imaflora®

FROM COMMITMENT TO ACTION:

the track of responsible beef in the Brazilian Amazon

FROM COMMITMENT TO ACTION:

the track of responsible beef in the Brazilian Amazon

STAFF

FROM COMMITMENT TO ACTION: the track of responsible beef in the Brazilian Amazon

IMAFLORA
Beef on Track Program

Authors:
Isabel Garcia-Drigo
Lisandro Inakake de Souza
Marina Piatto

Editor:
Maura Campanili

Reporter:
Flavia Yuri Oshima

Collaborator:
Gabriel de Oliveira Quintana

Revision:
Kátia Shimabukuro

Support:
Partnerships for Forests, British Government

Graphic Design:
W5 Publicidade

Cover photo:
Shutterstock

ISBN 978-65-86902-07-5

Keywords:
Beef chain, Brazilian cattle-ranching, Amazon, beef TAC, livestock commitments

Acknowledgements:
The authors would like to thank all those who offered their testimonies and data and reviewed this document. Starting with the partners of the Beef on Track Program, particularly the Government Prosecutors who are part of the Amazon Working Group of the 4th Environmental and Cultural Heritage Chamber of the Public Prosecutor's Office, the beef processing industry, retail organisations and civil society organisations. We would also like to extend a special thanks to Breno Felix, Daniel Azeredo, Erich Masson, Francisco Beduschi Neto, Jordan Timo, Marcio Astrini, Marcio Nappo, Maria Ester Tiziani Fava, Mauro Lúcio Costa, Suzy Yoshimura and Taciano Custódio for the interviews.

Developed by: BEEF ON TRACK | imaflora Partners: MPF Ministério Público Federal

This publication was supported by: Partnerships for Forests UK Government

SUMMARY

Shutterstock

INTRODUCTION

Possibly the greatest challenge of the 21st century is how we can mitigate and adapt to ongoing climate change. In Brazil, the economic importance of producing agricultural commodities (beef and soy) and the fact that the changes in the Amazon biome, especially for the creation of pastures or agricultural crops, account for a large part of the country's emissions, reforming the practices of the farming and livestock sector has become a crucial factor in the discussions.

The Beef on Track Program, created in 2019 by initiative of the Institute of Forestry and Agricultural Management and Certification (Imaflora) in partnership with the Public Prosecutor's Office, is a cooperation aimed at bolstering social and environmental commitments in the beef value chain in the Amazon and boosting its implementation by improving processes and tools (for monitoring, auditing, traceability and reporting) and expanding transparency for a deforestation-free beef chain.

For this endeavour, the Program relies on the contribution of different organisations and companies from the livestock and retail sectors, which have come together to develop tools and actions, as well as know-how and technical expertise, to create policies, procedures and other solutions for responsible cattle-ranching.

It is within this context that this publication is relevant. This collection of articles creates a time line of the commitments adopted by the cattle-ranching chain since the end of the 2010s showing what has advanced since then and the challenges overcome so that real results, i.e., the effective and permanent reduction of deforestation in the Amazon, can become a reality.

As such, chapter 1 - *Beef cattle-ranching and the beef industry in the Amazon* sets out, in addition to a brief history of the region's occupation, the characteristics and scale of cattle-ranching and the industry associated with it in Brazil and in the Amazon region, with emphasis on the complexity of the sector. One of the main issues taken into consideration is that the beef production chain has many links, which may involve many farms starting from where the calves are born until their sale to the beef processors, which makes it difficult to control the product's origin.

To avoid this risk, companies must make commitments to public entities and civil society and implement controls for the supply chain. Chapter 2, *Socio-environmental commitments*, addresses which controls are expected from the industry and brings a brief history of how the two main commitments of the beef chain in the Amazon - the Zero Deforestation Agreement with Greenpeace and the Term of Adjustment of Conduct with the Public Prosecutor's Office - were drawn up and executed, as well as the main characteristics of each one.

In chapter 3, *Advancements and limitations in the implementation of commitments*, this chapter is about the implementation of the actions that enable and make the commitments effective. In order to comply with the clauses of these agreements,

which require the monitoring of direct and indirect suppliers, the large beef processing groups and also the large retailers have established individual protocols for monitoring cattle suppliers. This was a breakthrough for the chain control agenda, but it still needs a few important advancements, both to align the monitoring rules and to unify the auditing criteria and procedures.

The fourth and final chapter, *The Future: Paving the way for a responsible and monitored chain* sheds light on the paths that need to be taken and offers a glimpse into the challenging but possible scenario for the future of beef cattle-ranching in the Amazon. The important steps that will be taken include new systems aimed at integrating and optimising existing control methods, such as the Rural Environmental Registry (CAR) and the Animal Transit Guide (GTA). The integration of the already existing data is the main building block for the indirect supplier traceability systems (currently the biggest challenge) and is capable of gaining scale and being implemented quickly.

ENJOY YOUR READING!

Shutterstock

CHAPTER 1.

BEEF CATTLE-RANCHING AND THE BEEF INDUSTRY IN THE AMAZON

Climate change poses huge challenges to contemporary society. However, there is no greater challenge than that faced by the business areas that have to change their production practices. In the case of Brazil, due to its economic importance, the environmental and social impact of the production of agricultural commodities (beef and soy) - and the possibility of accelerating the implementation of good farming practices by increasing the use technology in the field - are at the crux of the matter.

According to the latest data released by the System for Estimating Greenhouse Gas Emissions (SEEG), based on the 4th National Greenhouse Gas Inventory, the Land Use Change sector accounted for 44.5% of total national emissions, which amounts to 968 million tons of carbon dioxide equivalent (CO_2eq) emitted in 2019. Of this total, deforestation accounted for 80.4% of emissions, with a total of 778.12 million tons of CO_2eq (Albuquerque *et al.*, 2020).

In this context, beef cattle-ranching and the beef industry take on an important role both in the economy and in the climate issue. The national cattle herd stands at 215 million heads (20% of the global herd) and is distributed over approximately 160 million hectares of pastures (BRASIL, 2017). Beef production continues to grow and has reached over ten million tonnes of carcass weight equivalent in 2019. The domestic market consumed about eight million tonnes of carcass weight equivalent, while two and a half million of these tonnes were destined for the foreign market. Live cattle exports recorded a total of 483,000 heads shipped (Abiec, 2020).

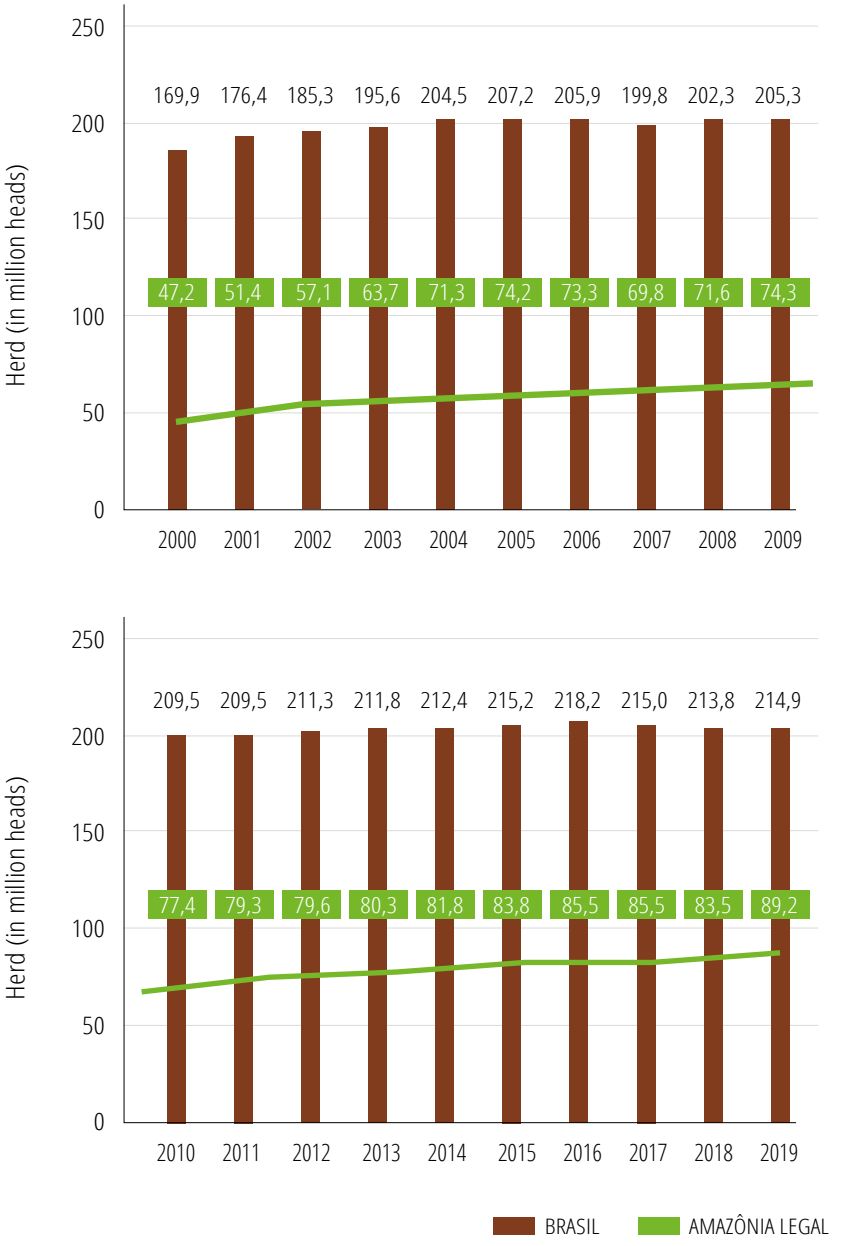


Figure 1 | Evolution of the national herd and in the Amazon biome.
Source: Brazil, 2021a.

