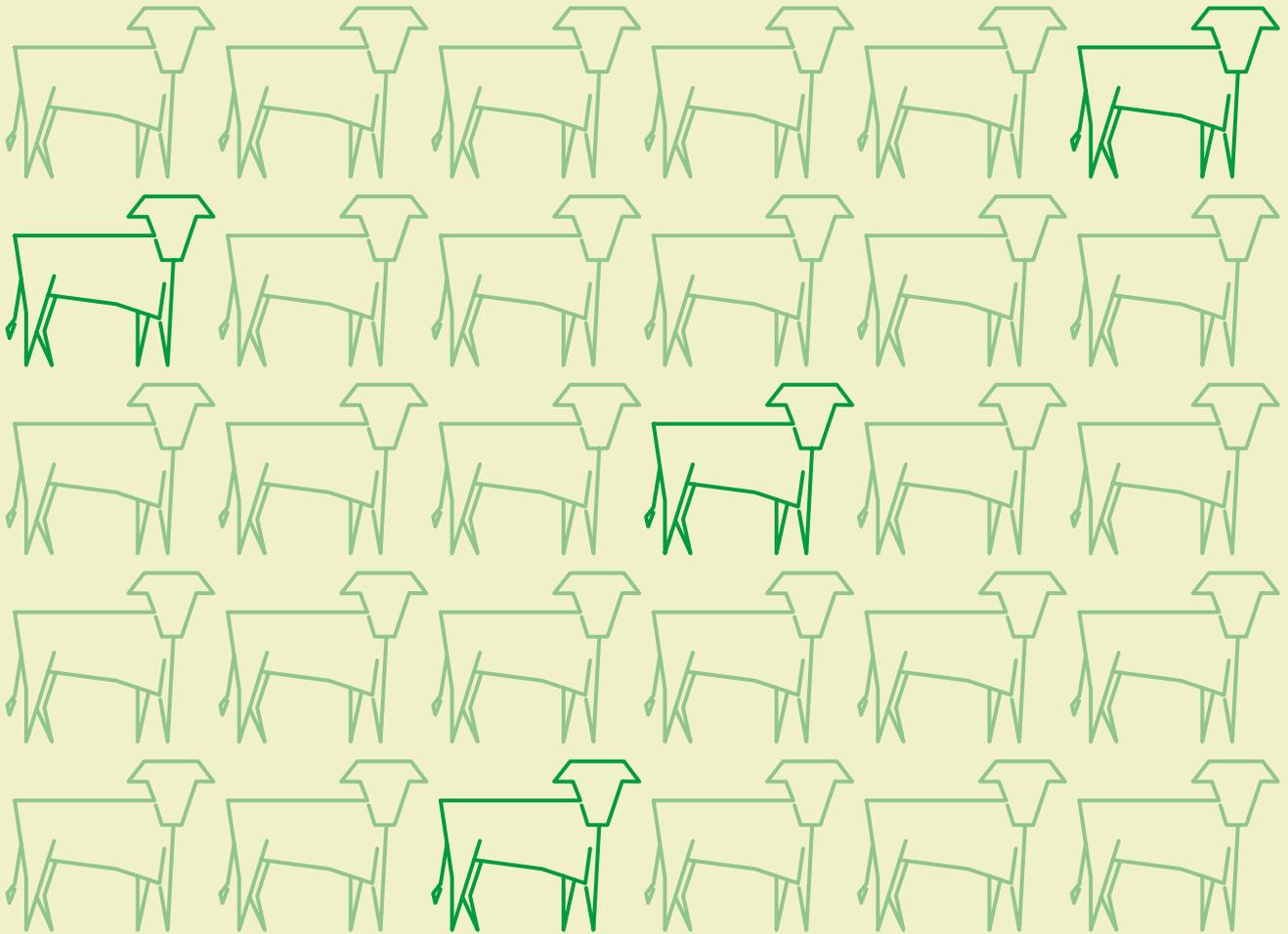


**BRAZILIAN
COALITION**

ON CLIMATE
FORESTS AND
AGRICULTURE

www.coalizaobr.com.br/en



B E E F C H A I N
T R A C E A B I L I T Y
I N B R A Z I L

CHALLENGES AND OPPORTUNITIES

FINAL REPORT AND RECOMMENDATIONS



INDEX

1	Introduction	6
2	State of the Art of the Beef Value Chain in Brazil	8
2.1	The Context of the Meat Value Chain in Brazil	8
2.2	Evolution of soil use	9
2.2.1	Deforestation in the Amazon	10
2.2.2	Deforestation in the Cerrado	12
2.3	Chain Segments Summary	14
2.4	Typology of the Meat Value Chain in Brazil	15
2.5	Financing and investments in the beef value chain	17
3	Traceability and monitoring in Brazil	21
3.1	Cattle and Buffalo Identification and Certification System (SISBOV)	21
3.2	The health surveillance system	22
3.3	Traceability and monitoring of voluntary agreements	22
3.4	Traceability and Monitoring models	24
3.5	Technology and traceability systems	28
3.6	Monitoring indirect suppliers	30
3.7	Economic analysis of the traceability system	31
4	Comparative analysis of traceability and monitoring systems	33
4.1	Comparative analysis of traceability and monitoring systems	33
4.1.1	Comments on comparative analyzes	39
5	Risk analysis and opportunities	41
5.1	Features of the proposed model (strengths and weaknesses)	43
5.1.1	GTA + CAR: The obvious solution and its risks	43



5.1.2	SISBOV: full, but not an environmental traceability system.....	45
5.1.3	Other challenges of the traceability and monitoring model.....	46
5.2	Opportunities and threats.....	46
5.2.1	The cyclical dynamics of traceability projects.....	47
5.2.2	Technological driver of traceability.....	49
5.2.3	Vertical integration projects.....	50
5.2.4	Other threats to traceability in Brazil.....	51
6	Recommendations	53
6.1	Integrate the chain based on jurisdictional models.....	54
6.1.1	Consolidate monitoring based on GTAs, CAR and environmental licensing.....	56
6.1.2	Sustainable enhancement of livestock production.....	59
6.1.3	Value the environmental quality of meat.....	61
6.2	Spread the best practices of vertical integration initiatives over the entire chain.....	62
6.2.1	Ensure public support for the creation of integrated sustainable meat chains.....	63
6.2.2	Support traceability and monitoring systems.....	64
7	Strategic guidelines	65
8	Bibliography	72
	Appendix: Notes on the multiple territory matrix	76
	Credits	80



FIGURES INDEX:

Figure 1 - Agricultural sector GDP in Brazil. Source: Prepared by Agrosuisse with CEPEA data (2020).....	8
Figure 2 - Break-even of Brazilian balance of trade. Source: Adapted from ABIEC (2019).....	9
Figure 3 - Evolution of biome-based land occupation in millions of hectares. Source: Prepared by Agrosuisse with Mapbiomas data (2020).....	10
Figure 4 - Deforested area in the Amazon biome between 2008 and 2019. Source: Prepared by Agrosuisse with INPE data (2020).....	10
Figure 5 - Per-state deforested area and variation of deforestation of the Amazon biome. Source: Prepared by Agrosuisse with INPE data (2020).....	11
Figure 6 - Deforested area in the Cerrado biome between 2008 and 2019. Source: Prepared by Agrosuisse with INPE data (2020).....	12
Figure 7 - Per-state deforested area and variation of deforestation of the Cerrado biome. Source: Prepared by Agrosuisse with INPE data (2020).....	13
Figure 8 - Interviews Analysis process. Source: Prepared by Agrosuisse.....	41
Figure 9 - The cycle of implementation and abandonment of quality control measures in the meat chain in Brazil. Source: Prepared by Agrosuisse.....	48
Figure 10 - Rationale of recommendations, by implementing circles and deadlines for the proposed measures. Source: Prepared by Agrosuisse.....	53
Figure 11 - Matrix of territoriality of the chain integration strategy based on jurisdictional models.....	66
Figure 12 - Matrix of territoriality of the strategy of generalizing good practices throughout the chain.....	69



BOX, CHART AND TABLE INDEX

Box 1 - ABC Program and financing alternatives for the beef value chain in Brazil, in traceability and monitoring systems.....	19
Box 2 - Mato Grosso do Sul Association of Producers of Young Steers.....	25
Box 3 - Sustainable Livestock in the Amazon.....	26
Box 4 - Sustainable meat: From the countryside to the table.....	26
Box 5 - Brazilian Association of Organic Producers	27
Box 6 - PCI Regional Pact of the Juruena Valley	27
Box 7 - Technologies for traceability and monitoring	28
Box 8 - Source monitoring technologies.....	29
Chart 1 - Summary of the characteristics of the beef value chain segments in Brazil.....	14
Chart 2 - Meatpacking companies typology, considering exposure to risks related to health and environmental demands.....	16
Chart 3 - Summary of SISBOV's economic analyzes of traceability systems.....	31
Chart 4 - Characteristics and evaluation	34
Chart 5 - Characteristics of the traceability systems model by country.....	35
Chart 6 - Summary of comparative Analysis between countries.....	36
Chart 7 - Comparison of the characteristics of the traceability system In Brazil between official system and voluntary agreements (monitoring).....	37
Chart 8 - Summary of the analysis between the official system and voluntary agreements (monitoring).....	38
Chart 9 - SWOT Matrix.....	42
Table 1 - Classification of beef production systems of complete cycle based on production costs (R\$) an arroba.....	15



1

INTRODUCTION

The development of the traceability and monitoring system in the beef value chain in Brazil began in 2000 with external markets pressure, especially in the European Union, in the face of health control requirements that include greater food safety for the consumer market.

In Brazil, there have been two moments that mark chain traceability and monitoring systems development. In 2002, an official system was created, the Cattle and Buffalo Identification and Certification System (SISBOV, in the Portuguese acronym); and, in 2009, a voluntary agreement on the Terms of Conduct Adjustment (TAC, in the Portuguese acronym) was signed between the Federal Prosecution Service (MPF, in the Portuguese Acronym) and meatpacking companies in the Amazon region.

From 2009, we can consider the establishment of these two models, namely SISBOV, which meets the requirements for the external market, and voluntary agreements, which serve the internal market. In 2019, the results of the voluntary TAC agreement allowed the onset of a new stage, i.e. adjusting voluntary agreements to solve the main problems observed.

The Final Report presents the main findings of the study “Beef Chain Traceability in Brazil: Challenges and Opportunities”, based on surveys of secondary data, analyzes carried out and the content of interviews with members of the Brazilian Coalition’s Beef Traceability Taskforce and additional contacts with agents involved in the beef value chain in Brazil.



Section 1, Brazil’s State of the Art of the Beef Value Chain, contextualizes the value chain and its importance in the country’s economy through sector indicators. In Section 2, we present the traceability and monitoring scenario in Brazil, as well as the Challenges and Opportunities of the sector including perspectives for the chain.

The summary of a comparative analysis of the traceability systems and models of relevant countries in the meat chain, especially the Brazilian case, is presented in Section 3, which also compares the SISBOV and the voluntary agreements arising from the Terms of Conduct Adjustment signed between the Federal Prosecution Service and companies in the meat chain industrial segment. At the end of the section there is a risk and opportunity analysis to develop traceability in the beef value chain.

Section 4, which is conclusive in this study, presents the recommendations and strategic guidelines to support the development of a traceability and monitoring system for the beef value chain in Brazil for the coming years.

2

STATE OF THE ART OF THE BEEF VALUE CHAIN IN BRAZIL

The report presents a summary of the State of the Art of the Beef Value Chain in Brazil. At its beginning, it contextualizes this chain in the country's economy, followed by a discussion on changes in land use within the Brazilian territory. Finally, it describes the evolution of the chain in each of its segments: Research and Inputs; Production; Industry and Marketing. Particularly, the paper seeks to evaluate the evolution of productivity in the sector, which is seen as crucial for decreased environmental impact of the value chain.

2.1

THE CONTEXT OF THE MEAT VALUE CHAIN IN BRAZIL

Agribusiness is very relevant for Brazilian economy. In 2019, the sector generated a GDP of more than R\$ 1.5 trillion, that is, 21% of the national GDP. Livestock farming (including other animal breeding) accounts for about one third of this value (see Figure 1). In the last decade, the sector grew by 8% a year at current prices. Real growth was much more modest, that is, 1.3% per year. Within the agribusiness sector, livestock production had a slightly higher growth than the other sectors: 9.7% at current prices, which corresponds to a real growth of 2% per year (CEPEA, 2020).

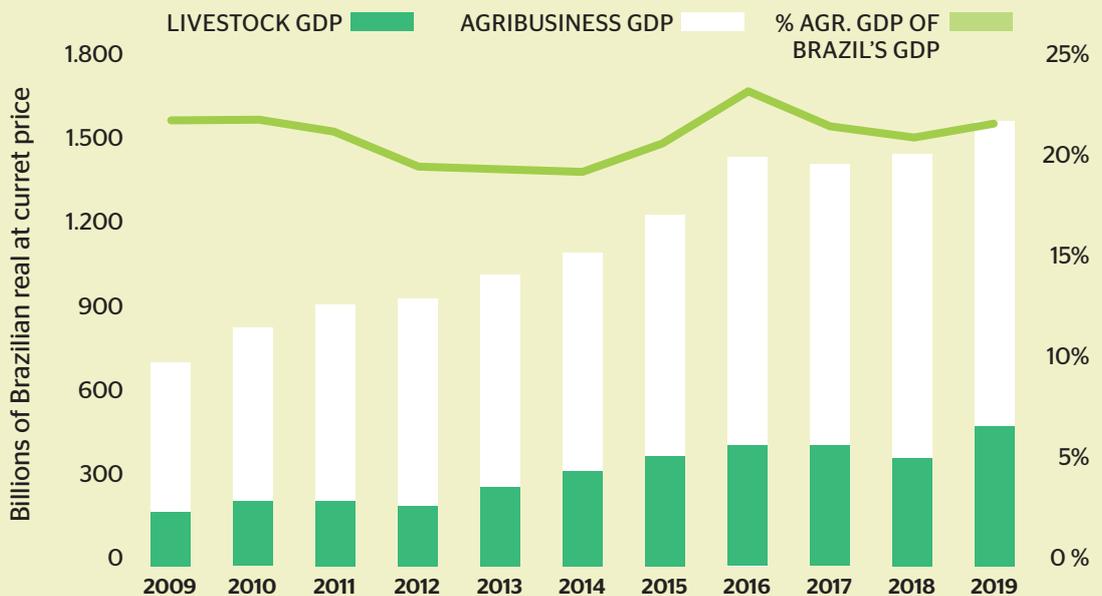


Figure 1 - Agricultural sector GDP in Brazil. Source: Prepared by Agrosuisse with CEPEA data (2020).

About one-fifth of the Brazilian agribusiness production is exported. Bovine products represent 3.9% of the total value of exports (ABIEC, 2019): which is enough to make Brazil the world's top exporter. Agribusiness is the break-even guarantee for the country's balance of trade, since the sector maintains the capacity to compensate negative net imports from the other sectors, as shown in Figure 2.

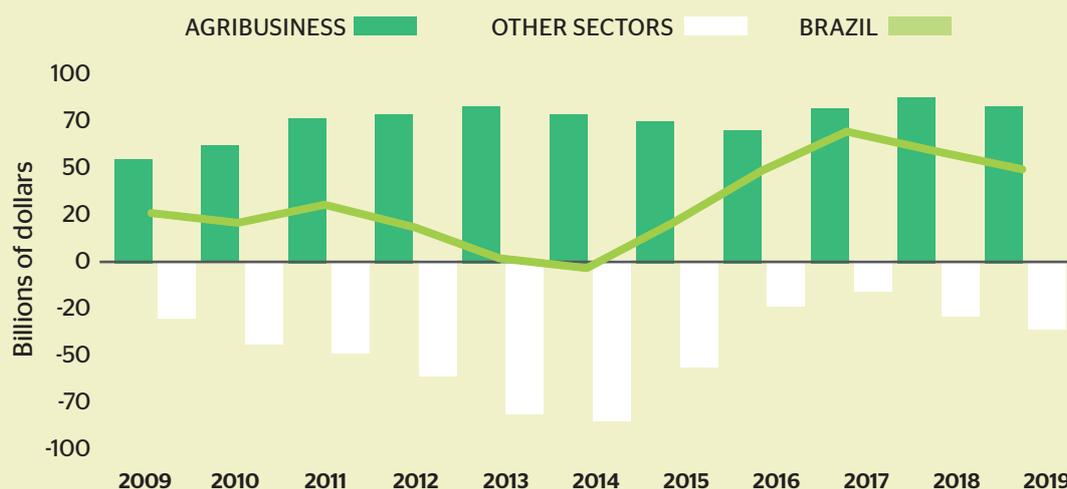


Figure 2 - Break-even of Brazilian balance of trade. Source: Adapted from ABIEC (2019).

2.2

EVOLUTION OF SOIL USE

The analysis of the evolution of biome-based soil use shows that the Amazon and the Cerrado were the ones that underwent the most transformation over the period analyzed (see figure 3). More than 90% of the forest that was converted to other uses, between 2008 and 2018, was located in both the Cerrado (48%) and the Amazon (45%) biomes.

It is worth noting that, in the Cerrado, deforestation is mainly due to expanded agriculture. Although there has been increased productivity, even with a perceived reduction in grazing area between 2008 and 2013, this has been reversed between 2013 and 2018. Much of the conversion in the sector-based soil use was intended for transformation into grains or integrated systems.

In the Amazon biome, on the contrary, livestock farming is more relevant than agriculture, while the latter remains important. Here, the forest lost 7.58 million hectares in 10 years, while livestock and agriculture expanded by 4.30 and 3.22 million hectares, respectively.

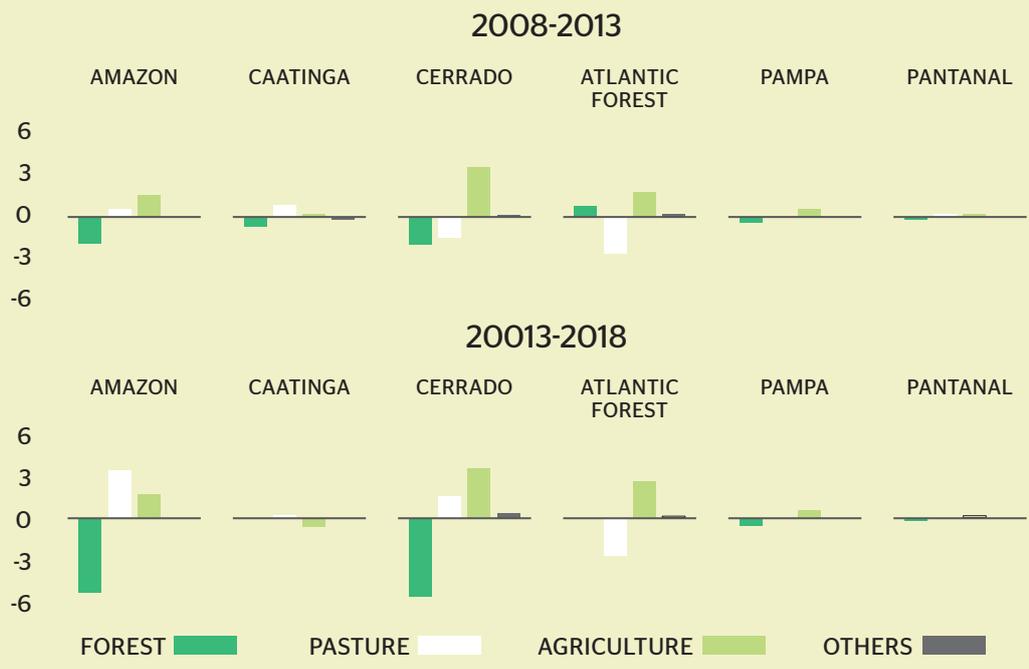


Figure 3 - Evolution of biome-based land occupation in millions of hectares. Source: Prepared by Agrosuisse with Mapbiomas data (2020).

