BRAZILIAN **BEEF CATTLE** PRODUCTION AND ITS GLOBAL CHALLENGES

Executive Summary

Leila Harfuch
Fernanda K. Lemos
Rodrigo C. A. Lima
Gustavo Dantas Lobo
Mariane Romeiro

AGROICONE
conhecimento para uma nova economia

Dados Internacionais de Catalogação na Publicação (CIP)
(Câmara Brasileira do Livro, SP, Brasil)

Brazilian beef cattle production and its global challenges [livro eletrônico] / Leila Harfuch... [et al.]. -- 1. ed. -- São Paulo : Agroicone, 2025.
PDF

Outros autores: Fernanda K. Lemos, Rodrigo C. A. Lima, Gustavo D. Lobo, Mariane Romeiro
Bibliografia
ISBN 978-85-5655-037-8

1. Agropecuária 2. Gado de corte - Brasil - Criação 3. Gado - Alimentação e alimentos 4. Gado - Criação
5. Gado - Reprodução I. Harfuch, Leila. II. Lemos, Fernanda K. III. Lima, Rodrigo C. A. IV. Lobo, Gustavo D. V. Romeiro, Mariane.

25-295475.0 CDD-636.202

Índices para catálogo sistemático:

1. Gado : Criação : Pecuária : Zootecnia 636.202

Maria Alice Ferreira - Bibliotecária - CRB-8/7964

BRAZILIAN **BEEF CATTLE** PRODUCTION AND ITS GLOBAL CHALLENGES

Executive Summary

This document analyzes the Brazilian beef system, highlighting its economic and sociocultural importance, the associated socio-environmental challenges, and the adopted strategies. It summarizes the "Brazilian beef cattle production and its global challenges (2025)" Whitepaper that presents the pillars for sustainable development in Brazilian cattle farming and for decarbonizing the activity, considering pasture stewardship as a driver of this process.

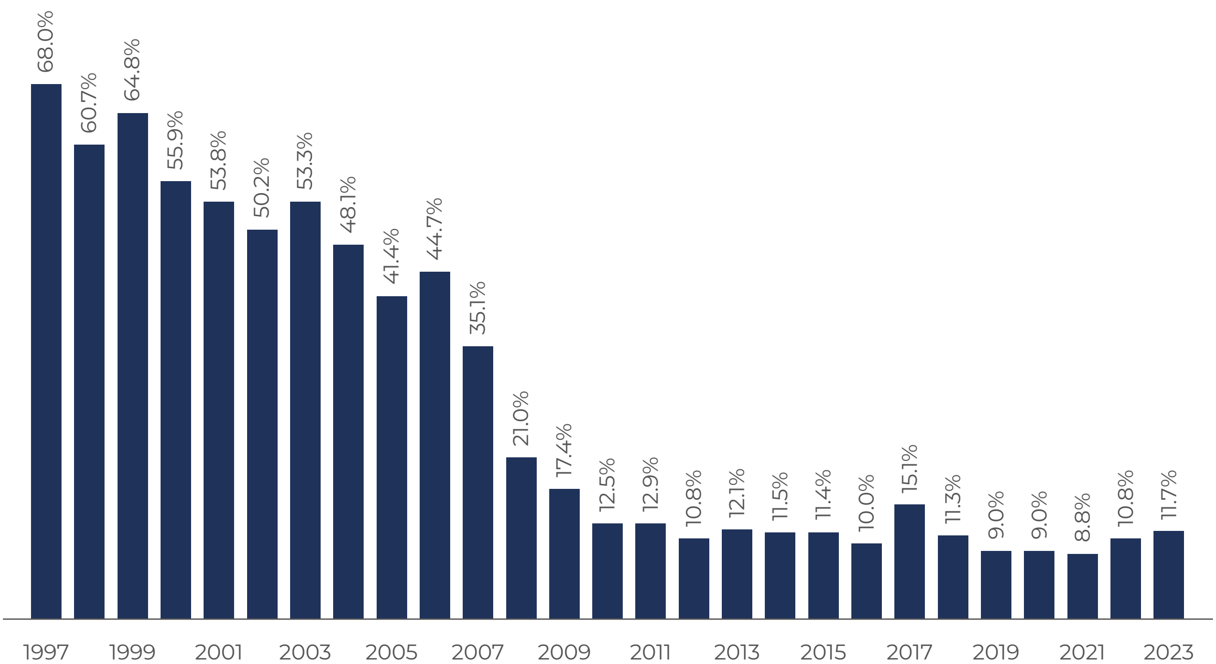
The global context of climate change, highlighted by the IPCC and events such as COP30, calls for urgent decarbonization of the economy and a search for sustainable food systems (SFS). The beef system is recognized as one of the most complex ones, with distinct cultural, economic, and environmental aspects in each country. In Brazil, agribusiness accounts for about 22% of total GDP (CEPEA, 2024[1]) and is the industry that is most exposed to international competition. The livestock industry accounted for 23.2% of agribusiness GDP and 5.1% of total Brazilian GDP in 2024.