In the Amazon biome, data shows 89 million head of cattle in the region in 2019. Between 2000 and 2005, the bovine herd in the Amazon region almost doubled, increasing from 42 million heads to 74 million heads and accounting for 36% of the national herd (Figure 1).

Land use for pasture creation prevails in 439,357 establishments (Brasil, 2021a; 2021b). The pasture area is largest in the state of Mato Grosso (20.9 million ha), followed by Minas Gerais (20.5 million ha) and Bahia (20.1 million ha)[1]. The pasture area has grown little in 20 years, but significantly in the Amazon as an instrument of land occupation and productive expansion (Figure 2).

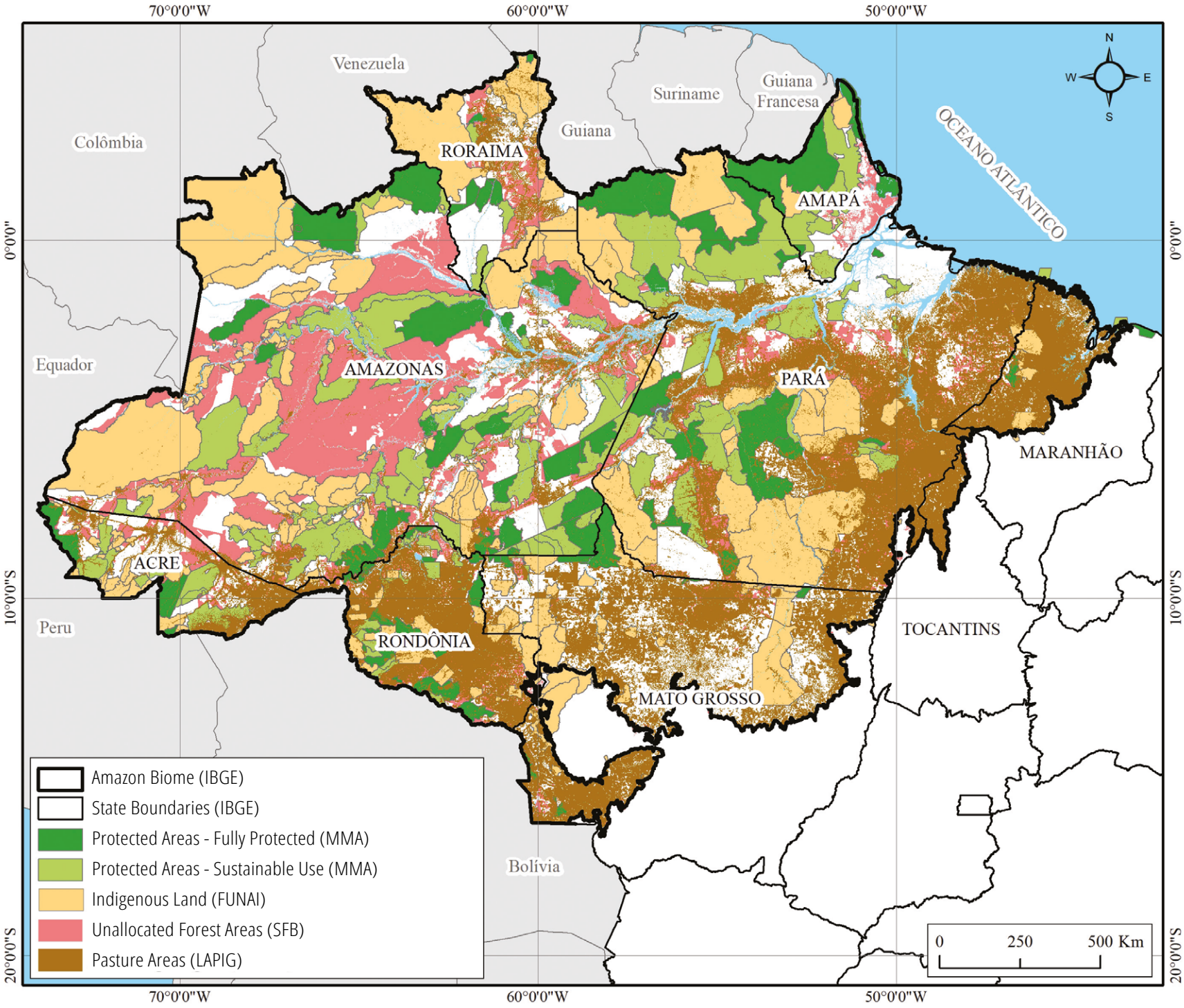
A very brief history of the occupation of the Amazon and the origin of the producers

Where are the people behind this gigantic production chain? To understand their origins, it is necessary to look back, albeit briefly, to the reasons for the occupation of the Amazon and the role of cattle-ranching. Although historical records show the presence of cattle and water buffalo in the Brazilian Amazon since the beginning of the 20th century, it was only at the end of the 1960s that cattle-raising was considered the primary activity by the Brazilian government for colonisation of the region: occupation by hoof of the ox, according to Santiagos (1972). The opening of roads cut through the forest and paved the way for colonisation. The Transamazon Highway (BR-230) was inaugurated in 1972 and the Belém-Brasilia Highway (BR-010) in 1974.

1. Digital Atlas of Brazilian Pastures. Available at: https://pastagem.org/map.

Brazilian Amazon

Pastures, protected areas and unallocated forest areas in the Brazilian Amazon.
Source: Data processed by Imaflora.



Alongside the large farms, which prioritised beef cattle-ranching, migrants from various parts of the country developed diversified production systems, in a dynamic process of building new frontiers. The origins of the cattle breeders who settled in the Amazon states is diverse. In Mato Grosso, the migration of gaúchos and people from the state of Paraná was significant. The cattle-breeders in the south and southeast of Pará were miners and natives from Goiás. Migrants from the northeast, many of whom were settled in colonisation projects by the Brazilian Colonisation and Land Reform Institute (INCRA) - the body responsible for coordinating the waves of migrants from the south, southeast and northeast of the country - also continue to raise cattle for beef and milk. "In the 1970s, people from Rio Grande do Sul, Paraná and Espírito Santo started coming to the Legal Amazon encouraged by the government. They only received deeds if they cleared 50% of the land", said Jordan Timo, a farmer who moved from Minas Gerais to the region two decades later.

The colonisation of the Transamazon, in particular, involved small farmers with the aim of resolving the issue of access to land. At the start of this colonisation, led by INCRA, subsistence farming was the norm. Two major cycles precede cattle-raising: the cocoa cycle (1973-1975) and the black pepper cycle (1985-1986). Both economic activities, however, sputtered out after a sharp price drop, new quality requirements, as well as phytosanitary diseases undermined production.

The low economic return from these activities led to a change in the land use pattern after the growth of cattle-ranching. The difficulty to transport and trade traditional agricultural products also explain the expansion of beef and dairy cattle breeding among small producers. The calf and the lean steer can walk at low costs. Fat cattle trading, however, is more expensive. Therefore, the regions closer to the slaughterhouses specialized in fattening and those in more remote regions in breeding (Veiga *et al.*, 2004).