The importance of both the Amazon and the Cerrado biomes, in this context, requires a more detailed discussion.

2.2.1

DEFORESTATION IN THE AMAZON

The historical series of data contained in the TerraBrasilis portal of the National Institute of Space Research (INPE, in the Portuguese acronym) points out that the Amazon region had a total deforestation of 8.048 million hectares between 2008 and 2019. In 2019, the highest deforestation rate since 2008 was recorded.

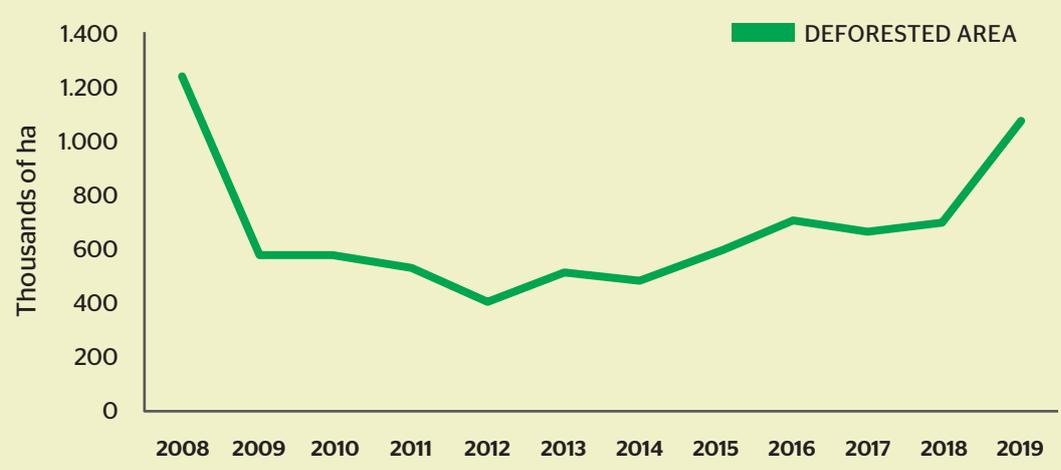


Figure 4 - Deforested area in the Amazon biome between 2008 and 2019. Source: Prepared by Agrosuisse with INPE data (2020).



Among the states included in the Amazon biome, since 2008, Pará is the state that deforested the most, corresponding to 43.9% of the total, followed by Mato Grosso (18.9%) and Rondônia (13.9%), as seen on Figure 5.

Figure 5 also compares the deforested area between 2008 and 2013 with the deforested area between 2014 and 2018, showing the per-state deforested area in the last five years as a percentage of the deforested area in the prior five years. Thus, for example, in the state of Rondônia, twice as much (200%) was deforested in the last five years compared to the first period, which indicates increased deforestation. The figure also shows accelerated deforestation of the Amazon biome in the states of Pará, Maranhão and Acre.

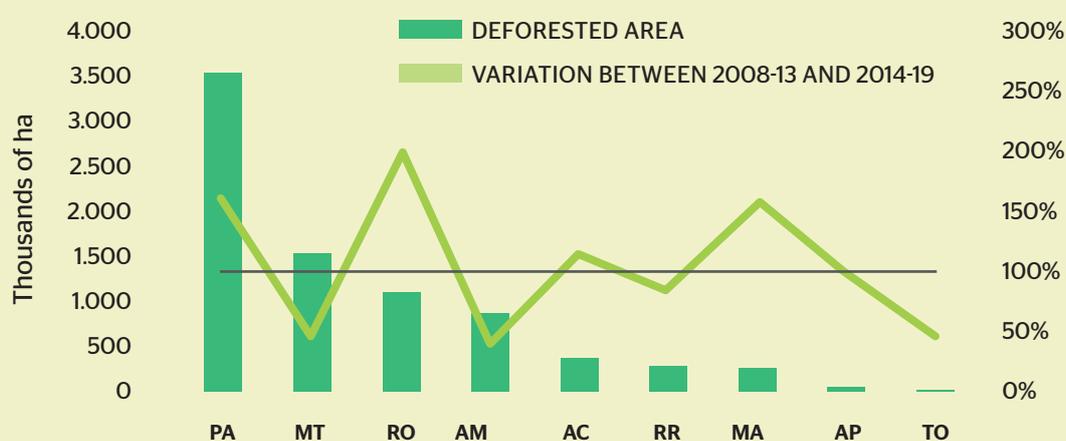


Figure 5 - Per-state deforested area and variation of deforestation of the Amazon biome. Source: Prepared by Agrosuisse with INPE data (2020).

According to the Amazon Environmental Research Institute (IPAM, in the Portuguese acronym), from January to August 2019, 31% of deforestation occurred in Undesignated Public Forests, 28% in private properties and 23% in Rural Settlements. In relation to fire spots, 33% are concentrated in private properties, 20% in Undesignated Public Forests and 18% in Rural Settlements. The Institute states that there is a strong relationship between fire and deforestation, mainly in private properties, areas without any information and Rural Settlements (ALENCAR et al., 2019).

In 2018, as many as 85% of all deforested area in the Mato Grosso Amazon was illegal (VALDIONES apud ALENCAR et al., 2019).

DEFORESTATION IN THE CERRADO

Throughout the historical series since 2008, the *Cerrado* recorded total deforestation of 11.632 million hectares. In 2008, the highest deforestation rate of the historical series was recorded. In 2016, the lowest annual deforestation rate was recorded. As a general rule, there seems to be a tendency of decreased deforested area annually over the period, with a reduction of almost 50,000 hectares per year.

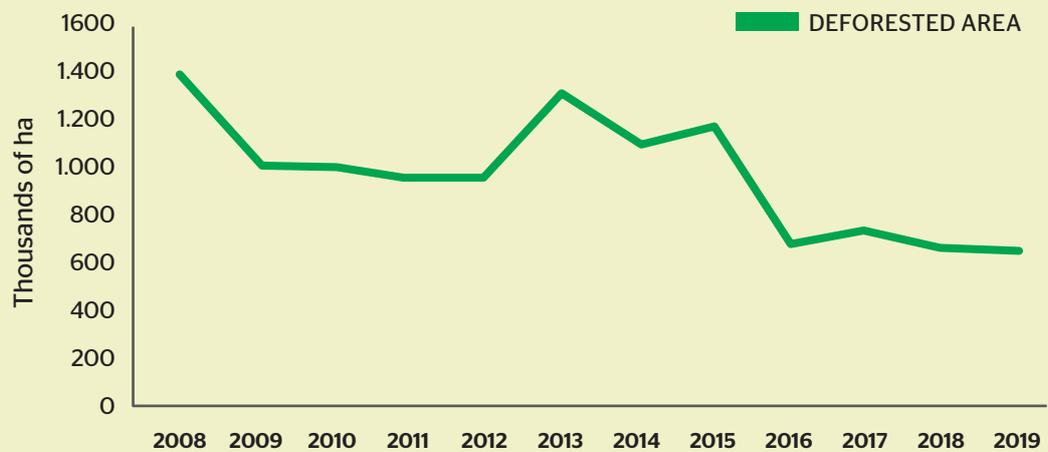


Figure 6 – Deforested area in the Cerrado biome between 2008 and 2019. Source: Prepared by Agrosuisse with INPE data (2020).

Among the states included in the Cerrado biome, since 2008, Tocantins is the state that deforested the most, corresponding to 20.2% of the total, followed by Maranhão (17.00%) and Minas Gerais (12.7%), as seen on Figure 7.

Figure 7 also compares the deforested area between 2008 and 2013 with the period from 2014 to 2018, showing, per-state, the deforested area in the last five years as a percentage of the deforested area in the prior five years. Thus, for example, in the state of Minas Gerais, half (50%) was deforested in the last five years compared to the first period, which indicates decreased deforestation. As a rule, in all states there seems to be a decreased speed of deforestation, even though this reduction is significant for some states, such as São Paulo, and minimal in others, such as Tocantins.

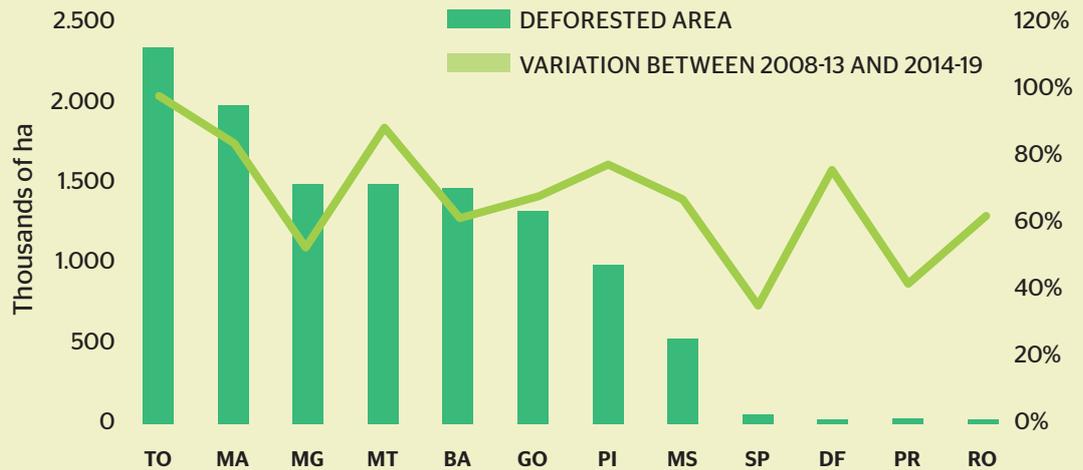


Figure 7 - Per-state deforested area and variation of deforestation of the Cerrado biome. Source: Prepared by Agrosuisse with INPE data (2020).

The Annual Report on Deforestation in Brazil states that 96% of the deforested area in both the *Cerrado* and Amazon biomes detected in 2019 had irregularities (AZEVEDO et al., 2020).

In Mato Grosso, for example, as many as 27% of the entire deforested area of the state between 2012 and 2017 occurred on soybean farms. In addition, about one-quarter (82,000 ha) of the land deforested on these farms has been converted to soybean plantations. It was observed that the conversion levels for soybean were higher in the lands that had been deforested for a longer period of time (VASCONCELOS et al., [s.d.]).

CHAIN SEGMENTS SUMMARY

The summary of the State of Art of the value chain highlights the main characteristics for each segment in the chart below:

Chart 1 - Summary of the characteristics of the beef value chain segments in Brazil.

Segment	Relevant features
Research and technology	Results in livestock farming production gains: Pasture load capacity, yield improvement, increased carcass yield, genetics, reproductive indexes. Crop-Livestock-Forestry Integration; Livestock-Forest and Crop-Livestock; Intensification/Confinement; In 2006, the Good Agricultural Practices Program (BPA, in the Portuguese acronym); In 2014, the Meat Intelligence Center; Information Technology, relevant development in the meat chain.
Inputs	The indicator of the intensification of livestock production trajectory is the evolution of the business value; Inputs - animal nutrition increased by 2% per year; protocols in semen by 3%; animal health by 4% (2015/2019);
Production	Effective Brazilian Bovine - 213 million heads; Extraction rate - 15%; Midwest - 73.8 / North - 48.6 million heads = 57% of the total national; Intensification of pastures are critical towards reducing the environmental impact of livestock farming. The increased per hectare stocking rate allows to a reduced deforestation pressure, in addition to an increased income for producers; Pasture area - 168.86 million hectares, 57% with some degree of degradation; environmental impacts on land use and greenhouse gas emissions.
Industry	Total of 4,390 meatpacking companies in Brazil producing more than eight million tons of meat per year; in 2009-2019, the production grew by 28%; average per meatpacking company: 1,872 tons of meat per year in 2019 - 62% more than in 2009; About one third of the meat production occurs in the Midwestern states, mainly in Mato Grosso and Mato Grosso do Sul, followed by the Northern states; In 2019, federal-inspected meatpacking companies (SIF, in the Portuguese acronym) processed 76% of the meat produced in Brazil; in 2009, this figure was 81%.
Consumer Market	Internal market: in 2019, 77% of Brazilian meat production; Brazil has already become the world's top beef exporter. Export destination: mostly China and Hong Kong (2019); The second top exporter of live animals transported by sea.

Source: Agrosuisse. For more details, see Ramos et. al. (2020).

TYOLOGY OF THE MEAT VALUE CHAIN IN BRAZIL

The approach of this part of the paper is to define typologies for cattle ranchers considering issues associated with the production system, a key feature to understand the supply of animals to the beef value chain.

Industry segment typology is unit-based and serves both the external and the internal market (SIF) and units that serve only the internal market (SIE and SIM, in the Portuguese acronyms). From this premise, they are also considered by size and dimension of operations.

Enhancing livestock production is a solution to match the growing demand for meat with environmental concerns. Therefore, creating typologies based on the capacity to support pastures and simultaneous use of food supplementation is frequent. An example is the typology offered by ABIEC (Brazilian Beef Exporters Association), summarized in Table 1.

Table 1 - Classification of bovine production systems of complete cycle based on production costs (R\$) an arroba

	Extractivist	Low technology	Medium technology	Adequate	High technology	Intensive
arroba/hectare	1 - 3	3 - 6	6 - 12	12 - 18	18 - 26	26 - 38
Nutrition, health, reproduction, correctives and fertilizers.	19	34	52	67	76	77
Other costs	138	82	55	38	34	27
TOTAL	157	117	107	105	109	103

Source: Adapted from ABIEC (2019).

The data indicates that, while investing more in nutrition, health, reproduction, fertilizers and correctives, the most intensive farms are able to produce at the lowest cost. Higher productivity rates, while requiring higher investments, eventually benefit the producer by diluting fixed costs by a larger number of animals produced.

Another relevant classification here arises from the division of labor across producers. If there are those involved in all breeding stages, from the cattle's birth to their finishing for slaughter, there

are process division cases across different producers. Thus, while some are concerned with the breeding phase, from birth up to six to eight months of age, others acquire the calf and deal with the successive breeding stages up until slaughter. Thus, three types of livestock properties can be defined:

- Full cycle;
- Breeding; and
- Re-breeding and Fattening

This division is important in the context of this paper, as traceability has advanced considerably in recent years in both full cycle and re-growth and fattening producers. They sell directly to the meatpacking companies that have hired monitoring services from their suppliers and traceability of the animals they buy. However, the breeding systems are hard to monitor since the meatpacking companies does not deal directly with them (GTFI, [s.d.]).

The typology for the proposed industry arises from the distinctions across meatpacking companies according to the exposure to risks related to the demand for health and environmental quality by the State and consumers, according to Chart 2.

Chart 2 - Meatpacking company typology, considering exposure to risks related to health and environmental demands

Type	Market	Inspection	Features
International players	Internal and external	Federal	Exports put these meatpacking companies under the risk of embargoes, for health and environmental reasons. In order to avoid these events and reduce risks, they are more willing to invest in incorporating sanitary and, above all, environmental demands.
National players	Internal only	Federal and state	These meatpacking companies are also exposed to both sanitary and environmental quality demands. However, they do not emerge as events, but as a tendency, that is, gradually. Therefore, they are less encouraged to incorporate these demands into their productive chain.
Illegal	Internal only	None	They do not respond to the demand for quality posed by the State or society. But they can be criminally prosecuted for that.

Source: Prepared by Agrosuisse.

FINANCING AND INVESTMENTS IN THE BEEF VALUE CHAIN

In this item, we present the outlook of rural credit programs, financial incentives through green papers, the ABC Program aimed at supporting low-carbon agriculture and the alternatives of fiscal and tax incentives.

The Agricultural and Livestock Farming Plan (PAP, in the Portuguese acronym; Safra Plan), which establishes the official rural credit for small, medium and large producers in Brazil annually, for 2019/2020, foresees that approximately R\$ 222.50 billion will be allocated to rural credit, rural insurance and trade support. In rural credit, R\$ 169.33 billion are earmarked for costing, trade and industrialization, and R\$ 53.42 billion for investments, with interest rates of 3% to 10.5% per year (MENDES; SOUZA, 2020).

Despite this, agricultural production has been financed mainly by own capital and private banks, or other forms such as financial instruments representing green securities, which can be via Rural Product Certificate (CPR, in the Portuguese acronym), Encouraged Debentures, Agribusiness Certificate of Credit Rights (CDCA, in the Portuguese acronym), Credit Rights Investment Funds (FIDC, in the Portuguese acronym), Agribusiness Receivables Certificates (CRA, in the Portuguese acronym) and Agribusiness Letter of Credit (LCA, in the Portuguese acronym) (MENDES; SOUZA, 2020).

Since 2014, the Central Bank of Brazil (BACEN, in the Portuguese acronym) has called on banks to assess the social and environmental risks associated with public funding (Rule No. 4,327/2014) and, since then, the Brazilian Federation of Banks (FEBRABAN, in the Portuguese acronym) has worked to implement and monitor this type of risk, in line with the “Task Force on Climate-related Financial Disclosures” (TCFD), an agency created under the Financial Stability Board, an independent international council accompanying the global financial system¹.

Assunção and others (apud IPAM, 2019), in a study published in 2013, calculated that R\$ 2.9 billion in credit was no longer granted between 2008 and 2011 as a result of new rules. According to the estimates presented, the effect of these banking requirements contributed to the reduction of deforestation by 15% in this period of time. This shows that adjustments in rural credit contribute

► 1. Learn more at <https://www.unepfi.org/climate-change/tcfd/>.



to environmental conservation, while supporting agricultural production (IPAM, 2019).

The Ministry of Agriculture, Livestock and Food Supply (MAPA, in the Portuguese acronym), together with the “Climate Bonds Initiative” (CBI), announced the launch of the Sustainable Agriculture Investment Plan for the Agriculture sector to stimulate the adoption of environmentally-friendly technologies (PLANO..., 2020). This plan aims to stimulate “Green bonds”, that is, debt securities that are used to raise funds with the objective of financing projects and acquiring assets to guarantee environmental benefits. This agreement is the result of technical cooperation to promote green finances in the Brazilian agricultural sector established in November 2019 between MAPA and the CBI.

According to the Minister of Agriculture, internal agricultural activities demand working capital credit in the order of US\$ 100 billion per year. Input, logistics, marketing and industrialization segments demands must be added to that value (PLANO..., 2020).

The Low Carbon Agriculture Program (ABC Program), a 2010 Federal Government initiative, confirms the belief that the agricultural sector can relevantly contribute to reducing emissions of gaseous pollutants, mainly through the expansion of agricultural and forestry activities, in degraded or recovering areas (BRASIL, 2012).

The ABC Program can meet the beef value chain in the Amazon and Cerrado biomes for its proposal to serve and strengthen sustainable production systems with environmental settlement.