Beef cattle production in Brazil has evolved significantly, especially after the Plano Real (1994) and expanding trade. Reducing the age of slaughtered animals shows one of the elements of production and productivity gains, as can be seen in Figure 1. Advances in nutrition, health, and genetics have driven the industry's development and exports.

[1]CEPEA. PIB do Agronegócio Brasileiro. Available at: https://www.cepea.org.br/br/pib-do-agronegocio-brasileiro.aspx . Accessed on May 16, 2025

Brazil has become the world's largest beef exporter, with 3 million metric tons (carcass equivalent[2]), although the domestic market is the destination for about 70% (7.65 million carcass-weight equivalent metric tons) of the total production of 10.6 million tons (carcass-weight equivalent) in 2023 (ABIEC, 2024[3]). The importance of exports and their exponential growth, especially to China[4], and the increasing expansion into new markets are directly related to cattle price increases and the intensification of part of production.

Figure 1 - Percentage of animals slaughtered after 36 months (only males)



Source: ABIEC (2024)

Despite market achievements and production advances, the industry faces social, environmental, and institutional challenges, such as the association of livestock farming with deforestation, high greenhouse gas (GHG) emissions, pasture degradation, herd traceability, lack of technology across the country, and exclusion of small producers from the production transition process. These challenges show the world that livestock farming (or Brazil as a major beef supplier) is not very sustainable, considering the positive attributes of the chain and the difficulties in coordinating public and private institutions.

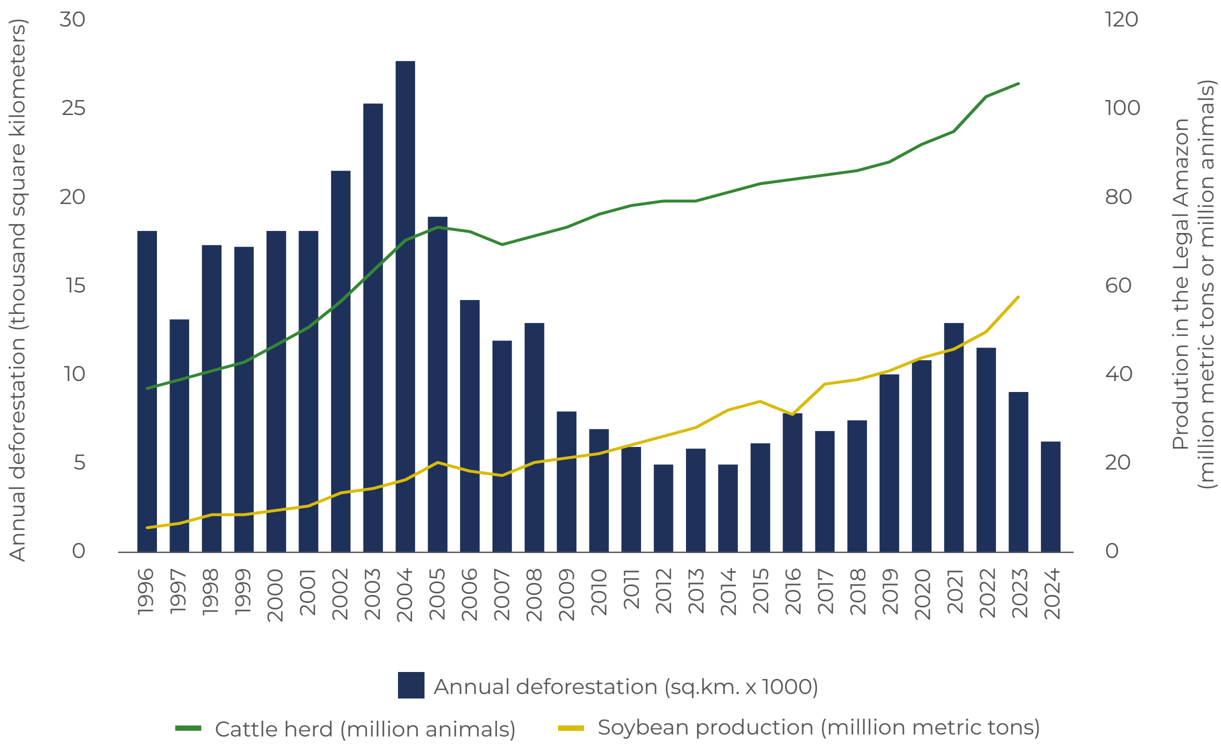
[2] The carcass weight equivalent (CWE) is a measure used for standardizing beef weighing, and is capable of comparing it with the weight of the animal's carcass, which is a percentage of the animal's live weight

