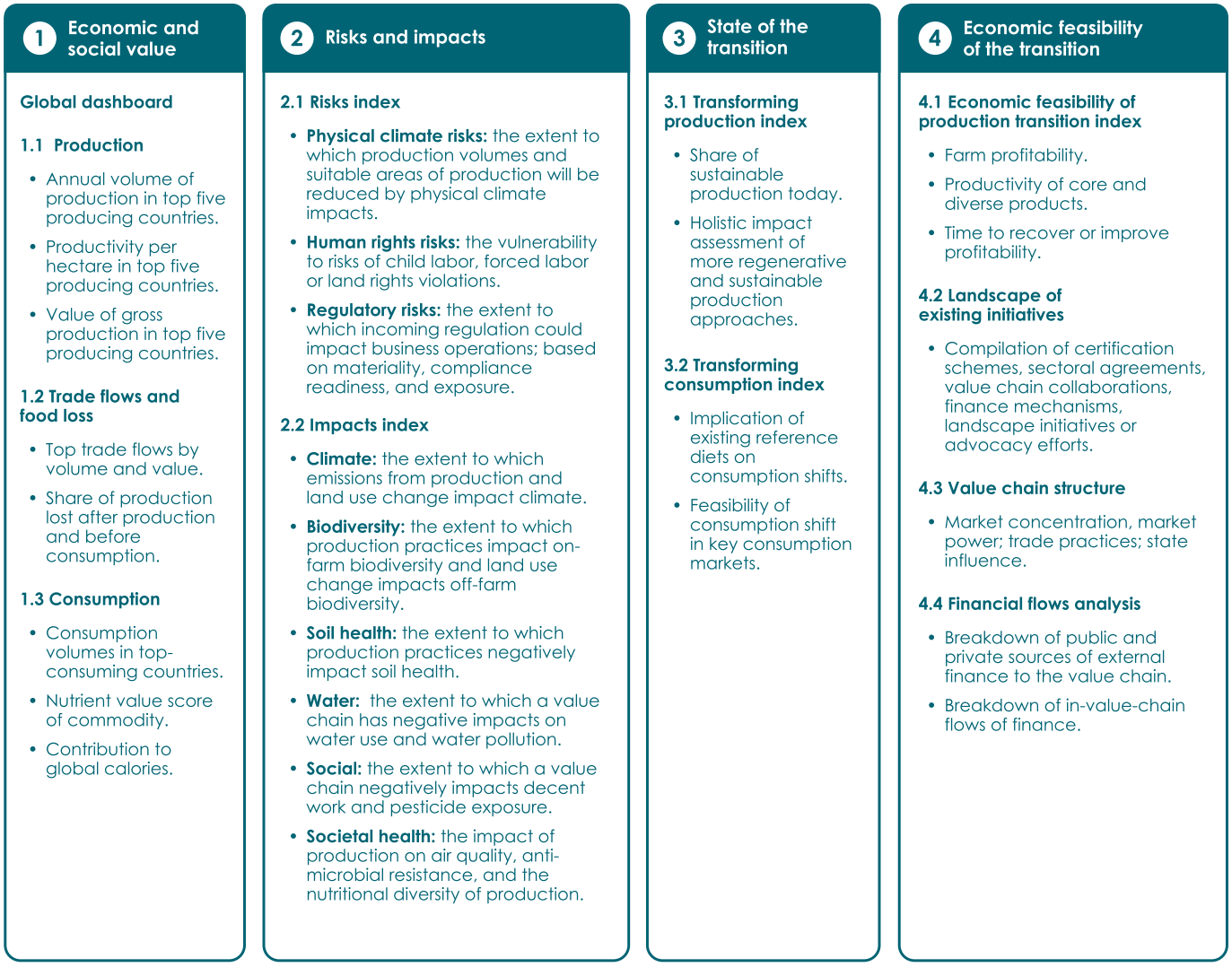
The evidence suggests that demand-side transitions are possible but contested. Large-scale dietary change faces political, cultural, and equity barriers. But policy and technological innovations—particularly in feed efficiency in China and health-driven initiatives in Brazil—are beginning to reshape consumption pathways. Businesses must prepare for this variability, governments should align health and sustainability objectives, and civil society can help ensure equity and legitimacy in the transition.

Section 2:
How to act today

Introduction

In the chapters that follow, we apply the Re-WIRE framework to the Brazil–China soy value chain and Brazil's domestic beef value chain. We combine economic-feasibility assessments of improved production approaches with value-chain structure and financial-flow analysis, complemented by expert interviews. From this, we present a practical framework for private-sector action.

Figure 1. *The Food and Land Use Coalition's Re-WIRE analytical framework for value chains*



Framework for private-sector action

Our framework groups action for the private sector into three categories:

- **Unilateral private-sector actions** are commercially feasible even when companies act alone.
- **Cross-value-chain collaboration** describes private-sector collaborations that further strengthen the commercial value of action to shift the value chain to become more regenerative and resilient.
- **Business policy advocacy** describes policy changes that companies can advocate for, in collaboration with civil society organizations and farmer representatives.

System-wide impact will be achieved through policy change or cross-value chain collaboration, with individual action and industry collaborations playing a critical enabling role.

Our framework further groups actions into five areas that can reshape incentives and finance:

- **Demand DCF and regenerative supply** by incentivizing and rewarding regenerative and productive practices.
- **Make finance conditional** by linking public or private capital flows to environmental and social improvements, supported by robust monitoring of outcomes across a broader range of impacts.
- **Lower or eliminate the cost penalty** by reducing the operational costs of regenerative and productive approaches or introducing legislation or standards that level the playing field.
- **Make regenerative inputs and technical assistance (TA) available** by ensuring farmers have the tools, inputs and knowledge to transition.
- **Reduce demand for over-consumed products** by growing new markets for alternative products with lower social, health and environmental impacts.

Table 3. *Illustrative private sector actions to re-wire value chains*

	Unilateral private sector action	Cross-value chain collaboration	Business policy advocacy
Demand DCF and regenerative supply Demand signals and incentive schemes for productive, regenerative and DCF supply.	Individual companies set DCF and regenerative procurement standards.	Multiple companies use certifications, align DCF and regenerative procurement standards or consumer premiums.	Importer countries mandate standards for DCF and regenerative production.
Make finance conditional Public or private capital rewards productive, regenerative farming.	Sustainability linked loans or bonds, green loans or credit lines, exclusion policies, ESG-linked bonds, technical assistance grants.	Blended finance funds, risk pooling and portfolio guarantees, offtake-backed loans, and securitization vehicles.	Agricultural subsidies, state credit and agricultural insurance are conditional on regenerative production.
Lower or eliminate the cost penalty Reduced operational and transaction costs, or legislation that levels the playing field.	Implement traceability technology.	Implement mass-balance, traceability technologies, and common approaches to mapping.	National or state enforcement of nature protection, land use laws, or agricultural production standards.
Make regenerative inputs and TA available Bundled input-finance packages that incentivize & enable regenerative production.	Individual input providers or regional buyers offer innovative input-finance bundles.	Input finance bundles, voluntary industry standards or cross value-chain incentives for inputs.	National or state government incentivizes more sustainable use of inputs and provides TA to support this transition.
Improve diets & prepare for reduced demand Scale healthier alternatives to over-consumed products and support producers to adapt.	Increase Research and Development (R&D) investment into new products and ingredients that can replace high-impact products.	Align on new product standards and marketing; Advocate for supportive regulation.	Public R&D investment. Supportive regulation for testing, advertising and marketing more sustainable products.

③ Soy in Brazil

3.0 Executive Summary: The future of Brazil-China soy

DCF is necessary, but not sufficient

Deforestation- and conversion-free (DCF) approaches have shifted corporate norms, reduced illegal deforestation, and improved traceability. Today, the five largest traders report 93–99% DCF sourcing for Brazil-origin soy, representing at least 37% of national production. But progress remains politically fragile, vulnerable to rollback, and insufficient to eradicate deforestation and conversion or to secure the long-term resilience of soy supply chains.

DCF is a foundation—not the end point. To sustain progress and address wider pressures—climate volatility, degraded soils, biodiversity loss, and community health impacts—economic incentives must be embedded into finance, procurement, and national policy, ensuring DCF becomes the market floor while unlocking broader regenerative and productive models.

Soy's global importance and rising risks

- **Concentration:** Brazil and the US account for 68% of global soy production; China is the largest buyer, sourcing 60% from Brazil and 32% from the US.
- **Nutritional efficiency gap:** Despite being protein-rich, soy contributes only 3.3% of global calories; ~75% is used in animal feed, with calories lost in conversion to meat, dairy, and eggs.
- **Rising pressures:** Climate volatility, EU deforestation regulations (covering ~13% of Brazil's output), and negative impacts on health, livelihoods, and biodiversity all undermine resilience.

Soy remains one of Brazil's most profitable exports. But sustaining its competitiveness requires aligning production with resilience, rural development, and global food security goals.

Initiatives exist, but remain fragmented and fragile

The Amazon Soy Moratorium slowed deforestation, and state-level initiatives such as Mato Grosso's Produce, Conserve and Include (PCI) have shown promise by integrating conservation and productivity. Yet both remain politically contested and under-financed. Early finance innovations (e.g., Responsible Commodities Facility, Innovative Finance for the Amazon, Cerrado and Chaco (IFACC) and pilot Chinese sourcing deals (e.g., COFCO–Mengniu) are promising, but volumes remain limited. Isolated projects cannot drive transformation at scale: without structural changes in credit, procurement, and trade, DCF gains will remain vulnerable.

Solutions are viable, but mid-sized producers are left out

DCF approaches cover the largest share of the market (at least 37%), but the likely scale-up of DCF soy will be insufficient to eliminate legal land clearing. More regenerative systems, such as crop–livestock–forest integration (CLFI), have only reached 3-4% of the market. They address a broader set of outcomes, improving yields, diversifying income, and restoring soil health. But they require 3–5 year payback periods, making them inaccessible under current credit structures. Certified soy has shorter paybacks but weak market demand.

Mid-sized farms (50–1,000 ha) represent a third of production, are prevalent in high-risk regions, and are flexible enough to adopt new models. Yet they face thin margins, degraded soils, and limited access to credit. Redirecting finance to this group is one of the most powerful levers for system change.

Finance and influence are misaligned

- **Credit flows entrench the old model.** Brazil's rural credit system channels ~90% of soy external finance, but 70% goes to the largest 5% of farms. Low-carbon credit lines, e.g., ABC+/RenovAgro, account for only 2% of the total.
- **Intra-value-chain finance dominates, but is opaque.** Forward contracts, barter, and pre-purchase agreements—often backed by Chinese importers—account for twice as much as external soy finance, often with little sustainability linkage.

Redirecting rural credit and intra-value-chain finance to mid-sized producers, with blended finance to de-risk adoption, could unlock large-scale transition.

What private sector action looks like in practice

Near-term actions can lock in DCF as the baseline by targeting finance and technical assistance for mid-sized producers at the highest risk of clearing land. In the longer term, there is a need to develop a higher-ambition vision for the soy value chain that takes DCF as a floor, and work towards aligning outcomes and metrics for more regenerative, resilient soy production.

- **Companies and traders:** Embed traceability into procurement and pre-finance; standardize onboarding checks in high-risk regions; and combine DCF implementation with targeted finance and technical assistance for producers at the highest risk of clearing land.
- **Cooperatives:** Offer bundled inputs, advisory services, and credit access to lower costs and reduce leakage.
- **Financial institutions:** Redesign loan terms to reward sustainability, backed by guarantees and concessional finance.
- **Chinese buyers:** Safeguard long-term sourcing by recognizing DCF as the floor and supporting resilient trade partnerships.

