# AGRI3 Sector Analysis Paper: Sustainability Interventions Roadmap for Soybeans and Cattle

Deck

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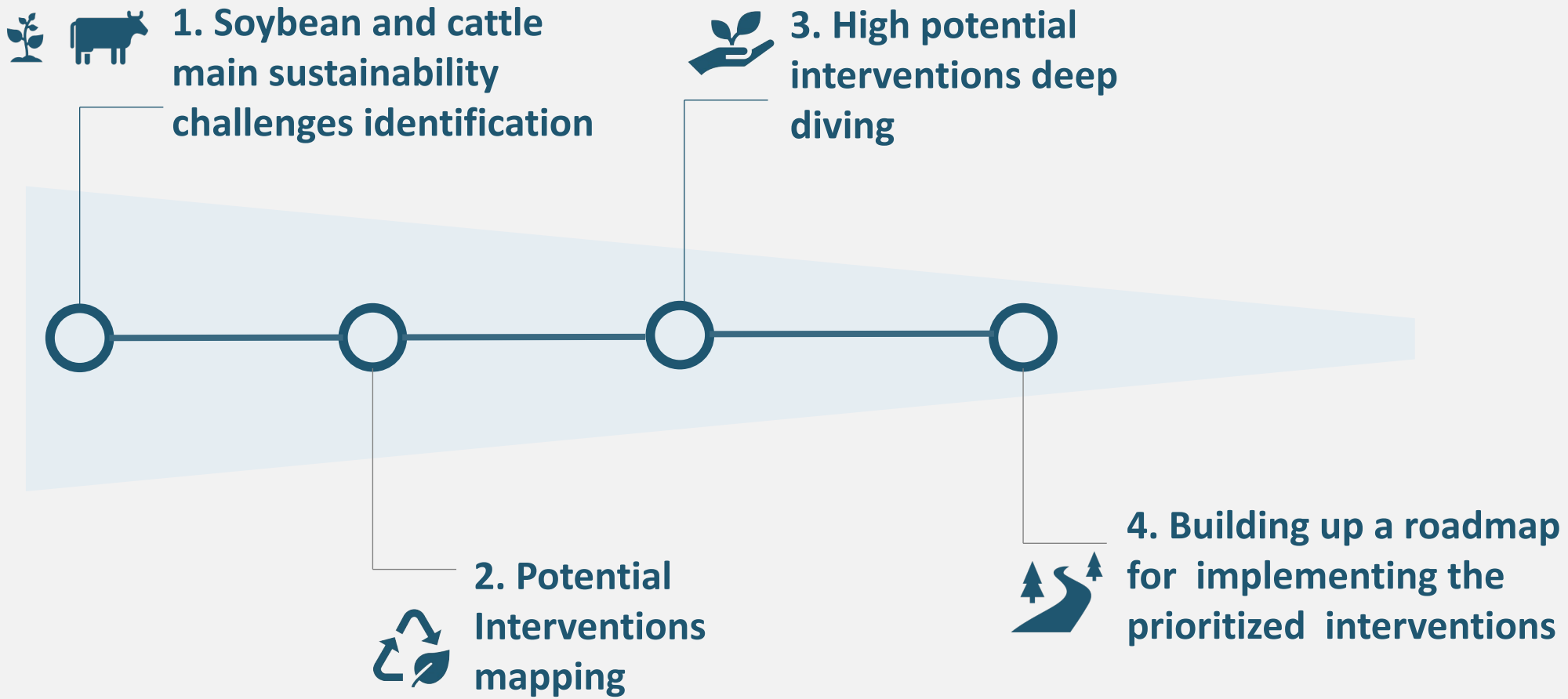
# We propose a 4-step approach to the problem



# We propose a 4 stepwise approach to the problem:

| | 1 Soybean and cattle main sustainability challenges identification | Potential sustainability interventions<br>2 Potential Interventions Mapping | 3 High potential interventions deep diving | 4 Building up a roadmap for implementing the prioritized interventions |
|---|---|---|---|---|
| AIMS | Identify chain stakeholders, market segments and sustainability challenges. | Identify and detail potential sustainability interventions related to sustainability challenges. | Deep dive on interventions regarding economic, technological and critical success factors. | Construction of a roadmap connecting high impact sustainability challenges to high impact potential interventions. |
| KEY ACTIVITIES | • Analysis of internal documents – IDH/Agri3;<br>• Interviews with Agri3 team and main partner-banks;<br>• Individual and group Interviews with stakeholders (e.g. producer, associations, NGOs);<br>• Desk research;<br>• Working group meetings. | • **Ideation meeting/workshop (MKS/IDH and others);**<br>• Interviews with specialists;<br>• Prioritization workshop. | • Operational details of potential interventions;<br>• Test of concept interviews with specialists and producers;<br>• Working group meeting. | • Discussion of partial working paper with Agri3 and partner banks;<br>• Analysis and understanding of E&S existing framework in Agri3 and partner's bank;<br>• Application of change management theory to stablish the main phases and steps to implement the interventions. |
| DELIVERABLES | Value chain map indicating stakeholders, market segments and identification of main sustainability challenges (e.g. deforestation; water pollution; soil pollution; biodiversity loss; etc.). | Map of potential sustainability interventions, market drivers and expected impacts – high level analysis in an unlimited number of potential interventions. | Map of high potential sustainability interventions, market drivers, implementation barriers, technological challenges, case studies and their potential types of financing.<br>Partial working paper to be delivered to Agri3 and stakeholders. | Implementation roadmap containing production methods, market segment, case studies, financial challenges; stepwise approach; financial approach to Agri3 and partners; business as usual scenario and interventions additions; review of E&S framework; areas for additional support to partner-bank. |

# Content

- **Step 1: Soybean and cattle main sustainability challenges identification**
  - Value Chain Map
  - Brazil Financing Scenario
  - Sustainability challenges

# In the 1st phase of the study, information and data were collected, through desk research and inputs obtained from interviews

## Methodology

The interviews included Rabobank, Agri3 and IDH teams and external contacts indicated by them, including producers, industries, banks, cooperatives, trading companies, associations, among other agents in the soybean and cattle chains.

The information obtained from desk research and interviews was used to identify which are the challenges, why are they considered challenges, which are the root causes of each one of them and which are the practices/initiatives that currently exist in an attempt to solve them, both for the soybean and the cattle chains.