The 2020/2021 Safra Plan was recently announced and the ABC Program was expanded to encourage the integration activities for Crop-Livestock, Livestock-Forest, Crop-Livestock-Forest, Crop-Forest (ILPF, in the Portuguese acronym), as well as the recovery of degraded areas and the promotion of conversion to organic systems. The Program is summarized in Box 1 below:

Box 1 – ABC Program and financing alternatives for the beef value chain in Brazil, in traceability and monitoring systems.

The ABC – Low Carbon Agriculture Program, implemented by MAPA with BNDES (National Development Bank) funds, is the main line for financing sustainable techniques. For the 2020/2021 Safra Plan, the program will have R\$2.5 billion, which increases by R\$400 million compared to the previous harvest, with interest rates of 4.5% to 6% per year.

The producers, companies and cooperatives will have access to the **Environmental ABC** line (interest of 4.5% per year) with resources for forest restoration, aimed at contributing to the environmental adequacy of the rural properties.

The purchase of environmental reserve quotas may be financed. For recovery of legal reserve areas, the rates will be 4.5% per year, lower than the Safra Plan's Business Rate.

The funding line called **ABC Integration** (interest of 6.0% per year) finances, among other initiatives, the implementation and improvement of Crop-Livestock, Crop-Forest, Livestock-Forest or Crop-Livestock-Forest Integration and Agroforestry Systems.

Another available line is the **ABC Recovery** (interest of 6% per year), aimed at recovering degraded pastures, and the **ABC Organic** (interest of 6% per year), which funds the improvement and implementation of organic farming systems.

Within the above lines, the following services, inputs and activities are fundable: drafting of projects and georeferencing, technical and administrative expenses related to environmental settlement, acquisition of inputs, costs related to the conversion from conventional to organic agriculture, acquisition of dams, seeds, environmental adequacy among several others aimed at sustainable agriculture.

Payment periods are up to 12 years with eight years of grace period included according to the activity financed.

Payment can be made according to the revenue stream of the activities financed, which may also have zero interest during the grace period.

The maximum financing cap is up to R\$ 5 million per borrower per agricultural year.

Source: Adapted from BNDES (2020)



Fiscal and tax incentive programs can be an instrument that generates economic and financial benefits for the rural producer to implement traceability and monitoring systems. It is worth remembering that, currently, the Safra Plan does not have a credit line for farms to adapt to traceability systems requirements.

The state of Mato Grosso do Sul, in a joint rule with the State Department of Environment, Economic Development, Production and Family Farming and the Secretary of State for Finance (see MATO GROSSO DO SUL, 2018), regulated the *Subprograma de Apoio a Produção de Carne Sustentável do Pantanal* (i.e. *Pantanal Sustainable Meat Production Support Subprogram*), in the scope of State Programme for the Enhancement of Livestock in Mato Grosso do Sul (PROAPE, in the Portuguese acronym), enacted by Decree No. 11,176 of April 11, 2003, as well the extension of the fiscal incentive provided in the Joint Resolution by the State Secretariat of Finance and State Secretary of Production and Family Agriculture (SEFAZ/SEPAF, in the Portuguese acronyms) - Rule No 69, of 30 August 2016, to the respective rural producers.

This resolution is based on support for the sustainable meat production in the *Pantanal* and aims at fostering competitiveness and encouraging cattle raising with low environmental impact in the region. The rule considers certification systems as an integral part of the *Pantanal* beef value chain, and this includes, for example, organic meat, produced according to the protocol of Federal Law No 10,831 (organic production) and SISBOV, as criteria for receiving the benefits. The protocol is the guarantee of the rules and principles that validate the production process which, through a Trade Transaction Statement (DTC, in the Portuguese acronym), document issued by the certifier, will prove the control of the animals' displacement and build upon the inspection of the animals in the meatpacking unit.

 3

TRACEABILITY AND MONITORING IN BRAZIL

The traceability and monitoring system for the meat chain in Brazil is made by the Cattle and Buffalo Identification and Certification System, SISBOV, the health surveillance system, the models of traceability systems in progress in Brazil (public systems, private systems and voluntary agreements), traceability and monitoring technologies and indirect vendor control initiatives.

 3.1

CATTLE AND BUFFALO IDENTIFICATION AND CERTIFICATION SYSTEM (SISBOV)

On January 10, 2002, the Regulatory Instruction No. 1 was published by the Ministry of Agriculture, Livestock and Food Supply (MAPA, in the Portuguese acronym), which created the Cattle and Buffalo Identification and Certification System (SISBOV). The objective of the system is to identify, record and monitor all cattle and buffalo born in Brazil or imported since the publication of the normative instruction. With the publication of Regulatory Instruction no. 1 of 1 January 2005, only exporting producers were obliged to join SISBOV. In order to enter it, Brazilian legislation establishes the obligation to register the properties in the national registry of the Registered Rural Establishment (ERC, in the Portuguese acronym) and, once all requirements are met, the Approved Rural Establishment (ERAS, in the Portuguese acronym) is issued.

According to Almeida et al (2019), other challenges² are related to the cost of deploying the system: the different property dimensions, the profile of non-adherent cattle ranchers to new technologies, a precarious information system given the poor support of infrastructure in rural areas and the difficulty in adapting beef value chain actors and agents to a traceability system that includes all segments.

- ▶ 2. The per animal traceability cost represents 0.53% of the animal's revenue value. In a herd of 50 animals, this value increases to approximately 1% and, for 5,000 animals, the traceability cost represented 0.40% of the individual animal's income. In view of this cost and the explicit difficulties for small and medium-sized livestock farmers, the government should demonstrate, through the Departments of Agriculture or Technical Assistance, to provide support to these producers and try to minimize these impacts on their incomes. One way of doing this could be to establish a subsidy, with the certifying officers, thus giving the producer a cost aid, or to make available professionals from the technical assistance or from the Agriculture Departments to carry out the visits, without burdening the producer (ALMEIDA et al., 2019).

THE HEALTH SURVEILLANCE SYSTEM

Both the federal and state health inspection systems, SIF and SIE, account for the large part of the animals slaughtered to serve the domestic and external markets. The SIF certifies with a stamp the product that complies with strict hygiene and health standards described in the Regulation of the Industrial and Sanitary Inspection of Products of Animal Origin (RIISPOA, in the Portuguese acronym). These procedures also fall within the international export criteria (AMIGOS DA TERRA, 2013). In this case, the traceability system is required for meat suppliers to be registered in SISBOV. In 2006, by Decree No. 5741, the Brazilian System of Animal Product Inspection (SISBI, in the Portuguese acronym) was established, and it is part of the Unified System of Attention and Agricultural Health (SUASA, in the Portuguese acronym).

The animal health surveillance system and the Animal Transit Guide (GTA, in the Portuguese acronym), a document accompanying the animal throughout its displacement, even on its way to the meatpacking company, are the controls that demonstrate the animal health and origin information.

GTAs are issued by state animal health control agencies, they are mandatory documents that prove good sanitary status for the batch being transported.

States and municipalities have structured their inspection services; however, in general terms, they are still far from providing the necessary inspection. Similarly, evidence was found that, in some states, these same establishments circumvent control measures imposed by the Federal Prosecution Service or the federal government, as is the TAC case, of the embargoed areas in relation to Amazon deforestation and to the list of companies charged with exploiting slave labor provided by the Ministry of Labor and Employment (AMIGOS DA TERRA, 2013).

TRACEABILITY AND MONITORING OF VOLUNTARY AGREEMENTS

The traceability and monitoring of voluntary agreements showed advances, as well as points of improvement and adequacy. During the 10-year existence, and according to the audits results, adjustments and renewals of the commitments between beef value chain agents involved in the agreements are required.



The agreements are related to the Legal Amazon, especially the states of Pará and Mato Grosso. Recently, a monitoring protocol was defined for livestock suppliers in the Amazon that is part of a complete MRV - Monitoring, Reporting and Verification - system. This protocol was agreed in 2020 with actors from the Federal Prosecution Office of the State of Pará and meatpacking companies operating in the Amazon region (MPF; IMAFLORA, 2020).

The Public Livestock Commitment, established since 2009, as reissued in 2020, defines 11 criteria for compliance with the Conduct Adjustment Terms established as a result of the Federal Prosecution Service's action since 2009. The protocol criteria are intended to identify irregularities in the supply chain of animals for slaughter. Several control models involving databases, analyzes of geographic and polygon positions, enabling or disabling criteria for certification, technical criteria and legal information crossing on areas and cattle displacement are considered. The following summarizes the main points of the 11 criteria set out in the public livestock commitment:

1. Illegal deforestation
2. Indigenous lands
3. Conservation Unit
4. Environmental embargo - vector IBAMA (Institute of Environment and Renewable Natural Resources)
5. Change within the limits of the CAR (Rural Environmental Registry) map
6. Environmental embargo (IBAMA and State Environmental Secretariat of the State of Pará [SEMA/PA])
7. Slave labor
8. Rural Environmental Registry - CAR
9. Rural Environmental Licensing - LAR, enforced in the State of Pará
10. Animal Transit Guide - GTA
11. Productivity

The public livestock commitment details the criteria for all situations related to the origin of the production areas through the use of information from databases, documents, cross-checking with lists, cross-sector data analysis and other forms of control.

This set of criteria strengthens the Rural Environmental Registry (CAR) as a control instrument through the direct relationship with the georeferencing of the supplying properties and with analysis of the overlapping areas and, in addition, seeks to require the appropriate environmental licenses.



Another relevant point is the role of health surveillance, through the technical responsibilities of the companies, along with federal surveillance system (SIF, from MAPA), in relation to GTA and animals unloading clearance in the packing plant.

The analysis of data verification by the Internal Revenue Service, namely Individual/Corporate Taxpayer ID (CNPJ/CPF, in the Portuguese acronym), in order to perform cross-checking of data, is fundamental to identify the irregularities in the cases related to the animals' area of origin. The integration of information between GTA and CAR can be a path for auditing and identifying irregularities without disclosing information and only directing to check-up.

Finally, the productivity criteria that include the producer's self-declaration on farm data are aimed at curbing the triangulation of animals from irregular areas.

The protocol also allows better identification of producers who are accomplices in the demands of illegal logging, land invaders and land grabbers. Considering the above, the public authorities will be able to better monitor the compliance of TACs between the agents in the chain. The use of information technology, such as satellite images and other instruments, is a fundamental support for the control and monitoring of suppliers for meatpacking companies, even to improve the tracking efficiency of indirect suppliers.

It is important to emphasize that not all public information necessary to fulfill the commitments is structured and made available by the governmental agencies that supervise it, in order to enable the implementation of systematic monitoring processes in companies, such as official lists of complaints about agrarian violence, information on land tenure regularization, among others (MPF; IMAFLORA, 2020).

3.4

TRACEABILITY AND MONITORING MODELS

There are models of traceability and monitoring systems both in the public and private sector, characterized as optional and voluntary agreements for producers, meatpacking companies and retail networks, as well as other beef value chain public or private agents in Brazil. Among the possibilities, we consider jurisdictional models to be an alternative to achieve traceability and monitoring of the meat chain. In this sense, the REDD+ jurisdictional models and sustainable meat supply are alternatives that must be analyzed, as demonstrated in the last item of this report.



In the public layer, in addition to SISBOV, the model of Law No 10,831³, of organic production and beef traceability, establishes the basis for standardization in the country of organic production. Industry establishments, meatpacking units and companies should be certified to work with organic raw materials (animals) and controls for traceability and monitoring of all stages of the process are required. The requirements include indicators of the animal origin and, at the production stage, individual identification of animals.

In the private layer, there are several projects supported by partnerships between government institutions or producer associations and non-governmental institutions. These partnerships are usually focused on models fostered in a jurisdiction where the entity involved provides technical and financial support for the implementation and monitoring of performance and the criteria are established between the parties, similar to voluntary agreements, i.e. creation of protocols and documentary controls to ensure traceability and monitoring of the areas of production and the animals. The following are some examples of such models that were established in the biomes of the Cerrado, Pantanal and Amazon.

Box 2 - Mato Grosso do Sul Association of Producers of Young Steers

Midwest Region - Mato Grosso do Sul Association of Producers of Young Steers (ASPMP, in the Portuguese acronym), State of Mato Grosso do Sul; Associates need to implement EMBRAPA's (Brazilian Agricultural Research Corporation) Good Agricultural Practices Program (BPA); Young Steer Protocol (PNP, in the Portuguese acronym) - criteria on breeds used, gender, weight, age, finish according to market requirements, nutritional, sanitary and reproductive patterns, meat pattern and cuts.

Source: Prepared by Agrosuisse.

- ▶ 3. With the publication of normative instructions regulating the production of plant and animal origin (IN46), the processing, storage and transport of food (IN18), mechanisms for controlling the guarantee of organic quality (IN 19) and the institutionalization of a single seal of the Brazilian System of Organic Conformity Assessment (IN 50), all criteria were established to guarantee the certification process and, consequently, the systems for traceability and monitoring of cattle.

Amazon Region - “Amazon Sustainable Cattle Ranching” (Pecsa, in the Portuguese acronym) in the state of Mato Grosso, an investment company in sustainable livestock systems through long-term partnerships with farmers involved in animal breeding, re-breeding and fattening systems; Priority rule that the chain is free from deforestation; project accesses GTA, which informs the displacement of animals, indicating the origin and destination and the name of their owners; identifies whether the property or the owner of animals is environmentally restricted; Control of indirect suppliers monitored by the Life Center Institute (ICV, in the Portuguese acronym) keeps post-2008 deforestation data up-to-date in the region where it operates, producing maps that match recent deforestation and property limits; Ecotrack tool of the *Terras* platform; All cattle commercialized by farms participating in the Pecsa are registered in the *Campo Novo* platform; independent audits carried out based on GTAs data from all farms.

Source: Agrosuisse elaboration based on Imazon and ICV (2017).

Amazon Region - “Sustainable meat - from the countryside to the table”, Sao Felix do Xingu, State of Pará. 46,000 hectares of land; slaughter of 500 heads per month, 70 tons of meat per month to supermarkets (BAGGIO, 2016); partnerships with Walmart and Marfrig to ensure both slaughter and distribution of meat; Development of methods for the traceability of animals, aiming at ensuring the meat partner companies and consumers that the product does not come from properties with deforestation; shared data from producers in the direct and indirect supply of animals (such as GTA); ear tags or chips in animals and data crossing with GTA and producers with CAR; measures to verify the origin of the animals before they arrive at the fattening farm, i.e. the direct supplier.

Source: Agrosuisse elaboration based on Imazon and ICV (2017).

Box 5 - Brazilian Association of Organic Producers

Midwest Region - Pantanal - Brazilian Association of Organic Producers (ABPO, in the Portuguese acronym), in the State of Mato Grosso do Sul; A protocol of social and environmental responsibility that guides the associated producers in improving the living and income conditions of the populations that depend on livestock activity, and also on the conservation and protection of the natural resources and biodiversity of the Pantanal; Protocol with organic quality standards established by Law No. 10,831/2003, for production, industry and consumption; requirement to carry out traceability through individual identification of animals, in addition, it seeks to adapt to the SISBOV standards.

Source: Prepared by Agrosuisse based on ABPO data (2020).

Box 6 - PCI Regional Pact of the Juruena Valley

The Carrefour Group and the Sustainable Trade Initiative (IDH), a project for the sustainable production of calves in Mato Grosso; the aim is to promote production for more than 450 properties, around 156 thousand hectares, in the areas of the Juruena Valley and the Araguaia Valley; Support for small producers; 11 municipalities, which account for more than 40% of Mato Grosso's calf production; the PCI (Sustainable Production, Forest Conservation and Social Inclusion) Regional Pact of the Juruena Valley was formed, including new partners such as Marfrig and defining the protocol of traceability and monitoring.

Source: IDH-based Agrosuisse elaboration (2019, 2018a)

TECHNOLOGY AND TRACEABILITY SYSTEMS

Technology development is relevant because of the great impact it has had on the livestock sector and the whole beef value chain. The technology is inserted in the management of production systems in the farm gate, post-farm gate and in all stages until meat consumption.

There are companies accredited in the MAPA to serve SISBOV and companies providing services in voluntary agreements through territorial analysis. These companies and initiatives work straightly to meet the TAC requirements through monitoring systems.

Other initiatives seek ways to extend traceability and identify the origin of animals by indirect suppliers, given the division between breeding and re-breeding systems.

Box 7 – Technologies for traceability and monitoring

Safe Trace: Identify an item individually (e.g. a bull) or batch aggregate; all quality and handling data are linked to its identification; each new move, farms/companies are checked for social and environmental criteria; Good practices for animal welfare and production are required and verified in the selection of suppliers who adhere to the Safe Trace traceability seal; all information provided by producers is periodically audited.

AgriTrace: Technology launched by the National Confederation of Agriculture (CNA); animal traceability, a computerized system that brings together the traceability protocols.

Land/Ecotrack: Tool for farms participating in the company Pecsa - Sustainable Livestock in the Amazon, where the cattle commercialized is registered on the platform, which enables monitoring of the entire chain (direct and indirect).

Source: Prepared by Agrosuisse.

Agrotools: Geographical platform; a tool that allows large companies to understand everything that happens to suppliers and customers across a rural territory; identify the locations of rural properties that give rise to the products consumed and verify the type of social and environmental risk, such as deforestation, slave labor, indigenous lands, embargoed areas, conservation units, and many other criteria.

Niceplanet: Supports the selection of cattle-supplying farms that meet the TAC and other legal commitments. They issue reports and information for real-time audits and analyze the social and environmental criteria of purchases made by the industry.

Visipec: Traceability tool, works in conjunction with the existing monitoring systems used by Brazilian meatpacking companies; the objective is to improve visibility in the supply chain in the cattle sector and establish more effective deforestation monitoring; it integrates information from public databases and serves to complement existing systems to help reduce the risk of exposure to deforestation in indirect suppliers of meatpacking companies.

ProForest: Supply chain mapping, assisting purchasers of leather and meat products in engaging with their suppliers; providing technical support, helps companies develop and implement responsible purchasing policies and guidelines; seeking to integrate the monitoring system with traceability system.

Boi na Linha Project (Imaflora): A platform for transparency of the beef value chain that seeks to strengthen the social and environmental commitments of the beef production sector; It seeks cooperation with the meatpacking companies, prosecutors, NGOs and retailers in improving the technical criteria and instruments for monitoring and verifying commitments entered into.

MoniTAC: Terms of Conduct Adjustment monitoring; independent platform to monitor commitment of large-scale meatpacking companies by eliminating meat production practices that contribute to deforestation in the Amazon; tool that helps the consumer understand, monitor and pressure this market in favor of sustainability and environmental preservation; the initiative is a partnership of Imazon and the Eco Association, which began at the end of 2019, with the objective of following the commitments made by large Brazilian meatpacking companies to adopt practices that prevent deforestation in the Amazon.

Source: Prepared by Agrosuisse.

MONITORING INDIRECT SUPPLIERS

Monitoring indirect suppliers is a priority for traceability and monitoring systems initiatives. It is important to point out that, in some initiatives related to chain monitoring, there is a process of technological development that, besides identifying the origin of the animal that reaches the meatpacking companies, also seeks to reach the indirect suppliers of animals derived from other breeding/re-breeding farms.