[3] Available in: ABIEC. Beef Report 2024: Perfil da Pecuária no Brasil. Available at: https://abiec.com.br/publicacoes/ Accessed on: May 25, 2025.

[4] Beef consumption is estimated to be 38%, while production capacity will reflect only 30% (FAO – 2024-2033 projection

Deforestation, especially in the Legal Amazon[5], is a persistent concern, although Brazilian agricultural productivity has grown significantly with fewer new lands being incorporated in recent decades (Figure 2). Furthermore, the Cerrado has been the focus of much criticism due to changes in land use, even when these are legally justified. One of the factors behind this criticism is the fact that land use change is the largest source of greenhouse gas emissions in Brazil, accounting for 39.5% in 2022, which is more than the agricultural industry, at 30.5% (BRASIL, 2025)[6].

Figure 2 - Brazil: Deforestation, soybean production, and cattle ranching in the Legal Amazon



Source: IBGE (PAM), IBGE (PPM), PRODES/INPE

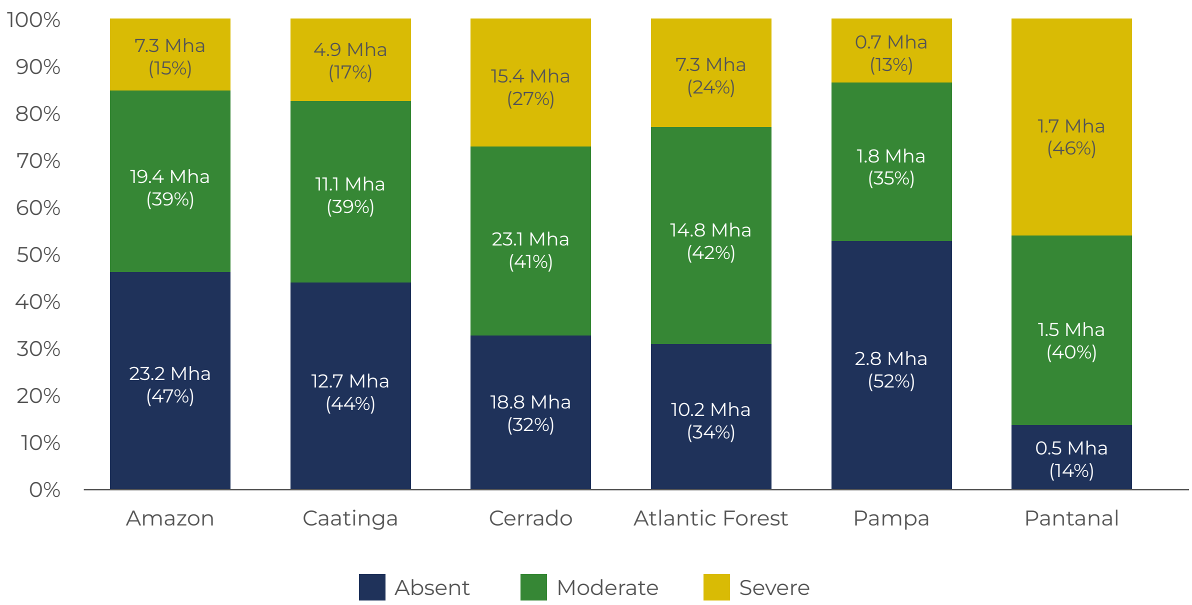
[5] The Legal Amazon corresponds to the area covered by the Amazon Development Authority (SUDAM), as defined in Article 2 of Complementary Law No. 124 of January 3, 2007. The Legal Amazon was established for the purpose of defining the geographical boundaries of the political region covered by SUDAM, aiming to foster inclusive and sustainable development of its operating area and the competitive integration of the regional productive base into the national and international economy. The region comprises 733 municipalities in Acre, Amazonas, Roraima, Pará, Amapá, Tocantins, Mato Grosso, and Maranhão States. Its total area is approximately 5 million square km, corresponding to around 58.92% of Brazil's territory, but it is inhabited by only 12.32% of the Brazilian population (IBGE).