The **main methodological steps** were:

1. Desk Research
2. Internal Interviews
3. External Interviews
4. Consolidation of the Challenges

### 1. Desk Research

Synthesis of information and data that has already been collected by other sources

### 2. Internal Interviews

Interviews with Rabobank, Agri3 and IDH internal team to align expectations and gather their insights

### 3. External Interviews

Interviews with external contacts, agents of the soybean and cattle chains

### 4. Consolidation of the Challenges

Consolidation of the challenges mapped out from the information and data obtained

# Listed below are the stakeholders interviewed to obtain information, data and inputs for the present study

## Interviewed stakeholders (32)

| Internal | External |
|---|---|
| Rabobank<br>idh the sustainable trade initiative<br>AGRI3 FUND | • Soybean producers<br>• Cattle ranchers<br>• Industries<br>• Tradings<br>• Coop<br>• Bank<br>• Associations<br>• Slaughterhouse |

The interviews with members of the indicated organizations **contributed** to clarifications and confirmations about the **existing challenges** in the **soybean and cattle chains**.

The **inputs gathered** in the interviews were used to bring together in this study the environmental **challenges**, with the existing **initiatives** to solve them, and the **financing mechanisms** that exist in the market or that could be created.

markestrat Agribusiness Source: Markestrat Metodology.

# The following articles, reports, and publications were used as source of information and data in the desk research

**The materials consulted were sources of data and information which enabled analysis and discussion about the mapped out challenges**


**SOYBEAN**

ANDRADE, M. C. and SILVA, H. D. The application of the forest code: advances or backwards? Revista Direito Ambiental e sociedade, v. 10, n. 2, 2020.

BERKUM, S. V. and BINDRABAN, P. S. Towards sustainable soy: an assessment of opportunities and risks for soybean production based on a case study Brazil. LEI Wageningen UR, 2008.

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FAGUNDES, M. B. B. and SIQUEIRA, R. P. Caracterização do sistema agroindustrial da soja em Mato Grosso do Sul. Revista de Política Agrícola, 2013.

GAZZONI, D. L. Sustainability of soybeans in brazil. VI Congresso Brasileiro de Soja, Cuiabá-MT, 2012.

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The Nature Conservancy. Environmental Framework For lending and investing in Soy in the Cerrado, 2020.

The Nature Conservancy. Incentivos para Produção de Soja Sustentável no Cerrado, 2019.

VOORA, V.; LARREA, C.; BERMUDEZ, S. Global Market Report: Soybeans. International Institute for Sustainable Development, 2020.

**CATTLE**

ABIEC. Beef Report – Perfil da Pecuária no Brasil, 2020.

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MARTHA, G. B. J. A sustentabilidade da pecuária brasileira. Embrapa, 2015.

MOREIRA, C. R. et al. Níveis de compactação em pastagem de sistema intensivo e extensivo de produção. Revista Acta Iguazu, 2016.

SANT'ANNA, A. C. et al. Bem-estar animal: um dos critérios da sustentabilidade na pecuária. Tópicos em Sustentabilidade & Conservação, 2017.

SILVA, R. P. M. Contaminação ambiental por resíduos da produção animal. Tese Pós Graduação, Universidade Federal do Rio Grande do Sul, 2005.

SOUZA, D. M. et al. A Review of Sustainability Enhancements in the Beef Value Chain: State-of-the-Art and Recommendations for Future Improvements. Animals, 2017.

WHELAN, T. et al. How to Quantify Sustainability's Impact on Your Bottom Line. Harvard Business Review, 2017.