In addition to the complete lack of information concerning breeding sites and owners the purchased animal has passed by, by limiting to monitoring its direct suppliers and using GTA only, which is sent to them as a guarantee of the last animals' origin, meatpacking companies are subject to purchases associated with practices such as animal triangulation and documents, also known as “animal washing”. Triangulation is a simple process by which farms that do not fit into the meatpacking companies' purchasing policies (the so-called “dirty properties”) market animals using the GTA of a “clean” rural property and thus their animals become acceptable to buyers (ARMELIN; BURNIER; GROSSI, 2020).

The Indirect Suppliers Working Group (GTFI, in the Portuguese acronym) is formed of several Brazilian and international actors from the beef value chain, led by the USA National Wildlife Federation (NWF) and Amigos da Terra- Brazilian Amazon (AdT) and has been working to offer advanced traceability and monitoring solutions to legitimize the inclusion of indirect suppliers in the formal chain of the livestock sector in Brazil.



ECONOMIC ANALYSIS OF THE TRACEABILITY SYSTEM

For economic analysis of the traceability system, the most common parameter used in the specialized literature is the cost of implementing, at the level of the rural producer, of the official traceability system of Brazil, namely SISBOV.

The impacts of the costs of setting up and maintaining a traceability system vary according to the type and profile of the producer, as well as according to the method of identification and the quantity of animals. The individual cost of animal identification with ear tag and button was lower than all methods of electronic identification (LOPES; SANTOS; AMADO, 2008; Chart 3).

Chart 3 - Summary of SISBOV's economic analyzes of traceability systems

Reference	Results	Conclusion
Mendes (2006)	<ul style="list-style-type: none"> • State of Santa Catarina - 23 animals • Cost that ranged between R\$ 19.20 and R\$ 24.76 per animal. In the second year, the cost ranged from R\$ 33.64 to R\$ 36.81 per animal. 	Indicates economic unviability
Lopes, Santos and Amado (2008)	<ul style="list-style-type: none"> • State of Minas Gerais - 67 animals monitored; • Cost between R\$ 6.39 and R\$ 6.43 per animal; • Additional revenue per tracked animal from R\$ 15.00 to R\$ 30.00, as most meatpacking companies pay R\$ 1.00 to R\$ 2.00 per arroba per tracked animal. 	Indicates economic viability
Ferrazza et al. (2013)	<ul style="list-style-type: none"> • 13 ERAS properties in SISBOV - economic survey of 3 certifiers and 1 meatpacking company; • The cost of R\$ 4.34, the difference in the value of the slaughtered cattle for the European Union was R\$ 10.73 an arroba. 	Indicates economic viability
Colussi (2013)	<ul style="list-style-type: none"> • State of Rio Grande do Sul • 4,500 heads tracked for six years, earning R\$ 100.00 per head; • Average herd (1,000 heads) costs R\$ 6.40 per animal; • Average herd (500 heads) costs R\$ 8.80 per animal. 	Economies of scale; unfeasible for small farms
Almeida et al. (2019)	<ul style="list-style-type: none"> • Cost represents 0.53 % of revenue; • For 50 heads, cost of 1% of revenue; • For 5,000 heads, it represents 0.4% of 1 animal's revenue. 	Economies of scale; unfeasible for small and viable for large farms

Fonte: Elaboração Agrosuisse.

“One of the advantages is tax, currently (ABPO case) the seller of an animal for slaughter, that is in the MAPA database, gains an average value of R\$ 100.00 per slaughtered cattle (if the value is R\$ 2,700, the tax credit is 3.7%, a significant gain for the



producer). When the animal's meat is exported, a record is made to the database and the producer gets the credit. In the case of ABPO, this tax benefit is based on the issues and requirements of maintaining the Pantanal biome, then the argument of crediting the farmers producing cattle of the Pantanal was created. ABPO is growing with this, since farmers want to profit and enter the market" (Interview, 2020).

In the case of cattle breeders that have achieved production capacity and technological level, the economic viability of the traceability system can be reached by the direct cost and revenue ratio when the meat destination is export.

SISBOV has a per animal average cost (including certification + ear tag) of R\$ 5.00 per head and receives a differential of up to R\$ 2.00 per arroba. For 20 arrobas, one has R\$ 40.00, a gain of R\$ 35.00, i.e. the producer will win for sure. These values are valid for the external market (Interview, 2020).

The highest quality, certified, markets are niche. Certification itself is a challenge. Few producers have a scale that supports certification cost. The solution is to offer incentives to provide information that allows for added value (Idem).

The lack of technical assistance to the producer, mentioned in the interviews as one of the main limitations for the improvement in livestock production systems, should be considered in the analyzes of the technical and economic viability of the traceability systems. Technical assistance and rural extension are key for the producers to be aware of the benefits they can obtain from the implementation of control systems in their herd. This principle fits into any typology and producer profile, whether small or large; the adoption of control systems in the livestock sector is still low in both profiles.



COMPARATIVE ANALYSIS OF TRACEABILITY AND MONITORING SYSTEMS

The analyzes of the beef value chain in Brazil for traceability and monitoring systems include an overview of countries with relevance in this chain and compares them with the official system in Brazil, SISBOV. In addition, an analysis of this is carried out, in the face of voluntary TAC agreements, and a risk and opportunity analysis is presented.

The set of results of the analyzes supported the formulation of recommendations and strategic guidelines for the development of a system of traceability and monitoring in Brazil (chapter 5).

4.1

COMPARATIVE ANALYSIS OF TRACEABILITY AND MONITORING SYSTEMS

First and foremost, the comparative analysis of the characteristics of traceability systems among countries seeks to compare the situation in Brazil to that of Argentina, Australia, Canada, China, the United States, France, New Zealand, the European Union (EU) and Uruguay. For this analysis, the systems surveyed were compared with the official system (SISBOV) in Brazil. We therefore seek to obtain an official X-ray. The characteristics defining the profile and stage of traceability systems in each country and in the EU are considered.

China has not been considered in the comparative analysis for the purpose of assessing traceability systems.

Then, a comparative analysis of the traceability system features in Brazil is performed between the official system, SISBOV, and the voluntary agreements (monitoring), thus allowing an evaluation between both scenarios.

In the table below, the characteristics used for analysis and a description of the criterion considered are presented:

Chart 4 - Characteristics and evaluation

Features	Assessment
Creation	System creation start year, development timeframe parameter
Source of animals	Obligation to record the location of the sourcing property of the tracked animal.
Individual identification for external market	Whether or not individual identification of animal is mandatory for the external market
Individual identification for internal market	Whether or not individual identification of animal is mandatory for the national market
Batch identification	Whether or not the identification by batch of animal is mandatory, if not voluntary
Handling and transport	Monitoring of displacement and transport of animals linked to the system of sanitary control
Computerization	The level of computerization of the traceability system, in whole or in part
Central database	Whether or not a public or private database exists with centralization of traceability system data
Identification model	Legal obligation of standard or permitted identification models; ear tag, chips, tattoos, intra-ruminal bolus, marking or Radio Frequency Identification Devices (RFID).
Management of the legal process	Public and/or private management model
Data access	Whether or not there is access to the data of the systems, whether public or private
Subsidies	Whether public or private subsidies exist for the cost of traceability, directly or indirectly
Industry obligation	Whether or not there is legal obligation of the traceability system
Market obligation	Whether or not there is legal obligation of the traceability system

Source: Prepared by Agrosuisse.

Chart 5 - Characteristics of the traceability systems model by country

Features	ARG	AUS	CAN	USA	FRA	NZE	URU	EU	BRAZIL
Creation	2003	1998	2001	2004	1997	2002	2002	2000	2002
Origin of animals	yes	yes	yes	yes/no	yes	yes	yes	yes	no
External individual identification	yes	yes	yes	yes	yes	yes	yes	yes	yes
Internal individual identification	yes	yes	yes	no	no	yes	yes	yes	no
Batch identification	no	yes	no	no	no	no	no	no	no
Handling and transport	yes	yes	yes	yes	yes	yes	yes	yes	yes
Computerization	partial	total	total	partial	total	total	total	total	partial
Centralized database	n.e.	yes	yes	no	n.e.	yes	yes	yes	no
Identification model	yes	yes	yes	yes	yes	yes	yes	yes	yes
Management of the legal process	public	public-private	public-private	public-private	public	public-private	public-private	public	public
Data access	yes	yes	yes	partial	yes	no	yes	yes	partial
Subsidies	no	yes	yes	no	yes	yes	yes	no	no
Industry obligation	no	yes	yes	no	yes	yes	yes	yes	no
Market obligation	no	yes	yes	no	yes	yes	yes	yes	no

Key: ARG - Argentina; AUS - Australia; can - Canada; USA - United States; FRA - France; NZE - New Zealand; URU - Uruguay; EU - European Union; n.e. - not entered

Source: Elaboration of Agrosuisse from Gregg et al. (2020)

Chart 6 - Summary of comparative Analysis between countries

Features	Analysis
Creation	Australia and France created their systems before the year 2000; process of creation by stages, permanent and medium/long term adaptations; similar to Brazil-SISBOV.
Origin of animals	All countries, except USA and Brazil, have legal requirements on the origin of animals; in Brazil, the sanitary legislation provides for the use of GTAs.
External individual identification	All countries have official legislation to meet the external market and their requirements are leveled; in Brazil, SISBOV meets this requirement.
Internal individual identification	USA, France and Brazil do not have any requirements; other countries include a requirement in their legislation.
Batch identification	Australia is the only country requiring batch identification, in addition to individual identification of the animal. In Brazil, this possibility is under discussion.
Handling and transport	All countries make legal requirements for the movement and transport of animals; in Brazil, this control is carried out through GTA.
Computerization	The computerization of the systems is common to almost all countries; in Australia and Canada, the management of the systems is private; in other cases, it is public; in Argentina, Brazil and USA, computerization is still partial.
Centralized database	Countries make legal requirements and have public databases; in Brazil, the only centralized database is SISBOV, for export purposes; there is no public database in the production and national market movement.
Identification model	All countries have identification models defined by legislation, including Brazil with SISBOV.
Management of the legal process	In Argentina, France, the European Union and Brazil, management is done by the public authorities; in the other countries, it is public-private.
Data access	In the USA and Brazil, access is restricted; other countries demand the opening of public data.
Subsidies	With the exception of Argentina, Brazil, EU and USA, in all other countries studied there are incentives from the government or private initiative.
Industry obligation	Argentina, USA and Brazil do not have mandatory legislation; other countries require full traceability until meat leaves the meatpacking company; in Brazil, voluntary agreements define the commitment.
Market obligation	Argentina, USA and Brazil do not have specific market legislation; in other countries there is a requirement for meat sales networks with traceability information, from origin to consumption.

Source: Prepared by Agrosuisse.

Chart 7 - Comparison of the characteristics of the traceability system In Brazil between official system and voluntary agreements (monitoring)

Features	SISBOV	Voluntary Agreements	Notes
Creation	2002	2009	Date of first agreement between MPF and private companies
Source of animals	No	Yes	Source of animals required for slaughter (CAR)
External individual identification	Yes	Yes	Required by external markets
Internal individual identification	No	No	Individual identification of animals required
Batch identification	No	No	Batch Identification required
Handling and transport	Yes	Yes	Displacement document required (GTA)
Computerization	Partial	Partial	100% computerized system required
Centralized database	Yes	No	Centralized database required
Identification model	Yes	No	Standard required
Management of the legal process	Public	Private	Management model - public or private
Data access	Partial	Partial	Access to public and private data
Subsidies	No	No	Subsidy programs and incentive programs
Industry Obligation	Yes	Yes	SISBOV and protocol legal criteria according to TAC
Market obligation	No	Yes	Direct requirements per legislation or agreement.

Source: Prepared by Agrosuisse.

Chart 8 - Summary of the analysis between the official system and voluntary agreements (monitoring)

Features	Summary of the analysis
Creation	SISBOV was created in 2002; until 2006 there were several adjustments and attempts to deploy throughout the national territory. Voluntary agreement signed in 2009, based on TACs between meatpacking companies and MPF.
Origin of animals	SISBOV has no requirement on the origin of animals for environmental purposes, but on the individual identification of animals. The voluntary Agreement requires environmental legality by crossing CAR and GTA.
External individual identification	SISBOV is a must for export; it is imposed on voluntary agreements, that is, those that produce for export are obliged to join SISBOV and can also join voluntary agreements.
Internal individual identification	The identification of animals for the internal market is not compulsory, nor is it compulsory in voluntary agreements.
Batch identification	Identification by animal batch is not required in either model.
Handling and transport	In both situations, handling and transport control is required by the GTA.
Computerization	Computerization in both cases was considered to be partial, that is, both in SISBOV and in voluntary agreements, it is clear that there are processes for the deployment of computerized controls, but not broadly.
Centralized database	The SISBOV system has the database centralized on MAPA; by the voluntary agreement, the database consists of GTA and CAR, with restricted access to public bodies and to companies providing services.
Identification model	SISBOV requires numbering in MAPA database, but the ear-plug model for individual identification can be defined by the supplier. Voluntary agreements do not require individual identification.
Management of the legal process	SISBOV management is performed by MAPA. The management of voluntary agreements is shared between the public authorities and the private actors party to the agreement.
Data access	In SISBOV, it is restricted to registered users and organs the processing for exports. Voluntary agreements, access to private data is exclusive to contractors and public data are controlled by the responsible bodies.
Subsidies	No credit programs and/or subsidies have been identified for any of the traceability cases.
Industry Obligation	Industry has obligations in the SISBOV system and voluntary agreements from the time of accession to TACs.
Market obligation	The market segment has no obligations in front of official traceability systems; through voluntary agreements, the retail sector has made a public commitment to eliminate deforestation in its supply chains.

Source: Prepared by Agrosuisse.

COMMENTS ON COMPARATIVE ANALYZES⁴

Comparative analysis among countries showed that there are similarities in the features of traceability systems. Most external market requirements are common to all countries, demanding equivalence in their traceability systems. What we observe is that countries with beef value chain tradition are able to meet the requirements of this market, including Brazil.

The differences are related to the characteristics of each country in terms of territorial size, producers' typologies, industrial park profile, government performance in health control management, environmental legislation, related requirements and other particularities. These differences are evident in certain stages of the development of traceability and monitoring systems.

One challenge is due to the capacity of individual identification for animals and control from source through meatpacking companies. Brazil is faced with numerous limitations to implement zotechnical controls and individual identification, ranging from the lack of technical capacity of the producers to the cost of implementing the systems, since there are no specific credit lines and subsidies targeting this.

The dynamics of the beef market are in full transformation worldwide, the growth of China consumption and imports may be a key factor towards developing the beef value chain in Brazil in the coming years. This movement has to do with increased exports and, possibly, the increase in meat production in Brazil, which can be a factor of improvement in efficiency (productivity by more sustainable production technologies) and/or a factor of pressure in the issue of increasing production areas (Risk of increased deforestation since the livestock frontier is the northern region, the Amazon region).

► 4. A more detailed analysis of the above charts can be found at Ramos et al. (2020)



By analyzing the traceability systems' models in Brazil, we have on one hand the official system that is aimed at the export market and, on the other hand, the voluntary agreements between public authorities and private companies that need to comply with TACs. In common, there is a lack of a single system of traceability to ensure that the whole beef value chain is put in place and that it will meet not only the requirements of the external market, but also those of the internal market, since most of the meat produced is consumed by the domestic market. The question is whether the country should opt for the lowest or the highest common denominator, or maintain a double system, which raises concerns.

The efforts of both public and private authorities are focused on promoting new initiatives, based on systems of tracking and monitoring technology, with integration between agents from multiple chain segments that can generate short-term results.

The initiatives raised during the present study can be represented by the recent positioning of meatpacking companies and the retail networks that are seeking new initiatives, projects and programs to suit all legal requirements and voluntary agreements.

RISK ANALYSIS AND OPPORTUNITIES

The risk and opportunity analysis provides a synthesis of the information gathered throughout the research, whether by interviews or in the vast bibliographies on the subject. The interviews gave rise to the SWOT analysis presented on the next page (see Chart), in accordance with the procedure set out in Figure 8. Later, the information collected in the interviews was compared with the bibliography consulted. The SWOT discussion on the next pages aims to show this debate.

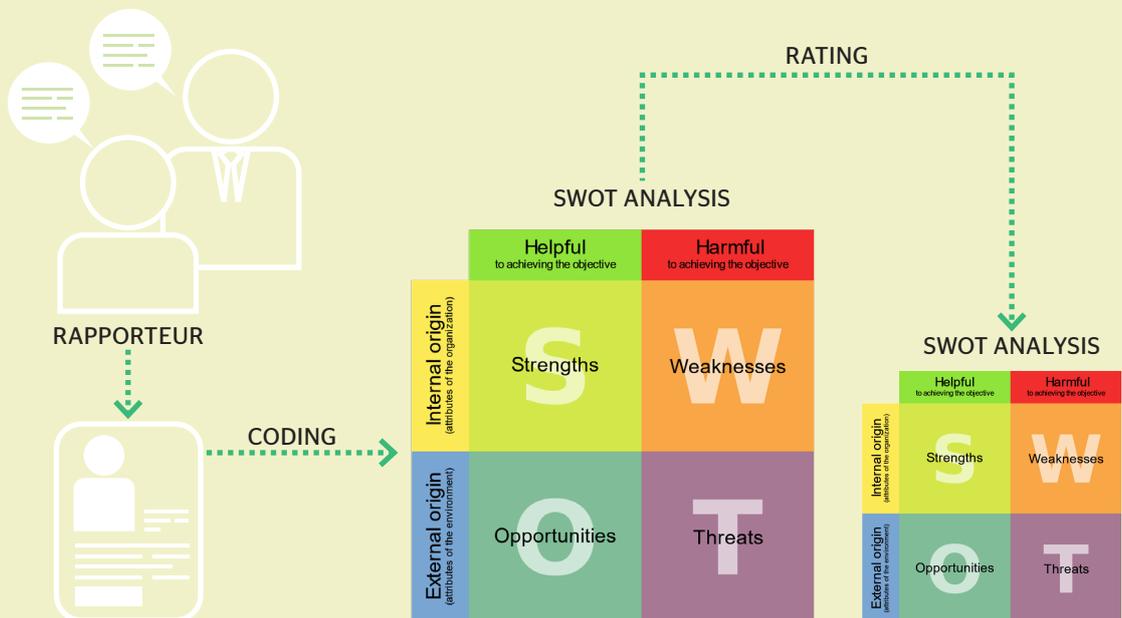


Figure 8 - Interviews Analysis process. Source: Prepared by Agrosuisse.

Two calls of invitations were made to 76 meat chain actors in Brazil to schedule interviews between June 21 and July 31. These calls resulted in 35 interviews. The number of interviews performed represents 46% of the total number of invitations sent. The respondents represent the majority of the links in the meat chain identified at the beginning of the work and have their relevance due to their involvement and their respective institutions in this theme in Brazil.

Chart 9 - SWOT Matrix



The first joint analysis of the interview reports aimed to determine the SWOT analysis object. For the interviewees, there are traceability models in Brazil that have two systems that work in parallel. SISBOV, the first system, was created to take account of the pressures of the external market, particularly the European Union. As will be discussed, its complexity has prevented it from becoming more widespread in the country, and the law provides for it to be compulsory only for those animals that are destined for export. More recently, from the voluntary agreements, a model has appeared based on the crossing of CAR data with the GTAs.