[6] BRASIL (2025). Sistema Nacional de Registro de Emissões (SIRENE). Ministério da Ciência, Tecnologia e Inovações. Available at: https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/cgcl/paginas/sistema-de-registro-nacional-de-emissoes-sirene. Accessed on June 9, 2025.

Another issue related to this activity is emissions from agriculture and livestock farming, which in Brazil are mainly dominated by methane (CH_4) and nitrous oxide (N_2O), with the main source of these emissions (80%) being enteric fermentation from cattle. Pastures undergoing moderate or severe degradation are also a source of emissions.

However, it is essential to show that there is potential for capture through pasture stewardship and integrated systems. Embrapa has shown that meat production can be carbon neutral. This led to the creation of a certification registered with the INPI called *"Carne Carbono Neutro"* (Carbon Neutral Brazilian Beef) for animals produced under intensive grazing conditions and in integrated systems. The forest component is relevant for achieving neutrality. In this sense, recovering and intensifying cattle farming, in addition to causing fewer emissions, leverages productivity gains.

Figure 3 – Levels of pasture degradation by biome



Source: Lapig (2022), Prepared by Agroicone.

In this debate on land use and emissions, it is worth noting that Brazil has institutions that guide forest conservation and regulate land use. The Forest Code[7] is a fundamental public instrument for conserving native vegetation on rural properties, requiring registration in the Rural Environmental Registry (CAR), and restoring or compensating for Permanent Preservation Areas

[7] BRASIL (2012). LAW No 12.651 OF MAY 25, 2012. Available at: https://www.planalto.gov.br/ccivil_03/_ato2011-2014/2012/lei/l12651.htm

(APPs) and Legal Reserves (ARLs). However, the evaluation of the CAR and the effective implementation of the Environmental Regularization Program (PRA) in several states is still ongoing (behind schedule), compromising the country's public image.

In addition to regulatory institutions, the Brazilian government encourages public policies for low-carbon agriculture, such as Plano ABC (2010-2020), Plano ABC+ (2020-2030) and, more recently, Decree No. 11,815/2023[8] the National Program for Converting Degraded Pastures into Sustainable Agricultural and Forestry Systems (PNCPD), which was recently incorporated into the federal government's *"Caminho Verde Brasil: restauração de terras e segurança alimentar"* ("Green Way Brazil: land restoration and food security" initiative (BRASIL, 2025[9]).

Policies and programs encourage recovery and conversion of degraded pastures into sustainable systems, such as no-till farming, integrated systems such as crop-livestock-forest integration (iLPF), and other practices and technologies that have the potential to mitigate GHG emissions and increase productivity and climate resilience of livestock, agricultural, and forestry activities. However, public incentives are not entirely capable of financing and achieving full land use change, pasture intensification, and adopting best practices. Financial resources are finite, and demand and urgency require that other kinds of financing be developed from private and international funds and blended finance funds for driving new technologies and supporting small producers.

According to the Agriculture and Livestock Ministry (BRASIL, 2024)[10] there is a potential of at least 27.7 million hectares (Mha) of degraded pastureland with high potential for conversion to sustainable production systems, distributed across 1.02 million private rural properties. For nine Brazilian states selected by the study, recovering or converting 23.1 Mha of degraded pastureland in these systems requires initial investments of at least R$ 139 billion, in addition to operating costs that could reach R$ 90.8 billion per year.