# Content

## Step 1: Soybean and cattle main sustainability challenges identification

- **Value Chain Map**
- Brazil Financing Scenario
- Sustainability challenges

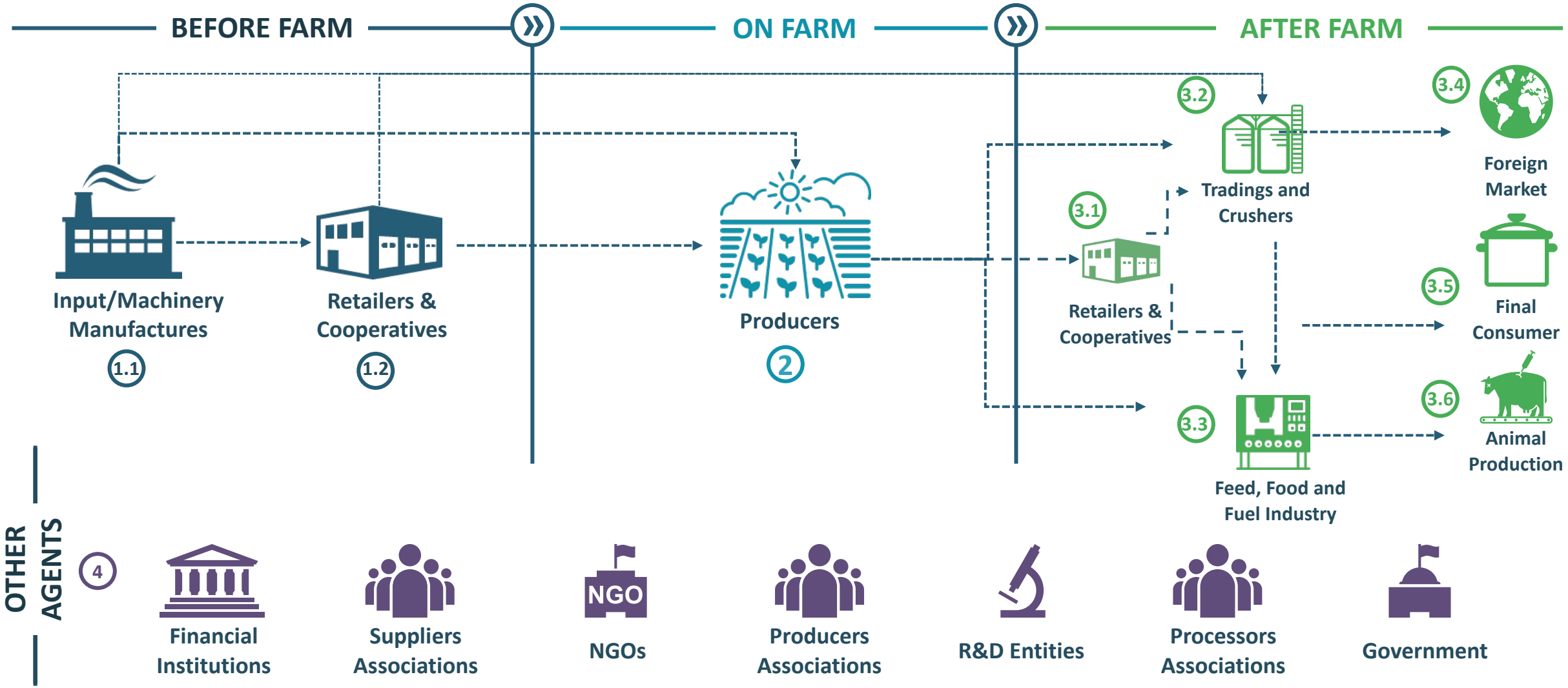
# Content

- Value Chain Map: Soybean chain

# Key Messages

- Soybean production achieved  124.8 million metric tons (MMT) in Brazil being planted over approximately 37 million hectars (2019/20)
- In the next decade, soybean production in Brazil is expected to grow 33%, while planted area is expected to grow less than 27% due to increase of productivity level. Legal deforestation is a challenge since legally opening of new areas is economically attractive;
- On Farm level is very consolidated. Farmers larger than 500 hectares represent  1,34% of total number and 72% of total production.
- Farmers with area bellow 50 hectares, which is a small area to produce soybean, respond to 87% total soybean farmers (approx. 2.6 millions of farmers).
- Soybean sector is export driven and 78 (MMT) of soybean grain is destined to foreign countries. China represents 82% of exports;
- Soybean chain players are represented by large input manufacturers, many of them, multinationals that directly access farmers or coordinate market access through a network of channels. Cooperatives and retailers have an important role in accessing farmers, financing production, offering technical assistance and selling products.
- Cooperatives, especially in south Brazil, are very influential and work as technological validators for small and medium farmers, having great influence on farmers' decision;
- Main trading companies play an important role in monitoring soybean origin and are compliant to Soy Moratorium.

# Market changes have connected players from different chain levels, which can create traceability opportunities



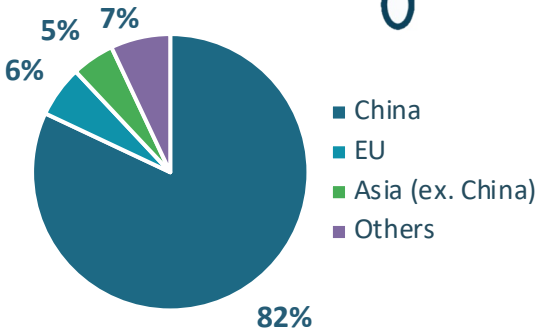
# Most of soybean production is exported, mainly to China, while soybean meal is exported to EU countries and Asia (excl. China).

**PRODUCTION BREAKDOWN (MMT)**

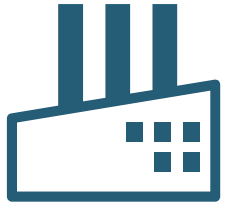
Production **124.8**

**Soybeans**

Exports **78.8**



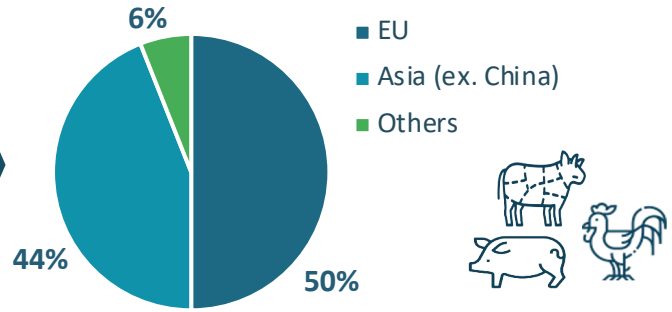

Crushing **44.0**



Meal **35.1**

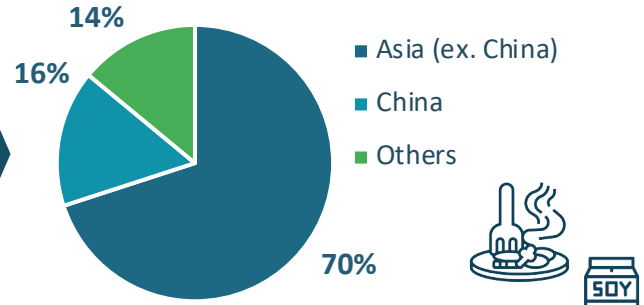
Oil **8.9**

Exports **17.2**




Domestic Consumption **17.7**

Exports **1.0**




Domestic Consumption **7.9**



Source: Conab (2019/20); Outlook Fiesp (2019/20).

# 1 Before Farm level is characterized by very distinct industry profiles. From large R&D multinationals to local family-owned retailers.

## LEVEL PLAYERS

**Inputs & Machinery Manufactures**

1.1

**Retailers & Cooperatives**

1.2

### 1.1 Ag-inputs & Machinery Manufacturers

Include fertilizers, seeds, crop protection, plant nutrition and machinery industries that go to market directly (large customers) or through dealers and cooperatives. Companies are, generally, transnational, with general sustainability policies from headquarters. Providing funding (structured operations and other options) for dealers and large producers plays a key role on the inputs & machinery manufactures business.

### 1.2 Ag-Input Retailers

Include distributors and cooperatives (more present in the south of the country) which are responsible for meeting soybean producer's technical assistance needs as well as delivering to farmers their inputs and machinery. Some of them are involved in grain trade and processing and they may import ag-inputs directly. These retailers may finance producers, intermediating the trade credit coming from manufacturers or trading companies using their production as collateral via barter operations.

## AGENT PROFILES

### Crop protection & seed industry

Consolidated market dominated by large multinationals with expertise on crop protection R&D or post patent products. Some hold GMO and seed genetics.

### Fertilizers & plant nutrition

Market divided into to two distinct groups. NPK commodity producers and specialized producers, like foliar fertilizers and plant stimulant products.

### Machinery and equipment

International machinery industry and national or regional parts industry.

### Cooperatives

Strong presence on southern Brazil, some are forward/backward integrated in food chains and inputs. Are responsible for major access to farmers since they have close relationship with them.