We then re-read the reports to identify the key ideas of each interview and codify them as Strengths, Weaknesses,



Opportunities and Threats. Next, the various key ideas were classified into themes, thus allowing, on the one hand, to unveil points of convergence between the interviewees and, on the other hand, to present a synthetic SWOT matrix, which allows in one eye to identify all the main results of the interviews.

Finally, the discussion of this synthetic SWOT allowed us to recover both the richness of the interviews and the information collected by the analysis of the secondary information that make up the chapters above.

5.1

FEATURES OF THE PROPOSED MODEL (STRENGTHS AND WEAKNESSES)

The internal context concerns the positive and negative aspects of each of the two systems that make up the Brazilian traceability and monitoring model. It is worth discussing each separately.

5.1.1

GTA + CAR: THE OBVIOUS SOLUTION AND ITS RISKS



The Voluntary Agreements sought to implement a chain environmental quality control system based on existing documents. The Rural Environmental Registry (CAR) is fully in line with the objectives of the Voluntary Agreements: to ensure producers comply with the Forest Code. Remote sensing allows to check whether a certain property is transgressing or not. In turn, GTAs allow tracking of the path the animals have made from the place of birth to the fattening farm. Thus, it is, in theory, a way to verify the CAR of each of the chain links and to exclude from the chain animal suppliers and illegal and/or irregular properties due to illegal deforestation.

Certainly, there are differences among respondents about the feasibility of these initiatives, especially about the reliability of these instruments. Most rural properties are not georeferenced, and only properties with more than four rural modules are required to do so by law. In addition, this registry is made by self-declaration. Without public authority validation, the CAR database is not completely reliable.

GTAs, in turn, are well deployed. According to one of the respondents, in a consultation conducted by the Brazilian Certification Service, in 10 million heads, only 3% were identified with GTA-related irregularities, which shows an excellent implementation that translates, in the first place, into the fact that



traceability can be implemented immediately. Secondly, that the system itself will not create a barrier to small producers entering the meat chain.

Others, however, highlight the existence of gaps in GTA issuance. For example, there are reports of cases of producers selling two or three animals for which they do not issue the GTA. On arrival of the cattle at destination, the GTA is issued on the basis of another producer's stock who makes the information available and who is in the local health surveillance agency database. Such exceptions can grow with the use of GTAs as a tool for monitoring deforestation. Some respondents pointed out that if they are used to exclude producers from the chain due to deforestation, there may be an increased number of GTAs fraud, thus endangering health traceability.

As noted in previous chapters, GTAs do not contain information open to public domain. Thus, access was, in emblematic cases, forbidden to those interested in using them to monitor the origin of the meat in the environmental aspect⁵.

Finally, the GTAs access model determines the depth of this traceability system, which can be strengthened by the integration of CAR code information, which is related to the ability to monitor indirect suppliers. The approach of the Indirect Suppliers Working Group (GTFI), which counts on the voluntary delivery of the GTAs of direct suppliers, relative to the animals bought by them, reaches only one depth level. However, according to GTFI (2019), most deforestation (89%) occurs in these two bands: 41% in the direct producers' band and 48% in the first level of indirect producers.

Alternatively, Rajão and others (2020) used the Pará Health Surveillance database to access the GTAs. With this centralized approach, they ensured the highest level of monitoring depth.

► 5. In August 2020, the entry into force of the Brazilian General Data Protection Law (LGPD) may influence the procedures of legal documents, under public control and may, therefore, impact public access for environmental monitoring purposes in favor of the beef value chain ordering, especially in the Amazon.

SISBOV: FULL, BUT NOT AN ENVIRONMENTAL TRACEABILITY SYSTEM

SISBOV is perceived by many of the interviewees as a well-structured system. Created in 2002 to meet the health demands of the European market, it ensures the individual traceability of animals. Its optional implementation, however, removes part of the effectiveness: many animals enter the system only 90 days before slaughter/boarding. While not ensuring the traceability of the animal since birth, it also does not allow the identification of animals bred at the expense of deforestation.

However, SISBOV is hard to implement. Besides having costs that, in part of the respondents' opinion, discourage participation in the system, SISBOV requires the use of a set of tools that many producers do not domain and demonstrate their need to acquire new practices and technologies throughout the chain also perceived in the interviews conducted.

It is true that the reality of livestock farming in Brazil is quite different. In questionnaires given to participants of courses promoted by the Nelore Breeders Association of Brazil, in several states, in 2012, it was shown that 68% of the respondents were already using spreadsheets. The sample does not represent the Brazilian reality - 57% of the participants had college degree. Despite, it shows there is a segment that must require the adoption of stricter animal follow-up systems (cf. PEREIRA; VIEIRA, 2014).

Thus, the brake on the SISBOV expansion is less given to its cost than the producer's capacity to invest in this technology, both due to lack of access to capital and lack of technical assistance. Fiscal support can also be used to unlock the deployment of SISBOV in the country.

It is worth recalling that SISBOV is not designed to ensure the legality of the areas of origin of the animals. And that, in order to do so, it would be necessary to register the animal immediately after birth or, at least, before it leaves the farm where it was born. That does not happen. According to the respondents, in some cases, the ear tag is placed 90 days before the animal destined for export is slaughtered or shipped. Therefore, in order for SISBOV to guarantee environmental traceability, it is first necessary that it extends to the whole chain in order to reach the animals immediately after birth. In addition, SISBOV data must be crossed with other instruments, such as CAR.

OTHER CHALLENGES OF THE TRACEABILITY AND MONITORING MODEL

Some interviewees were of the opinion that traceability can, instead of ensuring an end to deforestation, simply exclude large numbers of producers from the chain. Given the complexity, it is impossible to scale the effect of a boycott on cattle ranchers with environmental irregularities. For this reason, the implementation of a system of traceability and monitoring should be accompanied by mechanisms for land tenure regularization of rural producers and irregular areas.

For meatpacking and distribution companies, this scenario may pose a threat to the supply of raw materials, animals, in order to make their businesses viable. So much in recent news (cf. WENZEL, 2019), as noted in the interviews held, there are mobilizations that indicate actions and programs undertaken by the companies themselves, which can contribute to the planning of legalizing producers and allow their identification as well as of those who would be speculators or land grabbers, who are a minority. We will come back to that question further down the document.

OPPORTUNITIES AND THREATS

In the analysis of the context in which this traceability model is applied, three aspects stand out. The first is the cyclical dynamics of these projects, full of optimism and frustration. The second is that the emergence of integrated strategies to ensure the quality of meat that are not based solely on traceability and/or monitoring. Finally, the chain in general is seeking a quality meat production, despite the efforts made.

THE CYCLICAL DYNAMICS OF TRACEABILITY PROJECTS

For the respondents, the implementation of an environmental traceability model in the meat chain occurs due to buyers' pressure. In fact, the press has recently reported some meatpacking companies' interest in ensuring traceability of the entire supply chain (CAGLIARI; BRENT, 2020). However, they also report that the discourse is far from practice (CAMPOS et al., 2020). Environmental traceability is also the case. According to the literature, consumers' willingness to pay more for environmentally sustainable meat would stimulate the development of traceability systems capable of monitoring the environmental impacts of livestock production (BURNIER, 2018).

However, the Brazilian consumer, with little purchasing power, tends not to require meat of different quality or source. And, without taking financial advantage of traceability, only in exceptional cases has retail pointed out responsibilities to producers and meatpacking companies for the environmental impacts of the chain. Thus, the pressures for traceability and environmental monitoring of the chain are originally in the external market - the case of SISBOV - or in advocacy work of non-governmental organizations (NGOs) and in actions of the Federal Public Service - case of voluntary agreements.

Despite that, these initiatives are limited in the complexity of the chain, where some major actors coexist with numerous small actors in a country of continental size, where the beef value chain is spread throughout. This is why SISBOV is mandatory only for animals destined for export and is optional for the others. In any case, since there is no difference in the system in question, the adherence of few major actors is sufficient to raise expectations due to the concentration of the chain. For example, although not all companies have signed Terms of Conduct Adjustment (TAC) with the Federal Prosecution Service under voluntary agreements, the signatories represented 70% of the slaughter capacity in the Legal Amazon (BARRETO et al., 2017).

Finally, competition between those who voluntarily adopt the traceability system and those who do not leads to the loss of competitiveness of the former at a future moment. From the perspective of some meatpacking companies, refusing meat from a producer who deforests, in line with voluntary agreements, means only that that producer will look for a meatpacking company that did not sign a TAC, thus weakening the effects of

the agreements on deforestation.

Therefore, the chain again faces the disorganization in which it already was at the starting point, until further external pressures are felt. The return to the starting point is where the chain is today, considering the impact that the news about deforestation is having on the Brazilian and international media.

There is a common dynamic when it comes to meat quality control initiatives in Brazil, whether health- or environment-wise. They struggle to deal with the complexity of the chain, which is at the root of the lack of quality. This complexity is also why the agreements to ensure quality between the actors throughout the chain are voluntary. Consequently, only the major players adopt these measures and, in a short time, see themselves in unfair competition with the other actors. At the end of the day, even those who initially adhered to the measures eventually abandon or relax their application (see Figure 9).

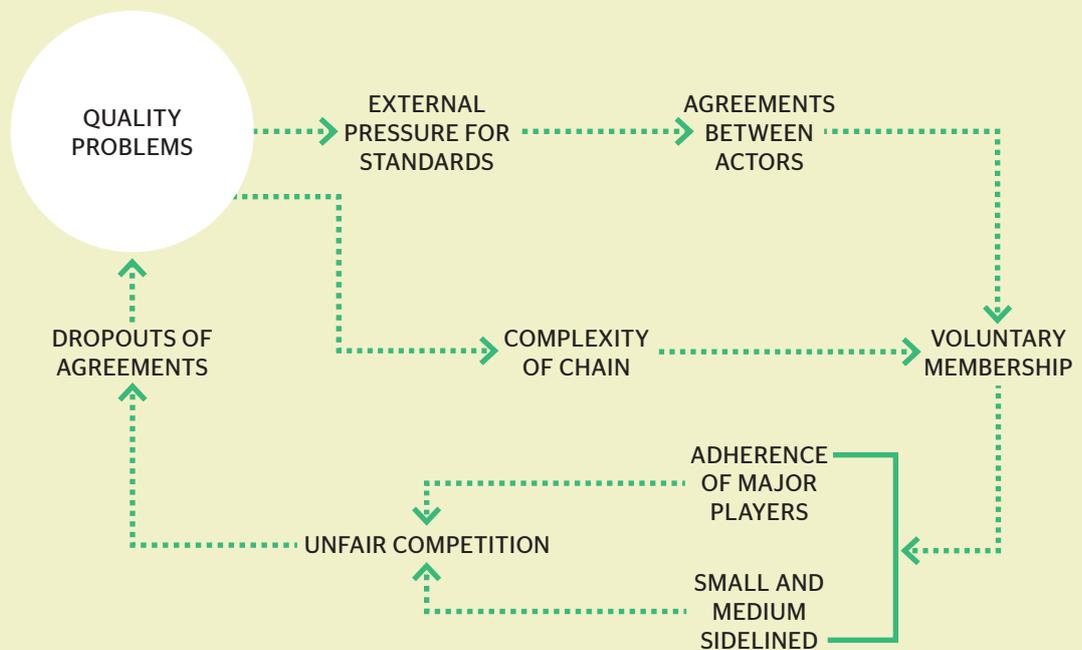


Figure 9 - The cycle of implementation and abandonment of quality control measures in the meat chain in Brazil. Source: Prepared by Agrosuisse.

Exceptions to this virtuous circle of standards creation and vicious of frustration and expectations are GTAs and SISBOV for export. This is because the adoption of such standards has been legally imposed on all actors in the chain. It implies that intervention points should also be through the improvement of monitoring and traceability instruments.

It is true that market pressures for traceability are ambiguous. They are incapable of making investments attractive in order to guarantee the environmental quality of meat unless they are internalized in the price of the product at the farm gate. On the other hand, it seems that these markets are pushing inexorably for the incorporation of technology into farms.

For example, Brazil's largest meat export market, China, demands younger animals, whose finishing requires more technology. In addition, a projection of the Meat Intelligence Center by Embrapa Beef (Brazilian Agricultural Research Corporation) published in the *Valor Econômico* newspaper (see WALENDORFF, 2020) indicates that 50% of the cattle ranchers could leave the activity in the next 20 years due to a lack of competitiveness. Respondents noted that small producers are abandoning livestock production in favor of more profitable crops such as cocoa, acai berry, etc.

Traceability is necessary as a good practice capable of enabling new technologies whose employment is demanded by the external market. Without control of the individual productivity of animals on which nutrition and genetic improvement practices are based, producers can be marginalized by the dynamics of competition.

On the other hand, some interviewees observe such a movement as a process of economic exclusion of the most vulnerable - and therefore negative. From the strict point of view of the implementation of traceability systems, the pressures for incorporating technology into production are an opportunity since they demand the traceability of animals within the property.

It is true, though, that the respondents also point out that the starting point is exceptionally low. The creation systems used in Brazil are very extensive and risk-averse - which is a cultural obstacle to the incorporation of technologies. To these observations, it should be added that statistical data indicate that, over the last 10 years, the intensification of livestock systems has been very restricted. As stated in the report of the State of the Art of the meat value chain, the confinement of the herd and the crop-livestock-forest, crop-livestock integration, pasture rotation systems, soil management and restoration of degraded areas are alternative forms of systems intensification. Despite its recent progress, only 2.5% of the effective bovine animal is confined and only 5% of the Brazilian pastures are integrated with trees (EMBRAPA, 2016; cf. ONDEI, 2019).





5.2.3

VERTICAL INTEGRATION PROJECTS

This is partly explained by access to differentiated credit among producers. There are several barriers to the implementation of existing credit programs. From the outset, land bonds are missing from those who enjoy it, preventing even a development bank from offering credit to such producers. Despite credit programs announced by public banks, this credit, according to respondents, does not reach the target audience of livestock (small and medium-sized producers), except for access to large livestock farmers.

There is also a lack of technical assistance and rural extension to help producers, especially small ones, adopt these technologies. The absence of technical assistance and rural extension was highlighted by several interviewees. Thus, the adoption of traceability systems appears as a cost to meet market demand, not as a herd management tool. Moreover, the lack of technical assistance limits the adoption of good practices of agricultural and environmental production.



One of the great reasons for producers to adopt traceability systems is that they guarantee access to niche markets willing to pay a premium on the value of meat. Organic production is an example, but there are also brand names in the sector such as Beef Passion. It is worth adding the “Low Carbon Meat” stamp proposed by Embrapa Beef (see ALMEIDA; ALVEZ, 2020), still under development. To access these markets it is necessary to ensure individual traceability.

These models, according to some respondents, reflect niche markets and are unable to meet demand on a scale. The processes of certification of these models represent higher costs and a management capacity that most of the cattle ranchers do not own, either because of lack of educational capacity or because of the cultural aspects of how they manage their production systems.

In the same sense, some meatpacking companies and retailers turn to the organization of vertical integration schemes that would be able to secure long-term contracts that can stimulate producers to adhere to traceability systems. For example, Marfrig, in partnership with IDH, is developing a vertical integration program with its producers based on three pillars: Intensification, technical assistance and traceability (MAFRIG; IDH, 2020).

This approach also aims to overcome the exclusionary character inherent in any traceability and monitoring system. So



far, approaches have been focused on mechanisms for identifying and excluding producers who practice deforestation or other illegality. However, the complexity of the chain allows them to always find buyers for their animals, frustrating the objectives of traceability systems. Moreover, this approach affects mainly those smaller producers, who have more difficulty in adapting to the legislation.

Green financing can help leverage these projects. Several initiatives have been mapped throughout this paper, aimed at projects related to carbon sequestration and intensification of grazing systems. Tax support can also contribute to this leverage. The state of Mato Grosso do Sul has a program that grants a tax credit of R\$ 100 to each animal slaughtered with SISBOV. In addition, mobilizing technical assistance in support of cattle ranchers will be indispensable if they are to meet the design standards of this nature.

To be sure, pilot projects are implemented in an overly complex context, characterized first of all by the disorganization of the chain associated with the presence of some large and many small actors. The situation becomes even more complex due to the growing number of livestock offices that, whether tied to meatpacking companies or not, make the chain even more complex. All of this occurs in an environment guided by mutual distrust between actors. In other words, the challenges posed to vertical integration projects in the chain are huge, but their need is also evident.

5.2.4

OTHER THREATS TO TRACEABILITY IN BRAZIL

For the respondents, the pressure for meat quality is much lower than the pressure for quantity. Thus, the mechanisms for controlling deforestation and even the sanitary meat conditions clash due to the need to satisfy the demand for market carcasses. Simultaneously, the bodies of the State without infrastructure and resources are either of little interest or are moving slowly to ensure voluntary traceability.

On the other hand, respondents also indicated that financial speculation is a more important driver than cattle raising for deforestation. Breeding is only one way to justify deforestation of the area and to guarantee possession for its use. In this sense, there is a risk of waiting for traceability systems to provide solutions to problems they are unable to solve.



Nevertheless, the problems of deforestation due to the meat chain can only be solved if traceability is linked to access to credit and technical assistance from producers. Despite the existence of several rural credit programs that were listed in previous chapters, the interviewees' perception is that this credit does not reach those who need it. The literature confirms this observation. According to the ABC Observatory (apud MAY et al., 2019), there is a general perception of the producers who have experience with the ABC Program, that this is a bureaucratic process, preventing the access of several cattle ranchers, even more in the Amazon biome where there are few credit agreements in the modality.

Access to credit in private banks is even more difficult. Livestock activity operates with narrow margins and is therefore considered a sector to which credit is risky. There are, of course, exceptions: Sicredi is a bank with a tradition of serving small and medium-sized producers, which has large banks as shareholders. But, as a general rule, the producer has funding to adapt through the Safra Plan, more precisely to the ABC Program, as mentioned earlier, and some of the Pronaf (National Program for Strengthening Family Farming) lines, also with extraordinarily little support from the family farmers.

Furthermore, the lack of technical assistance prevents producers from adopting traceability systems. It has already been said that individual traceability, rather than a tool to control the quality of meat for third parties (meatpacking company, consumer, state, etc.), should first and foremost be a tool to measure herd productivity for the producer. Thus, even if SISBOV is not adopted, it is interesting, from the zootechnical point of view, that the producer implements some individual internal traceability system. However, many producers lack knowledge and technical assistance to do so.

RECOMMENDATIONS

In line with the previous analysis, especially with the hypothesis raised in item 5.2.1 (see particularly Figure 9, p. 47), the recommendations are laid out here in two subsections. The first concerns recommendations for the organization of vertical chain integration initiatives, based on jurisdictional models. We propose that agreements be concluded between meatpacking companies and “premium” cattle ranchers, that is to say, those with the conditions for taking immediate account of the challenges of controlling the environmental quality of meat. These agreements should be concluded in the medium-term between a greater proportion of the chain actors within the territory where these initiatives are implemented, creating a regional standard of quality and environmental commitment.

The second section concerns recommendations aimed at incorporating the control of the environmental meat quality into legislation. In other words, they aim to make private agreements established in vertical integration initiatives as a contribution to adequacy and to impose new public standards by law. Certainly, it is not assumed that all agreements should be put into law or normative instruction, but it will be essential that minimum monitoring and traceability rules be imposed by the state. However, it is worth insisting that only in this way will it be possible to get out of the cycles of enthusiasm and frustration that have characterized the implementation of models of meat quality control in Brazil.