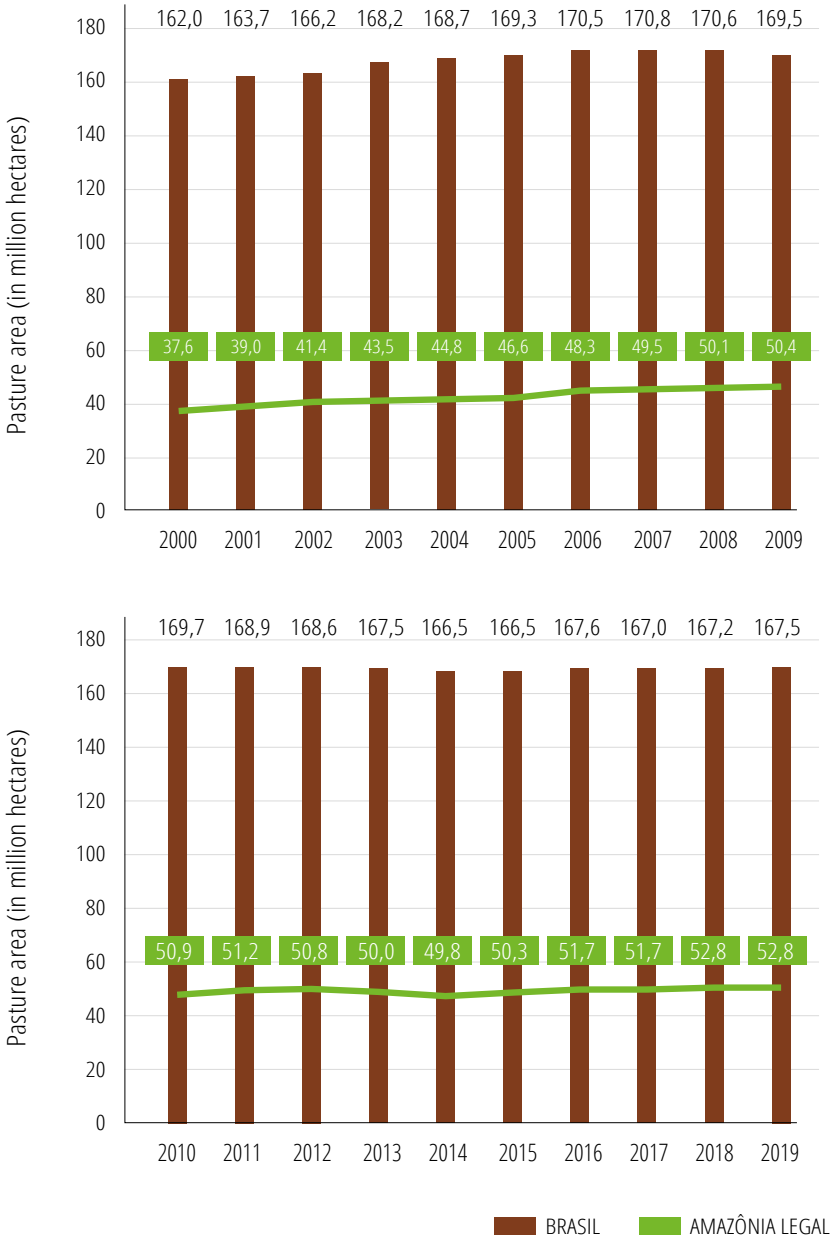


Figure 2 | Evolution of pasture area in Brazil and in the Amazon biome.
Source: MapBiomas, 2021.

A complex chain

The beef production chain has several links. It extends from the farms where the calves are born to those that are responsible for the final stage of fattening the cattle. These successive stages can involve many different properties. Soon after weaning, at seven or eight months of age and weighing around 150 kilos, the calf is transferred to a breeder, who will fatten it up until it reaches around 350 kilos. The rearing time may vary between 12 and 24 months, depending on the production system (pasture feeding, with or without feed supplementation, etc.). Fattening begins when the animal is 24 months old and may extend to 36 months. The steer is considered fat when it reaches 500 kilos live weight. The finishing of the cattle for slaughter, or the last phase of fattening, may take place on another property.

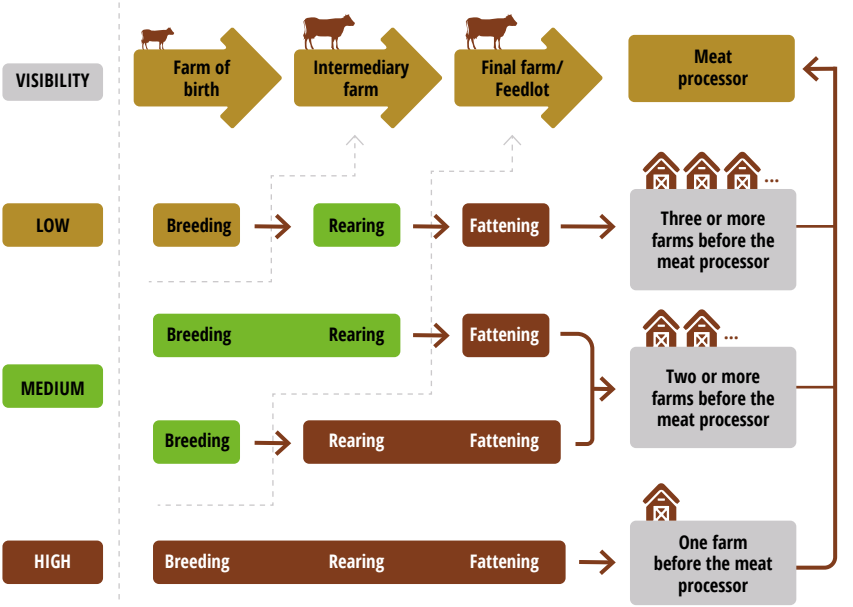


Figure 3 | Illustration of the complexity of the bovine chain.
Adapted from Proforest (2017).

When carried out in confinement structures, the steer comes in at 30 months of age and remains confined for up to 120 days until it reaches 500 kilos live weight. The mobility of cattle is regulated for sanitary reasons and requires the issue of an Animal Transport Guide (GTA), which certifies that the herd has been vaccinated.

Since the merger of the Bertin Group and JBS in 2009, the three top beef exporters in Brazil are JBS, Marfrig and Minerva. In the Brazilian Amazon, JBS is responsible for 21 industrial units. Minerva and Marfrig have, respectively, six and five installed industrial plants[2].

Despite the importance of these three major beef processors, several other companies take part in this sector and have a stake in the beef economy. Barreto et al. (2017), using data from the federal and state sanitary inspection systems, listed 157 slaughterhouses in the Amazon, but only 128 active units. The authors estimated that the 99 companies, owners of the 128 active plants, can directly or indirectly influence 390,000 farms, which total an approximate herd of 79 million head of cattle.

Besides JBS, which has 21 plants installed in the Amazon, other leading companies are at high risk of acquiring cattle from farms that deforest. Examples are the Redentor factory in the north of Mato Grosso state, and the Vale Grande and Mercúrio plants. To diminish this risk, companies must make commitments to public entities and civil society puts in place controls for the supply chain. What these commitments are and what controls are expected from the companies are discussed in Chapter 2.

2. https://www.boinalinha.org/transparencia.

Shutterstock

CHAPTER 2.

SOCIO-ENVIRONMENTAL COMMITMENTS

The first actions aimed at opening the way for the emergence of socio-environmental commitments in the beef chain were taken between 2005 and 2008. In 2005, the Brazilian Environment and Renewable Natural Resources Institute (Ibama) embargoed an area of 2,060 hectares located inside the Terra do Meio Ecological Station in the municipality of São Félix do Xingu. It was one of the cases of encroachment of public land for illegal cattle-ranching. The farmer who had appropriated the area was fined three million reais.

In December 2007, the Presidency of the Republic published Decree 6231 (Brasil, 2007), which regulated the embargo of illegally deforested areas and made the production chain jointly responsible. Beef processors that acquired products from these areas would be subject to criminal sanctions. On 16 June 2008, Ibama launched Operation Boi Pirata I (Pirate Ox I), which lasted until December 2008. Operation Boi Pirata I ended with 56,000 head of cattle removed from the Terra do Meio Ecological Station and other public areas that make up the mosaic of protected areas in the region.

Also in 2008, Resolution 3545 of the National Monetary Council was passed to restrict public banks from granting credit to landowners who failed to submit environmental licensing for their activities. Financial agents who did not comply with this law would be criminally sanctioned. According to Banco do Brasil and Banco da Amazônia analysts interviewed years later, loans for investments in cattle-ranching activities (building fences, buying cattle, etc.) practically ceased (Drigo, 2013).

The federal prosecutors for the state of Pará (MPF/PA) filed a Public Civil Inquiry[3] to locate and analyse documents such as the Animal Transport Documents (GTA), which details the origin of the cattle, land documents and environmental licensing processes. According to reports from prosecutors, more than 100,000 GTAs have been reviewed. The result was the finding of environmental liabilities on about 20 farms. This investigation became the basis for even more stringent actions taken by the Prosecution Office of Pará state in 2009.

On the civil society side, the Nossa São Paulo (Our São Paulo) Movement and the Sustainable Amazon Forum, which included organizations such as Imaflora, Instituto Socioambiental, Imazon, Greenpeace, Instituto Ethos, SOS Mata Atlântica, and others, held a seminar in 2008 which they named *Sustainable Connections - São Paulo-Amazon (Conexões Sustentáveis - São Paulo-Amazônia)*. The reasoning behind the initiative was the fact that the city of São Paulo is the main consumer market for Amazon-derived products (meat, tropical woods and soy). The goal of the event was to create pacts for soy, timber and meat, ensure adherence from the members of the chains and monitor the fulfilment of the commitments undertaken. The commitments, expressed in a few clauses, basically referred to the legality of the products. In other words, the signatories agreed not to acquire raw material from suppliers included in the slave labour list or from areas embargoed by Ibama.

The pressures produced by outside buyers and aimed at the beef chain in the Legal Amazon intensified in 2009. In April of that year, the survey dubbed *A Hora da Conta (Time for the Bill)* conducted by Amigos da Terra, mapped and updated the numbers of the beef industry in the states of the Legal Amazon, underpinning the socio-environmental problems in the cattle supply chain (Amigos da Terra, 2009).

The Public Civil Inquiry filed by the Prosecution Office of Pará state in 2008 began to produce practical effects at the beginning of June 2009. The prosecutors have filed 21 public civil suits against 34 defendants. The institutional innovation was that the public prosecutors also included the beef processors that had purchased cattle from these farms. They decided to use the concept of "shared responsibility" to hold the beef processors accountable (Steigleder, 2016).

3. Public Civil Inquiry 1.23.000.00573/2008-49.

The legal concept of shared responsibility has been present in the Brazilian Environmental Crimes Law since 1998[4]. In short, this concept includes the accountability of buyers for environmental damage caused by their suppliers in a chain. Therefore, if a cattle rancher commits an environmental crime (such as illegal deforestation), the company that buys the cattle from the rancher can also be prosecuted for the crime. The Public Prosecutor's Office also sent a letter of recommendation to 69 companies that purchase cattle from these farms and to large retail chains such as Carrefour, Pão de Açúcar and Wal-Mart.