### Large or corporate retailers

Group being consolidated by PE funds, Asiatic groups and trading's or organic growth by national players. Net revenue over U$ 200 millions. Recent presence of international groups.

### Small and medium retailers

Atomized market of regional or local retailers, mainly family-owned and low level of integration of chains (downstream or upstream).

# Brazilian cooperatives represent almost 50% of agri-food GDP and are relevant players on inputs selling, commodities processing and technologies dissemination

## Cooperatives Business Model

| **Ag-inputs sales** as core business | | **Grain trading** as core business | | **Grain processing** as core business | |
|---|---|---|---|---|---|
| **Cada - Cooperativa Agropecuária** | **Coopercitrus** | **Cotrijuc** | **Camnpal** | **Cocamar** | **Coamo – Agroindustrial Cooperativa** |

## Why Are Agri-food Cooperatives Relevant for Sustainability Initiatives?

*Farmers Training, Funding and Support*

*Technology Curation*

*Production Traceability Conditions*


*Best practices dissemination*

*Community Welfare Purpose*



Source: Markestrat Research | O Novo Protagonismo das Cooperativas | dec/2020

# 2 On Farm level is very consolidated. Farmers larger than 500 hectares represent 1,34% of total number and 72% of total production.

## LEVEL PLAYERS

Producers

2

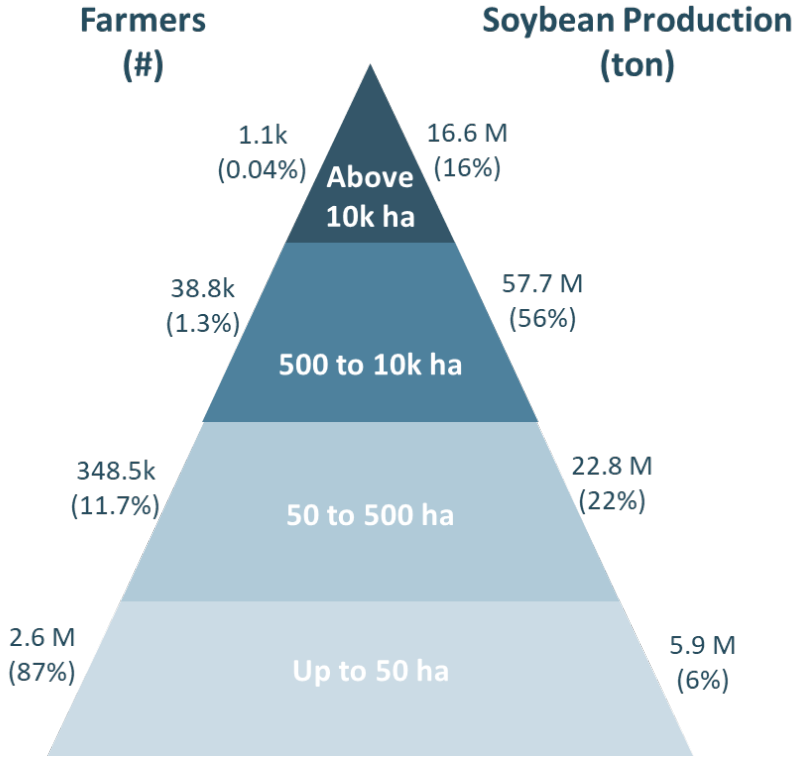
### 2 Producers

From large corporate farming, to large, medium and small farmers, all producers buy inputs directly from manufacturers or ag-retailers. They typically have soybeans as their primary summer crop, and many alternate it with corn, cotton or wheat as winter crops.

Capitalized ones are less dependent from suppliers funding, while less capitalized depends on industries or dealers financing. Financial institutions are more relevant for corporate farming and large producers and can tie loans to environmental requirements. In order to securitize loan operations, suppliers require different types of collaterals such as property rights over to-be-harvested grains ("CPRs") and other assets.

Producers sell their grain mainly to traders/crushers, that can be cooperatives or private companies. Large farmers deal directly with exporters, which can guarantee product traceability and compliance to Soy Moratoriun. Small and medium farmers eventually trade with intermediaries and traceability is hampered, thus imposing challenges to guarantee that Soy Moratoriun in being fulfilled.