The rationale of the recommendations is presented in Figure 10.

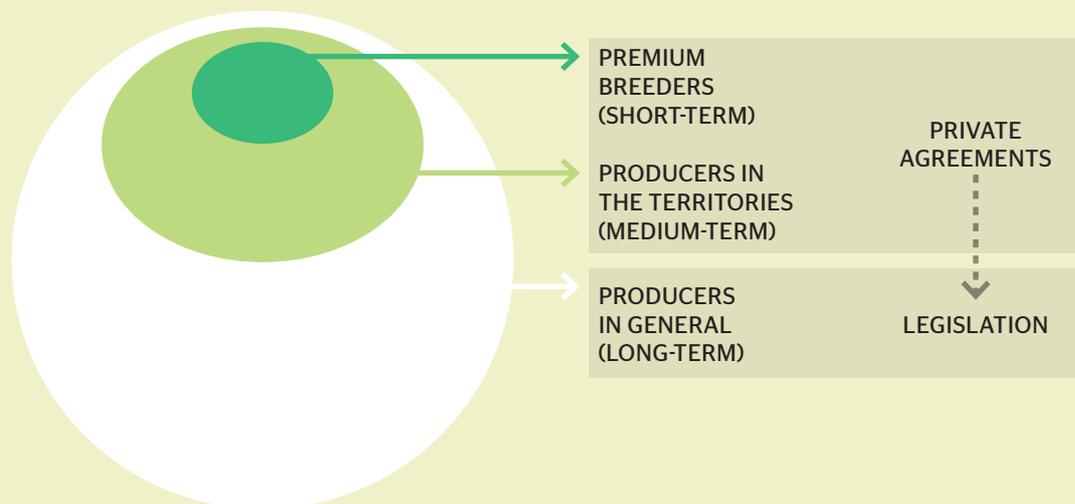


Figure 10 - Rationale of recommendations, by means of implementing circles and deadlines for the proposed measures. Source: Prepared by Agrosuisse.



The logic of the recommendations is presented by application circles and short, medium and long-term scenarios. According to the advances and improvements in the technological standard of producers, control systems and the results achieved, it will be possible to evaluate the effectiveness of traceability and monitoring systems throughout Brazil.

As is anticipated, the extension of the “premium” producer group rules for all producers in a territory requires negotiations similar to those that will be necessary and develop through state parameters to establish adequate legislation to meet the requirements of the traceability and monitoring system.

6.1

INTEGRATE THE CHAIN BASED ON JURISDICTIONAL MODELS

A new cycle of projects is based on the perceived experience of REDD+/LED initiatives. This approach is called jurisdictional models. They emerged as a critique of the first generation of REDD+ strategies, which aimed to create a regulatory framework at the national level, capable of encouraging sectoral activities aimed at promoting a low-carbon economy⁶. The lack of short- and medium-term results, common in initiatives that seek to impact from top to bottom through political and legislative decisions, eventually reduced the capacity to mobilize these projects.

Nevertheless, the jurisdictional models still look at legislative changes on a national scale. On the contrary, it is a matter of implementing them in advance on a sub-national scale and in a private/voluntary manner, and thus using their good results as an argument in favor of their constitution as a public policy, initially at the state or regional level.

There are already vertical chain organization experiences. One example is the work of The Nature Conservancy (TNC) in São Félix do Xingu, Pará. In partnership with Walmart, TNC created a sustainable supply program that altered the industry’s dynamics of extensive pasture use, degradation due to lack of investment and forest clearing to develop new grassland areas in favor of sustainable intensification of production with the introduction of good practices.

▶ 6. The ENREDD+ regulatory framework was created on the eve of the Conference of the Parties in Paris in 2015 by Decree No. 8,576 of November 26, 2015. In November 2019, the current government issued a decree creating CONAREDD+ (see BRASIL, 2019).



In the beginning, the project supported the conversion of 16 farms, with a supply capacity of 70 tons of meat per month. Then, it offered technical assistance to producers interested in adopting the sustainable livestock model in the Amazon. Tax incentives and access to credit were important to encourage producers to modernize their production systems and to regularize their land and environmental situation (BAGGIO, 2016; FISHBEIN; LEE, 2015).

In addition, the new phase of the project also aims to extend traceability. The producers involved began to monitor their suppliers of steers, using data from GTA and CAR, in addition to implementing, in certain cases, individual traceability systems in their herds (BARRETO et al., 2017).

Converting local experiences and private arrangements into laws, decrees and normative instructions capable of scaling incentives targeting the local level to the national level is strategic in the jurisdictional models. Fishbein and Lee (2015) note that the judiciary approach is recent and that these results in the legal/political sphere can only be achieved in the long term. At the same time, the authors insist on the importance of political will.

Having said that, our recommendations are as follows:

- 1. Meatpacking companies signatories to the agreements should form organizations and groupings of “premium” suppliers with medium-term contracts (1-2 years) combined with technological investment and environmental preservation counterparts with qualified technical assistance defined below and support in gaining access to credit.**
- 2. Producers should adopt Embrapa’s Beef Cattle Good Practices Manual (see VALLE, 2011).**

Meatpacking companies and suppliers’ groups should call interested public and private entities, including retail and consumer representatives, to set out Territorial Councils of Livestock and Forest (CTPF, in the Portuguese acronym) or, alternatively, to acknowledge similar councils such as state and municipal councils that operate in the territories and may have structures and organizations that allow them the ability to meet the proposed points.

Vertical integration should be led by consortia that include industry, production, third sector and retail markets. In territories where this does not occur, we recommend:



3. Civil society and other organizations⁷ should call interested organizations to set out Territorial Councils of Livestock and Forest (CTPFs), if they do not exist.



4. CTPFs should start a campaign (advocacy) in meatpacking companies, seeking support in the retail and producers, for their adherence to the process, including the creation of a “premium” supply group.



The formation of groups of premium suppliers (who have control over the origin of the animals, either by adopting the complete cycle or by registering the property of origin) is important, since they can test solutions that will later be extended to the whole chain. The expansion of such solutions will take place in two moments: in the medium-term, by voluntary adoption by the chain actors included in a given territory and, in the long-term, chain organization may improve and create subsidies for public policies or future legislation. For this reason, we consider the creation of these supplier groups to be strategic.



Similarly, it is essential to create CTPFs in cases where there are no equivalent entity. It is these councils that will reflect, discuss and propose the judiciary decisions that will ensure sustainable meat production. Our recommendations are as follows:



5. CTPFs or equivalent (similar) councils should put together strategic plans with a reference framework for a given period, no less than five years, according to the recommendations below.



6.1.1

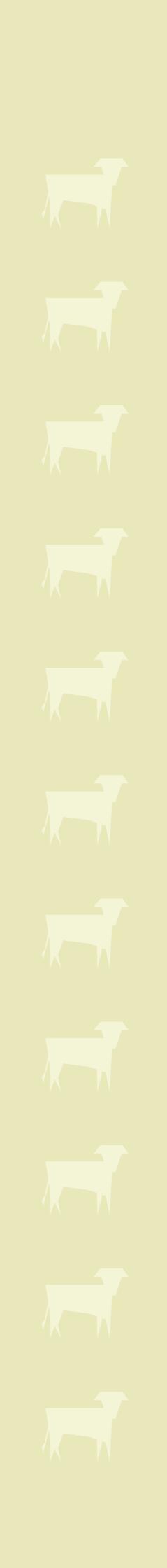
CONSOLIDATE MONITORING BASED ON GTAS, CAR AND ENVIRONMENTAL LICENSING



Strengthening environmental monitoring implies building a database that allows the purchaser of cattle to know the environmental quality of the meat bought. In the ideal situation, each livestock seller would be identified with a registration number, and based on the Monitoring Protocol for Cattle Suppliers, would receive a code, such as a color code (for example):



► 7. Any actor can lead to set out CTPFs, where they do not exist. There are projects similar to the one proposed that were born as a result of the private investor initiative. For example, in the meat chain in Brazil, the company PECSA is well known to operate, whose investments have helped to articulate the chain around sustainable production models.

- 
- a) Red: Unfit for supply, in accordance with the Protocol criteria.
 - b) Yellow: Fit. However, animals were bought from non-fit calf suppliers.
 - c) Green: Fit and without record of purchase of animals from unfit producers.

There are many ways this database can be developed, coming from the negotiation between actors in each territory. They can be private, managed by private companies or civil society organizations, or public (with the participation of civil society), managed by state bodies.

The integration of the CAR information registered in the GTA could accomplish the task of identifying the regularity or irregularity of the supplier quickly and safely.

Except for the Brazilian Health Regulatory Agency (ANVISA) database which, through state agencies, registers the issued GTAs, all the information necessary to these databases is already public and freely accessible. Therefore, we recommend:

- 6. State ANVISAs should intensify action to verify that the cattle ranchers are complying with the Supply Protocol established through the database used by the issuance of the GTA, thus becoming an effective control tool.**
- 7. CTPFs or similar organizations should advocate with state governments to include ANVISAs in this process.**
- 8. Producers should include GTAs in these databases, when these are not provided directly by state ANVISAs.**

Ideally, a single database could serve all territories, considering that, increasingly, the purchasing radius of calves by fattening farms increases. However, the adoption of a database by an existing territory must take into account the strategy of generating control of the information.

It is worth noting that the use of a common database for direct suppliers of meatpacking companies should be the main way to ensure the monitoring of their indirect suppliers (GTFI, 2019).

Therefore, we recommend:

9. CTPFs or similar should identify and make public bidding of service providers to set out and maintain these databases that should automate the crossing between GTAs and CAR, including the CAR code in GTA (mandatory).

10. Entities that manage the databases should adopt strategies to guarantee the confidentiality of the collected information (for example, with the adoption of blockchain technology), allowing its users only access to the suggested color code, informing CPF and CNPJ.

11. Meatpacking companies should assign databases which already have or are administered by third parties designated by the CTPFs or similar, as a means of allowing access to all purchasers of cattle.

The database may be divided between the public authorities, private initiative and the third sector, but the organization of the jurisdiction may shape itself in the best alternative, aiming to have information for the control of the process.

It should also be financed privately and paid by users, although the initial creation of financing of federal, state and municipal programs is permitted, allowing international cooperation. For this reason, we recommend:

12. Meatpacking companies should adopt this database as soon as available, and require their adoption by their premium suppliers as part of loyalty contracts.

13. Meatpacking companies should establish a mandatory adoption period for this database by all their suppliers.

14. Meatpacking companies and retail companies should establish a premium in price or privileged access to the market for meat from producers that ensure the environmental quality of meat through these databases.

15. State governments should require by law the adoption of these databases by all purchasers of livestock within a period agreed between the governance of the project or CTPF.



The Monitoring Protocol for Cattle Suppliers (MPF; IMAFLORA, 2020) provides for the automatic exclusion of cattle ranchers who do not meet the established criteria⁸. But, competition by suppliers between meatpacking companies forced them to relax the application of such measures. Therefore, we recommend:

16. CTPFs or similar should set out deadlines for the exclusion of unfit suppliers in their strategic plan, as well as criteria and means to allow the return and inclusion of these, in a manner articulated with the objectives of sustainable intensification of livestock.

6.1.2

SUSTAINABLE ENHANCEMENT OF LIVESTOCK PRODUCTION



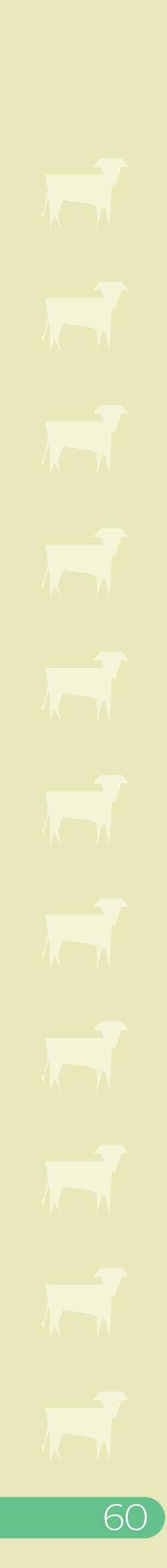
Monitoring unfit producers should not translate in their mere exclusion. It should be accompanied by a process of sustainable meat enhancement by the adoption of good farming practices and facilitation of access to credit by producers. The latter will not be possible without an intense process of land tenure regularization or, in the case of settlements, agreement by INCRA (INCRA (National Institute for Colonization and Agrarian Reform) or state land institution. Therefore, we recommend:

17. CTPFs or similar should call research centers, such as Embrapa or state research centers, ATER (Technical Assistance and Rural Extension) or state and municipal equivalent, state and municipal departments and universities to join the council.

18. CTPFs or similar, with the collaboration of the research centers and ATER, should build technological routes of livestock in their territory, which must be stated, with goals and deadlines, in their strategic plan, in alignment with the Beef Cattle Good Practices Manual (EMBRAPA GADO DE CORTE, 2016).

19. Producers should adopt technical equipment recommendations through the intensification of livestock production at the respective strategic level.

► 8. Imaflora created the Boi na Linha platform to ensure the transparency of the beef chain and strengthen the social and environmental commitments of the beef production sector. The project seeks cooperation with the meatpacking companies, prosecutors, NGOs and retailers in improving the technical criteria and instruments for monitoring and verifying commitments entered into.



20. Meatpacking companies should establish in contracts with their premium suppliers the obligation to adopt the technical equipment recommendations of livestock set out in the strategic plan.

One of the key aspects of production enhancement is the measurement and recording of zootechnical indexes that allow the evaluation of the management decisions adopted. Therefore, a minimum internal traceability system should be included in the long-term productive intensification plans. In the medium-term, private traceability systems should be adopted in territorial scope, as part of the meat health and environmental quality monitoring. Therefore, we recommend:

21. Producers should adopt individual identification systems, with ear tag and/or alternative technologies, of the animals and record of their zootechnical indicators, as well as sanitary treatments.

22. CTPFs or similar should create traceability systems common to all producers in a territory that may, within a period of five to 10 years, have control systems that allow the tracing of information from direct and indirect suppliers.

23. Database management companies should create databases prepared to track the environmental quality of meat for each animal.

24. Meatpacking companies should contractually establish the adoption of individual identification of animals with their premium suppliers and establish a deadline for adoption by all their suppliers.

Undoubtedly, these efforts will require investments from cattle ranchers who will first demand technical assistance. For this reason, we recommend:

25. CTPFs or similar, in partnership with research centers, should organize training courses for cattle ranchers in the territory, in line with the objectives of their strategic plan; Research centers, particularly Embrapa, should create contributive research programs for technical equipment of livestock aligned in the territories with the strategic plans.



26. Meatpacking companies should pay part of the meat price premium with environmental quality or, alternatively to the premium, offer private technical assistance services.

In addition to technical assistance, producers will also need access to credit. Therefore, we recommend:

27. Municipal and state public bodies should make efforts to land regularization while prioritizing producers included in vertical integration projects, as well as for farmers in rural settlements and other small farmers in the territory. These credit programs should be adequate and accessible, allowing subsidy for technological improvement.

28. Meatpacking companies should mediate the negotiation between livestock farmers and the financial sector, finding mechanisms to approve credit borrowers (for example, by giving contracts with meatpacking companies as collateral).

6.1.3

VALUE THE ENVIRONMENTAL QUALITY OF MEAT



Our research indicated the lack of interest of Brazilian consumers, who are 77% of the demand for beef, in rewarding the quality of the meat. This is certainly due to the low purchasing power of consumers. However, this observation does not allow us to forget both the existence of high-standard consumers in the country and in other countries of export destination. Therefore, we recommend:

29. Retailers should support territorial initiatives with the creation of quality meat brands, by rewarding the efforts to guarantee the environmental quality of meat and fulfilling the mission of direct communication to the consumer with a wide dissemination of the relationship of good practice with the value and environmental quality attributed to meat produced in this way.



30. In this premium context on the efforts to guarantee the quality of meat, there should be mechanisms to pass on the incremental valuation to producers that meet the criteria and requirements of the protocols in relation to quality assurance.

6.2

SPREAD THE BEST PRACTICES OF VERTICAL INTEGRATION INITIATIVES OVER THE ENTIRE CHAIN

Private voluntary agreements are almost always assumed by only a minority of actors. For this reason, the meat quality control models have fallen short of the objectives of their proponents. In order to emerge from these cycles of enthusiasm and frustration, it is necessary to shed minimum rules of production and quality control in legal obligations.

Therefore, we recommend:

31. Promotion of common efforts for the adequacy of the meat chain in relation to indirect supply, which may be through the extension of the Indirect Suppliers Working Group (GTFI) to deal with the issue of traceability in an integrated way to jurisdictional initiatives.

The GTFI is creating instruments that allow strengthening the mechanisms for monitoring the environmental quality of meat. However, the relevance of this contribution will be the greater the more aligned it is with the new control cycle the quality.

It is worth noting that the pressure of international investors for the federal government's action in this theme may generate opportunities for strengthening the advocacy by the Brazilian Coalition on Climate, Forests and Agriculture. In this sense, we recommend:

32. The Brazilian Coalition should promote a national meeting on territorial and jurisdictional sustainable meat production initiatives in 2021.

33. Create an advocacy plan with the Ministry of Agriculture, Livestock and Food Supply in line with the recommendations below.

ENSURE PUBLIC SUPPORT FOR THE CREATION OF INTEGRATED MEAT CHAINS

Beef value chain financing can be supported by both public and private capital. There are several state and private credit programs aimed at investing and defrayal in the meat chain and the low-carbon economy, including the ABC Program (MAPA, 2020). In this context, there are financing alternatives that come directly from the financial market through private and public funds which are increasingly suited to support agricultural and food chains with social and environmental responsibility. Considering its existence, we recommend:

34. BNDES and BASA (Banco da Amazônia S.A.), regional banks, as well as other public credit institutions, supported by MAPA, should adapt their programs, in the short term, to the needs of each territorial or judicial project, by creating territorial sub-programs.

35. BNDES and BASA, regional banks, as well as other public credit institutions, supported by MAPA, should adapt their programs, in the medium-term, to spread good farming practices, as tested in these initiatives.

36. MAPA should bridge territorial and/or jurisdictional initiatives and private credit entities.

37. Embrapa should foster collaborative research in the context of projects for vertical integration of the meat chain.

38. State and municipal departments and financial agents in the meat chain, in the territory or jurisdictions, should promote fiscal and tax incentive programs aimed at the environmental quality of meat.



SUPPORT TRACEABILITY AND MONITORING SYSTEMS

It is essential, however, to translate the territorial and national experiences into effective results in the functioning of the meat chain, under the law, and establish subsidies for the adequacy and improvement of legislation.

The recommendations below aim to create conditions, on the one hand, for the consolidation of meat quality control databases at the territorial level (medium-term) and their mandatory dissemination throughout the chain (long-term). For this, we recommend:

39. MAPA and state governments should directly steer state ANVISAs to participate in the CTPFs where they exist and ensure access through management institutions of meat quality monitoring databases to the relevant information, while safeguarding the protection of private data.

40. MAPA should maintain the SISBOV program and its database, facilitating the adherence of new producers involved in the territorial projects. MAPA should call the actors relevant to the discussion on the creation of a calendar to decide on whether or not it is mandatory, on the individual traceability of animals and on a single national database accessible to all.

41. Promote traceability systems in territorial projects aimed at guaranteeing meat quality through certification processes that adopt animal and livestock traceability criteria. Models enabling replication on a viable production scale for the beef value chain.