Table 4. *Private sector actions to transition the soy value chain*

Private sector actions to re-wire soy

	Unilateral private sector action	Cross-value chain collaboration	Business policy advocacy
Demand DCF and regenerative supply Make DCF soy the baseline and align on a shared ambition for regenerative, resilient soy	Embed traceability in contracts, procurement, onboarding checks, payment timing, and working capital with public reporting.	Align procurement / onboarding checks across the value chain focusing on high-risk regions.	Mandate standards for DCF and regenerative production in importer countries.
Make finance conditional Public or private capital rewards productive, regenerative farming.	Make sustainability-linked loans, bonds, credit lines, and technical assistance grants conditional on DCF supply.	Collaborate to provide flexible, targeted packages of inputs, credit, technical assistance, and finance for high-risk producers.	Advocate for scaling up ABC+ / RenovAgro and for conditionality of PRONAF and PRONAMP credit on minimum sustainability criteria.
Lower or eliminate the cost penalty Reduced operational and transaction costs; legislation that levels the playing field.	Leverage existing national registries and common traceability systems.	Limited action here due to recent improvements in traceability technologies and data infrastructure.	Advocate for strengthening the Forest Code to encompass clearing native vegetation to lower the opportunity cost for at-risk producers.
Make regenerative inputs and TA available Bundled input-finance packages that incentivize & enable regenerative production.	Individual input providers or regional buyers offer innovative input-finance bundles.	Collaborate to provide flexible, targeted packages of inputs, credit, technical assistance, and finance for high-risk producers.	Collaborate with state-led efforts to reach mid-sized producers with targeted technical assistance programs.
Improve diets & prepare for reduced demand Scale healthier alternatives to over-consumed products and support producers to adapt.	Increase R&D investment into nutritious, plant-based alternatives to beef.	Align on new product standards and marketing; Advocate for regulation supporting plant-based alternatives to beef.	Advocate for increased public R&D investment & regulation supporting testing, advertising, and marketing of plant-based alternatives to beef.

Next steps

The soy transition does not require new systems—it requires repurposing existing ones. The immediate priorities are:

1. Consolidate DCF as the market baseline, embedding traceability into contracts and finance.
2. Redirect capital flows to mid-sized producers, using blended finance to de-risk transitions and scale regenerative practices. Targeted finance and technical assistance must be provided to producers at the highest risk of clearing land.
3. Build a shared Brazil–China vision, framing the transition around resilience, sovereignty, and competitiveness to secure buy-in from producers, buyers, and governments.

3.1 A strategically important crop with growing risks and unrealized potential

Soy is one of the world's most strategically concentrated crops. Brazil and the US produce 68% of global supply (Figure 7), while China is the dominant buyer, sourcing 60% from Brazil and 32% from the US. The Brazil–China corridor has become the backbone of global soy trade and one of Brazil's most profitable exports. This concentration gives a small set of actors outsized influence over whether the system evolves toward resilience—or remains locked into fragile, high-risk models.

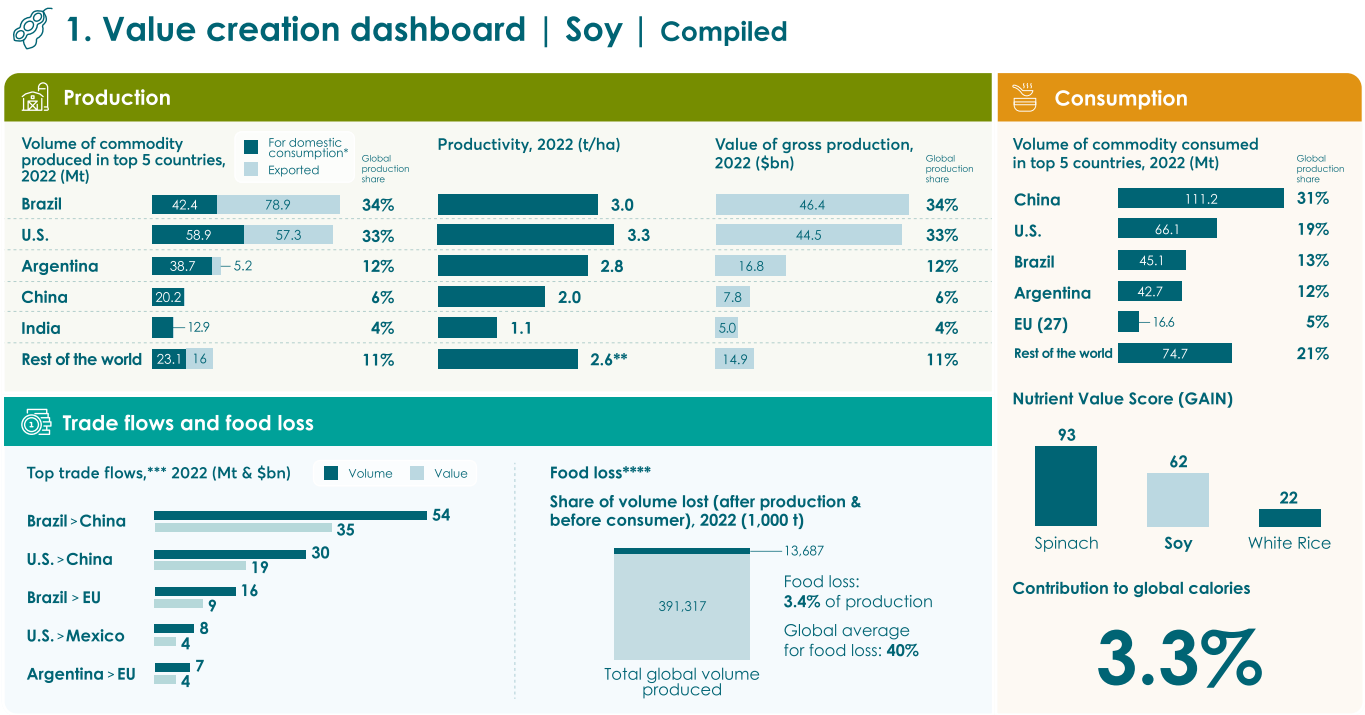
Despite being protein-rich and agronomically efficient, soy is underutilized in human diets, contributing just 3.3% of global calories. Nearly three-quarters of traded soy is fed to animals, losing most of its caloric and protein value in conversion to meat, dairy, or eggs. Of the 20% of soy consumed directly by people, over half is in the form of soybean oil, with only a small share reaching people as nutrient-dense foods such as tofu or soy milk.[31] This nutritional efficiency gap highlights both a vulnerability and an opportunity for business and policymakers.

Brazil's soy sector faces significant systemic risks. Climate exposure varies, with expected changes to the suitability of production regions by 2050. Due to shorter wet seasons in some regions and the impact of extreme weather, yields are projected to reduce by 10-20% by 2050. Human rights risks are moderate, with forced and child labor indicators in frontier regions and allegations of land conflicts involving Indigenous and smallholder groups. Regulatory risk is significant: EU deforestation rules would impact 13% of production, while domestic traceability systems (e.g., Cadastro Ambiental Rural (CAR)[32]) and certifications (e.g., Round Table for Responsible Soy (RTRS)[33]) that can support compliance still cover only a limited share of the market.

Current production models are eroding the long-term resilience of the value chain. Large-scale monocultures reduce on-farm biodiversity and push ranching into sensitive ecosystems. Direct climate impacts are severe: about half of forest lost to soy is due to direct conversion,[34] and deforestation is intensifying local warming.[35] Pesticide exposure and chemical runoff harm workers and surrounding communities, while soil health continues to degrade. Mechanization has boosted incomes for some, but displaced traditional labor, further weakening rural livelihoods.

Commitments by the five largest traders to procure 100% DCF soy by 2025 create a near-term opportunity to consolidate progress. Together, these firms already report 93–99% DCF sourcing for Brazilian soy—covering at least 37% of national output. But this momentum will stall unless procurement practices change and investors provide the right financial backing. Without embedding DCF into contracts, credit, and policy, the system remains vulnerable to reversal.

Figure 7. *Global dashboard - Soy*



* Quantity of domestic production for domestic consumption is an indicative, simplified estimate calculated by taking the difference between total domestic production and export volumes. The total amount of the commodity consumed per country, whether produced domestically or imported, is in the "Consumption" figure.
**"Rest of world" bar in "Productivity" figure refers to the production-weighted global average productivity of all remaining countries.
*** Data sets underlying figures for Value of gross production (FAO) and Top trade flows (ResourceTrade) are not directly comparable but offer an indicative view of economic value created.
**** FAO data for loss encompasses all stages in the value chain between the level at which production is recorded and the household, i.e., storage and transportation. Losses occurring before and during harvest are excluded. Waste from both edible and inedible parts of the commodity occurring in the household is also excluded.

3.2 Transitions are economically viable, but incentives still favor deforestation

More regenerative models are viable, but require better incentives and risk-sharing

Brazil has a pathway to more regenerative and productive soy production. Yet current incentives still reward expansion into new land rather than more regenerative and productive approaches on existing farms or degraded land. Our analysis of the impacts, scale, and economic feasibility of existing solutions shows:

Among the more sustainable production models, DCF systems have the highest share of soy volume, impacting at least 37% of soy volumes,[36] but they are insufficient to eliminate land conversion. Progress has been driven by voluntary 2025 zero-deforestation commitments from the top five soy traders. With improved mapping and traceability, verified DCF is increasingly available without a systematic price premium at current demand levels and in specific origination zones. However, if buyer demand (e.g., from China) grows faster than compliant supply, premiums are likely until supply expands. Demand signals from traders, often through their control over storage and logistics assets, influence farmer choices in production practices. But for a minority of farmers, stronger incentives will still be needed to eliminate land conversion. In the Cerrado, land clearing is legal, and beyond it, enforcement is inconsistent.[37] Retaining native vegetation carries a high opportunity cost—estimated at USD $125-175/ha annually.[38] Only a targeted package of interventions—combining technical assistance to support productivity growth on existing or degraded land, credit lines, and changes to the law—is likely to eliminate land conversion.

Progress in transitioning to more regenerative, resilient soy is limited by long payback periods. CLFI systems hold the highest long-term business case and deliver the broadest impact. They improve yields, diversify income, and rebuild soil health. But a 3–5 year payback period and short-term yield risks make them hard to finance under current credit structures, and they currently only account for 3-4% of soy volumes in Brazil.

Certified soy combines DCF with a broader set of sustainability outcomes, but demand is weak. Certified soy can demonstrate compliance for downstream actors and offers a shorter 1–3 year payback period for farmers. However, demand is weak and price premiums too low to drive farm-level change. Progress in the near term is more likely to come from DCF-as-default practices—supported by traceability and targeted incentives—than from widespread uptake of certification.

***Table 5**. Approaches to more regenerative and productive agriculture - Soy in Brazil*

Summary table of production systems | Soy

Country / Region	Production systems and standards	Estimated share of production	Key characteristics	Level of detail and consistency	Key references
United States	Standard soy production	Data unavailable	Large-scale monocropping, often rotated with corn, GM seeds dominate, large farms, precision agriculture techniques in some farms. Widespread use of weedkillers and synthetic fertilizers, mostly rainfed, some use of fungicides and insecticides.	Implicit definition – based on dominant production methods in each country	USDA
	Organic certified	<1%	Focus on tillage, crop rotations, cover crops, and preventative or mechanical and biological weed and pest control. Most synthetic fertilizers and pesticides prohibited, use of animal manure or crop waste, no GMO seeds, efficient water use.	Standardized definition – vary by region and country	USDA Organic
	Regenerative agriculture	<1%	Cover crops, mulch, green manure, no till or reduced-till, 3+ crop rotations, extensive natural strips and buffers, some systems integrate livestock grazing. Minimization of synthetic fertilizer or pest control, using natural buffers and biological pest management instead.	Emergent – mixture of outcomes-based and practice-based definitions	IDH, NRDC
Brazil	Standard soy production	Data unavailable	Large-scale, mechanized monocropping dominates, often rotated with corn (safrinha). Heavy use of pesticides, high fertilizer reliance, 98% GM crops, increasing use of irrigation in some regions.	Implicit definition – based on dominant production methods in each country	WBCSD, PNAS, industry reports
	Deforestation- and conversion-free (DCF)	33%	Soy whose production does not contribute to the conversion, legal or illegal, of natural forests or other natural ecosystems (e.g., grasslands, wetlands, and savannas) to agriculture or tree plantations after a specified cut-off date.	Standardized, widely adopted by several major organizations	Accountability Framework initiative
	Certified	4%	Encourages agricultural practices that improve productivity and soil health, labor protections, no-deforestation, or zero conversion; and practices that minimize the use of synthetic fertilizers and pesticides.	Standardized – but definitions vary across 70 different schemes	RTRS
	Regenerative CFLI	3-4%	Integrates agricultural, animal farming, and forestry systems through intercropping, crop succession, or crop rotation. Reduced reliance on inputs such as fertilizers through approaches that improve and maintain soil health.	Codified definition – in Brazil's ABC Plan and ILPF framework	EMBRAPA, ABC Plan (Brazil), industry reports

The indices illustrated by Figure 8 and Figure 9 present comparative impact and feasibility scores for more regenerative systems. However, national averages obscure important subnational differences. Subnational analysis is needed, as farmer profiles, credit access, and governance vary by region. For example, progress in Mato Grosso has depended on close alignment between the state government, producer groups, and international partners.