## FARMERS PROFILE

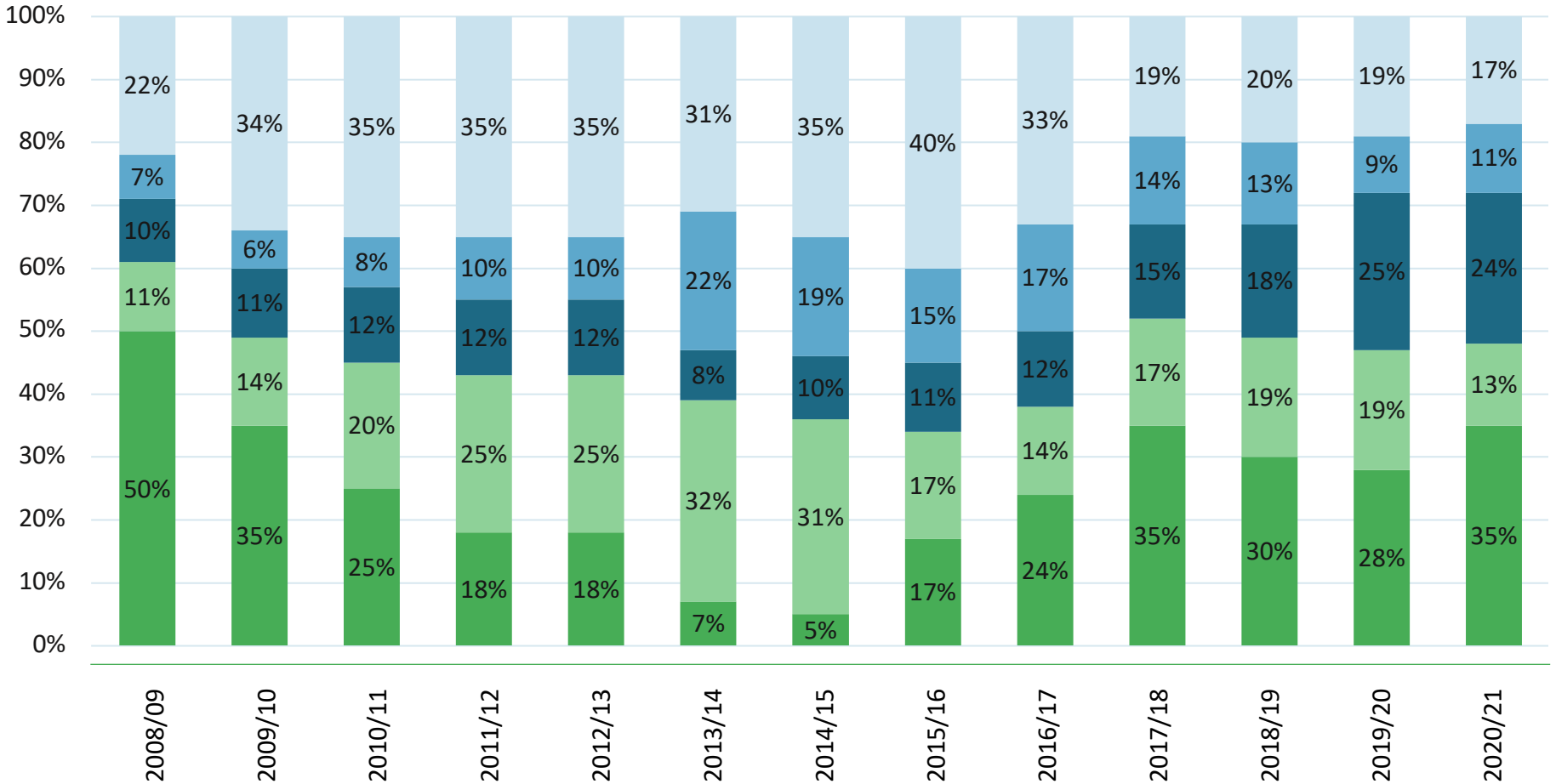



Most of Brazilian soybean production (72%) is concentrated on only 1,34% of total farmers (approximately 38.9 thousands of farmers). Farmers with area bellow 50 hectares, which is a small area to produce soybean, respond to 87% total soybean farmers (approx. 2.6 millions of farmers).

Source: Censo Agropecuário IBGE 2017 and interviews with specialists.

# In the last four years, the funding for soybean crop in Mato Grosso state received a greater supply of credit by the financial system

**Evolution of Soybean Funding in Mato Grosso**
% of Share (2008-2020)




Own resources

Banks with federal funds

Financial System

Resellers

Multinational



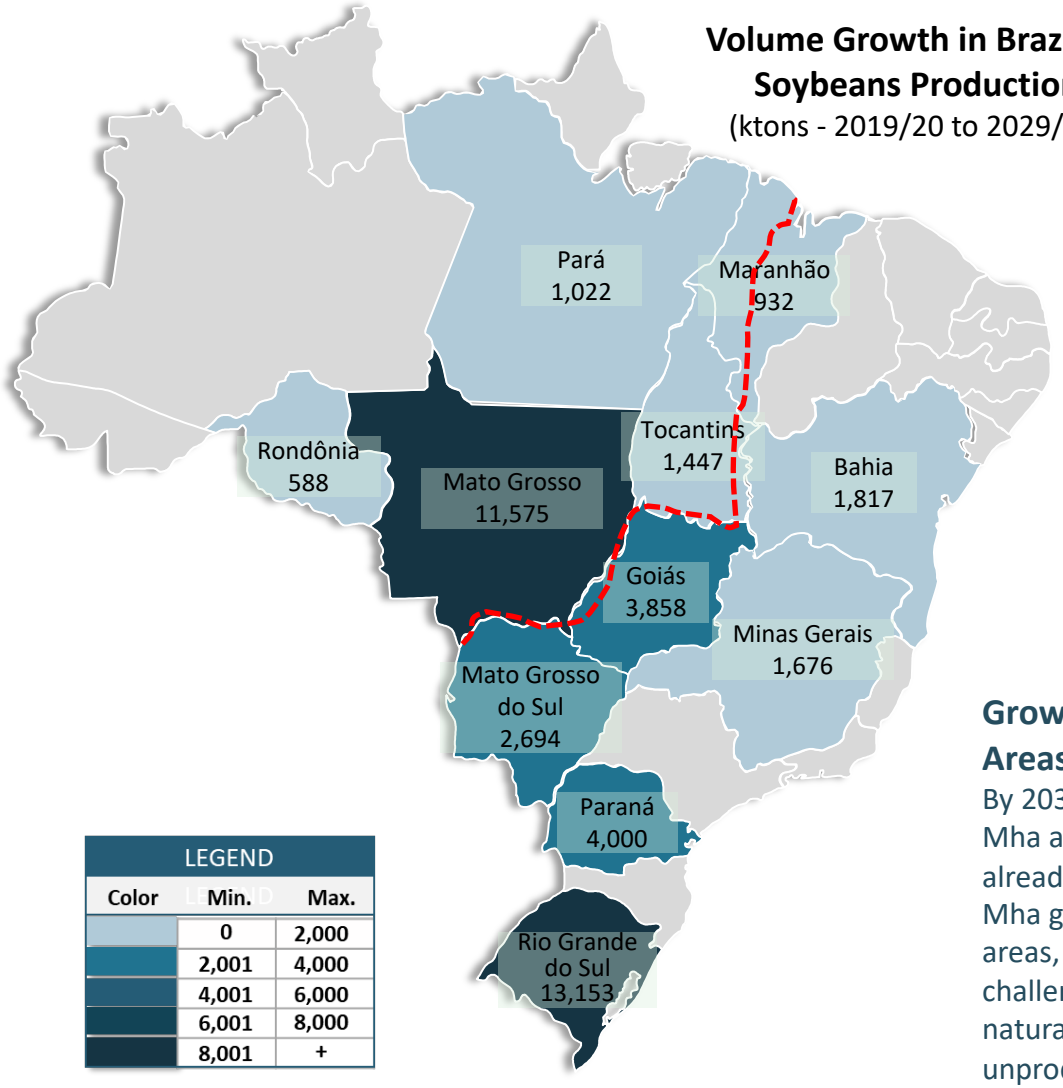
Source: Markestrat Analysis, based on Interviews; IMEA, december, 2019

# In the next decade, soybean production in Brazil is expected to grow 33%, while planted area is expected to grow less than 27%

The planted area is expected to grow **26.6%** over the next decade, mainly due to the conversion of degraded pastureland into soybean area, and the opening of new agricultural areas.

| State | Soybean Production , 2020 (Milion tons) |
|---|---|
| Mato Grosso | 35.4 |
| Paraná | 20.8 |
| Goiás | 12.5 |
| Rio Grande do Sul | 10.8 |
| Mato Grosso do Sul | 10.5 |
| Bahia | 6.0 |
| Minas Gerais | 5.9 |
| Tocantins | 3.4 |
| Maranhão | 3.1 |
| Pará | 1.8 |

**Volume Growth in Brazilian Soybeans Production**
(ktons - 2019/20 to 2029/30)




*Legal Amazon Boundaries*

Legal Amazon is different from Amazon biome, and it encompasses the hole Amazon biome and the Cerrado biome and transitions areas from Cerrado to Amazon.