42. Considering the relationships and overlaps between the milk chain and the meat chain, the hypothesis that the individual identification of the calf should start when the breeding farm sells the animal to the re-breeding farm should be discussed. Thus, individual identification will occur when the first GTA of the animal is issued and, in this sense, a price difference for animals with individual identification may be considered.





STRATEGIC GUIDELINES

The strategic guidelines based on the suggested recommendations present an integrated set of articulations, actions and project development for the beef value chain in Brazil. For an understanding of the dynamics from the recommendations, we present a summarized perspective with visualization of the territorial level of action and the integration between actions in the beef value chain.

Thus, a multiple-territory matrix was built, in which each change is positioned according to these two criteria: Sector = logic/function (column) and territorial level (line). The multiple-territory matrix was created for the first time to elaborate the strategic planning of an association of municipalities in northern Nicaragua (cf. HURTADO, 2005). Later, this methodology was used by ActionAid International in the same direction as was used in the present study on the beef value chain in Brazil (SARMLEL; FERREIRA; HURTADO, 2009). The matrix aims to indicate the responsibilities, the movement of the actors and agents of the chain at the different territorial levels and sectors⁹.

Considering the construction of the recommendations and the complexity of the beef value chain, the proposal on the use of this methodology aims to allow a review of all the recommendations and their targets and deadlines.

In red, the premises of this strategy are presented. The first is the formation of a premium breeders' group, that is, preferably organized producers who enter into contracts for the supply of cattle with meatpacking companies for a minimum period of one year, in return, the guarantee of compliance with the commitments to control the environmental quality of meat and the sustainable intensification of its production system.

The second premise is the adoption of good farming practices, according to the manual published by Embrapa (cf. VALLE, 2011), to steer enhancement investments for sustainable livestock.

► 9. For more details on the multiple-territory matrix, see the appendix.

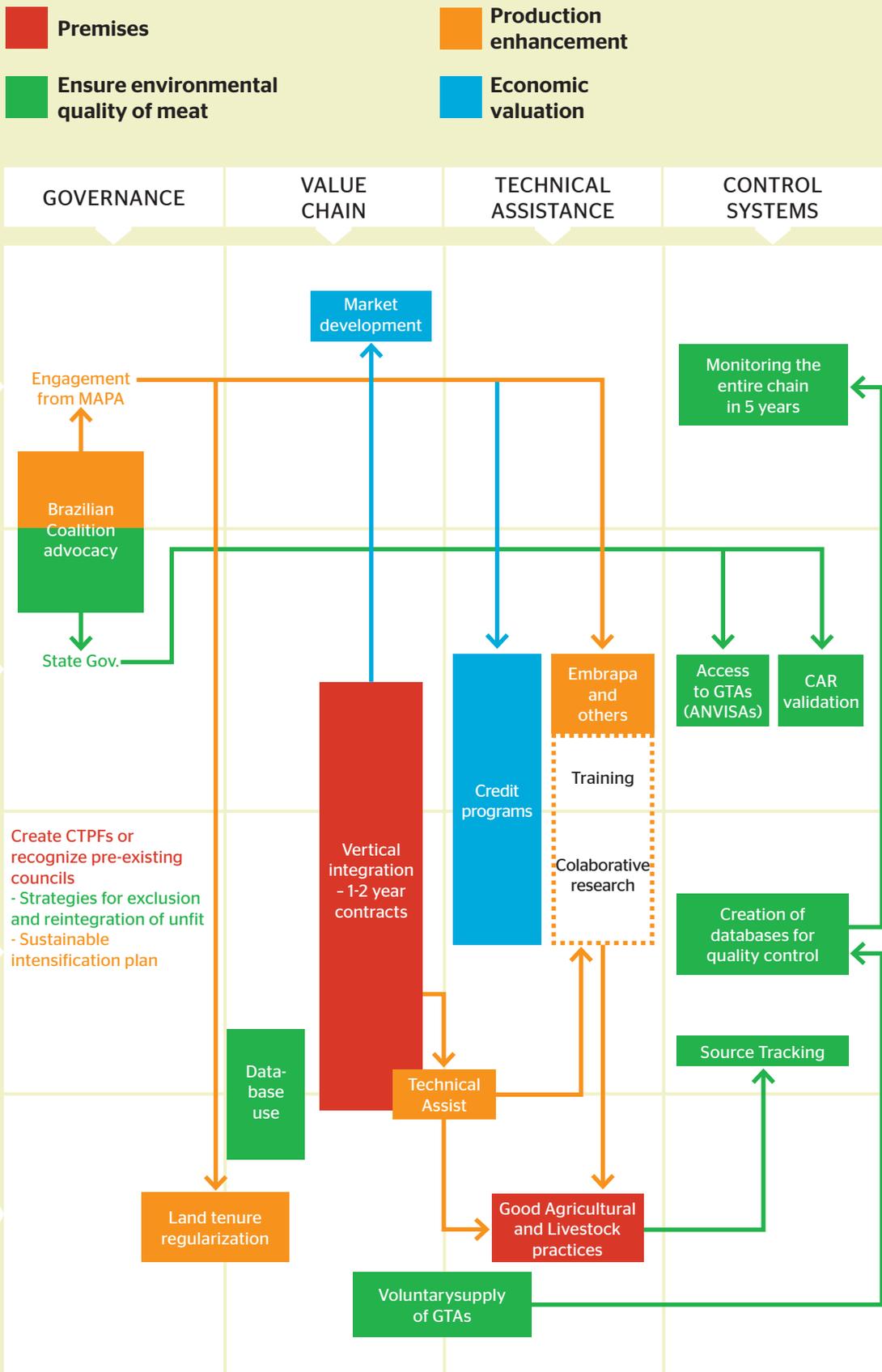


Figure 11 - Matrix of territoriality of the chain integration strategy based on jurisdictional models



The third premise is the constitution of governance, which may be by a Territorial Council of Livestock and Forest or the recognition of similar existing councils. The main task of these entities is to find mechanisms for extending, from the premium producer group to all producers in the territory, commitments to control meat quality and sustainable intensification of production.

A number of recommendations have been made around these foundations. The changes required to ensure the environmental quality of the meat are marked **in green** in Figure 11. Two of them should be highlighted: i) the consolidation of a database that crosses information from multiple public sources evaluating a particular livestock supplier and ii) the elaboration of a strategy of exclusion and inclusion of inappropriate suppliers.

The database should ensure the privacy of information by using blockchain technology. Only the information to suppliers should be consulted in relation to the criteria set out in the Monitoring Protocols for Cattle Suppliers.

Most of the data needed to structure these databases are of public access. Only GTAs data, as has been stated, are restricted to access. It is therefore necessary to articulate with state governments so that the meat quality control databases have direct access to the GTAs issued databases, managed by ANVISAs, as long as they ensure the confidentiality of the producer's data. In addition, it should also advocate the incorporation of the CAR code into GTA and its validation by the public authorities, followed by information cross-checking by blockchain systems.

The databases should serve all actors in the territory, especially livestock buyers in general, and not just meatpacking companies. Control of indirect suppliers will be much more effective if it is done by direct suppliers at the time of calf purchase. This requirement may be achieved by contracts between the meatpacking companies and their premium producers, then extended to all producers in the territory.

The second key element of meat quality control is the existence of a strategy for the exclusion and reintegration of unfit producers, or with the inclusion of unfit suppliers, according to the Monitoring Protocol criteria. Above, we have made a recommendation to make this territorial decision linked to the strategy for the sustainable intensification of livestock production.

In Orange, in Figure 11, is a summary of the third set of recommendations, aiming at the productive intensification of livestock systems. These strategies must be defined territorially, in dialog with the strategy of exclusion and reintegration of producers who are unfit.



In any case, there are required changes that are common to all territories. It is necessary to speed up land tenure programs so that cattle ranchers can obtain credit.

In addition, it will be essential to ensure technical assistance programs in line with territorial strategies. It should be offered by public research institutions and ATER. Simultaneously, contracts for vertical integration between breeders and meatpacking companies should provide for the operation of private technical assistance organizations (whether these companies provide services or civil society organizations).

Monitoring of the origin of animals through GTA/CAR control and animal screening brings together, in an initiative of vertical chain integration, the control of the environmental meat quality and the sustainable production enhancement. Individual internal traceability, with record of the main zootechnical indicators, makes many of the technologies associated with the adoption of good farming practices possible. Once traceability exists due to the producer's need, it should be used in the meat quality control databases, aiming at improving the system.

In blue, the economic valuation flows are marked. The first is credit, which is essential for the sustainable intensification of livestock farming. It will be necessary to align public credit mechanisms with territorial strategies and, where possible, use medium-term contracts between cattle ranchers and meatpacking companies as a credit guarantee.

In this respect, the territorial integration of the chain also creates the opportunity to develop products for high-value markets once the environmental quality of the meat is assured. The development of the internal market with an expansion of brands will be essential to reward the most successful territories for the price.

Figure 12 is a set of long-term changes that summarize the recommendations made above in order to spread the best practices expected to be built in vertical integration projects.

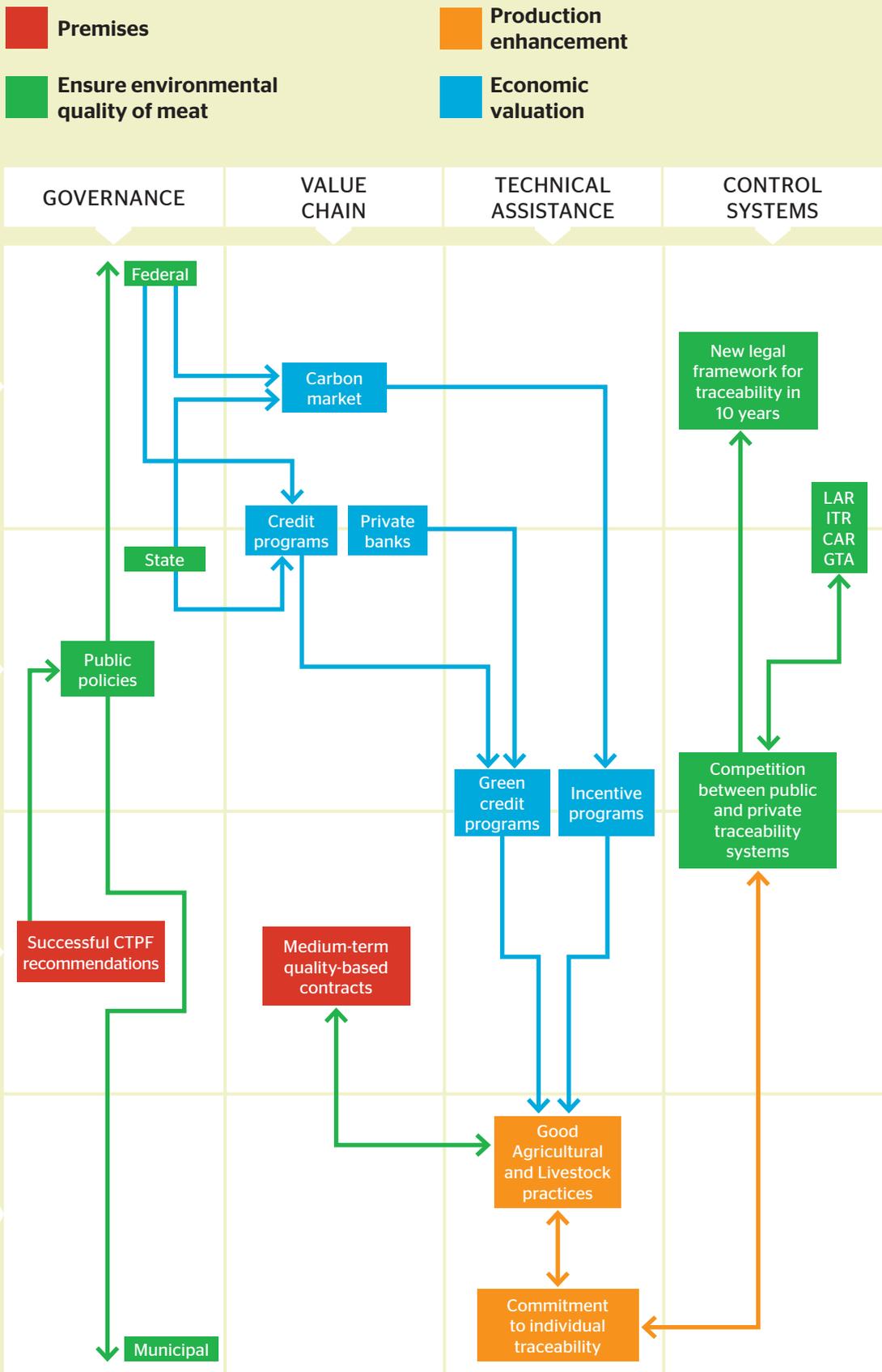


Figure 12 - Matrix of territoriality of the strategy of generalizing good practices throughout the chain.



It is important to ensure that public and private agreements translate into minimum rules, imposed by the results of these agreements, that is to say, by becoming legal mechanisms applied throughout the chain in the sense of environmental planning. Only this can ensure that vertical integration initiatives, as a way of ensuring the environmental quality of meat, do not complete yet another cycle of enthusiasm and frustration that has characterized meat quality control systems in Brazil.

It is the premise of this strategy (marked in red in Figure 12) that the private agreements reached in the CTPFs or equivalent bodies serve as a model for the elaboration of public policies at all levels: federal, state and municipal. This is, after all, the objective of the jurisdictional models of land management. In addition, medium-term contracts, with environmental and health quality contracts between cattle ranchers and meatpacking companies, must become the rule. Finally, the adoption of the manual of good farming practices will have to be generalized in cattle farms in Brazil.

In the long term, we hope that territorial projects will create a market for companies managing meat environmental quality control databases, and that this will boost this sector. This will change the dynamics of the health and environmental quality control of the meat (marked in green). From the multiplication of solutions offered by several companies we expect:

- Consolidation of traceability mechanisms and environmental monitoring of the beef chain;
- Simplification of individual traceability mechanisms;
- The response to the demands of environmental and health quality in an integrated manner;
- Marketing, together with meatpacking companies and cattle ranchers, for adherence to these systems;
- Integration of shares with the consumer market through the participation of the retail and consumer networks.

For this reason, a new regulatory framework for ensuring environmental quality is expected to emerge, in which public and private quality control systems coexist.

In order for the environmental meat quality control to be implemented successfully, the market must favor sustainable enhancement of production. In Figure 12, color Blue highlights the processes by which private actors and public bodies can boost the market. On the one hand, it is important to boost the credit system, whether public or private. Green bonds will be essential in



this process and mean an instrument to stimulate environmental conservation.

On one hand, these farms will have access to the carbon market as a counterpart to the sustainable intensification of production. Thus, these markets can leverage these investments that can go hand in hand with monitoring and traceability of the meat environmental chain.

Finally, the pressure of quality control systems, on the one hand, and market opportunities, on the other, should contribute to the productive intensification of the chain (**orange**, in the figure). This, in turn, is made possible by the adoption of internal traceability systems, condition of registration and use of zootechnical criteria in farm management. And, thus, adherence to health and individual traceability systems becomes easier, which will strengthen pre-existing monitoring systems, taking into account the growing market demand for vertical traceability systems, from animal to meat in the consumer market.



BIBLIOGRAPHY

ABIEC. **Beef report: perfil da pecuária no Brasil 2020**. 2019. Available at: <http://abiec.com.br/publicacoes/beef-report-2020/>. Access on: June 25 2020.

ABPO. **ABPO: Pantanal sustentável**. 2020 Available at: <http://abpopantanalorganico.com.br/>. Access on: June 15 2020.

ALENCAR, A.; MOUTINHO, P.; ARRUDA, V.; BALZANI, C.; RIBEIRO, J. **Amazônia em chamas: onde está o fogo**. 2019. Available at: <https://ipam.org.br/bibliotecas/nota-tecnica-amazonia-em-chamas/>. Access on: June 1 2020.

ALMEIDA, J. V.; FRANCISCHINI, R.; SILVA, F. F. da; BETT, V. Rastreabilidade na bovinocultura brasileira: condições e benefícios. **Pubvet: medicina veterinária e zootecnia**, v. 13, p. 1-14, Sep. 2019.

AMIGOS DA TERRA. **Radiografia da carne no Brasil**. [São Paulo]: Amigos da Terra, 2013.

ARMELIN, M. J. C.; BURNIER, P. C.; GROSSI, N. T. B. R. **TAC da carne no Pará e compromisso público da pecuária: a importância da rastreabilidade da carne na redução dos desmatamentos na Amazônia**. São Paulo: Amigos da Terra, 2020.

AZEVEDO, T. R.; ROSA, M. R.; SHIMBO, J. Z.; MARTIN, E. V.; OLIVEIRA, M. G. **Relatório anual do desmatamento 2020**. São Paulo: MapBiomas, 2020.

BAGGIO, G. **Commitments and Sourcing in Action**. Alberta: [s. n.], 2016. Available at: https://grsbeef.org/resources/Documents/GCSB%202016/Baggio,%20Giovana_revised.pdf. Access on: Aug 13. 2020.

BARRETO, P.; PEREIRA, R.; BRANDÃO JR., A.; BAIMA, S. **Os frigoríficos vão ajudar a zerar o desmatamento na Amazônia?** Belém/Cuiabá: Imazon/ Instituto Centro da Vida, 2017.

BNDES. Programa ABC. 2020. **BNDES - Banco Nacional do Desenvolvimento**. Available at: <https://www.bndes.gov.br/wps/portal/site/home/financiamento/produto/programa-abc>. Access on: June 15 2020.

BRASIL. Ministério da Agricultura, da Pecuária e do Abastecimento. **Plano setorial de mitigação e de adaptação às mudanças climáticas para a consolidação de uma economia de baixa emissão de carbono na agricultura: plano ABC (Agricultura de Baixa Emissão de Carbono)**. Brasília: MAPA, 2012.

BRASIL. Ministério do Meio Ambiente. **Decreto nº 10.144**, de 28 de novembro de 2019. Available at: https://www.planalto.gov.br/ccivil_03/_ato2019-2022/2019/decreto/d10144.htm. Access on: Aug 17. 2020.



BURNIER, P. C. **A influência da dimensão ambiental na atitude, na intenção de compra e no desejo de pagar pela carne bovina.** 2018. 178 p. Thesis - Escola Superior de Propaganda e Marketing, São Paulo, 2018.



CAGLIARI, A.; BRANT, D. Mafrig rastreará gado para se blindar de boicote do exterior. **Folha de São Paulo**, São Paulo, July 19, 2020.



CAMPOS, A.; LOCATELLI, P.; WASLEY, A.; HEAL, A.; PHILLIPS, D. JBS transporta gado de desmatador e contraria política de só ter fornecedor que preserva a Amazônia. **Reporter Brasil**, São Paulo, July 27, 2020. Available at: <https://reporterbrasil.org.br/2020/07/47389/?s=09>. Access on: June 28 2020.



CEPEA. PIB do agronegócio brasileiro de 1996 a 2019. June 28 2020. **Centro de Estudos Avançados em Economia Aplicada**. Available at: <https://www.cepea.esalq.usp.br/br/pib-do-agronegocio-brasileiro.aspx>.