Figure 8. *Re-WIRE impact index - Transforming production - Soy*

Transforming soy production | Impact index

Key: Severe impact 1 2 3 4 5 Minimal impact

			US			Brazil			
		Production approach	Standard	Certified Organic	Regenerative agriculture	Standard	DCF	Certified	Regenerative CLFI
		Definition type	Implicit	Standardized	Emergent	Implicit	Standardized	Standardized	Codified
		Share of production	~99%	<1%	<1%	~90%	~33%	~4%	~3-4%
Impact	Climate	Climate impact	4	4	4	2	4	4	3
	Nature	Off-farm biodiversity	4	4	4	2	5	5	5
		On-farm agri. biodiversity	2	3	3	2	2	2	5
	Soil	Soil health	2	3	4	3	3	3	5
	Water	Water use	4	4	5	4	4	4	5
		Water pollution	3	4	5	3	3	4	5
	Livelihoods	Decent work	4	4	4	3	3	4	4
		Pesticide exposure	2	4	4	2	2	4	4
	Societal health	Air quality	3	4	4	3	3	4	3
		Anti-microbial resistance	n/a	n/a	4	n/a	n/a	n/a	3
		Nutritional diversity of production	2	2	3	2	2	2	3
Aggregate impact improvement against the baseline			30/50	+6	+10	(26/50)	+5	+10	+16

Figure 9. *Re-WIRE economic feasibility index - Transforming production - Soy*

Transforming soy production | Economic feasibility index

			US			Brazil			
		Production approach	Standard	Certified Organic	Regenerative agriculture	Standard	DCF	Certified	Regenerative CLFI
		Definition type	Implicit	Standardized	Emergent	Implicit	Standardized	Standardized	Codified
		Share of production	~99%	<1%	<1%	~90%	~33%	~4%	~3-4%
Economic feasibility	Transition risk	Time to regain profits		3	3		n/a	3	3
	Value added in the transition	Farm profitability		+1	+1		0	+1	+2
		Core product productivity		-1	+1		0	0	+1
		Diverse products productivity		0	+2		0	0	+2

Key: Transition risk – Time to regain profits

1 (10+ years) 2 (5-10 years) 3 (3-5 years) 4 (1-3 years) 5 (0-1 years)

Key: Value added in the transition – Profitability and productivity relative to standard production

-2 Greatly decrease; -1 Decrease; 0 No change; +1 Increase; +2 Greatly increase

3.3 Existing efforts show promise, but remain fragmented and politically fragile

A review of existing initiatives illustrates some green shoots of progress, but limited impact.[39]

- **Amazon Soy Moratorium:** Credited with meaningful forest protection but remains politically fragile and vulnerable to roll-back. Without embedding DCF in national strategies that also meet producer needs and rural development goals, gains will not endure.
- **Mato Grosso's Produce, Conserve, Include (PCI):** Shows how locally owned landscape initiatives[40] can align conservation and productivity goals while earning producer legitimacy. Yet they depend heavily on political support and remain under-financed.
- **Finance pilots (RCF, IFACC):** Efforts to unlock conditional capital, such as the Responsible Commodities Facility (RCF) and Innovative Finance for Amazon, Cerrado, and Chaco (IFACC), have seen some success, though investment levels remain in the tens or hundreds of millions.
- **Chinese buyer engagement:** On the demand side, early engagement with Chinese buyers has yielded some early successes, such as the COFCO-Mengniu deal,[41] but remains limited in scope and scale.

The common thread: these efforts are fragmented, fragile, and too small to alter market incentives. Scaling impact requires embedding incentives into credit systems, procurement frameworks, and export platforms.

Interviews highlighted a deeper barrier: failure to find common ground. International actors—both civil society organizations and foreign governments—have largely focused on deforestation and compliance. While this approach is evidence-based,[42] it has alienated many producers, who view it as foreign interference that challenges national sovereignty and fails to reflect production realities.

The way forward is to rebuild legitimacy: strengthen collaboration with national stakeholders, including producer associations, and align sustainability goals with national development priorities.

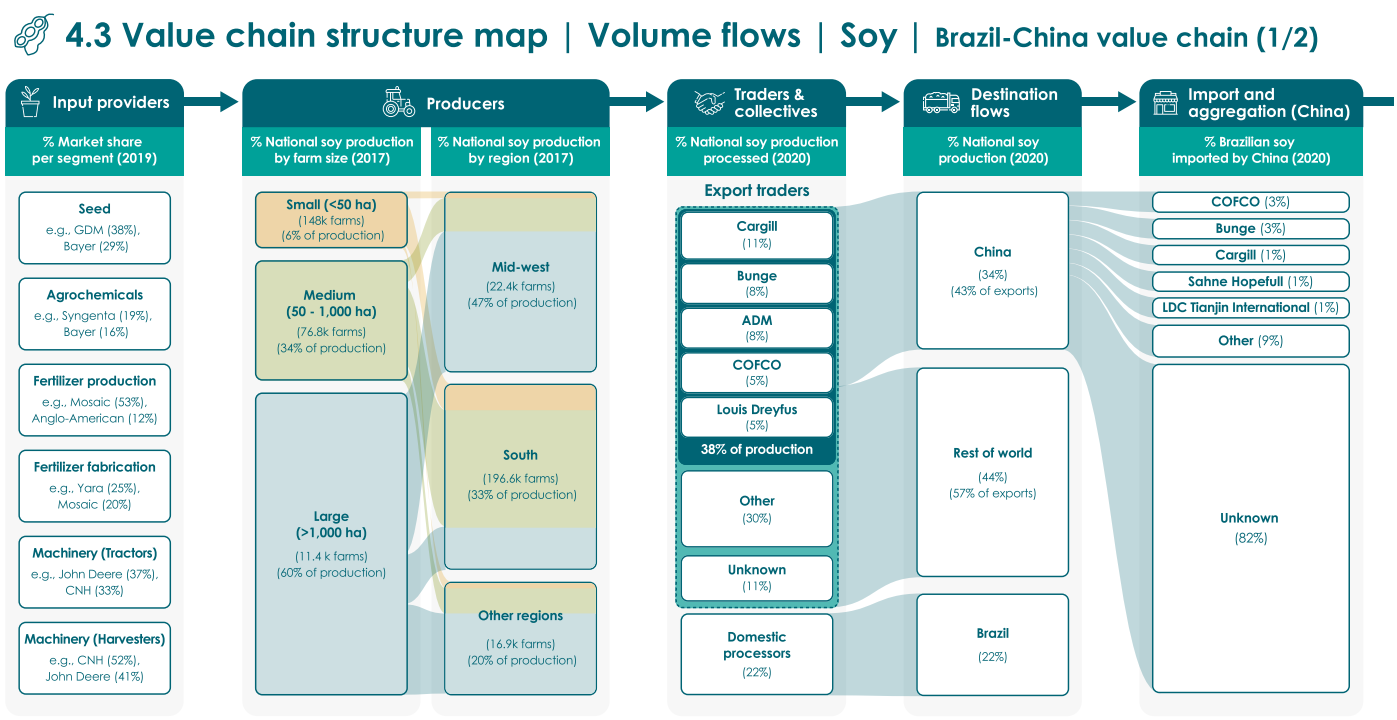
3.4 Finance can be redirected to drive transformation

A concentrated value chain shapes who holds leverage—and who's excluded

Volume flows in the Brazil-China soy value chain reveal a stark contrast between upstream concentration and downstream fragmentation, as shown in Figure 10 and Figure 11.

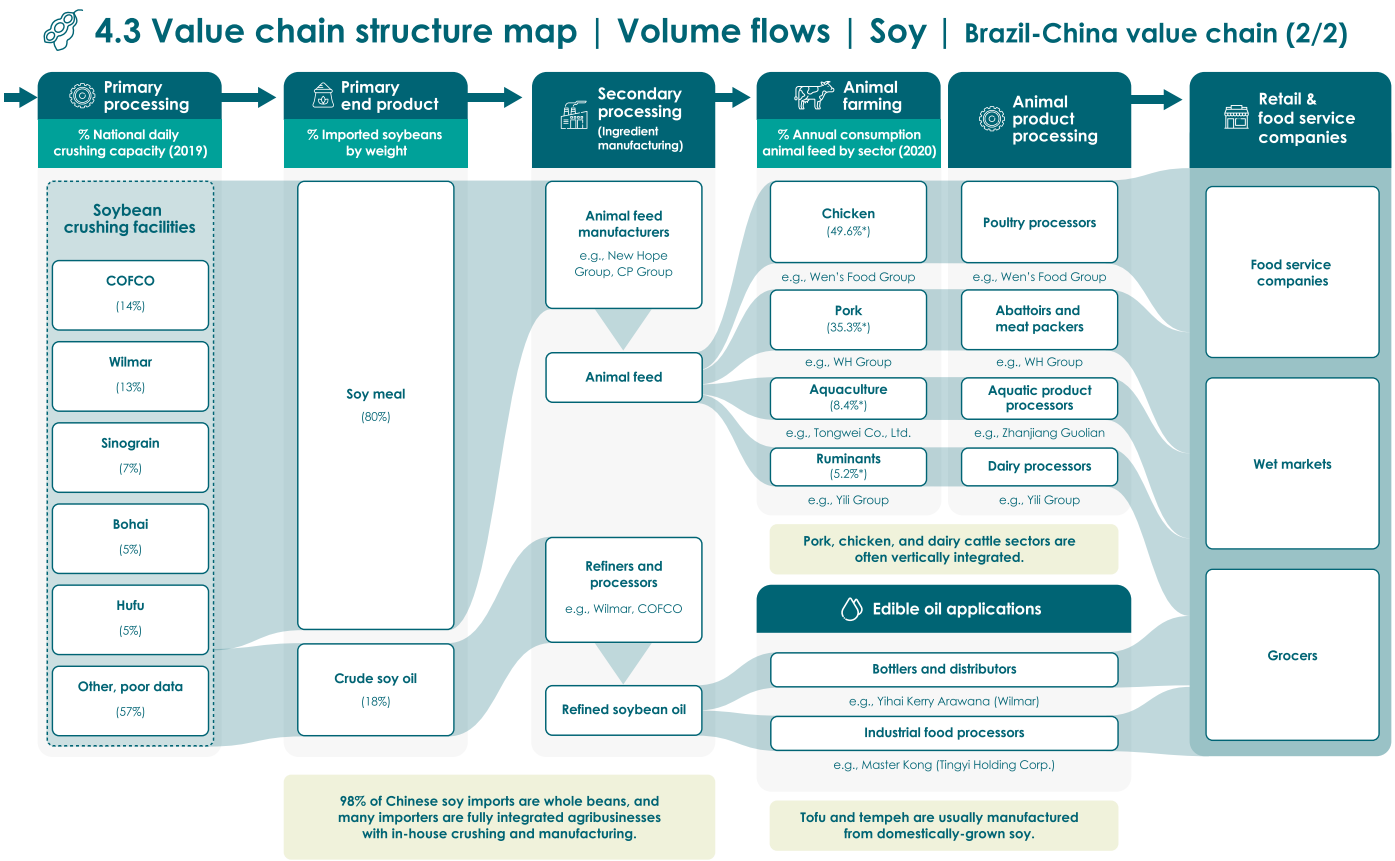
- **Large farms dominate output.** Large farms (over 1,000 ha), mostly in Brazil's Midwest, represent less than 5% of farms but produce 60% of national output. These farms already have capital, technology, and market access, but low incentives to transition.
- **Mid-sized farms are a critical entry point to transition soy.** Mid-sized farms (50-1,000 ha) produce nearly all remaining national output, accounting for about a third of both farms and volume. Many are in high-deforestation risk regions like MATOPIBA.[43] Their thinner margins and vulnerability to soil degradation and input shocks provide strong incentives to adopt regenerative practices, but they are often excluded from finance and technical support.[44]
- **The top five traders shape incentives and funnel finance.** They handle 38% of Brazil's total soy volume (Figure 12) and shape infrastructure, pricing, and logistics.
- **Cooperatives provide agronomic support and influence state policy.** They aggregate supply, provide agronomic support, and influence critical state-level policy on rural credit, extension services, and land-use enforcement.[45,46]
- **Chinese buyers dominate exports but are fragmented.** In 2022, 80% of Brazil's soy was exported; half went to China.[47] China's imports are fragmented and opaque. COFCO, the largest importer by volume, manages just 3% of the trade, while 82% of China's importers lack public data (Figure 10). Downstream fragmentation continues into crushers, feed manufacturers, and meatpackers. There is higher consolidation in China's pork and poultry sectors, which consume 85% of soy-based animal feed (Figure 11). Large meat companies such as WH Group and Wen's Food Group can shape demand.