## Growth challenge: Existing Areas vs. New Areas

By 2030 Soybean area is estimate to increase by 7.2 Mha and most of the growth would come from already cleared pastureland. However, there is a 2.2 Mha growth that is expected to come from new areas, legally cleared over natural habitat. The challenge is to create incentives for farmers to keep natural habitats intact and convert existing unproductive areas into soybean crop land.

Source: GAIN USDA (2020) – Brazilian Agricultural Production and Trade Long-Term Projections, based on FAS/Brasilia Graphic; CONAB Forecasts; MAPA - Projeções do Agronegócio Brasil 19-20 a 29-30; Production: CONAB; TNC – Environmental framewrok for Lending and Investing in Soy in the Cerrado.

# 3 Trading and crushers are the main players after farmers. This segment is dominated by international trading companies which are very export oriented.

## LEVEL PLAYERS


### 3.1 Retailers and Cooperatives

Large retailers and cooperatives trade and/or industrialize soybean, being farmers' partners before and after harvesting.

### 3.2 Tradings and Crushers

National and mainly transnational companies, the sector is considerably consolidated, with five big players responsible for more than 50% of soybean trade. Some trading companies also operates as ag retailers (in the same way some ag retailers, as dealers and cooperatives, enter grain trade and processing. These players sell domestically but are normally very export oriented.

### 3.3 Feed and Food Industry

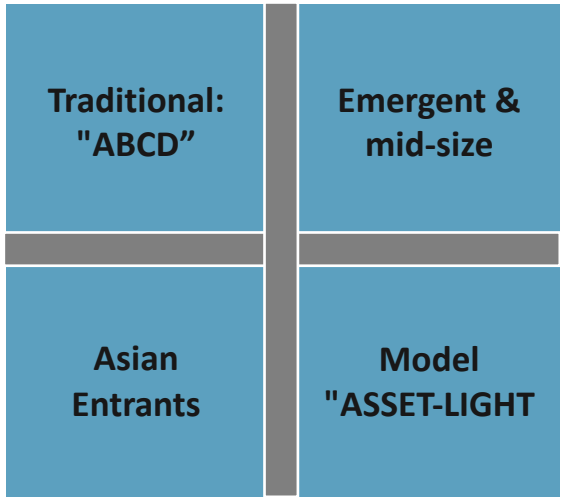
Big or regional companies which use soybean grain, meal or oil to produce by-products, such as animal feed, cooking oil, margarines and biofuel. Agri-food cooperatives are also found at this level. In this segment there is a high degree of interaction with food retailers/wholesalers.

## MAIN ROLE IN THE CHAIN

Connect soybean producers with national and international markets, purchasing, trading and processing soybean grain. Also, trading companies finance farmers when buying inputs in order to secure their grain as part of the payment.

## AGENT PROFILES (TRADINGS)

### Business Scope



# Main trading companies play an important role in monitoring soybean origin and are compliant to Soy Moratorium.

| Traditional: "ABCD" | Emergent & mid-size | Asian Entrants | Model "ASSET-LIGHT" |
|---|---|---|---|
| ADM Cargill<br>LDC Bunge | AMAGGI<br>COAMO CUTRALE | COFCO Olam<br>Marubeni | GAVILON<br>LOTUS |
| **Business model & objectives:**<br>• Main objective is to increase / maintain grain origination, either directly or through exchanges;<br>• The ABCD trading companies account for more than 46% of the exported volume of grains. | **Business model & objectives:**<br>• Traditional challengers with regionalized operating model and diversity of business models: Amaggi - chain integration; Cutrale - optimization of installed capacity; Glencore - pure trading; COAMO - cooperative going to trading; | **Business model & objectives:**<br>• Almost all soy origination is destined for export and operations are related to food security specially for China traders;<br>• Pressures regarding environmental factors and food safety; | **Business model & objectives:**<br>• They do not have storage structures or port terminals and focus on one-off opportunities;<br>• Could work in partnership with other trading companies (e.g. Gavilon trades with Marubeni); |

## SUSTAINABILITY ROLE

Some trading companies are signatories of the Soy Moratorium, established in 2006. To comply with the moratorium, companies develop a monitoring and traceability system to avoid trade soy from illegal origin. Signatories must comply with the Soy Moratorium, however, the "ABCD" group, which responds to half of exports are at the spot and have more structured programs, that reaches other Latin America countries. Besides of traceability programs, some tradings also develop projects on sustainable practices and certification (e.g. Cargill 3S program), however those programs are of limited scope.



Source: Markestrat Analysis, based on interviews and desk research;

# 3 Most of the grain production is consumed by importing countries and used as feed ingredient. Recently, Europe is also importing for biofuel production.

## LEVEL PLAYERS

3.4 Foreign Market

3.5 Final Consumer

3.6 Animal Production

### 3.4 Foreign Market

Countries importing soybean mainly as an ingredient for animal feed and biofuel. China demand for feed ingredient and Europe for biofuel purposes as well.

### 3.5 Final Consumer

Brazilian food manufactures that purchase soybean as input for their food products like margarines and cooking oil. It is a small part of the total market for soybean.