Despite the environmental and economic challenges, the social aspect refers to marginalization and difficulties faced by small producers. Lack of technical

[8] BRASIL (2023). DECREE No 11.815, OF DECEMBER 5, 2023. Available at: https://www.planalto.gov.br/ccivil_03/_ato2023-2026/2023/decreto/d11815.html

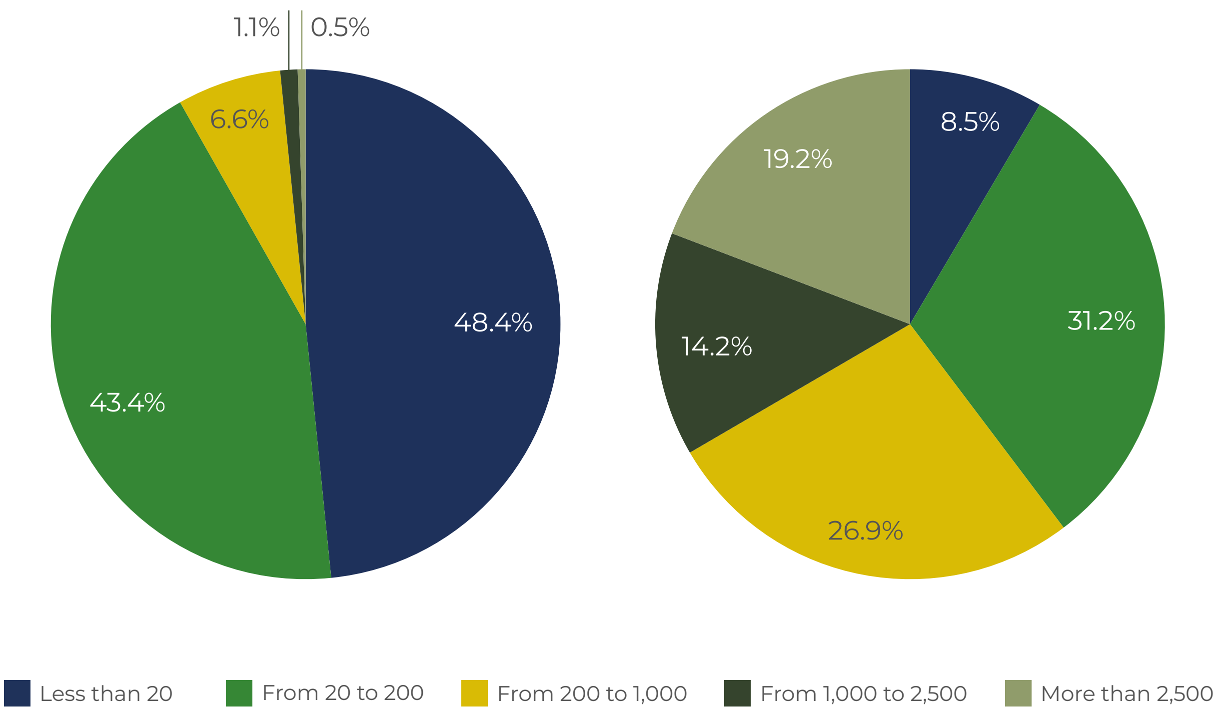
[9] BRASIL (2025). Caminho Verde Brasil: Restauração de Terras e Segurança Alimentar. Available at: https://www.gov.br/agricultura/pt-br/campanhas/caminho-verde

[10] BRASIL (2024). Converting degraded pastures into sustainable agricultural and forestry production systems: Prioritizing areas and investment estimates. Agriculture and Livestock Ministry. Innovation, Sustainable Development, Irrigation, and Cooperativism Secretariat; Intelligence Center for Land Governance and Sustainable Development; Agroicone; Imaflora; ESALQ Public Policy Group. – Piracicaba, SP, MAPA, 2024. Available at: https://agroicone.com.br/publicacao/conversao-de-pastagens-degradadas-em-sistemas-de-producao-agropecuarios-e-florestais-sustentaveis-priorizacao-de-areas-e-estimativas-de-investimentos-brasil/

assistance, difficulties in accessing credit, or even knowledge of stewardship practices impact the adoption of technologies and good production practices (genetics, adequate nutrition, animal and local health), compromising their activities and profitability in the long term.

Figure 4 – Distribution of establishments by area (hectares)

Figure 5 – Distribution of herd (%) by establishment (hectares)



Source: IBGE (2017)

Unlike farmers, small cattle ranchers are not connected to cooperatives, supply stores, or other sources that can provide information, technology, technical assistance, and financial support. Small cattle farmers are often calf suppliers and engage in other activities on their farms as a means of diversification and subsistence. Lack of land tenure or land regularization is a bottleneck to development, as it marginalizes small producers who wish to work in line with the country's public and private policies.