COLUSSI, J.O brete do custo para rastrear o rebanho gaúcho. 2013. **Gaucha ZH: campo e lavoura**. Available at: <https://gauchazh.clicrbs.com.br/economia/campo-e-lavoura/noticia/2013/10/o-brete-do-custo-para-rastrear-o-rebanho-gaucha-4304194.html>. Access on: Aug 1. 2020.



EMBRAPA. **ILFP em números**. Sinop-MT: Embrapa Agrosilvopastoril, 2016.



FERRAZZA, R. de A.; SCHÜLLER, M. C.; LOPES, M. A.; LAGE, L. A. Rastreabilidade Bovina na Região Centro Sul do Estado do Mato Grosso: Aspectos Econômicos, Técnicos e Conceituais. **Boletim de indústria animal**, v. 70, n. 2, p. 110-118, 2013.



FISHBEIN, G.; LEE, D. **Early lessons from jurisdictional REDD+ and low emissions development programs**. Rep. Arlington: The Nature Conservancy / Forest Carbon Partnership Facility / World Bank Group, 2015.



GTFI, G. de T. dos F. I. **Boas práticas para monitorar fornecedores indiretos**. [s. d.].



GTFI. **Meeting VII - Report**. São Paulo: Grupo de Trabalho de Fornecedores Indiretos., 2019.



HURTADO, A. **Memoria del ‘Taller introductoria para el ordenamiento de las agendas de incidencia de los movimientos y representaciones sociales del departamento de Nueva Sergóvia’**. Nueva Sergóvia, 2005.



IDH. São Marcelo: o business case para uma abordagem sobre a região para a produção sustentável de carne bovina no Brasil. 2018. **IDH: The sustainable trade initiative**.

IDH. Carrefour, Marfrig e Casterleite aderem ao Pacto PCI do Vale do Juruena. 2019. IDH: **The sustainable trade initiative**. Available at: <https://www.idhsustainabletrade.com/news/carrefour-marfrig-e-casterleite-aderem-ao-pacto-pci-do-vale-do-juruena/>. Access on: June 15 2020.



INPE. PRODES: desmatamento. 2020. **TerraBrasilis** Available at: <http://terrabrasilis.dpi.inpe.br/>. Access on: June 15 2020.



IPAM. **Fluxos financeiros para a pecuária na Amazônia Legal**. Brasília: IPAM, 2019.



LOPES, F.; SALLES, M. Desmatamento já é motivo para “bloqueios silenciosos”. **Valor econômico**, São Paulo, July 9, 2020. Available at: <https://valor.globo.com/agronegocios/noticia/2020/07/09/desmatamento-ja-e-motivo-para-bloqueios-silenciosos.ghtml>. Access on: Aug 12. 2020.



LOPES, M. A.; SANTOS, G.; AMADO, G. B. Viabilidade econômica da adoção e implantação da rastreabilidade em sistemas de produção de bovinos no estado de Minas Gerais. **Ciência e agrotecnologia**, v. 32, p. 288-294, 2008.



MAPA. Com mais recursos e melhores condições de financiamento, Plano Safra 2020/2021 tem R\$ 236,3 bilhões. **Ministério da Agricultura, Pecuária e Abastecimento**. 2020. Available at: <https://www.gov.br/agricultura/pt-br/assuntos/noticias/com-mais-recursos-e-melhores-condicoes-de-financiamento-plano-safra-2020-2021-tera-236-bilhoes>. Access on: Aug 17. 2020.



MAPBIOMAS. Coleção 4.1 da série anual de cobertura e uso do solo. June 25 2020. **MapBiomás Brasil**. Available at: <https://mapbiomas.org/estatisticas>.



MARFRIG; **IDH. 10 year program for sustainable origination**. 2020. Available at: <https://drive.google.com/file/d/1dmlxExGoBT61SOkSS-OV5LJsDIFu8vUN/view>. Access on: June 28 2020.



MATO GROSSO DO SUL. Secretaria do Estado de Fazenda e Secretaria de Estado do Meio Ambiente, Desenvolvimento Econômico, Produção e Agricultura Familiar. 2018. **Resolução Conjunta SEFAZ/SEMAGRO N° 74** de 22 de novembro de 2018. Available at: <https://www.legisweb.com.br/legislacao/?id=369608>. Access on: June 11 2020.



MAY, P. H.; BARBOSA, A. C. L. H.; RAMOS, F. S. V.; SPERANZA, J.; AZEREDO, E. B. F.; LANZA, T.; COSTA, F. Políticas de crédito podem incentivar boas práticas agroambientais na Amazônia Legal. **Agroanalysis (FGV)**, v. 39, p. 25-26, 2019.



MENDES, A. G. S. T.; SOUZA, L. C. de. **Destravando o potencial de investimentos verdes para a agricultura no Brasil**. [S. L.]: Climate Bonds Initiative, 2020.



MENDES, R. E. Impacto financeiro da rastreabilidade em sistemas de produção de bovinos no Estado de Santa Catarina. **Ciência Rural**, v. 36, n. 5, p. 1524-1528, 2006.



MPF, M. P. F.; IMAFLORA. **Protocolo de monitoramento de fornecedores de gado na Amazônia: diretrizes para a implementação dos Termos de Ajustamento de Conduta com o Ministério Público Federal para a Amazônia e do Compromisso Público da Pecuária**. Brasília: Ministério Público Federal, 2020.



ONDEI, V. Confinamento de bovinos pode ir a 6 milhões em 2020. 2019. **Portal DBO**. Available at: <https://www.portaldbo.com.br/confinadores-engordam-53-milhoes-de-bovinos-em-2019/>. Access on: June 29 2020.



PEREIRA, M. A.; VIEIRA, J. S. **Práticas e ferramentas gerenciais adotadas por pecuaristas de corte em Estados selecionados: reflexões para gestores de P&D e consultores rurais**. Goiânia: [s. n.], 2014. Available at: <https://ainfo.cnptia.embrapa.br/digital/bitstream/item/109784/1/3839.pdf>. Access on: June 15 2020.



PLANO INCENTIVA MERCADO DE TÍTULOS VERDES E FINANCIAMENTO POR AGRICULTURA SUSTENTÁVEL. 2020. **Sociedade Nacional de Agricultura**. Available at: <https://www.sna.agr.br/plano-incentiva-mercado-de-titulos-verdes-e-financiamento-da-agricultura-sustentavel/>. Access on: June 11 2020.



RAMOS, F. S. V.; MAY, P. H.; BARBOSA, A. C. L. H.; AZEREDO, E. B. F.; FERREIRA, J. **A rastreabilidade da cadeia da carne bovina no Brasil: desafios e oportunidade -- Produto 2: estado da arte da cadeia bovina no Brasil**. Rio de Janeiro: Agrosuisse, 2020. Consultancy Report.



RAJÃO, R.; SOARES FILHO, B.; NUNES, F.; MACHADO, L.; ASSIS, D.; OLIVEIRA, A.; PINTO, L.; RIBEIRO, V.; RAUSCH, L.; GIBBS, H.; FIGUEIRA, D. Rotten apples of Brazil agribusiness. **Nature**, v. 369, n. 6501, p. 246-248, Jul. 2020.



SARMENTO, F.; FERREIRA, J.; HURTADO, A. **Territorial diagnosis handbook**. Rio de Janeiro: ActionAid, 2009.

THE ECONOMIST. The roots of the problem: a study names firms that buy products from areas with deforestation. **The Economist**, June 11, 2020.



VALLE, E. R. Boas práticas agropecuárias: bovinos de corte (manual de orientações). Campo Grande: **Embrapa Gado de Corte**, 2011.



VASCONCELOS, A.; BERNASCONI, P.; GUIDOTTI, V.; SILGUEIRO, V.; VANDIONES, A.; CARVALHO, T.; BELLFIELD, H.; PINTO, L. F. G. **Desmatamento ilegal e exportações brasileiras de soja: o caso de Mato Grosso**. [s. d.].



WALENDORFF, R. Embrapa traça cenário de longo prazo positivo para a pecuária, mas prevê forte concentração na atividade. **Valor Econômico**, São Paulo, June 26, 2020. Available at: <https://valor.globo.com/agronegocios/noticia/2020/06/26/embrapa-traca-cenario-de-longo-prazo-positivo-para-pecuaria-mas-preve-forte-concentracao-na-atividade.ghtml>. Access on: June 27 2020.



WENZEL, F. Jogo de empurra mantém inércia do boi ilegal. 2019. **Eco**. Available at: <https://www.oeco.org.br/reportagens/jogo-de-empurra-mantem-inercia-do-boi-ilegal/>. Access on: Aug 1, 2020.





APPENDIX: NOTES ON THE MULTIPLE TERRITORY MATRIX

The territoriality matrix is a tool used to map change processes, with the purpose of facilitating dialog between actors in different sectors and different levels of territoriality. It is therefore a complex tool, as it tries to deal with dynamic realities from multiple points of view, in a graphical way. Therefore, it is necessary to know how to read the matrix of multiple territory.

A LITTLE BIT OF ITS STORY

The matrix of multiple territory was invented in the midst of the elaboration of the strategic plan of the Association of Municipalities of Nueva Segóvia, in northern Nicaragua (cf. Hurtado, 2005). Many of the expectations that the mayors involved raised about the Association could only be solved at the national level, especially by the government and the congress of the country. By highlighting what can and should be resolved at each level, the matrix allowed to define the scope of the Association's work in a much more realistic way: much of its work became an advocacy for the national government and congress.

ActionAid International used this methodology, between 2008 and 2011, to design the articulation between projects of two natures: technical assistance [capacity building] at the local and advocacy level at the national level (cf. Sarmento; Ferreira; Hurtado, 2009). With this approach, the concentration of actors is the driving force for development, regardless of whether it happens through partnership, service contract, advocacy (seminars and awareness campaigns of public but also private decision-makers) and conflict (strikes, protests, etc.). In addition, ActionAid has tuned the direction of the sectoral division of the matrix, as detailed below.

HOW TO READ THE ARRAY

A multiple territory matrix, given its objective, is necessarily complex. It should be read in three steps. First, it is necessary to understand its structure and its assumptions. The reality presented in the matrix must then be captured. Finally, there is room for a debate on the consequences of this result for the negotiation between actors.

1 - MATRIX STRUCTURE AND ASSUMPTIONS

The matrix divides reality into territorial levels, changeable according to context and sectors - four, in general. The mapped change processes imply multiple exchanges in reality, which are located at various territorial levels and sectors. In this paper, the shift processes analyzed are those that result from the strategies previously presented, that is, are proposed changes (the action plan). On the other hand, the territoriality matrix can also be used for diagnostics, that is, to map shifts in progress.

The definition of territorial levels is quite clear. One of the actions of the State is to split reality in territories by administrative levels, forcing the other actors to organize themselves similarly. Sometimes, other territorial levels are required, as a planning unit between two state levels, such as river basins or territorial business chains. In any case, they are easily captured by the matrix lines. The mapping of shift processes at territorial levels aims to locate the different decisions that must be made for such a change to take place, according to the appropriate territorial level, because changes made at a below needed level are ineffective, and those taken above that level are inefficient.

Less evident is the division of the matrix into sectors, which is based on the sociological insight according to which, as society develops, it is segmented according to the logic of action. The need for meatpacking units to hire specialized companies to monitor suppliers, within the framework of voluntary agreements, shows that the effectiveness of an actor in modern society requires focus and competence in the sector. In a certain sense, each sector demands a specific type of skills which leads each actor - company, NGO, public agency, etc. - to specialize, to drop out their presence in other sectors without leaving partners there. The matrix distributes the responsibility so decisions are made by the most competent actors to do so.

Finally, the simultaneous visualization of all territorial levels and of all sectors allows for a complete view of the process. It aims to facilitate coordinated action among countless actors to achieve a certain change or, more accurately, to set in motion a certain process of change. And, in cases where some actors are not engaged in the process, it creates strategies so that actors engaged in the process mobilize non-engaged actors through partnerships, contracts, advocacy and even public protests, instead of taking on the responsibility of others. Trying to solve it, from a “site”¹⁰,

▶ 10. “Local” means each of the cells in the matrix, that is, the combination of a territorial level and a sector.



generates a lot of inefficiency and will never be fully effective, because it mobilizes actors to solve problems for which they do not have competence (inadequate sector) or means (inadequate territorial level) to solve.

2 - UNDERSTANDING THE PROCESSES THAT MAKE UP THE MATRIX

Matrix reading is process-based. Here, it is worth taking Figure 11 (see page 66) as an example. The text describes the matrix well. Nevertheless, the use of colors and the key already facilitate the analysis: each process has been given a color, and the individual reading of each one, that is, the cause and effect relationships between each of its components can be done separately. This is why there is a sort order of the different elements of the process, which corresponds to the order in which they are presented in the text. Likewise, the processes were exposed by a certain logical order, implicit in the key and explained in the text: first, the premises; then, the management of environmental quality; following, the enhancement of the production chain and, finally, the economic valuation.

There is also a certain interaction across processes in the matrix. As stated in the text, environmental meat quality management leads to the definition of a strategy for the exclusion and reintegration of unfit producers. This, in turn, must be linked to a plan for the sustainable intensification of animal breeding. Consequently, quality control and production intensification are related through the strategic plans of the CTPFs or equivalents.

Finally, it is necessary to understand the move of the processes mapped in the matrix, in a dynamic way, which requires: 1) to identify each process individually; 2) to understand the order of each of its components in cause-and-effect relationships; and 3) to understand the interrelationships between the various proposed change processes, almost always linked to their order of presentation.



3 - USING TERRITORIALITY MATRICES

The function of the territoriality matrix arises when its construction is understood. The actors involved in the process can visualize which components of their change they are tasked with accomplishing and which are others' responsibility. As for the first, it is worth remembering that, in each "site" of the matrix, there is no single actor, there are several actors who must negotiate to achieve a certain result. As for the second, it reminds the actors that the performance, more often, involves, in some way, the mobilization of others. As has been stated, the creation of partnerships, the formalization of contracts and the advocacy are instruments used to bring about this mobilization.

Together, the matrix shows why actors from the same "site" should negotiate and facilitate partnership and advocacy initiatives with actors from other "sites," because the multiple territory matrix shows the change these initiatives intend to achieve.

CREDITS:

Production: The present paper has been prepared by the technical team of Agrosuisse Technical and Agricultural Services Ltd., which is available for any necessary explanations.

Agrosuisse's Executive Team:

Fábio Ramos - Director

Peter May

Antonio Claudio Horta Barbosa

Eduardo Azeredo

José Ferreira

Support: Good Energies Foundation

Proofreading and Translation: Carlos Abelheira

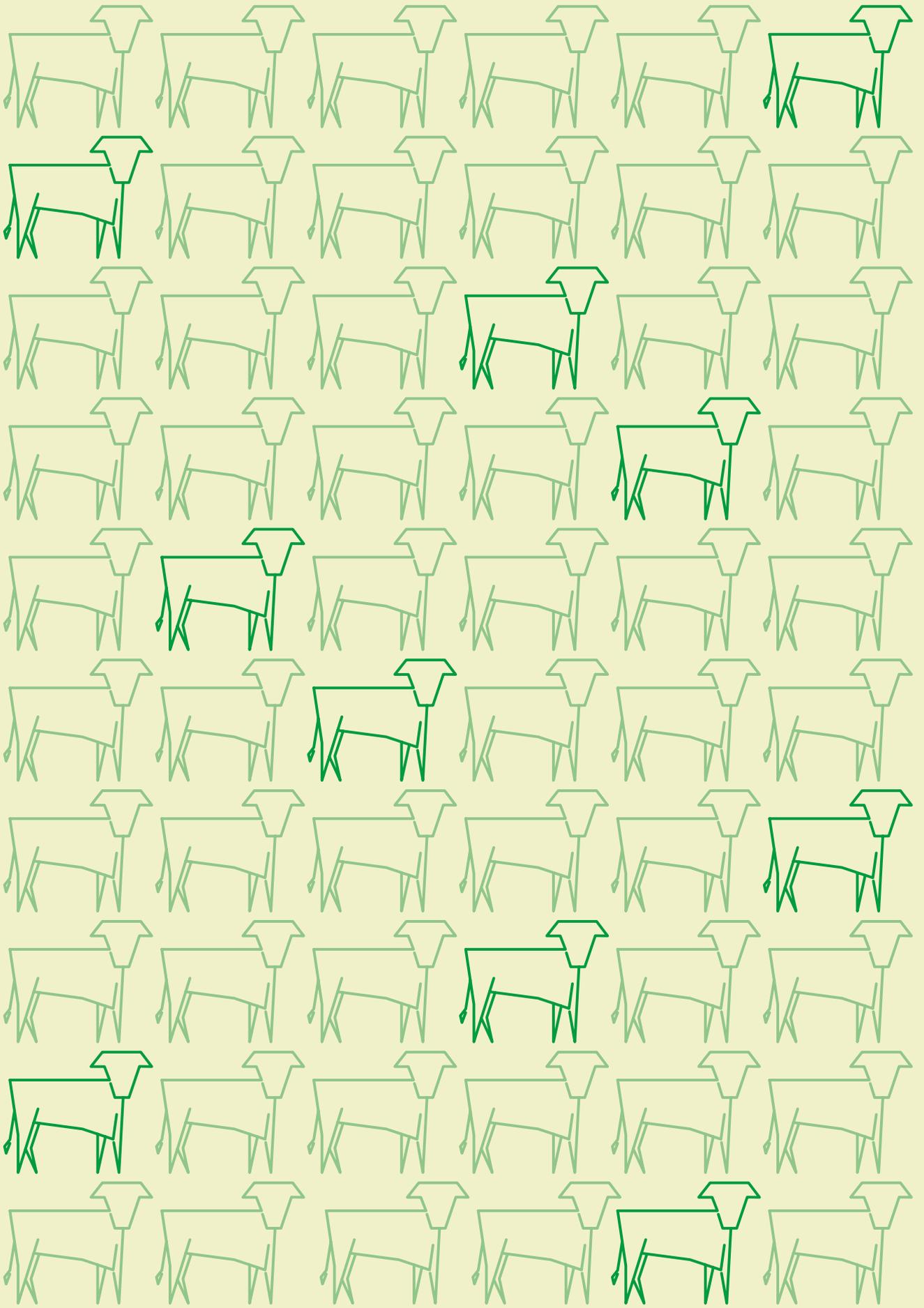
Design: The Infographic Company

The comission and coordination of the paper were carried out by the Brazilian Coalition's Beef Traceability Taskforce, in 2020, formed by representatives of the following organizations: Brazilian Beef Exporters Association (ABIEC), Brazilian Agribusiness Association (Abag), EQAO, Brazilian Roundtable on Sustainable Livestock (GTPS), Imaflora - Institute of Forestry and Agriculture Management and Certification, Arapyauá Institute, Amazon Environmental Research Institute (IPAM), JBS, Marfrig Global Foods, Partnerships for Forests - P4F, Solidaridad Network, The Nature Conservancy (TNC), Federal University of Minas Gerais (UFMG), Vicente and Maciel Law Firm: Environmental Consultancy and WWF Brazil.

Beef Traceability Taskforce was created as referral of the Possible Amazon initiative, of which the Brazilian Coalition is part of and was launched in 2019.

Published in September 2020







**BRAZILIAN
COALITION**
ON CLIMATE
FORESTS AND
AGRICULTURE
www.coalizaobr.com.br/en