Figure 10. *Volume flows in the soy value chain, Brazil-China – From input providers to importers*



Sources: Future of Sustainable Food Systems, Trase, SIDRA, ResourceTrade.earth

Figure 11. *Volume flows in the soy value chain, Brazil-China – From importers to retail & food service*



Sources: Trase, USDA ERS, Malaysian Palm Oil Council, China Animal Feed Industry Association, McKinsey

*These sectoral estimates use 2020 feed output shares from the China Animal Feed Industry Association as a proxy for soybean meal consumption shares. While this provides a directional approximation consistent with species-specific feed demand structures, it does not account for variation in soymeal inclusion rates across species or shifts in feed formulation since 2020. Actual soymeal use by sector may differ, particularly for pork and chicken, which typically have higher inclusion rates, and ruminants and aquaculture, which typically have lower ones.

Redirecting financial flows to mid-sized producers is a high-impact opportunity

Financial flows, especially to producers, mirror the concentration patterns of volume flows:

- **Public credit dominates and predominantly supports large-scale producers.** Brazil's rural credit program delivers nearly 90% of formal finance to soy producers through subsidized rural credit lines, mostly via domestic banks.[48] But the 5% of large farms capture 70% of all rural credit for soy operations (Figure 12).[49]
- **Intra-value-chain finance is double the size of public credit, and could be made conditional upon regenerative, and DCF production.** Traders pre-finance large producers through forward contracts, bartering, or input pre-purchase agreements. Input providers provide bundled credit tied to inputs and advisory services. Together, these form a large share of capital flows, though most are confidential and not disclosed publicly (Figure 12, Table 7). Almost half originates with Chinese importers, giving them significant indirect influence over sourcing incentives and terms. Today, these flows are rarely linked to environmental criteria—but they could be.
- **Sustainability-linked credit for mid-sized producers is growing from a tiny base.** PRONAF and PRONAMP, the credit programs designed for small and mid-sized producers, account for 12% and 18% of soy operating credit, respectively.[50] Most is not tied to sustainability. While both programs contain sub-lines for regenerative practices,[51] uptake is limited. Brazil's flagship ABC+/RenovAgro credit line was less than 2% in the 2024/25 Plano Safra.[52]
- **Private finance favors large, low-risk, high-input, monoculture producers.**[53] Products designed for short-term returns cannot serve regenerative transitions with 3-5 year paybacks. For banks to extend patient capital and flexible repayment, they need de-risking tools: first-loss capital, guarantees, and concessional co-investment. Expanding these tools through blended finance, state development banks, or donor-backed credit enhancement could unlock the transition for mid-sized producers. Traditional credit remains cheap and accessible,[54] yet banks and insurers could offer preferential terms for traceable, deforestation- and conversion-free soy.

The opportunity is not to create new finance, but to embed transition incentives into the sizable capital already flowing through the value chain. Linking rural credit to regenerative criteria, aligning trade finance with traceability, and reshaping intra-chain credit terms could make finance a driver of transformation rather than a barrier.

Table 6. *Formal financial flows from public and financial institutions in Brazilian soy, by type of finance*

Financial Sector and Public Sector Flows: Breakdown by type of finance

Financial sector and public sector flows refer to direct, traceable support through formal loans, bonds, and public investments from banks and institutions to soy companies in Brazil. These flows represent new external capital and totaled approximately $35.6 billion between 2013 and 2020. About 90% of this was debt, of which 74% came from the Brazilian government's National Rural Credit System (SNCR). Our subsequent analysis therefore focuses on debt as the most material financing mechanism in financial sector and public sector flows.

Type of finance	Estimated value (USD) (2013-2020)[1]	Approx. % of soy formal finance	Flow origin	Flow recipient
Debt: Subsidized rural credit Working capital, crop finance Legal requirements mean that around two-thirds of funding comes from deposits at Brazilian banks, with subsidized interest rates on approximately 75% of the credit	~$26.5 bn	**74%**	**Brazilian Government** - National Rural Credit System (SNCR)	**Brazilian soy farmers—mostly large farmers**
Debt: Commercial lending Short- and medium-term loans, including working capital and investment credit; supply chain loans; production credit	~$5.7 bn	**16%**	**All other public and private sources of financing:** Brazilian public and private banks (as commercial lenders) and foreign banks	**Brazilian soy farmers, cooperatives, traders**
Underwriting	~$2.5 bn	**7%**		
Shareholding	~$0.7 bn	**2%**		
Bondholding	~$0.2 bn	**1%**		

Sources: [1]Chain Reaction Research / Forests & Finance; [2]Frontiers in Sustainable Food Systems

Table 7. *Intra-value-chain financial flows between actors in the Brazil-China soy value chain, by origin*

Intra-value-chain flows

Intra-value-chain flows refer to recirculated funds and embedded credit within commercial contracts, such as trader pre-financing or trade finance from importers. These are not new capital entering the sector, but internal financial arrangements between value chain actors.

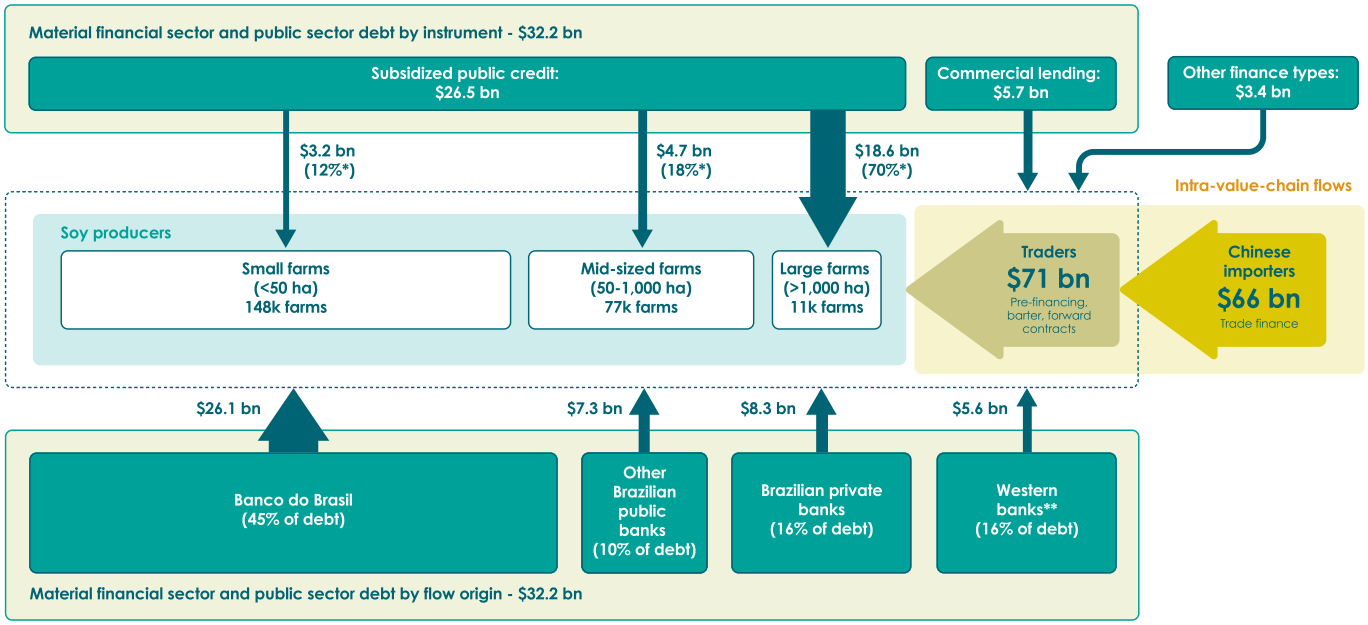
These flows are often larger than formal finance and public investments, as they reflect a significant portion of the value of commercial transactions, not just recorded loans or external investments.

Flow Origin	Flow recipient	Type of finance	Estimated value (USD) (2013-2020)[1]	Approx. distribution of flows
Multinational traders (e.g., Cargill, Bunge, ADM)	**Brazilian soy farmers**	Pre-financing, barter (future crop inputs), forward contracts	~$71 bn[1]	Predominantly flow to large, low-risk producers. Barter and trade finance are dominated by input suppliers and traders but remain out of reach for smallholders lacking land titles, delivery guarantees, and formal market access.
Chinese importers (State/private)	**Brazilian traders, exporters**	Trade finance (letters of credit, advance payments)	~$66 bn[2]	Assuming proportional distribution of soy volume exported, most finance flows to the top five traders by volume. In descending order, these are: Cargill, Bunge, ADM, COFCO, and Louis Dreyfus, which collectively handle 38% of Brazilian soy production.

Notes: [1]Estimated value calculated from the product of total soy production value (CONAB, World Bank), pre-financing adoption share among farmers (The Soybean Trap, CAO Audit), and the estimated share of production costs covered by traders through barter or pre-finance contracts; [2]Calculated from the product of total soy export value to China (SECEX, World Bank) and trade finance coverage rate (ICC Trade Finance Register)

Sources: Trase, World Bank Commodity Price Index, Frontiers in Sustainable Food Systems, USDA ERS, Comex Stat, World Bank Group

Figure 12. *Visualized material financial flows in the Brazil-China soy value chain from 2013-2020*



Sources: [1]Chain Reaction Research / Forests & Finance; [2]Frontiers in Sustainable Food Systems

* The distribution of subsidized public credit by farm size reflects the share of total rural credit disbursed specifically for soy operating costs. While rural credit also includes other types of financing, we use this operating credit share as a proxy for the overall distribution of subsidized credit in the Brazilian soy sector.

** Lenders headquartered in Europe/North America. The top 25 lenders to Brazil's beef & soy sectors in this category of financial flows account for 90% of lending. Of these institutions, 10 of the 12 non-Brazilian lenders are Western and provide ~93% of all non-Brazilian lending.

3.5 Private sector leadership is critical to securing recent gains.

Commercially viable actions exist and can scale through collaboration and policy

Research and stakeholder consultations point to a practical near-term operating model:

1. **Make DCF soy the baseline** by ensuring farm-of-origin traceability for direct supply, and best available documentation for indirect supply.
2. **Combine DCF implementation with a targeted approach for high-risk producers.** Apply stricter scrutiny and targeted finance and technical assistance for these producers.
3. **Align around a shared ambition for regenerative, and resilient production** that goes beyond DCF and embed it into procurement standards.

Our framework highlights three categories of private sector action (Table 8):

- **Unilateral company actions:** embed traceability evidence in contracts, procurement and onboarding checks, payment timing, and working capital, with public progress reporting.
- **Cross-value-chain collaboration:**
  - A. **Make DCF soy the baseline:** standardize the origin ask (with support from civil society as needed); align procurement/onboarding checks across traders, co-ops, and intermediaries—focusing on high-risk regions or corridors—to reduce mixing and make documentation routine; train teams on the same evidence.[55]
  - B. **Targeted mechanisms to shift incentives for high-risk producers:** collaborate to provide flexible, targeted packages of inputs, credit, technical assistance, and finance for the producers most at risk of clearing land.
  - C. **Align on a shared ambition for regenerative, resilient soy:** develop a higher ambition, vision that takes DCF as a 'floor' and work towards aligning on outcomes and metrics for more regenerative, resilient soy production.
- **Business policy advocacy:** back rural credit design and enforcement that lowers the opportunity cost for the small, at-risk cohort of producers.

These actions translate into tangible benefits:

- **Traders** can reduce market and reputational risk by tying pre-finance and sourcing to traceable, DCF supply.
- **Cooperatives** can retain and grow membership by offering inputs, credit access, and advisory services that lower production costs or secure better market terms for producers.
- **Chinese buyers** can safeguard long-term sourcing stability by accepting parity DCF with standard assurance wording.
- **Financial institutions** can expand their client base and mitigate long-term risk by rewarding sustainable performance rather than penalizing informality.

The soy transition does not require entirely new systems. It requires repurposing existing tools—credit lines, procurement policies, and trade deals—to deliver better outcomes for climate, nature, and people, while securing the resilience and competitiveness of Brazil's soy value chain.