Although challenges and bottlenecks persist in the industry, they should be seen as an opportunity for Brazil to contribute to the global agendas for sustainable development, climate change mitigation and adaptation, food security, and reducing poverty. A study coordinated by ABIEC (Lima & Lemos, 2024[11]) addressed the pillars for the sustainable transition of cattle farming, which should be implemented with continued engagement of rural producers in the identified actions: (i) expand adoption of technologies and good production practices; (ii) compliance with the Forest Code (validation of the CAR and its use across the beef chain); (iii) traceability and monitoring (health and environmental); (iv) diversified financing; (v) productive inclusion of cattle farming (small producers).

Among the aspects already mentioned, it is worth highlighting the importance of cattle traceability in the country. Although the system proposed by the National Plan for Individual Identification of Cattle and Buffaloes (PNIB)[12] is voluntary (during its implementation phases), traceability and producing individual cattle data contribute to health security in Brazil, which recently achieved the status of a country free of foot-and-mouth disease without vaccination, but which shares borders with many South American countries, posing an imminent risk. In this sense, as the herd is tracked, diseases and areas can be isolated, without compromising the country's trade.

Herd traceability for environmental reasons is another key issue for the supply chain in terms of the legality of animals and whether the production is deforestation-free. In addition to these environmental attributes, microdata production from livestock establishments contributes to gains in public and private management and to opening markets that are coordinated by environmental attributes. However, this remains part of future developments as implementation progresses in the states in terms of data infrastructure and traceability models.

As protagonists of change, meatpacking companies, especially those that serve the entire national territory and exports with the Federal Inspection System (SIF), have stood out for their role in coordinating this agri-food system, driving improvements in quality and process standards, and encouraging the adoption of technologies by producers through financial and non-financial incentives. This role is seen as crucial for driving sustainability in the chain due to market pressures, especially those coming from abroad. However, dealing with social and environmental issues still represents a dimension that requires collaboration with the public and financial sectors and civil society.

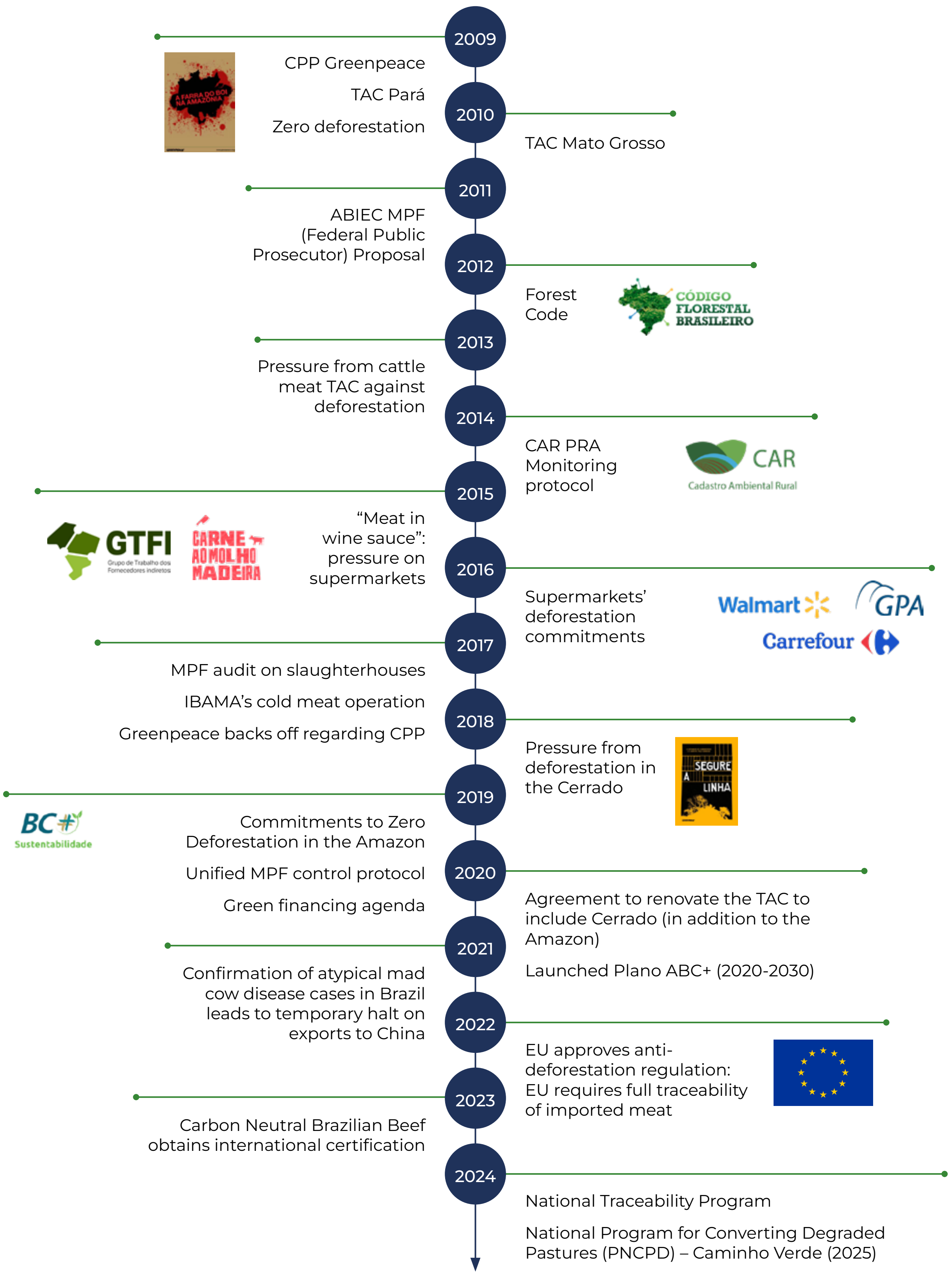
Since 2009, several social and environmental advances have been achieved across the chain, due to institutional development and private efforts. Figure 6 shows this evolution and commitment.