### 3.6 Animal Production

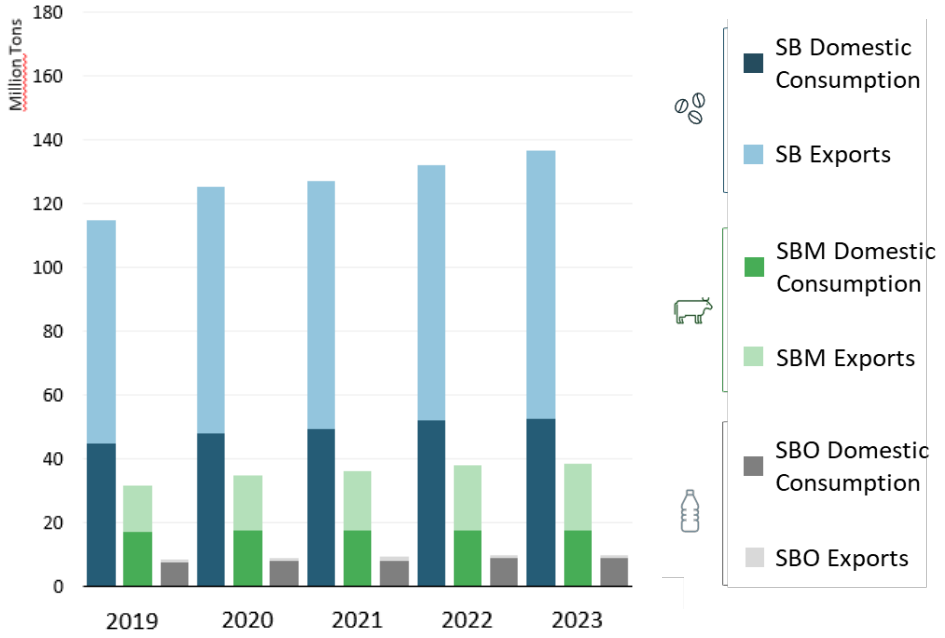
Beef and dairy cattle, poultry and swine producers using bran or processed feed for animal nutrition. Most common use for the soybean remaining in the country.

## MAIN ROLE IN THE CHAIN

Soybean buyers are companies in the food or animal feed industries . They are being challenged to demonstrate their sustainable production practices.

## AGENT NUMBERS

**Projection on Soybean Domestic Consumption and Exports by Type***
Million Tons (2019-2023)




markestrat Agribusiness Source: Markestrat Analysis, based on Outlook FIESP (2020);

SB = soybean (grain) SBM = soybean meal SBO = soybean oil

# 4 Other agents are relevant and have various roles in the soybean chain

### Financial Institutions

Act as funds operators and financers for all players in the chain . Can demand environmental triggers in order to approve loans.

**Rabobank**

**BNDES**

**Banco do Brasil**

**Sicredi**

### Ag-Input Manufacturers Associations

Can help their members to increase the adoption of sustainable practices, related technologies, knowledge.

**ANDAV**

**abisolo**

**ABRAS**

### NGOs

Interact with whole chain, promoting sustainability, educating, monitoring and communicating the relationship between chain members and environment.

**WWF**

**SOS AMAZÔNIA**

**The Nature Conservacy**

**WORLD RESOURCES INSTITUTE**

**GREENPEACE** **RTRS**

### Producers Associations

Defend producers' interests regarding legal questions, governmental support and chain development.

**APROSOJA BRASIL**

### R&D Entities

Related to innovation releasing products and crop handling, being connected with Before farm and on Farm level. They can be government or private owned.

**EMBRAPA Soja**

### Processors Associations

Several associations defending processors interests and providing data for strategic decisions.

**ABIOVE**

**APROBIO**

**ASBRAM**

### Government

Create laws and enforcement regarding to environmental issues and support the development of the chain

**MINISTÉRIO DA AGRICULTURA, PECUÁRIA E ABASTECIMENTO**

**MINISTÉRIO DO MEIO AMBIENTE**

**Conab**

**IBAMA** **MMA**

**CONSELHO NACIONAL DA Amazônia Legal**

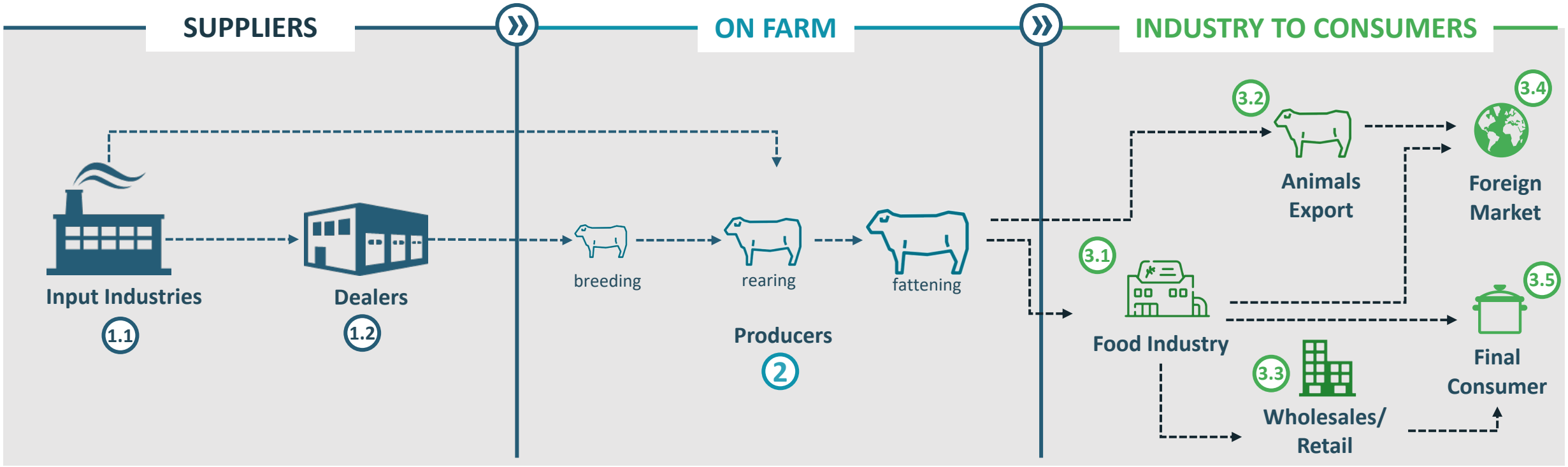
# Content

## Value Chain Map: Cattle chain

# Key Messages

- Beef cattle industry in Brazil is responsible for 8,5% of its GDP;
- Exports represent 24% of the total produced in Brazil, being one of the largest exporting countries in the world;
- The demand for food is growing in the world, which directly impacts this chain in Brazil;
- The number of cattle that passes through feedlot systems is growing;
- Input industries, cooperatives and dealers are the ones that are closer to the producer helping them with products, services and technical assistance;
- The slaughterhouses have an export profile, and the industry is concentrated in a few players. Most of them are aware of the sustainability demands and are currently developing projects in this field;
- Some challenges associated with the beef chain in Brazil are:
    - Opening of new pasture areas specially in the amazon region;
    - Degraded pasture (low investments and extensive production);
    - Lack of education in the field (overall level of education);
    - Difficulties in implementing traceability systems, especially whit indirect producers (those that don’t have any contact with slaughterhouses);

# In 2020, the beef cattle industry accounted for 8.5% of Brazil's GDP




OTHER AGENTS


Financial Companies | Suppliers Associations | NGOs | Producers Associations | R&D Entities | Processors Associations | Government

Source: Markestrat Analysis based on desk reaserch.