However, to tackle the broader set of impacts and risks facing soy and guide value-chain collaboration and policy advocacy, businesses will need to align around a shared vision that goes beyond DCF and articulates a transition to regenerative, resilient production. These efforts will be most successful if they appeal to the common interests of producers and policymakers in Brazil and China: food security, soy productivity, farmer prosperity, and resilience.

Table 8. *Indicative summary of private sector actions across categories in the Brazil-China soy value chain*

Private sector actions to re-wire soy

	Unilateral private sector action	Cross-value chain collaboration	Business policy advocacy
Demand DCF and regenerative supply Make DCF soy the baseline and align on a shared ambition for regenerative, resilient soy	Embed traceability in contracts, procurement, onboarding checks, payment timing, and working capital with public reporting.	Align procurement / onboarding checks across the value chain focusing on high-risk regions.	Mandate standards for DCF and regenerative production in importer countries.
Make finance conditional Public or private capital rewards productive, regenerative farming.	Make sustainability-linked loans, bonds, credit lines, and technical assistance grants conditional on DCF supply.	Collaborate to provide flexible, targeted packages of inputs, credit, technical assistance, and finance for high-risk producers.	Advocate for scaling up ABC+ / RenovAgro and for conditionality of PRONAF and PRONAMP credit on minimum sustainability criteria.
Lower or eliminate the cost penalty Reduced operational and transaction costs; legislation that levels the playing field.	Leverage existing national registries and common traceability systems.	Limited action here due to recent improvements in traceability technologies and data infrastructure.	Advocate for strengthening the Forest Code to encompass clearing native vegetation to lower the opportunity cost for at-risk producers.
Make regenerative inputs and TA available Bundled input-finance packages that incentivize & enable regenerative production.	Individual input providers or regional buyers offer innovative input-finance bundles.	Collaborate to provide flexible, targeted packages of inputs, credit, technical assistance, and finance for high-risk producers.	Collaborate with state-led efforts to reach mid-sized producers with targeted technical assistance programs.
Improve diets & prepare for reduced demand Scale healthier alternatives to over-consumed products and support producers to adapt.	Increase R&D investment into nutritious, plant-based alternatives to beef.	Align on new product standards and marketing; Advocate for regulation supporting plant-based alternatives to beef.	Advocate for increased public R&D investment & regulation supporting testing, advertising, and marketing of plant-based alternatives to beef.

④ Beef in Brazil

4.0 Executive Summary: The future of Brazilian beef

DCF progress is nascent

Brazil is the world's second-largest beef producer by volume (15% of global output), with over 80% consumed domestically. The three largest meatpackers control ~57% of slaughter capacity, yet traceability remains weak, especially for indirect suppliers. Reliable data on deforestation- and conversion-free (DCF) beef volumes is lacking. Jurisdictional traceability initiatives are promising but remain early-stage.

DCF is necessary but not sufficient

To tackle drivers of deforestation and rising climate risks, DCF must be paired with incentives that raise productivity, cut methane, and improve resilience. Finance, procurement, and public policy should make DCF the market floor while supporting regenerative and productive systems.

Beef's national importance and rising risks

- **National staple:** Over 80% of Brazil's production is consumed domestically,[56] where high consumption is linked to health risks but is deeply rooted in national culture.
- **Climate risk:** Heat stress, forage degradation, and longer dry seasons are projected to reduce productivity.
- **Productivity opportunity:** Predominantly extensive systems produce just ~4 kg/ha—among the lowest globally—leaving room to double or even quadruple efficiency

Beef is deeply woven into Brazil's culture, economy, and politics; it is central to food culture and pivotal to land-use futures.

Initiatives exist, but have not yet established robust traceability

The *TAC da Carne* agreement, which legally binds meatpackers to exclude deforestation-linked suppliers, has made some measurable impact on reducing deforestation rates. States such as Mato Grosso, Pará, and Minas Gerais have made progress in establishing beef traceability systems, but this infrastructure is still nascent, and there is insufficient publicly available data to estimate verifiable volumes of DCF beef.[57] Furthermore, these initiatives do not typically target finance and technical assistance for broader improvements in productivity or other social and environmental impacts.

Solutions are economically viable, but have long payback periods

Sustainable intensification approaches cover the largest share of the market (10-15%) and improve yields and farm profitability, but payback periods range from 3-8 years, longer than what most farmers can absorb. Crop-livestock-forestry integration (CLFI) systems deliver soil restoration, income diversification, and resilience with 3–5-year paybacks, but remain inaccessible under prevailing credit terms.

Finance is misaligned

- **Many small and mid-sized ranchers cannot access credit.** Small and mid-sized ranchers make up 98% of Brazil's 2.5 million cattle producers,[58] but are often unable to access rural credit due to a lack of formal titles, Cadastro Ambiental Rural (CAR) registration, or sufficient collateral.
- **Rural credit favors large, documented producers.** Brazil's rural credit system channels ~70% of beef finance, and predominantly serves large, documented producers, while failing to consistently apply environmental conditionalities.
- **Private sector finance for meat-packers has no sustainability conditionality.** Over 90% of beef-sector bond underwriting from Western and Brazilian private banks goes to JBS, Marfrig, and Minerva,[59] despite documented instances of deforestation in their supply chains and an inability to disclose verified volumes of DCF beef.

- **Intra-value-chain finance is significant.** Deferred payments, cash advances, input finances, and other forms of informal credit are likely the sector's biggest financial engine and could be used to incentivize traceability or deforestation-free compliance. However, these financial flows are confidential and not publicly disclosed.

Redirecting rural credit and intra-value-chain finance to compliant small and mid-sized ranchers—while making all finance conditional on legality, then DCF—is the most powerful lever for system change.

What private sector action looks like

- **Unilateral company actions:** embed traceability evidence in contracts, procurement and onboarding checks, payment timing, and working capital, with public progress reporting.
- **Cross-value-chain collaboration:**
    - **Establish legally compliant beef as the baseline:** collaborate to co-invest in traceability technologies and approaches for indirect suppliers and make trade-finance conditional upon legal compliance.
    - **Shift incentives for small and medium-sized producers:** make private finance and trade finance conditional upon legal, and then DCF beef production, and bundle inputs, technical assistance, and off-take contracts to support DCF mid-sized ranchers.
    - **Align on a shared ambition for regenerative, and resilient beef:** develop a higher-ambition vision that takes DCF as a floor and work towards aligning outcomes and metrics for more productive, regenerative, and resilient beef production.
- **Business policy advocacy:** advocate for stronger government enforcement of the Forest Code and the simplification and integration of CAR and Global Trade Alert (GTA) databases to reduce the burden of compliance for producers.

Benefits are shared. Meatpackers and banks reduce risk; retailers grow sales of healthier, traceable products; governments improve food security and enforcement efficiency; and producers gain productivity, resilience, and a more stable income.

Next steps

The beef transition must be made economically rational for producers. The immediate priorities are:

1. **Establish legal compliance as the market baseline** by investing in traceability, embedding traceability into contracts and finance.
2. **Make finance conditional on legal, DCF supply** and redirect finance and technical assistance to small and mid-sized producers; use blended finance to de-risk the transition to more sustainable, regenerative beef production. and scale regenerative practices.
3. **Build a shared vision for more regenerative, rand esilient beef,** framing the transition around rural development, resilience, and national pride to secure buy-in from producers, buyers, consumers, and governments.

Beef's cultural and economic role is undeniable, but so are its escalating costs. Protecting forests, raising productivity, and strengthening livelihoods can—and must—advance together.

Table 9. *Private sector actions to transition the beef value chain*

Private sector actions to re-wire beef

	Unilateral private sector action	Cross-value chain collaboration	Business policy advocacy
Demand DCF and regenerative supply Raise the floor with commitments to DCF beef covering indirect suppliers	Commit to deforestation- and conversion-free beef for indirect suppliers. Embed traceability in contracts and working capital.	Launch deforestation- and conversion- free product lines and redirect advertising and marketing spend to educate consumers.	Redesign public procurement frameworks to recognize legal reserves and Permanent Preservation Areas as productive assets.
Make finance conditional Public or private capital rewards productive, regenerative farming.	Make sustainability-linked loans, bonds, credit lines, trade finance and technical assistance grants conditional on DCF supply.	De-risk procurement by bundling inputs, technical assistance and offtake contracts for DCF mid-sized ranchers.	Scale up ABC+ / RenovAgro and make PRONAF and PRONAMP credit conditional on DCF, productivity and sustainability.
Lower or eliminate the cost penalty Reduced operational and transaction costs; legislation that levels the playing field.	Support jurisdictional approaches to scaling up traceability across indirect suppliers.	Collaborate to co-invest in traceability technologies to tackle the challenge of indirect suppliers.	Strengthen Forest Code enforcement and integrate CAR and GTA databases to reduce the burden of compliance.
Make regenerative inputs and TA available Bundled input-finance packages that incentivize & enable regenerative production.	Individual input providers or regional buyers offer innovative input-finance bundles.	Collaborate to provide flexible, targeted packages of inputs, credit, technical assistance, and finance for high-risk producers.	Advocate for state investments in TA for pasture recovery, productivity enhancements, and methane reduction.
Improve diets & prepare for reduced demand Scale healthier alternatives to over-consumed products and support producers to adapt.	Increase R&D investment into animal feed that replaces soy with lower-impact alternatives.	Align on new product standards and marketing; Advocate for regulation supporting more sustainable animal feed.	Health ministries strengthen national dietary guidelines for red meat consumption and reduce overconsumption of ultra-processed red meat.

4.1 Beef is a national staple with rising costs to nature, climate, and health

Brazil is the world's second-largest producer of beef by volume, accounting for 15% of global output (Figure 13). More than 80% of this beef is consumed domestically;[60] it is deeply embedded in national diets and culture. Brazil is also the largest beef exporter to China, supplying 51% of China's imports in 2022.[61] However, exports remain a minority share of production, so the domestic market largely shapes the sector.

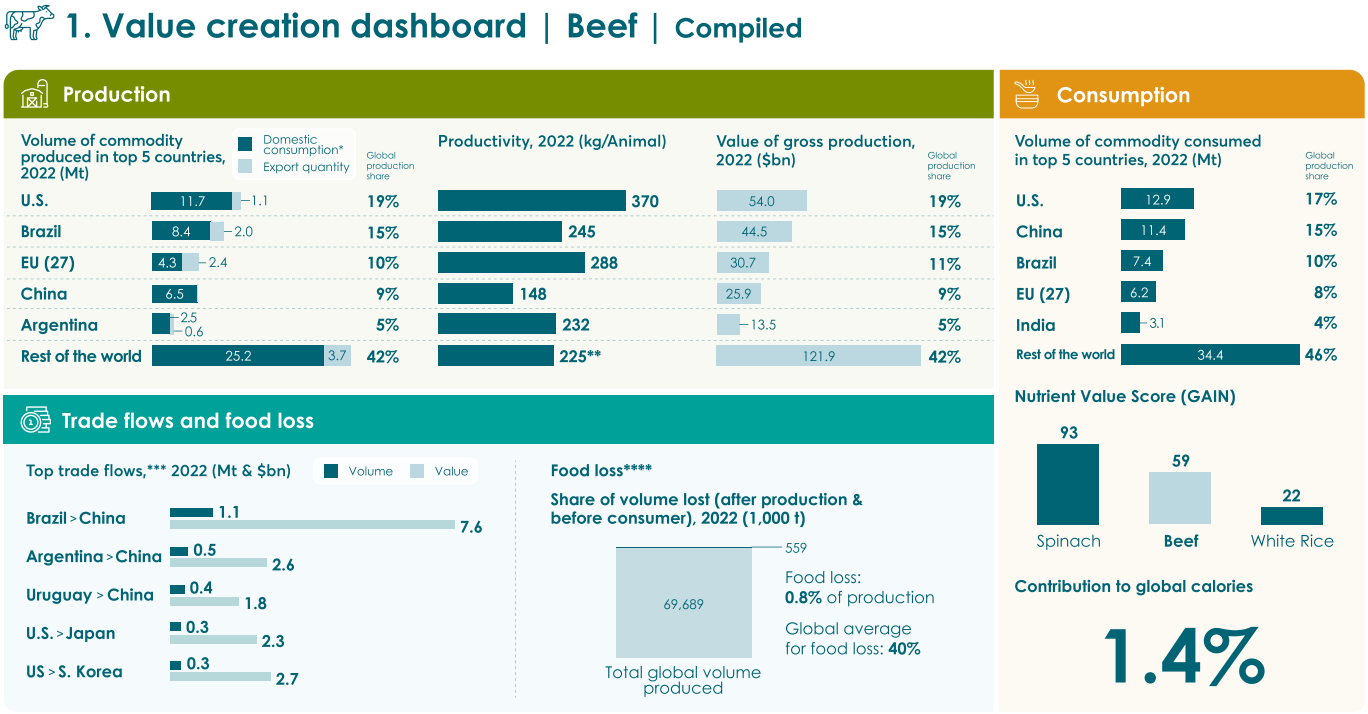
Beef plays a central role in Brazilian diets and livelihoods. It is a complete protein, rich in essential nutrients, but overconsumption—particularly of ultra-processed forms such as fast-food burgers—is linked to health risks including cardiovascular disease and cancer. Production is predominantly extensive, relying on rain-fed pasture systems with minimal feedlot integration. While these systems minimize blue water use, they leave productivity gains untapped: Brazil produced just 4 kg of beef per hectare in 2017,[62] which is among the lowest levels globally.[63] The sector is tightly interwoven with informal labor markets and regional political economies, making its transition complex and high-stakes.