That same year, Greenpeace published the report *Slaughtering the Amazon* or *A Farra do Boi*, which is the title chosen for the Brazilian version of the report (Greenpeace, 2009). The document was the result of three years of investigation by the organisation. The findings exposed the transgressions taking place in the cattle supply chain in the regions at the top of the deforestation list - Pará and Mato Grosso state. With basis on the analysis of satellite images, the review of official data and aerial incursions, the organisation reported the purchase of cattle raised in areas of deforestation that occurred in 2006, 2007 and 2008.

4. Law 9605/1998.

Zero deforestation agreement with Greenpeace

All this movement in the field of the judiciary and civil society gave the boost needed for the commitments to be signed by the Amazon-based beef processing industry. On October 5, 2009, beef processors Bertin, JBS, Marfrig and Minerva executed an agreement with Greenpeace and adhered to the *Minimum Criteria for industrial-scale cattle and beef product operations in the Amazon biome*. A space for dialogue had finally been opened.

Although difficult, the process was a learning experience for both sides. Environmentalists gained a better understanding of how the beef business works. Companies understood that the aim was not to bankrupt them but to structure them to meet society's new demands.

The companies were required to prove that none of their direct suppliers (the fattening farms) were involved in any deforestation after 5 October 2009. Therefore, the document signed with Greenpeace is a zero-deforestation agreement. Another criterion that must be met by the companies is to apply a "monitorable, verifiable and reportable" tracking system in all their suppliers. The deadlines for this implementation were six months for direct suppliers (fatteners) and two years for indirect suppliers (rearing and breeding farms) (Greenpeace, 2011). The commitment also included other criteria, such as the obligation to block suppliers who had their names on the slave labour list, not to buy cattle from supplier farms that overlapped protected areas and not to buy animals from areas embargoed by environmental agencies (Table 1).

Term of Adjustment of Conduct (TAC)

In 2009, the Prosecution Office for the state of Pará drew up the first public livestock farming agreement aimed only at beef processors in Pará, as a way to prevent public actions, by means of Terms of Adjustment of Conduct (TACs). The Legal Amazon Working Group was also created and is composed of federal prosecutors from all the states in the Amazon biome. Soon after, came the TAC for the State of Mato Grosso and, in 2013, the Amazon TAC. The content of the TACs is very similar (Table 1) and the difference is basically in the cut-off dates.

Commitments	Greenpeace minimum criteria	Pará TAC	Mato Grosso TAC	Amazon TAC
Cut-off date	05/10/2009	01/08/2008	22/07/2008	22/07/2008
Zero deforestation	✓	✗	✗	✗
Zero illegal deforestation	✗	✓	✓	✓
Overlap into indigenous land	✓	✓	✓	✓
Overlap into preserved areas	✓	✓	✓	✓
Federal environmental embargoes (Ibama)	✓	✓	✓	✓
State environmental embargoes (Sema[5])	✓	✓	✗	✗
Rural Environmental License	✓	✓	✓	✓
Animal Transport Guide from direct suppliers	✓	✓	✓	✓
Forecast of actions for indirect suppliers	✓	✓	✓	✓

✓ YES ✗ NO

Table 1 | Comparison of current commitments.

5. State Environmental Departments.

The first requirement is to eradicate illegal deforestation in direct suppliers. The new Brazilian Forest Code[6] in force since 2012, still allows deforestation in the Amazon biome up to the limit of 20% of the property area (Brasil, 2012). All deforestation beyond this limit is illegal unless it occurred before 22 July 2008. As a result, the beef processors now need to demonstrate with satellite images that their cattle suppliers are complying with the new Brazilian Forest Code and that the farms have no overlaps into preserved areas or indigenous land.

Another requirement is to prove the compliance of its suppliers with other environmental and social requirements. For example, the cattle agreement forbids companies from buying cattle from suppliers who are on the environmental agency's 'black list' (e.g. cattle ranchers who have been fined or whose licenses have been suspended for breaking environmental laws) and/or the Labour Ministry's list of slave-like labour.

In addition, the companies can only purchase animals from suppliers that have a Rural Environmental Registration (CAR) and a Rural Environmental Production License (LAR). The CAR is a mandatory digital record, which aims to integrate environmental information and the actual uses of land on the properties of cattle ranchers. This information makes it possible to verify the existence of legal reserves and areas of permanent preservation, such as riparian forests. The LAR is mandatory and proves that the production abides by environmental laws as a whole - avoids sources of water pollution, conserves riverside vegetation and springs, etc.).

6. Law 12651/2012.

Shutterstock

CHAPTER 3.

ADVANCEMENTS AND LIMITATIONS IN THE IMPLEMENTATION OF COMMITMENTS

In order to comply with the clauses of the Amazon beef chain agreements, which require the monitoring of direct and indirect suppliers, the large beef processing groups and also the large retailers have established individual protocols for monitoring cattle suppliers. This was a breakthrough in the chain control agenda.

Two important challenges, however, remained. Firstly, some medium-sized beef companies, which have signed commitments, have not implemented monitoring. On the other hand, even those who started monitoring their suppliers applied monitoring protocols that used different parameters to drive the purchasing decisions. As such, some progress was needed to effectively implement the commitments.

Some results

The agreements with the beef companies began being signed in 2009. In that same year, deforestation in the Amazon fell 42% compared to 2008, from 12,911 to 7,464 square kilometres. It was the largest drop in deforestation in a decade. Thirty of the 43 municipalities on the list of top deforesters, mostly located in Pará and Mato Grosso, have reduced the amount of forest cut down to less than half.

Obviously, the livestock agreements were not the only reason for these results but they did have an important role. Thanks to them, for example, tens of thousands of rural properties have come under the legality radar. In Pará alone, the number of properties registered in the Rural Environmental Registry jumped from 300 to 160,000 from 2009 to 2014, representing 389,000 square kilometres (greater than the area of Germany) of areas registered in the CAR.

A joint study by NGO Imazon and the University of Wisconsin-Madison showed that, for JBS suppliers in Pará, registration in the CAR jumped from 2% before the agreement to 96% after it was signed. In addition, the percent of farms supplying the beef processors that had recently deforested fell from 36% before the TAC to 4% after the agreement (Barreto and Gibbs, 2015).

Cattle-ranching agreements have also been established with the message that deforestation hinders business, especially exports. "Since then, we have built a monitoring system based on three pillars: the Livestock Public Commitment, a monitoring system and a system that ensures accountability to society through an independent audit process," stated Márcio Nappo, director of sustainability at JBS.

ADVANCEMENT 1:
ALIGNING MONITORING RULES

Faced with the need to align and standardise, the six leading companies, i.e. the three large beef processors (JBS, Marfrig and Minerva) together with the three largest retailers, Grupo Pão de Açúcar, Walmart (now BIG) and Carrefour, joined forces to align the monitoring rules. Between 2017 and 2018, these six companies came up with a first draft of what the Aligned Protocol would look like with the help of consulting firm Agrotools. In 2019, Imaflora, through the Beef on Track Project, joined in with the help of the Public Prosecutor's Office, which was interested in setting up official rules applicable to all companies.

These combined efforts then allowed for further review with the involvement of prosecutors and civil society organisations. The new joint creation has enabled incremental improvements, such as the definition of clear rules that did not exist before. The following are examples of the main changes.

In search of greater clarity in analysis

One of the main advancements of the Aligned Monitoring Protocol is to bring greater clarity to the interpretation of rules in the commitments. Table 2 sets out the criteria and parameters, and Figure 4 illustrates the decision flow for the deforestation criterion. It is important to note that the decisions depend on the analysis of several elements. The more complex the issue, the more detailed the analysis should be in the monitoring. Indigenous land and protected areas are two examples of situations that require more information. With basis on the Aligned Protocol, these aspects are further detailed in technical notes, which provide the step-by-step process for the analysis of the issues mentioned above, as well as for the analysis of the maximum productivity index.

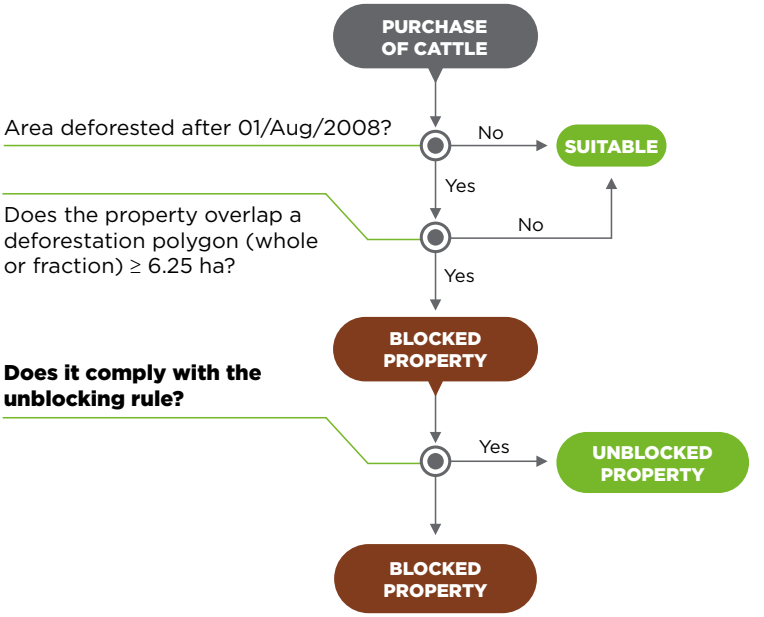


Figure 4 | Example of a decision-making flow.
Source: Protocol to Monitor Cattle Suppliers.