---

[11] Lima, R.& Lemos, F. (Agroicone). 2024. Priority Actions for Livestock Transition. A study coordinated by the Brazilian Beef Exporters Association (ABIEC) and the Tropical Forest Alliance (TFA). October 2024. p.49 (unpublished).

[12] BRASIL (2025). National Plan for Individual Identification of Cattle and Buffalo. Available at: https://www.gov.br/agricultura/pt-br/assuntos/sanidade-animal-e-vegetal/saude-animal/rastreabilidade-animal/pnib

Figure 6 - Historical perspective of the beef cattle system, deforestation, and traceability



Source: prepared by Agroicone

Marfrig, one of the global leaders in the industry, exemplifies this transition. Since 2009, the company has made commitments to decouple its production from deforestation in the Amazon, implementing geo-monitoring systems and strategic partnerships. In 2020, it launched Programa Marfrig Verde+, which aims to ensure that 100% of its production chain is sustainable and deforestation-free by 2030, a commitment that has been brought forward to 2025.

The inclusive approach aimed at supporting supplier regularization in social and environmental non-compliance, rather than excluding them, involves financial mechanisms, technical assistance, and indirect supplier monitoring. This way, more than 4,000 suppliers have been reintegrated into its supply chain. Marfrig's strategy, with clear targets for eliminating new deforestation in its chain, seeks not only to meet market demands but also to generate positive social and environmental externalities and foster systemic change in the industry.

Finally, the Brazilian beef system is economically vital but faces serious environmental and social challenges. Public policies and private sector initiatives, such as the ABC+ Plan, the Brazil Green Way initiative, and the initiatives of meatpacking companies, point to a path to sustainability based on technology, innovation, social inclusion, and transparency. However, effective coordination of implementation actions, especially by meatpacking companies, and collaboration between the different organizations involved in the chain and governments, including the challenges in funding, are essential to overcome these challenges and ensure that Brazilian beef production contributes to global food security in a sustainable and inclusive manner.

AGROICONE

conhecimento para uma nova economia

EXECUTIVE SUMMARY

This summary provides an overview of the Brazilian beef cattle production and its global challenges (2025) Whitepaper. It presents the economic and sociocultural importance of the beef chain and the environmental challenges it faces, as well as its potential for contributing to global sustainable development agendas.

ISBN: 978-85-5655-037-8

9 788556 550378

AGROICONE
conhecimento para uma nova economia