Systemic risks are rising. Climate change is projected to reduce productivity through heat stress, forage degradation, and longer dry seasons. Meanwhile, grazing land is becoming less climatically suitable. Human rights risks are concentrated in the meatpacking segment, where labor violations, including forced labor and unsafe working conditions, are well-documented. Indigenous and smallholder communities have also faced displacement linked to cattle expansion. Regulatory risk is low in the short term: domestic markets dominate, and key export markets such as China impose few sustainability requirements.

Beef production also contributes significantly to environmental and social impacts. It is the leading driver of deforestation in the Amazon and Cerrado, with a substantial share occurring illegally under Brazil's Forest Code. Cattle generate high methane emissions and manure runoff that affects water quality.[64] Pasture degradation affects more than 100 million hectares,[65] [66] while soil compaction, herbicide use, and air pollution from slash-and-burn practices further erode ecosystems. Working conditions in meatpacking plants remain among the most hazardous in Brazil.

The sector's importance to culture and the economy is undeniable, but so are its escalating costs to health, nature, and climate. A more resilient and sustainable path forward is needed.

Figure 13. *Global dashboard - Beef*



* Quantity of domestic production for domestic consumption is an indicative, simplified estimate calculated by taking the difference between total domestic production and export volumes. The total amount of the commodity consumed per country, whether produced domestically or imported, is in the "Consumption" figure.
**"Rest of world" bar in "Productivity" figure refers to the production-weighted global average productivity of all remaining countries.
*** Data sets underlying figures for Value of gross production (FAO) and Top trade flows (ResourceTrade) are not directly comparable but offer an indicative view of economic value created.
**** FAO data for loss encompasses all stages in the value chain between the level at which production is recorded and the household, i.e., storage and transportation. Losses occurring before and during harvest are excluded. Waste from both edible and inedible parts of the commodity occurring in the household is also excluded.

4.2 Beef production can be transformed, but current incentives favor informality

Productivity gains could unlock land for sustainable use

Restoring Brazil's degraded pasture land—an estimated 100 million hectares—offers major opportunities for food security, land use efficiency, economic development, and climate goals. The federal government has committed to recovering 40 million hectares by 2030 under its Nationally Determined Contribution (NDC) and ABC+ Plan, supported by the National Program for the Conversion of Degraded Pastures into Sustainable Agricultural and Forestry Production Systems (PNCPD).[67]

Productivity gains in beef could also free up land. Doubling average stocking density from one to two animal units per hectare (AU/ha) could, in theory, spare 80 million hectares, nearly half of Brazil's pasture area. In some regions, productivity increases of up to 4 AU/ha[68] are possible, creating scope for reforestation, agroforestry, or other regenerative uses if policies, enforcement, and incentives align.[69]

Approaches to more productive systems

Three approaches dominate current efforts:

- **Crop-livestock-forestry integration (CLFI)** (~6% of production) combines beef production with trees and crops, delivering long-term soil and biodiversity benefits and diverse income streams, though with lower beef productivity gains than sustainable intensification systems. They are codified.
- **Deforestation- and conversion-free (DCF)** ensures no conversion of native vegetation, but does not directly change production practices. No robust estimates of DCF beef exist due to weak standards and poor disclosure.[70]
- **Sustainable intensification** (10-15% of production) improves yields and reduces emissions per kilogram of beef through better pasture management and input efficiency. Practices vary by region and are not formally codified.

Table 10 outlines the key characteristics of these systems compared to conventional beef production.

Table 10. *Approaches to more regenerative and productive agriculture - Beef in Brazil*

Summary table of production systems | Beef

Country / Region	Production systems and standards	Estimated share of production	Key characteristics	Level of detail and consistency	Key references
United States	Standard beef production	Data unavailable	Intensive production with cow-calf, stocker/ backgrounding, and feedlot finishing as separate production phases. High reliance on grain-based feed, synthetic fertilizers used extensively to boost forage and feed crop production, routine antibiotic and hormone use.	Implicit definition – based on dominant production methods in each country	USDA, US FDA, industry reports
	Voluntary Sustainability Frameworks	15-25%	Voluntary frameworks such as US Roundtable for Responsible Beef, with priority indicators to encourage continuous improvement on a range of production practices designed to reduce GHGs and water use and improve land health alongside employee health, safety, and wellbeing.	Voluntary frameworks with no verification or audit requirements	US Roundtable for Responsible Beef Framework
	Certified sustainable / regenerative	<1%	GHG-focused & regenerative certifications, e.g., Low Carbon Beef, ROC, Land to Market™, AGA, AGW, USDA Organic	A variety of codified approaches	USDA Organic standards, Nature Tech Collective, Regenerative Organic certified, USDA partnerships for climate smart commodities
Brazil	Standard beef production	Data unavailable	Predominantly traditional, extensive pastures with minimal management interventions, lower productivity, and efficiency. Minimal input use, reliance on native grasses without fertilizer or soil improvement limits forage quality.	Implicit definition – based on dominant production methods in each country	EMBRAPA, industry reports
	Deforestation- and conversion-free (DCF)	Data unavailable	Beef whose production does not contribute to the conversion, legal or illegal, of natural forests or other natural ecosystems (e.g., grasslands, wetlands, and savannas) to agriculture or tree plantations after a specified cut-off date.	Standardized, widely adopted by several major organizations	Accountability Framework initiative
	Sustainable intensification	10-15%	Combination of rotational grazing, high yield forage grasses, increased stocking rates, combining pasture grazing with feed supplementation to enhance feed efficiency and reduce methane emissions, selective breeding, satellite & digital monitoring for pasture, and herd management.	Loose definition – defined in research but lacks policy standardization	RGSA, industry reports, academic papers
	Regenerative crop-livestock-forestry integration (CLFI)	6%	Integrates agricultural, animal farming, and forestry systems through intercropping, crop succession, or crop rotation. Reduced reliance on inputs through production of forage and feed and reduced need for fertilizers.	Codified definition – in Brazil's ABC Plan and ILPF framework	EMBRAPA, ABC Plan (Brazil), industry reports

Financial barriers and data gaps

The main constraint is financial, not technical. Payback periods for sustainable intensification approaches range from 2.5 to 8 years,[71] well beyond what most farmers manage without stable credit. Small and mid-size ranchers face steep compliance costs of meeting environmental or traceability requirements, often tied to credit or access to markets, and have limited access to long-term finance. For many farmers, non-compliance is the more rational economic choice.

Benefits such as improved stocking rates are rarely tracked or reported, limiting confidence across the value chain. Weak monitoring capacity and data opacity erode trust in market mechanisms and make it difficult for producers to demonstrate returns or for buyers to justify premiums. As a result, promising models remain trapped at low adoption. Scaling requires concessional finance, stronger incentives, and robust data systems to monitor, report, and reward outcomes.

Figure 14. *Re-WIRE impact index - Transforming production - Beef*

Transforming beef production | Impact index

Key — Severe impact 1 2 3 4 5 Minimal impact

			US			Brazil			
		Production approach	Standard	Voluntary frameworks	Certified sustainable	Standard	DCF	Sustainable intensification	Regenerative CLFI
		Definition type	Implicit	Standardized	Emergent	Implicit	Standardized	Standardized	Codified
		Share of production		15-20%	<1%		Data unavailable	10-15%	6%
Impact	Climate	Climate impact	2	2	3	1	2	3	3
	Nature	Off-farm biodiversity	2	2	3	1	5	4	4
		On-farm agri. biodiversity	1	1	4	3	3	3	5
	Soil	Soil health	1	2	5	2	2	3	5
	Water	Water use	4	4	5	5	5	5	5
		Water pollution	1	3	4	2	2	3	5
	Livelihoods	Decent work	1	2	3	2	2	2	3
		Pesticide exposure	2	2	5	3	3	3	4
	Societal health	Air quality	1	2	4	1	1	2	3
		Anti-microbial resistance	1	3	5	3	3	3	3
		Nutritional diversity of production	2	2	3	2	2	2	3
Aggregate impact improvement against the baseline			(18/55)	+7	+26	(25/55)	+5	+8	+18

Figure 15. *Re-WIRE economic feasibility index - Transforming production - Beef*

Transforming beef production | Economic feasibility index

			US			Brazil			
		Production approach	Standard	Voluntary frameworks	Certified sustainable	Standard	DCF	Sustainable intensification	Regenerative CLFI
		Definition type	Implicit	Standardized	Emergent	Implicit	Standardized	Standardized	Codified
		Share of production		15-20%	<1%		Data unavailable	10-15%	6%
Economic feasibility	Transition risk	Time to regain profits		2	2		n/a	2	3
	Value added in the transition	Farm profitability		0	-1		0	+2	+2
		Core product productivity		0	-1		0	+2	+1
		Diverse products productivity		0	0		0	0	+2

Key: Transition risk – Time to regain profits

1 — 10+ years; 2 — 5-10 years; 3 — 3-5 years; 4 — 1-3 years; 5 — 0-1 years

Key: Value added in the transition – Profitability and productivity relative to standard production

-2 Greatly decrease; -1 Decrease; 0 No change; +1 Increase; +2 Greatly increase

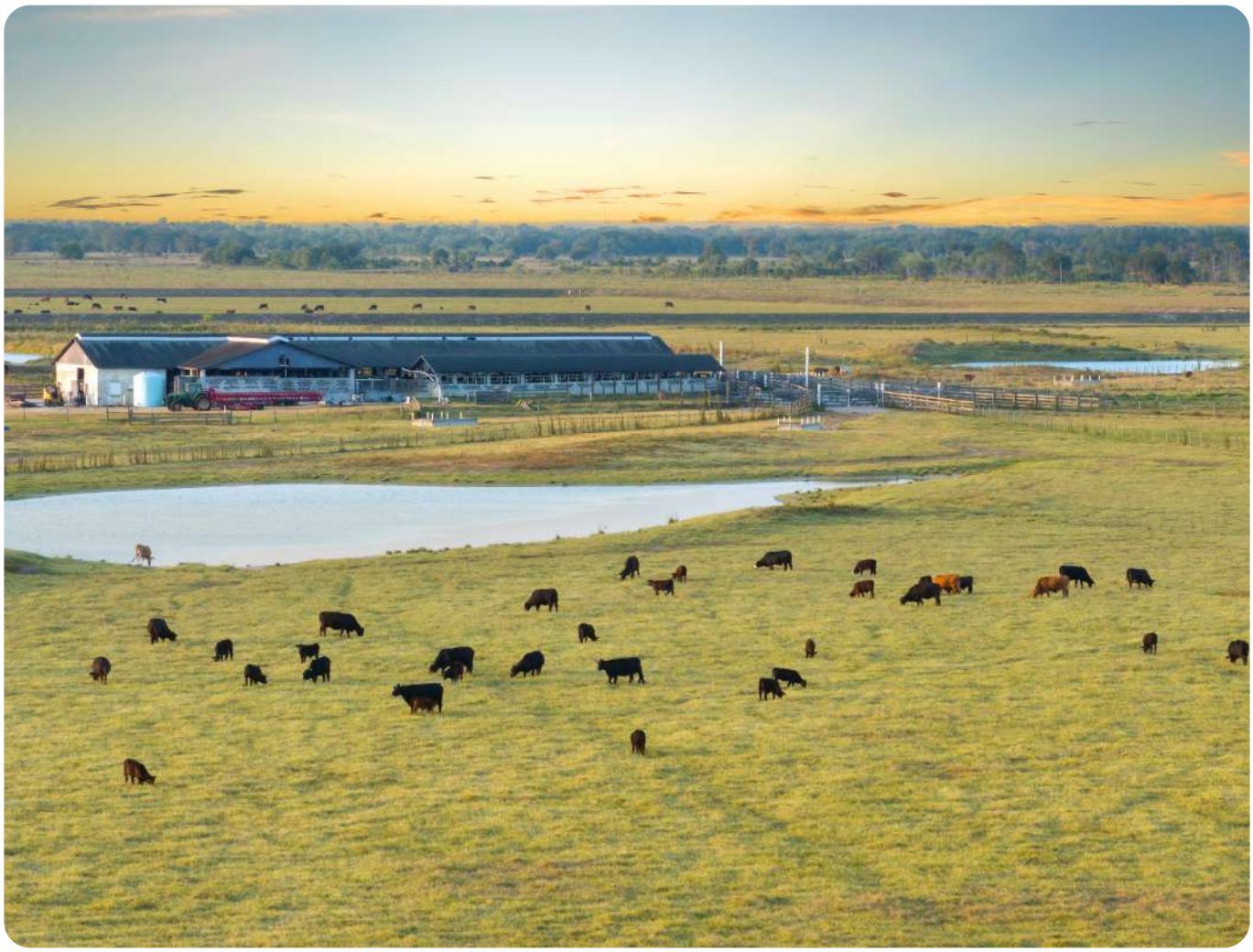
Traceability progress is raising the cost of illegality, but progress is slow