Parameters and rules were defined for monitoring the changes in the limits of the Rural Environmental Registry (CAR) and in the Productivity Index. In regard to the monitoring of the black slave labour list and environmental embargoes, it became clearer that the CPF or CNPJ taxpayer registry[7] data of the lessee must be monitored when the supplier is not the owner of the farm. In terms of environmental embargoes, in addition to analysing if the supplier property is not embargoed, the geographic coordinates, the municipality, the notice of violation and other information concerning the property must now be verified.

Parameters	Blocking rule
CRITERIA: **Illegal deforestation**	
Overlapping deforestation polygons ≥ 6.25 ha from Prodes Amazônia/Inpe, after 1/Aug/2008.	**Suitable:** the property has no overlapping deforestation polygons. **Unsuitable:** Does the property overlap a deforestation polygon (whole or fraction) ≥ 6.25 ha.
CRITERIA: **Indigenous Land (IL)**	
Overlap with IL in a "declared" situation or at a more advanced stage of the demarcation process.	**Suitable:** the property has no deforestation polygons that overlap IL. **Unsuitable:** properties that overlap IL that exceed the technical rule established according to the size of the property (from less than 100 to more than 3,000 hectares) and different levels of overlaps of the property over the Protected Area (2% to 10%) will be blocked, as detailed in Annex 1 - Technical Note 2.

7. Individual Taxpayer Registry (Natural Person Registry) and Corporate Taxpayer Registry (Legal Entity Registry).

Parameters	Blocking rule
CRITERIA: **Preserved Areas (PA)**	
Overlap with PA in the cartographic bases of the relevant public agencies.	**Suitable:** the property has no deforestation polygons that overlap the PA. **Unsuitable:** properties that overlap PA that exceed the technical rule established according to the size of the property (from less than 100 to more than 3,000 hectares) and different levels of overlaps of the property over the Protected Area (2% to 10%) will be blocked, as detailed in Technical Note 2.
CRITERIA: **Ibama Vector - Environmental Embargo (Ibama and Semas/PA)**	
Environmental embargo due to deforestation of Ibama and Semas/PA [Vector] Does not include: i. Standard" polygons based on a single point (geographic coordinate) ii. Polygons that are "suspended" or "cancelled"	**Suitable:** the property has no overlapping illegal deforestation polygons. **Unsuitable:** the property has no overlapping illegal deforestation polygons.
CRITERIA: **Changes to the CAR boundaries**	
Annual update of the suppliers' database based on CAR.	**Suitable:** the property has no boundary changes in the updated CAR database. **Unsuitable:** the property has changes in its boundaries in the updated CAR database.

Table 2 | Monitoring Protocol Criteria.
Source: https://www.beefontrack.org/pubic/media/arquivos/1597414420-protocolo_de_monitoramento_fornecedores_gado.pdf

After several rounds of constructive discussions, the Aligned Protocol was approved by the Public Prosecutor's Office in May 2020 and began being used by all companies that signed the TACs from July 1, 2020 (MPF, 2020).

The Aligned Monitoring Protocol also covers the Public Beef Commitment although this only has JBS, Marfrig and Minerva as signatories. The Protocol is structured on 11 criteria for TAC compliance, five of which are monitorable by geospatial analysis, two by public list analysis, three by document analysis and one by supplier productivity analysis. To meet the Public Livestock Commitment, there is an additional geo-monitoring criterion: zero deforestation[8].

8. Unlike zero illegal deforestation, which considers deforestation permitted by law and authorized, zero deforestation assumes that no new deforestation should be allowed.

Unified Audit Protocol

Until 2021, the Public Prosecutor's Office regulated the statutory audits of the TAC by means of rules set out in official internal documents of the Public Prosecutor's Office and through notices sent only to the signatories of the agreement.

Likewise, Greenpeace's Minimum Criteria for industrial-scale operations with cattle and bovine products in the Amazon Biome had its own guidance documents for the three companies that signed the commitment. Therefore, the application of the rules varied a lot, causing misalignments in the audits and making them incomparable.

The construction of the Unified Audit Protocol took more than a year and went through several consultations with the partners of the Beef on Track Program and a pilot test for the slaughterhouses that agreed to volunteer, so that a first version could be applied as accurately as possible.

Since the start, the new document has specified that the audits must apply all the principles that ensure the independence and ethical conduct of the audit organisation and auditors in relation to the audited company, among other principles established by nationally- or internationally-recognised auditing and verification protocols, 'ISO 19011 - Guidelines for audit management system', 'NBC Standard TO 3000 - Different audit and review assurance work' or 'NBC TSC 4400 'Work of Previously Agreed-Upon Procedures on Accounting Information'.

One of the main improvements of the Protocol is to define rules for the choice of the auditing organisations and the necessary technical skills of the auditing teams, such as ensure their staff has experts in IT and in geospatial information systems analysis to ensure more robustness in the assessments of the monitoring systems of the companies.

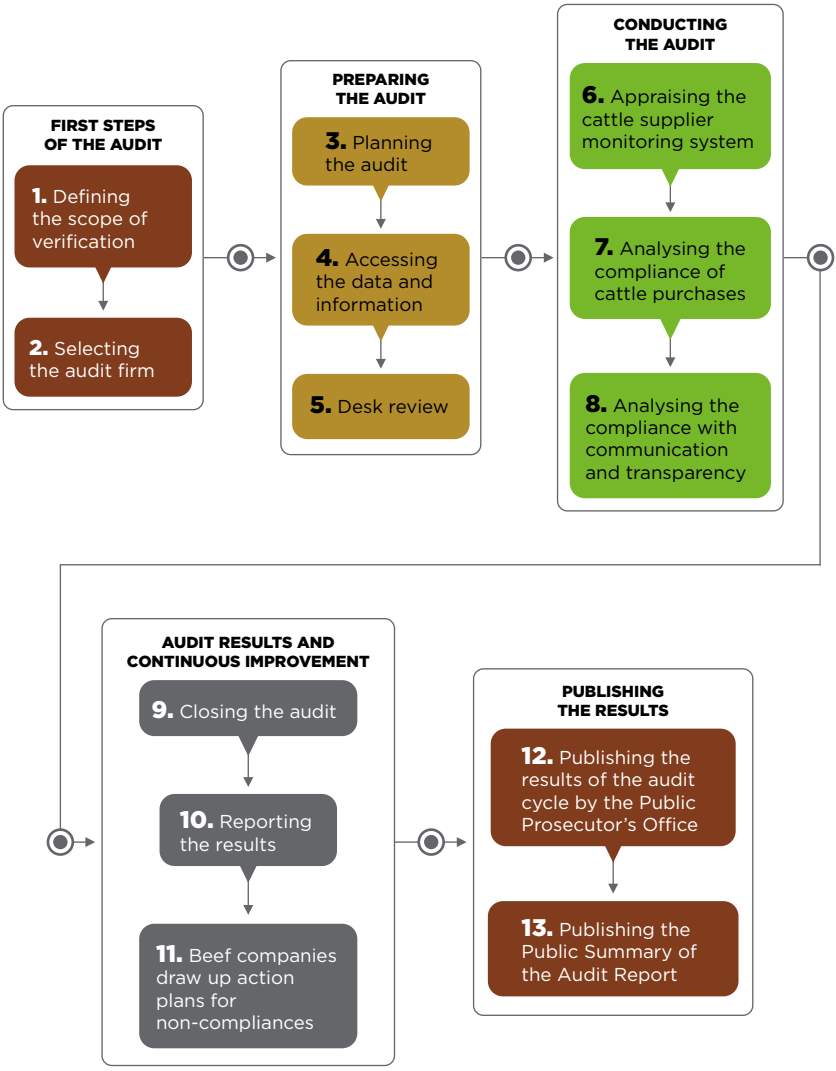


Figure 5 | Outline of the audit process.
Source: https://www.beefontrack.org/pubic/media/arquivos/1597414420-protocolo_de_monitoramento_fornecedores_gado.pdf

The process illustrated in Figure 5 shows the importance of prior audit preparation and, as such, introduces the obligation of the Audit Plan. The extensive document of over fifty pages also includes the sampling rules and checklists with key questions for each criterion of the commitments that should be audited.

Continuous improvement: enhancing MRV and transparency

There is still a long way to go though, even with the improvements introduced by the new documents that complement the TAC and Minimum Criteria (zero deforestation agreement) regulations. The second versions of these documents will tackle the unresolved issues.

Some topics have been left out of the first version due to their complexity, such as, for example, the monitoring of indirect suppliers. Several aspects of the monitoring of indirect suppliers needs to be assessed, taking as a principle the available technologies and ongoing discussions, which present good practices for the monitoring of these suppliers.

During the training process of the companies and the geomonitoring service providers, improvements were identified that should be further developed in the next version, such as the possibility of monitoring deforestation polygons with a size smaller than 6.25 ha and the availability of state environmental embargo data, as in the case of data from the State of Mato Grosso.

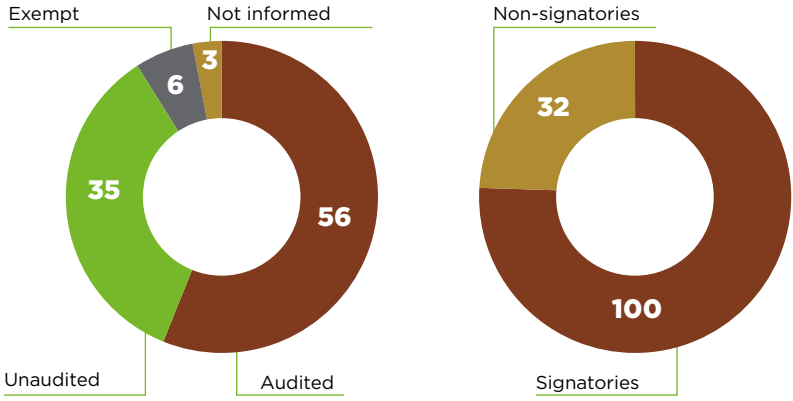


Figure 6 | Beef processing companies with commitments and audit status by July 2021.
Source: Beef on Track.

Important steps have been taken in terms of improvement, but there is no doubt that much remains to be done. By July 2021, a large number of TAC signatories in the Amazon were still in the early stages of implementing the new Monitoring Protocol and more than 30 beef processing units had never been audited. Perhaps the greatest challenge for the implementation of the TAC is the organisation of governance and increasing cooperation among the players of the productive sector, federal and state public authorities and civil society. The initiatives under way to improve these factors are complementary and will be addressed in the next and final chapter, which sheds some light as well as offers a glimpse into a challenging but possible scenario for the future of beef cattle-ranching in the Amazon.

Shutterstock

CHAPTER 4.

THE FUTURE: PAVING THE WAY FOR A RESPONSIBLE AND MONITORED CHAIN

More than a decade after the commitments to eliminate deforestation and other socio-environmental irregularities in the beef chain in the Amazon were signed, the balance shown in the previous chapters makes it clear that important actions and steps have been taken. There are still a few issues to tackle, however, for a deforestation-free chain.

While efforts are being made to enforce the current rules, other actions are needed to unlock mechanisms that will enable them to be implemented throughout the chain and on a large scale. Therefore, this final chapter addresses proposals and actions that experiment with ways of tracking the cattle from birth.

Bovine and similar tracking systems in application

First of all, it is important to remember the technical definition of traceability, which is the capacity to identify the origin of the raw material, the ingredients and the inputs used in the manufacturing of a product, as well as to follow its movement during its production, distribution and sale stages. Traceability, to exist, requires that records are kept all along the chain of custody of a product and that these records are accessed and analysed at specific times.

In the beef chain, there are some instruments that are actual traceability systems and others that resemble traceability systems. They allow cattle to be traced to some extent, but they do not yet have a wide enough range and have been designed for different purposes. Others are tools provided for by law that make it possible to know the origin of livestock and can be part of a traceability system.

Created by the Agriculture, Livestock and Supply Ministry (MAPA), the Brazilian System for the Identification and Certification of Bovine and Water Buffalo Origin (SISBOV) aims to individually identify, register and monitor all bovine and water buffalo cattle born in Brazil and imported (MAPA, 2002). Regulatory Instruction 1 of January 1, 2005 changed the rules and only exporting producers are required to adhere to SISBOV.

This system does not include requirements about the origin of the animals for environmental purposes, but only for health purposes, requiring individual identification of the animals for sale to the foreign market. Identification of the animal for the domestic market is not compulsory.

The SISBOV system has its database centralised at MAPA. Its implementation cost varies according to the size of the properties. The cost of traceability per animal represents on average 0.53% of the animals' revenue value. In a herd of 50 animals, for example, this figure scales up to around 1%; for 5,000 animals, therefore, the cost of traceability represents 0.40% of the individual animal's income (Almeida, 2019).

Sanitary inspection systems

Sanitary inspection systems are understood as sanitary quality certification systems. Although they have characteristics of these systems, they do not offer complete traceability of cattle and were not built with a socio-environmental purpose in mind. Sanitary inspection systems make it possible to trace in which cold storage plant a cut of meat sold in supermarkets was processed.

The Federal Inspection System *(Sistema de Inspeção Federal - SIF)* has its rules defined by the Regulation on Industrial and Sanitary Inspection of Products of Animal Origin *(Regulamento da Inspeção Industrial e Sanitária de Produtos de Origem Animal - RIISPOA)*. The SIF seal is required for all companies that sell meat between states and for those who export. There is also the State Inspection System *(Sistema de Inspeção Estadual - SIE)* which, as the name implies, is established in each state and is used to certify the sanitation standards of the company, enabling it to sell within the state itself.

The inspections carried out for the SIF or SIE systems do not provide information on the compliance of the beef processing plants with socio-environmental commitments. But cross-referencing the SIF or SIE number with the list of companies that signed the TAC with the Public Prosecutor's Office in each state makes it possible to know who does or does not have obligations to control direct cattle suppliers. This cross-checking was made possible by the Beef on Track Transparency Platform[9], a list which is kept up to date.

Rural Environmental Registry

The new Forest Code defines the Rural Environmental Registry (CAR) as a nationwide electronic public registry, mandatory for all rural properties, that gathers environmental information about rural properties and ownerships, and is the database for control, monitoring, environmental and economic planning and fighting deforestation (Brasil, 2012a).

The origin of CAR as an instrument for monitoring rural properties lies in the State of Mato Grosso, the first state to institute the Environmental Licensing System for Rural Properties (SLAPR) back in 1997. In the wake of the cooperation of the Pilot Program for the Protection of Brazilian Tropical Forests (PPG7)[10], the non-governmental organization *The Nature Conservancy* (TNC) created a methodology that

9. www.boinalinha.org/transparencia.
10. This program was created in 1990 at the Houston Convention, which brought together the G7 countries to protect Brazil's tropical forests, and was ratified at the United Nations Conference on Environment and Development (Rio-92).

gathered detailed information on each rural property, which served as the basis for the transition from the SLAPR system to the CAR in the form that was adopted by the new Forest Code.

From then on, CAR began to be implemented in several states in the Amazon region. The first federal decree establishing the Rural Environmental Registry, however, is from 2009, and is an instrument of the Mais Ambiente (More Environment) Program (Brasil, 2009)[11]. The CAR of the states and that of the Federal Government were created in 2009 and 2012, but their databases did not share information with one another.

In 2012, the CAR was ratified legally and nationally, becoming a mandatory instrument for the environmental regularisation of rural properties. Since then, it has been managed by an electronic system of georeferenced identification of the rural properties, which accurately delimits the permanent preservation areas (APP), the legal reserves (RL), the areas subject to alternative land use, in addition to the hydrography and the remnants of native vegetation located within the properties. Decree 7830/2012, which regulated the CAR (Brasil, 2012b), also established the rules that instituted the CAR System (Sicar) nationwide, integrating the database of all the states.

Animal Transit Guide (GTA)

The Animal Transit Guide (GTA) is provided for in the decree that created the Unified Agricultural Healthcare System and was established by Regulatory Instruction no. 18 (MAPA, 2006). The document contains information on the age and sex of the animals, vaccination history, origin, destination and purpose of their transport, as well as information on the buyer and seller. The GTA is for phytosanitary control purposes. Therefore, when cattle are moved from one farm to another, they must

11. Environmental regularization program for rural properties of the Environment Ministry.

be accompanied by a GTA. The commitments signed by the Amazon-based beef industry require direct suppliers to obtain GTAs. Cross-referencing the GTA with the CAR provides an environmental snapshot of the livestock supplier.

The cattle sold to the beef processor must include the GTA of the last supplier. Producers who sell the cattle to be fattened by the latter must also issue a GTA. However, the content of the GTA of the previous parties is confidential and the direct suppliers are not obliged to provide this information to the beef processors. Furthermore, the GTA document and the CAR, which contains the Individual Taxpayers' Registry number (CPF), are not public. There are difficulties in accessing commercial and individual information. Only in voluntary agreements is such access possible. Even though the cross-referencing of different databases and types of records makes it possible to see the origin of the cattle from birth, there are legal and commercial hindrances involved. Supplementary agreements and the creation of an environment of trust and new incentives needs to be created.

Monitoring of indirect suppliers

As we have seen, the combination of several systems that currently exist enables a certain amount of traceability and monitoring of the chain. The sanitary inspection system applied to the industry, when cross-checked with the list of companies that have entered the Terms of Adjustment of Conduct for Beef with the Public Prosecutor's Office, allows one to know if a certain beef processor with a SIF or SIE number has a signed agreement and if it was audited. The improvements in the CAR database and the fact that it is compulsory to issue GTAs for cattle transactions also make it possible to know the origin of cattle from the direct supplier. The main issue, however, continues to be extending this possibility to indirect suppliers. Two initiatives that look for ways to attain this and the plans and strategies of the large beef processing companies to expand their controls are shown below.

GTFI

The Working Group for Indirect Suppliers of the Brazilian Cattle-Ranching Sector *(Grupo de Trabalho de Fornecedores Indiretos na Pecuária Brasileira - GTFI)*[12] is composed of various Brazilian and international stakeholders in the cattle value chain, led by the National Wildlife Federation (NWF) of the United States and Amigos da Terra - Amazônia Brasileira (AdT), and has been working to provide advanced traceability and monitoring solutions to legitimize the inclusion of indirect suppliers in the formal chain of the cattle-ranching sector in Brazil.