Efforts to strengthen traceability are advancing but remain incomplete. The TAC da Carne agreement, which legally binds meatpackers to exclude deforestation-linked suppliers, and a voluntary commitment from Febraban, the federation of Brazilian banks, to make credit to slaughterhouses conditional on legality, are beginning to shift incentives. Payments for ecosystem services (PES) initiatives such as Bolsa Verde and Bolsa Floresta show potential, but remain constrained by a lack of monitoring and equitable spatial and financial distribution.[72]

State-level efforts to improve traceability hold the most promise, but progress is slow and hampered by the technical challenges of securing traceability for indirect suppliers. The ambitious Sustainable Livestock Program of Pará state, a high-risk area for beef-driven deforestation, aims to tag all cattle with electronic ear tags by December 2026 as part of an effort to deliver full traceability. However, as of May 2025, some reports suggest it had tagged only 12,000 of its 25 million cattle.[73]

Missing coherence

Progress to date is fragmented. Current initiatives rarely address productivity, resilience or livelihoods alongside deforestation. What is needed is coherence: rules embedded in procurement and finance systems, aligned incentives across indirect suppliers, and national strategies that frame regenerative, sustainable and deforestation-free beef as a core development priority. Achieving this will require stronger domestic alliances with producer organizations and institutionalizing new norms within Brazil's cattle sector.



4.3 System-level constraints in beef reinforce the status quo

Informality and opacity keep producers locked out

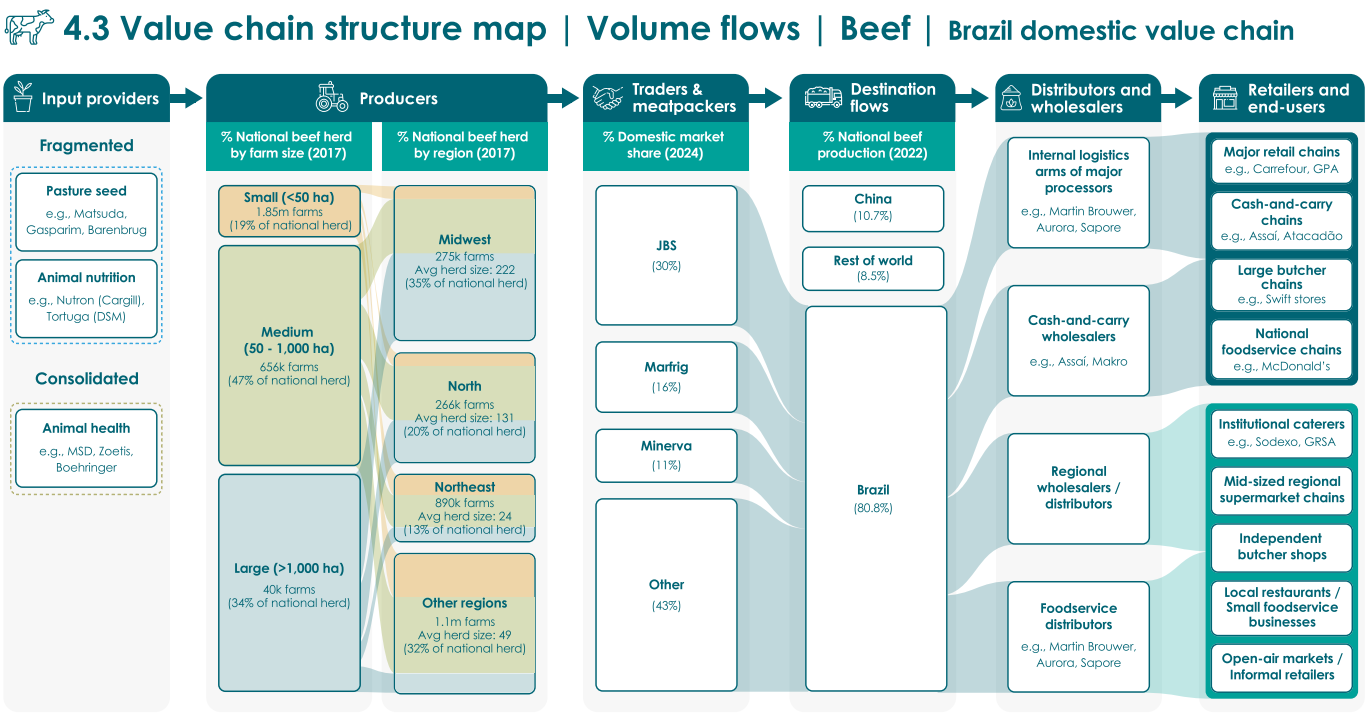
Brazil's domestic beef value chain is marked by asymmetries of power, information and risk. Influence and capital concentrate downstream, while informality and opacity dominate upstream. This structure isolates the producers most critical to reform and enables ongoing deforestation.

Small and mid-sized ranchers—98% of Brazil's 2.5 million cattle producers[74]—often lack formal land titles, collateral, or complete CAR registration, restricting access to credit and traceability programs. Weak enforcement allows illegal land clearing on public or undocumented lands,[75] facilitating land grabbing in areas where conversion carries few consequences and significant economic gains through access to pastures. Between upstream producers and downstream processors is a loosely regulated web of intermediaries that facilitate multiple unmonitored transactions, where GTA[76] documentation loopholes allow cattle linked to deforestation to enter formal supply chains.

JBS, Marfrig, and Minerva control roughly 57% of slaughter capacity in Brazil,[77] with strong footholds in frontier regions. These companies influence pricing, logistics, and market access. While they have made traceability and deforestation-free commitments,[78,79,80] monitoring of indirect suppliers remains a significant challenge, and some commitments only extend to illegal deforestation.[81,82,83] Large portions of the upstream chain remain invisible, compounded by weak enforcement and rare prosecution of violations.

Most domestic beef is sold into low-margin retail and food service markets, which have limited demand for sustainability, thin margins, and few traceability requirements. Segments of ultra-processed formats—11-20% of consumption—are particularly opaque. Some global buyers, including McDonald's and Sodexo, apply stronger sourcing standards and are helping to scale traceability in their supply chains, but limited domestic demand hampers system-wide change.

Figure 16. *Volume flows in the domestic beef value chain, Brazil*



Sources: Frontiers in Sustainable Food Systems, Trase, SIDRA, ResourceTrade.earth, Chain Reaction Research, ABIEC, RB Investimentos

Finance is not incentivizing a transition of the beef value chain

Brazil's beef sector faces a deep structural mismatch between where capital flows and where transformation is most needed. Most formal finance supports large, well-capitalized firms, while small and mid-sized ranchers (~98% of producers)—who manage much of Brazil's pastureland—remain excluded due to lack of collateral, incomplete registration, and limited credit history.

Public rural credit, primarily through the Plano Safra, represents over 70% of formal finance to the sector,[84] making it the largest regulated financing channel (Table 11). However, it disproportionately serves large producers.[85] Environmental conditionalities are applied inconsistently, and subsidized loans continue to flow to properties with a history of deforestation.[86] This enables subsidized expansion in high-risk regions, including the Legal Amazon, with limited accountability.[87]

Private capital is more concentrated still. Between 2013 and 2022, more than 90% of all beef-sector bond underwriting—a total of USD $10.7 billion, mostly from Western and Brazilian private banks—went to JBS, Marfrig, and Minerva.[88] Despite these companies' sustainability commitments, evidence of deforestation in their supply chains suggests that conventional credit and bond underwriting were not explicitly contingent on enforceable environmental conditions.

Trade finance, though poorly documented, is likely the sector's largest financing engine. Meatpackers and traders offer deferred payments, cash advances, and input financing, particularly in domestic markets. These flows, especially to indirect suppliers, are rarely monitored and seldom tied to compliance with deforestation-free commitments.[89] [90]

Credit design itself discourages conservation. Native vegetation is often undervalued per hectare relative to cropland or pastureland[91] and discounted heavily in collateral valuations,[92] reducing credit access for producers who preserve ecosystems.

Table 11 details formal financial flows into the beef sector, while Figure 17 visualizes these flows across key financiers and recipients.

Table 11. *Formal financial flows from public and financial institutions in Brazilian beef, by type of finance*

Financial Sector and Public Sector Flows: Breakdown by type of finance

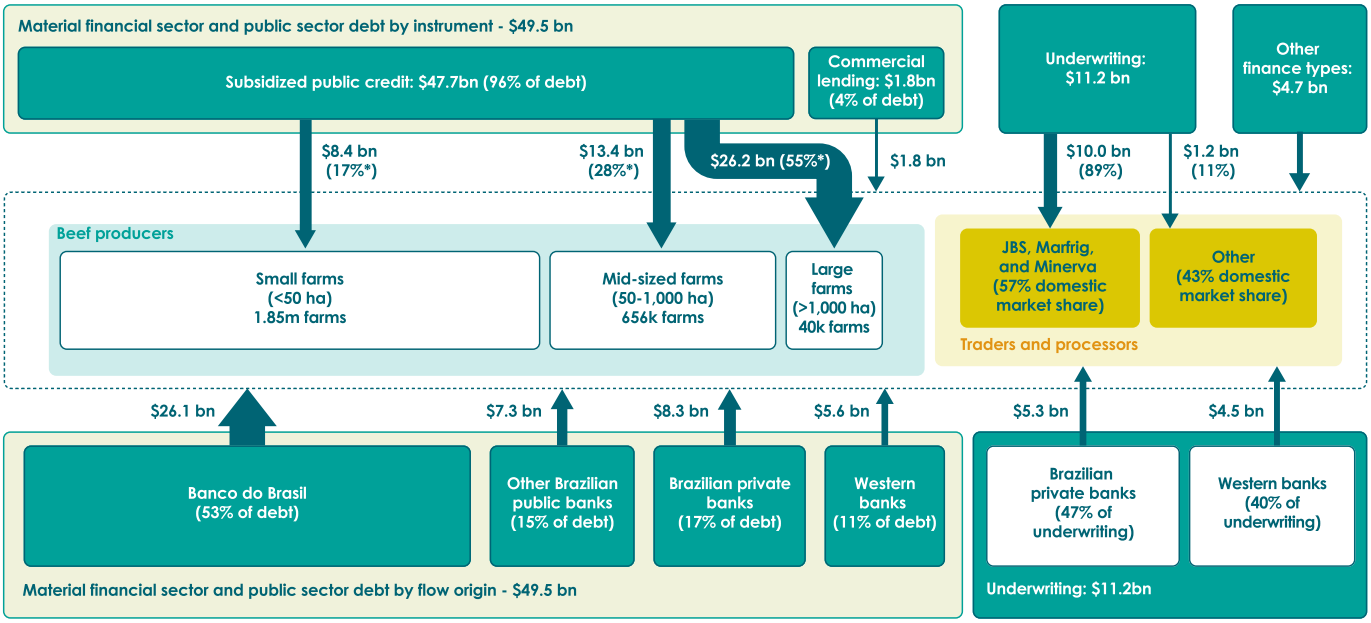
Financial sector and public sector flows refer to direct, traceable support through formal loans, bonds, and public investments from banks and institutions to beef companies in Brazil. These flows represent new external capital and totaled approximately $65.4 billion between 2013 and 2020. About 76% of this was debt, of which 73% came from the Brazilian government's National Rural Credit System (SNCR).

Our analysis therefore focuses on debt as the most material financing mechanism in financial sector and public sector flows with notable entries for underwriting, which accounted for $11.2 billion, or 17% of these flows.

Type of finance	Estimated value (USD) (2013-2020)[1]	Approx. % of beef formal finance	Flow origin	Flow recipient
Debt: Subsidized rural credit Working capital, crop finance Legal requirements mean that around two-thirds of funding comes from deposits at Brazilian banks, with subsidized interest rates on approximately 75% of the credit	~$47.7 bn	**74%**	**Brazilian Government** - National Rural Credit System (SNCR)	**Brazilian cattle farmers—mostly large farmers**
Debt: Commercial lending Short- and medium-term loans, including working capital and investment credit; supply chain loans; production credit	~$1.8 bn	**3%**	**All other public and private sources of financing:** Brazilian public and private banks (as commercial lenders) and foreign banks	**Brazilian cattle farmers, cooperatives, traders**
Underwriting	~$11.2 bn	**17%**		
Shareholding	~$4.1 bn	**6%**		
Bondholding	~$0.6 bn	**1%**		

Sources: [1]Chain Reaction Research / Forests & Finance; [2]Frontiers in Sustainable Food Systems

Figure 17. *Visualized material financial flows in the Brazil domestic beef value chain from 2013-2020*



Sources: [1]Chain Reaction Research / Forests & Finance; [2]Frontiers in Sustainable Food Systems

* The distribution of subsidized public credit by farm size reflects the share of total rural credit disbursed specifically for beef operating costs. While rural credit also includes other types of financing, we use this operating credit share as a proxy for the overall distribution of subsidized credit in the Brazilian soy sector.

4.4 Private sector action is possible and increasingly necessary

Commercially viable actions exist

Research and consultations highlight opportunities for unilateral action, cross–value-chain collaboration, and policy advocacy (Table 12). Brazil's beef value chain is constrained by informality, illegality, capital misallocation, and weak enforcement of existing rules such as CAR validation. While policy reform is essential, companies can act now to reduce risk and secure competitive advantage:

1. **Establish legal compliance as the market baseline** by investing in traceability, embedding traceability into contracts and finance.
2. **Make finance conditional on legal, DCF supply** and redirect finance and technical assistance to small and mid-sized producers, using blended finance to de-risk the transition to more sustainable, regenerative beef production. and scale regenerative practices.
3. **Build a shared vision for more regenerative, resilient beef**, framing the transition around rural development, resilience, and national pride to secure buy-in from producers, buyers, consumers, and governments.

By taking these steps, businesses can stabilize supply, open new markets, and help build a beef sector that is competitive, resilient, legal, and credible.

- **Meatpackers and private banks:** make DCF supply a condition for trade finance and private lending.
- **Meatpackers, restaurant chains, and retailers:** educate consumers and direct advertising and marketing spend to DCF product lines.

- **Input providers, meatpackers, and banks:** co-invest in strengthening traceability systems for indirect suppliers, and providing inputs, technical assistance, and finance to compliant producers.
- **Retailers, food service companies, and meatpackers:** grow sales by expanding access to healthier, lower-impact proteins.

Table 12. *Indicative summary of private sector actions across categories in the Brazilian domestic beef value chain*

Private sector actions to re-wire beef

	Unilateral private sector action	Cross-value chain collaboration	Business policy advocacy
Demand DCF and regenerative supply Raise the floor with commitments to DCF beef covering indirect suppliers	Commit to deforestation- and conversion-free beef for indirect suppliers. Embed traceability in contracts and working capital.	Launch deforestation- and conversion- free product lines and redirect advertising and marketing spend to educate consumers.	Redesign public procurement frameworks to recognize legal reserves and Permanent Preservation Areas as productive assets.
Make finance conditional Public or private capital rewards productive, regenerative farming.	Make sustainability-linked loans, bonds, credit lines, trade finance and technical assistance grants conditional on DCF supply.	De-risk procurement by bundling inputs, technical assistance and offtake contracts for DCF mid-sized ranchers.	Scale up ABC+ / RenovAgro and make PRONAF and PRONAMP credit conditional on DCF, productivity and sustainability.
Lower or eliminate the cost penalty Reduced operational and transaction costs; legislation that levels the playing field.	Support jurisdictional approaches to scaling up traceability across indirect suppliers.	Collaborate to co-invest in traceability technologies to tackle the challenge of indirect suppliers.	Strengthen Forest Code enforcement and integrate CAR and GTA databases to reduce the burden of compliance.
Make regenerative inputs and TA available Bundled input-finance packages that incentivize & enable regenerative production.	Individual input providers or regional buyers offer innovative input-finance bundles.	Collaborate to provide flexible, targeted packages of inputs, credit, technical assistance, and finance for high-risk producers.	Advocate for state investments in TA for pasture recovery, productivity enhancements, and methane reduction.
Improve diets & prepare for reduced demand Scale healthier alternatives to over-consumed products and support producers to adapt.	Increase R&D investment into animal feed that replaces soy with lower-impact alternatives.	Align on new product standards and marketing; Advocate for regulation supporting more sustainable animal feed.	Health ministries strengthen national dietary guidelines for red meat consumption and reduce overconsumption of ultra-processed red meat.

A shared narrative is needed to unite stakeholders

Transformation is hindered by a narrative that frames beef as a problem, alienating producers and provoking political backlash. Global campaigns emphasizing deforestation and illegality have raised awareness, but often clash with domestic realities. A new framing is needed—one that recognizes beef's cultural and economic importance while promoting resilience and competitiveness.

Four principles can help reshape the conversation.

1. **Consistent enforcement creates economic feasibility for producers.** In established regions where cattle ranchers have long-held titles,[93] sustainability investments show clear payback: better genetics, pasture management, and infrastructure raise land values, reduce volatility, and strengthen economic resilience. By contrast, in frontier areas such as the Amazon, insecure tenure turns cattle ranching into a vehicle for land speculation;[94] where enforcement is inconsistent, rapid clearing and low-cost expansion remain rational economic choices.
2. **Reform must be shaped with producers.** Sustainability systems often disengage producers because they feel externally imposed. Streamlined, producer-designed traceability and land governance systems can accelerate adoption.
3. **Intensification and restoration build climate resilience.** Droughts, heat stress, and pasture degradation already affect productivity and land value. Intensification and restoration are economic necessities but require finance and incentives that support producer resilience.
4. **Public health and national pride can engage consumers.** Domestic demand drives the sector. In the short term, consumer demand for legal beef that safeguards Brazil's assets can help decouple beef from deforestation. In the longer term, reducing consumption of ultra-processed beef (11–20% of total) can support national health goals.

The current story fuels defensive politics and delays reform. A shared narrative—built on resilience, productivity, and national pride—can unite producers, governments, businesses, and consumers behind a more sustainable beef sector.

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54 Chiavari, Joana, Priscila Souza, Miguel Motta, Renan Florias, and Eduardo Minsky. (2024). Landscape of Climate Finance for Land Use in Brazil 2021-2023. Climate Policy Initiative.

55 Pre-competitive: templates/checklists/training; no prices or volumes

56 2022 Values. Source: FAO. (2024). FAOSTAT: Crops and livestock products.

57 A full list of initiatives that authors reviewed in the Brazil beef value chain is available in the methodology document.

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61 Chatham House. (2022). Resource Trade Earth: Brazil–China Beef trade flows [Interactive database].

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Source: Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers.

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66 Oliveira, W. F. de, Souza, P., & Assunção, J. (2024). The impact of Brazil's ABC Program credit on pasture recovery: Evidence from the Cerrado. Climate Policy Initiative.

67 Ministry of Agriculture, Livestock and Food Supply (MAPA), Brazil. (2024). Ministry of Agriculture presents pasture conversion program to investors in the United States of America.

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70 Marfrig has committed to deforestation and conversion-free beef and is making progress in applying full traceability to indirect suppliers, but has not publicly disclosed the proportion of its beef volumes that meet its DCF target. Other meatpackers have committed to eliminating illegal deforestation, which leaves open the possibility of legal conversion of native vegetation in the Cerrado, and have made progress in traceability only for direct suppliers.

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73 Reuters. (2025). Why Brazil's cattle king is embracing a plan to save the Amazon

74 Instituto Brasileiro de Geografia e Estatística (IBGE). (2019). Censo Agropecuário 2017: Resultados definitivos.

75 "… within the Amazon about 60% of its land is classified as public land… These public lands have been the target of intense deforestation and part of this area has already been illegally registered as "private property" in the Rural Environmental Registry (Cadastro Ambiental Rural - CAR), making it clear that these lands are vulnerable to land grabbing and speculation." Source: Lima Filho, Francisco Luis, Arthur Bragança e Juliano Assunção. (2021). The Economy of Cattle Ranching in the Amazon: Land Grabbing or Pushing the Agricultural Frontier? Climate Policy Initiative.

76 The GTA (Guia de Trânsito Animal) is Brazil's official animal transport document required to move livestock between properties, markets, or slaughterhouses.

77 RB Investimentos. (2024). Análise do setor de frigoríficos.

78 In 2021, as part of its net-zero commitment, JBS pledged to eliminate illegal deforestation from its supply chain—including the suppliers of its suppliers—in the Amazon by 2025, and in other Brazilian biomes by 2030. Source: JBS Foods. (2021). JBS makes global commitment to achieve net-zero greenhouse gas emissions by 2040.

79 In 2023, as part of its goal to ensure a fully sustainable, traceable, and DCF supply chain by 2025, Marfrig committed to achieve full traceability in procuring animals for slaughter from both direct and indirect suppliers across all biomes in Brazil. Source: Marfrig Global Foods S.A. (2020). Marfrig Commitments: promoting inclusion, fighting deforestation, and enhancing traceability and transparency.

80 Minerva has committed to combating illegal deforestation in the value chain. By December 2025, it has set a goal to implement a monitoring program for level 1 indirect supplier farms for 100% of the animals purchased in the legal Amazon and the state of Maranhão. Source: Minerva Foods. (2025). Commitment to sustainability.

81 JBS has developed the Transparent Livestock Farming Platform to monitor its upstream cattle supply chain. It reports that as of 2023, over 62% of cattle processed by JBS were enrolled in the platform, with the goal to achieve 100% participation by 2025. Source: JBS ESG. Responsible sourcing.

82 Marfrig has reported that, in September 2022, it had control of 71% of tier 2 suppliers and 68% of tier 3 suppliers in the Amazon biome. Norges Bank's Council on Ethics noted that as of late 2023, Marfrig reported monitoring just 0.6 to 4 indirect suppliers per direct supplier, compared to an industry average of 6. Marfrig's survey of its indirect suppliers is based on information provided voluntarily to the company's direct suppliers. Source: Council on Ethics for the Norwegian Government Pension Fund Global. (2024). The Council's observation of Marfrig Global Foods SA.

83 In 2024, Minerva's monitored percentage of slaughtered cattle traced and monitored down to indirect suppliers ranged from 1.18% (captured by the Individual Traceability Protocol adopted by Minerva Foods) to 54.75% (unaudited, based on the mapping of production cycles employed by Direct Suppliers to Minerva Foods and obtained via interviews and site visits). Source: Minerva Foods. (2025). SARB 026/2023 report: Compliance indicators and socio-environmental monitoring results (base year 2024).

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85 Between 2013-2021, 55% of rural credit for cattle operations went to large producers. Source: Corcioli, G., Medina, G. S., & Arrais, C. A. (2022). Missing the target: Brazil's agricultural policy indirectly subsidizes foreign investments to the detriment of smallholder farmers and local agribusiness. Frontiers in Sustainable Food Systems.

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92 By up to 50-80%, per expert interviews.

93 "Practically 95% of the [Pantanal] is made up of private lands, of which 80% of the area has been used for cattle production for more than 250 years." Source: Abreu, U. G. P., McManus, C., & Santos, S. A. (2010). Cattle ranching, conservation and transhumance in the Brazilian Pantanal.

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September 2025

For consultation

The Food and Land Use Coalition

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