In 2019, after four years of studies and discussions with members, the GTFI established the basic points to be included in the monitoring procedures for indirect suppliers. With these, the industry and retailers could start monitoring indirect suppliers from a pre-defined baseline common to all, the so-called "Good Practices" (Table 3).

Aspect	Rules
Baseline date for monitoring in 2019	Indirect suppliers will be monitored as of 2019.The study considered that applying the same cut-off date as the TAC (2009) could imply a very large number of non-compliances, making it unfeasible for the sector to implement Good Practices for monitoring indirect suppliers, and reducing its potential for reducing deforestation.
Minimum property size	The group realized that if the industry only considered level 1 indirect suppliers over 100 ha, it would be possible to more than double the monitoring scope. These conditions create a practical and positive path for companies to start including indirect suppliers in existing monitoring systems through commercial criteria.

12. To find out more about GTFI go to: https://gtfi.org.br/boas-praticas/.

Aspect	Rules
Tolerance	The study also identified that only a very small percentage of direct suppliers had more than one (indirect) supplier with a deforestation problem. The group, therefore, concluded that there could be a tolerance of 1 problematic indirect supplier for every direct one, since the total volume of non-compliant suppliers allowed would be minimal. This flexibility is designed to work in particular for situations in which the direct supplier does business with many indirect suppliers.
Periodic review	A provision is made for periodic review of the Good Practices, incorporating new mechanisms that allow for the readjustment and reinsertion of producers who are blocked in the chain. This point is extremely important to ensure the long-term sustainability of indirect supplier monitoring practices.

Table 3 | The GTFI Good Practices Set.
Prepared with basis on www.gtfi.org.br

GTFI members believe that using the CAR and GTA in an integrated manner is one of the best approaches for building traceability systems, since it uses information that already exists and allows for a viable, cost-effective solution that can gain scale and be implemented quickly. For such, they recommend using Visipec[13], which is a complementary tool to the systems that beef companies already use to monitor their direct suppliers, and serves to implement good practices. By cross-referencing CAR and GTA, the tool is able to provide additional information on indirect supply properties in the beef supply chain, filling in the gaps and improving existing tracking systems. The software is being tested by companies in Mato Grosso, Pará and Rondônia, and is supplied with GTAs issued until mid-2019 - when data on GTAs was open.

13. To find out more about Visipec go to: https://www.visipec.com/pt/home/.

CONECTA

The Conecta (Connect) initiative - Partnerships for Responsible Agriculture - combines a sustainability protocol with a monitoring tool to offer a swift and comprehensive solution for transparency in the value chain for the Brazilian beef industry. Developed by a Brazilian traceability company, Safetrace, and implemented with the support of NGOs *The Nature Conservancy* and Amigos da Terra - Amazônia Brasileira, it is supported by Partnerships for Forests.

The goal of the initiative is to provide an intelligent tool that combines satellite monitoring data and blockchain technology to check if illegal deforestation and other socio-environmental non-compliances are present in the beef cattle production chain. The information is provided voluntarily by the farmers and integrated into a single database. Blockchain technology is used to monitor deforestation risk factors in the production chain, increasing the ability of beef processors to monitor the entire value chain and giving them the means to keep to their commitments of improving traceability and confidentiality.

Besides access to data and making it available to the beef companies, the initiative encourages the use of a sustainability protocol undersigned by producers and beef processors, which formalises the commitment to the Brazilian Forest Code to protect forests within the farms. It opens a path for irregular producers to regularise themselves and make them able to sell their cattle to the beef companies.

Conecta has been applied, initially, in the southeast region of Pará state which, according to TNC data, is currently sheltering irregular producers who hold 1.9 million head of cattle on private properties. The project so far involves beef processors Frigol, the Xingu Rural Producers Association (Aprux), located in the municipality of São Félix do Xingu, one of the most deforested regions in the Amazon, and retailer Carrefour. The Brazilian Micro and Small Business Support Service *(Serviço Brasileiro de Apoio às Micro e Pequenas Empresas - Sebrae)* will provide training in farm management to all committed producers who join the platform.

SMGeo Indirect Suppliers

This is a voluntary platform developed in 2017 by Niceplanet Geotechnology that allows socio-environmental analysis and monitoring of indirect suppliers (properties and physical herd). The platform is fed with information provided by the producer and has a mobile application that allows an early assessment of the social and environmental compliance of indirect suppliers, which prevents contamination of the herd.

The platform's analyses are based on information such as CAR, LAR, certificates, traceability and sale of animals acquired through SISBOV, Invoices, GTAs and health records. Socio-environmental legality is based on TACs and public commitments undertaken by the sector.

Movements in the beef processing industry

• JBS

JBS introduced, in September 2020, the Juntos Pela Amazônia (Together for the Amazon) program[14] based primarily on the development of the value chain, the conservation and recovery of forests, support for communities and scientific and technological development. The Plan includes a platform that will cross-reference information from the company's suppliers with data from animal transit guides using blockchain technology. Scheduled to be rolled out in four stages, the plan is for all its suppliers to be on the platform by 2025, when this will be a condition for selling cattle to the company. The company also announced its intention to share its monitoring system with producers, other suppliers of agricultural inputs and financial institutions that wish to adopt social and environmental criteria in

14. https://jbs.com.br/tag/juntos-pela-amazonia/.

their relationships with their value chains. Lastly, the JBS Fund for the Amazon[15] is expected to provide R$ 250 million to finance initiatives and projects aimed at contributing to the sustainable development and environmental conservation of the Amazon.

• Marfrig

Marfrig, in turn, announced the Marfrig Verde+ (Marfrig Green+) Plan[16], which aims to ensure that 100% of the company's production chain is sustainable and deforestation-free over the next ten years. Achieving full traceability of Marfrig's supply chain in the Amazon is planned by 2025 as part of the goal to achieve zero deforestation by 2030. The plan, conceived in partnership with the Dutch public-private institution the Sustainable Trade Initiative (IDH), specifies that over the next ten years Marfrig will invest R$ 500 million in sustainability actions. The investment will go towards chain control and risk mitigation. To this end, it intends to adapt all its systems for chain control and risk mitigation by 2022 and to launch the Indirect Supplier Risk Mitigation Map, a tool that cross-references various maps of native vegetation with those of livestock production. With this, between 2022 and 2025, Marfrig intends to regularise and reintegrate the producers who were blocked, making it possible for them to once again meet the company's criteria. Lastly, the plan announces a program of technical assistance, intensification and restoration to boost grazing, genetics and animal nutrition.

• Minerva Foods

For the Amazon region, Minerva adopts geospatial technology monitoring, which cross-references satellite images with deforestation information from Prodes (the Project to Monitor Deforestation in the Legal Amazon by Satellite), established by the National Institute for Space Research *(Instituto Nacional de Pesquisas Espaciais - Inpe)*. According to the 2020 Sustainability Report, more than 9.6 million hectares in the Amazon are monitored.

15. https://fundojbsamazonia.org/quem-somos/o-fundo/.
16. https://www.marfrig.com.br/pt/sustentabilidade/plano-marfrig-verde.

Since 2020, Minerva Foods has adopted Visipec and, by the end of 2021, intends to integrate the tool into its geographic monitoring system for the Amazon so it can then monitor risks related to indirect supplier farms.

The 2020 pilot project involved 3,314 suppliers located in Mato Grosso and Rondônia, within the Amazon biome, and certified the compliance of 99.9%. The analysis was based on publicly available information, up to 2018. For 2021, the company will develop new stages of calibration for the tool and integration to cattle purchasing systems in the Amazon region. The expectation is to reach the end of the year with all the operations in the Amazon using the indirect supplier assessment tool, according to sustainability director Taciano Custódio.

Other beef processors, such as Frialto and Frigol, have also started working with GTFI to test solutions, underpinning their commitment to implementing practices aimed at deforestation-free beef production.

The role of buyers

As mentioned earlier, the retail, cash-and-carry and wholesale sector is an important link in the responsibly sourced beef chain because it has an important direct connection with consumers and civil society, both of which demand transparency in product origin. The sector can exert enormous influence by sharing its concerns with the beef suppliers and requiring, for example, that the cattle sourcing farms be monitored from a social and environmental aspect. Therefore, the retail sector has an important role in supporting the fulfilment of commitments in the beef chain.

The three largest local supermarket chains - Carrefour, Grupo Pão de Açucar and BIG (former Walmart) - have committed to not buying beef from companies whose cattle suppliers have social and environmental discrepancies. In 2013, the Brazilian Supermarket Association (ABRAS) agreed, along with the 4th Chamber of Environmental Coordination and Revision of the Public Prosecutor's Office, to create systems and practices to encourage the Brazilian supermarket sector to avoid purchasing beef from deforested areas in the Amazon and others with environmental and social discrepancies. The specific objectives of such Term of Cooperation are to inform, disclose and guide the Companies of the Brazilian supermarket sector to adopt practices that create a chain free from deforestation. In addition to the large chains, regional supermarkets also play an important role in encouraging medium and small companies to implement these commitments.

One of the first actions of the Beef on Track Program on the retail front was for Imaflora, Abras and representatives of the sector to meet to develop and implement the *Guide for Retailers: Developing an Effective Beef Procurement Policy* with the support of public prosecutors, representatives of beef companies and civil society organisations.

The policy of every company should be applicable to its entire area of operation where suppliers are located, and may include the Amazon, Cerrado, Pantanal, or

any other biome. However, the Guide has an Amazon focus, for full compliance with the Protocol to Monitor Cattle Suppliers in the Amazon. The Guide was launched in 2021 and Imaflora, along with retailers, will conduct a series of workshops in the Amazon states to help with its implementation.

Shutterstock

CONCLUSION

Advancements have been made to control direct cattle suppliers in the beef chain in the Brazilian Amazon. A combination of public and private strategies and articulations has led many to take responsibility for their actions and to direct their investments at monitoring supplier farms. The intensification of actions and the improvement of tools by the Beef on Track Program has made the first leap into information transparency possible. Other partner initiatives have also emerged with the aim of finding solutions for full traceability.

However, there are important obstacles that need to be overcome. The monitoring of indirect suppliers is the main one. Another obstacle, which hinders this monitoring, is the lack of access to documents such as the GTA and the CAR validation of the properties. The public power, both at state and federal level, is a key element for these changes to take place. A multi-party arrangement that enables the unification of information, with agreements to protect the sensitive personal and commercial data of indirect suppliers, is critical if monitoring is to be scaled up.

Another issue that needs to be tackled is what to do with the suppliers, who have environmental liabilities and who, when monitored, will not be able to sell their cattle. It is well known that simple formal exclusion does not prevent the sale of cattle, due to the difficulties inherent in the state surveillance system (size of the territories, lack of agents and funds). Therefore, public policies and private aid to reinsert these farms into the productive system are essential. The adhesion of producers to the Environmental Regularisation Program (PRA) to ensure greater speed in

its validation by environmental agencies and the monitoring of implementation, through technical assistance and rural extension on the farms of those who adhere, are needs known for years.

Therefore, the initiatives of companies and civil society continue to be essential, but they cannot and should not replace public policies and actions of state stakeholders when the objective is to curb illegal deforestation and consolidate an entire value chain of responsible beef production.

Another step is to create the conditions for the desired goal of achieving zero deforestation, which is essential in mitigating the effects of climate change. To achieve this positive impact, the right economic and financial incentives need to be aligned. The role of the financial sector in putting in place green finance programs that are accessible to different producer profiles and that can gain greater scale is essential. Real incentives for low carbon cattle-ranching are also key. Although banks and investors are being held accountable and are undertaking their own commitments, the actual supply of green financial products is still small and restricted.

The trail that we have to forge towards a responsible beef chain in the Amazon has started to open. The climate emergency situation calls for actions to be accelerated and solutions for the many issues in the chain to be found. A new chapter in the history of beef cattle-ranching and the beef industry is yet to be written.

Shutterstock

BIBLIOGRAPHY

Albuquerque, I., Alencar, Angelo, C., Azevedo, T., Barcellos, F.,Coluna, I.,Costa Junior, C.,(Imaflora), Cremer, M. Piatto, M.Potenza, R.,Quintana, G, Shimbo, J.,Tsai, D.,Zimbres, B. **Análise das emissões brasileiras de gases de efeito estufa e suas implicações para as metas de clima do brasil 1970-2019** [Analysis of Brazilian greenhouse gas emissions and their implications for Brazil's climate targets] SEEG, 2020.

Almeida, J. V.; Francischini, R.; Silva, F. F. da ; Bett, V. **Rastreabilidade na bovinocultura brasileira: condições e benefícios** [Traceability in Brazilian Cattle-Ranching: conditions and benefits] **Pubvet: medicina veterinária e zootecnia.** vol. 13, p. 1–14, 2019.

Amigos da Terra. **A Hora da Conta. Pecuária, Amazônia e Conjuntura.** São Paulo, 2009.

Associação Brasileira dos Exportadores de Carne (Abiec). **Beef Report. Perfil da pecuária no Brasil.** São Paulo, 2020.

Barreto, P., Marianno, B., Valdiones, A.P., Barreto, G. **Frigoríficos vão ajudar a zerar o desmatamento na Amazônia?** [Will beef processing companies help to eliminate deforestation in the Amazon?] Belém: Imazon; Cuiabá: Instituto Centro da Vida. 2017.

Brasil (Presidência da República). **Decreto 6.231 de 21 de dezembro de 2007.** Provides on actions related to the prevention, monitoring and control of deforestation in the Amazon biome, as well as changes and adds provisions to Decree 3179 of September 21, 1999, which provides on the specification of sanctions applicable to conducts and activities that are harmful to the environment, and other provisions.

Brasil (Presidência da República). **Decreto 7.029, de 10 de dezembro de 2009.** Establishes the Federal Program of Support for the Environmental Regularisation of Rural Properties, dubbed "Programa Mais Ambiente" and other provisions. Available at: http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2009/decreto/d7029.htm.

Brasil (Presidência da República). **Decreto 7.830, de 17 de outubro de 2012.** Provides on the Rural Environmental Registry System. The Rural Environmental Registry establishes general rules for the Environmental Regularisation Programs covered by Law 12651 of May 25, 2012, and other provisions. Available at: http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2012/decreto/d7830.htm. 2012a

Brasil (Presidência da República). **Lei 12.651, de 25 de maio de 2012**. Provides on the protection of native vegetation; amends Laws 6938 of August 31, 1981, 9393 of December 19, 1996, and 11428 of December 22, 2006; revokes Laws 4771 of September 15, 1965, and 7754 of April 14, 1989, and Provisional Measure 2166-67 of August 24, 2001; and other provisions. Available at: http://www.planalto.gov.br/ccivil_03/_Ato2011-2014/2012/Lei/L12651.htm#art83.2012b.

Brasil. IBGE. **Censo Agropecuário 2017.**

Brasil. IBGE. **Censo Agropecuário:** Tabela 6.911 - Número de estabelecimentos agropecuários com bovinos, efetivos e venda, por tipologia, grupos de área de pastagem grupos de área total. 2021b. Available at: https://sidra.ibge.gov.br/tabela/6911. Accessed on: 13 July 2021.

Brasil. IBGE. **Pesquisa da Pecuária Municipal:** Tabela 3.939 - Efetivo dos rebanhos, por tipo de rebanho. 2021a. Available at: https://sidra.ibge.gov.br/tabela/3939. Accessed on: 13 July 2021.

Brasil. IBGE. **Pesquisa de Pecuária Municipal (PAM) do repositório estatístico SIDRA.** Dados sobre o rebaho de bovinos em todos os municípios considerados pelo IBGE como Amazônia Legal (772 municípios). 2019.

Drigo, I.G. **Rumo à carne sustentável e certificada? As razões e os mecanismos pelos quais os produtores de carne bovina na Amazônia Legal estão iniciando mudanças em suas práticas**. Relatório Final de Pós-Doutorado. FEA/USP. 2013.

Gibbs and Barreto. **Como melhorar a eficácia dos acordos contra o desmatamento associado à pecuária na Amazônia? [How to improve the effectiveness of agreements against deforestation associated with cattle-ranching in the Amazon?]** Available at https://imazon.org.br/PDFimazon/Portugues/livros/TACPecuaria_WEB.pdf.

Greenpeace. **Quebra de confiança [Breach of trust]** São Paulo, 2011.

Greenpeace. **Slaughtering the Amazon**, 2009.

MapBiomas (Brasil). **Estatísticas.** Cobertura bioma & estados. 2021. Coleção 5.0. Available at: https://mapbiomas.org/estatisticas. Accessed on: 20 July 2021.

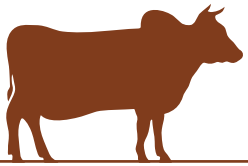
Ministério da Agricultura, Pecuária e Abastecimento (Mapa). **Instrução Normativa 1, de 10 de janeiro de 2002.** Available at: http://www.sysrastro.com.br/legislacao/IN%2001%20de%2010.01.2002.pdf.

Ministério da Agricultura, Pecuária e Abastecimento (Mapa). **Instrução Normativa 18, de 18 de julho de 2006.** Approves the model of the Animal Transport Guide (GTA) to be used nationwide for the transport of live animals, fertile eggs and other materials for animal reproduction. Available at: https://www.defesa.agricultura.sp.gov.br/legislacoes/instrucao-normativa-mapa-18-de-18-07-2006,761.html.

ProForest **Monitoreo socioambiental del sector ganadero en Brasil [Socio-environmental monitoring for the cattle-ranching sector in Brazil]**. 2017. Available at: https://proforest.net/proforest/es/files/bn09_final_port_web.pdf.

Steigleder, AM. **Atuação do Ministério Público com Vistas à Prevenção e Reparação de Danos Ambientais [Action by the Public Prosecutor's Office for the Prevention and Repair of Environmental Damage]** In: Philip Jr, A., De Freitas, V.; Spínola, A. L. S. (eds.). Environmental Law and Sustainability. Publishing house Manole: São Paulo, p. 1023-1054. 2016.

Veiga, J.B.; Tourrand, J.F.; Piketty, M.G.; Poccard-Chapuis, R.; Alves, A.M.; Thales, M.C. **Expansão e trajetórias da pecuária na Amazônia, Pará, Brasil [Expansion and trajectory of cattle-ranching in the Amazon, Pará, Brazil]** Brasilia: Publishing house of Universidade de Brasília, 2004.



To see who is involved and supports the Beef on Track Program, go to:

www.beefontrack.org

ISBN-13: 978-65-86902-07-5

Produced and developed by:

BEEF ON TRACK | imaflora

Partner:

MPF
Ministério Público Federal

Publication supported by:

Partnerships for Forests | UK Government