# The Brazilian meat industry and its segments (2019)

**Cattle**

Pasture Area
**163 mi ha**

Herd (animals)
**215 mi**

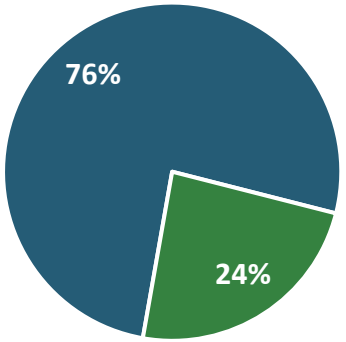
Stocking Rate
**1.3 animal/ha**

**Slaughter 43.3 mi animals**

Animals from Feedlots
**6.1 mi animals (14% of the total)**

**Meat 10.5 MT CWE**

**Domestic Consumption 8 MT CWE**




**Exports 2.5 MT CWE**

| Fresh Meat | Processed | Byproducts |
|---|---|---|
| **82%** | **10%** | **8%** |
| China: 31,9% | USA: 38% | Hong Kong:61,8% |
| Hong Kong: 14,1% | EU: 34,2% | Côte d'Ivoire: 5,8% |
| Egypt:: 9,8% | Jamaica: 2,3% | Egypt:: 5,8% |
| Others: 44% | Others: 25,4% | Others: 26,6% |

Source: Markestrat Analysis based on desk research; ABIEC (2019/20).

# 1 Before-farm level is characterized by suppliers pursuing differentiation and proximity to producers

## LEVEL PLAYERS

Inputs Industries

1.1

Dealers

1.2

### 1.1 Inputs Industries

Include grazing seeds, nutrition, animal health and genetics that go to market directly (large areas) or through dealers. Leading companies are, generally, multinationals seeking for differentiation in terms of service providing, sustainability and innovation. Local companies generally are looking for lower portfolio differentiation with lower prices.

### 1.2 Dealers

Include distributors and cooperatives (more commons in the south of the country), are responsible for meeting medium and small cattle producer's technical assistance as well as delivery inputs. Some of them are involved on feed production with their own animal's food factory.

## MAIN ROLE IN THE CHAIN

Provide inputs, technical assistance and short-term credit for producers.

## AGENT PROFILES (INPUT INDUSTRIES)

| Origin | | |
|---|---|---|
| Global | DSM, CORTEVA, MSD, nutron, Alta | • Service providers;<br>• Global vision;<br>• Seek differentiation;<br>• Innovation in services;<br>• Focus on the global image of the chain. |
| National | Premix, FORT SAL, ourofino, UCBVET, VETNIL | • Product focus;<br>• Regional action in some cases;<br>• Proximity to regional producers;<br>• Sales representatives are used as sales force organization |

Source: Markestrat Analysis based on desk reaserch.

# 2 The opening of new areas by livestock is focused on the Amazon region while grains producers in Cerradoand MATOPIBA are producing cattle aiming at production and income diversification.

## LEVEL PLAYERS


**Producers** ②

### 2 Producers

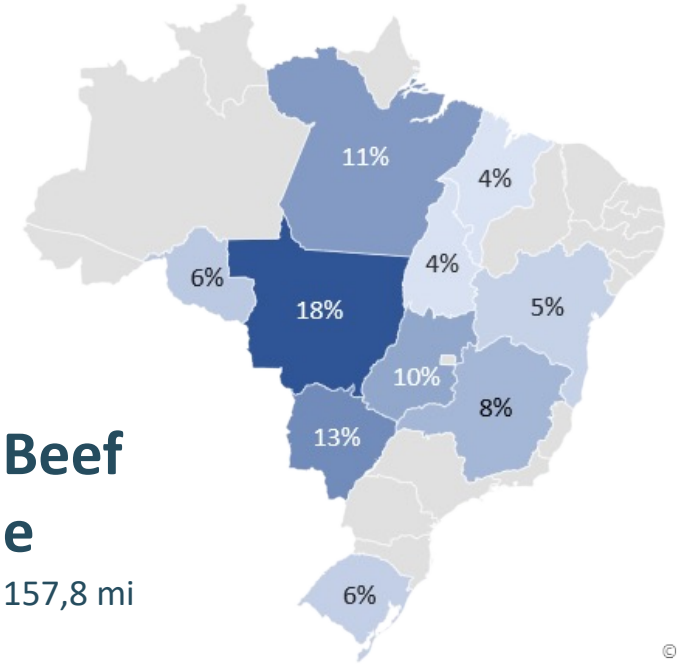
- In Brazil, beef cattle farming has three stages of production: breeding, rearing, and fattening, so there are three different levels of producer visibility, which is a challenge in controlling and tracking the chain;
- They operate in different production models, with different intensification levels (feedlots, pasture supplementation, extensive);
- The producers are in the process of professionalization. Cerrado crop farmers move towards animal production as a form of diversification and drive the wave of professionalization;
- They buy inputs from resellers, cooperatives or directly from the manufactures, depending on the size of their operation;
- Little presence of contracts with animal buyers, or short-term contracts. Most of the sale is made in the spot market;
- Few premium payment initiatives at @ for certifications and differentiated quality.

## MAIN ROLE IN THE CHAIN

The core of chain make use of inputs and land for animal production, selling it majority for slaughterhouses. Considering the need of land and use of soil and water, this level carries a lot of environmental issues, meaning sustainability actions opportunities.

## Herd of Beef Cattle

Brazil (2019) = 157,8 mi




Da plataforma Bing
© GeoNames, Microsoft, TomTom

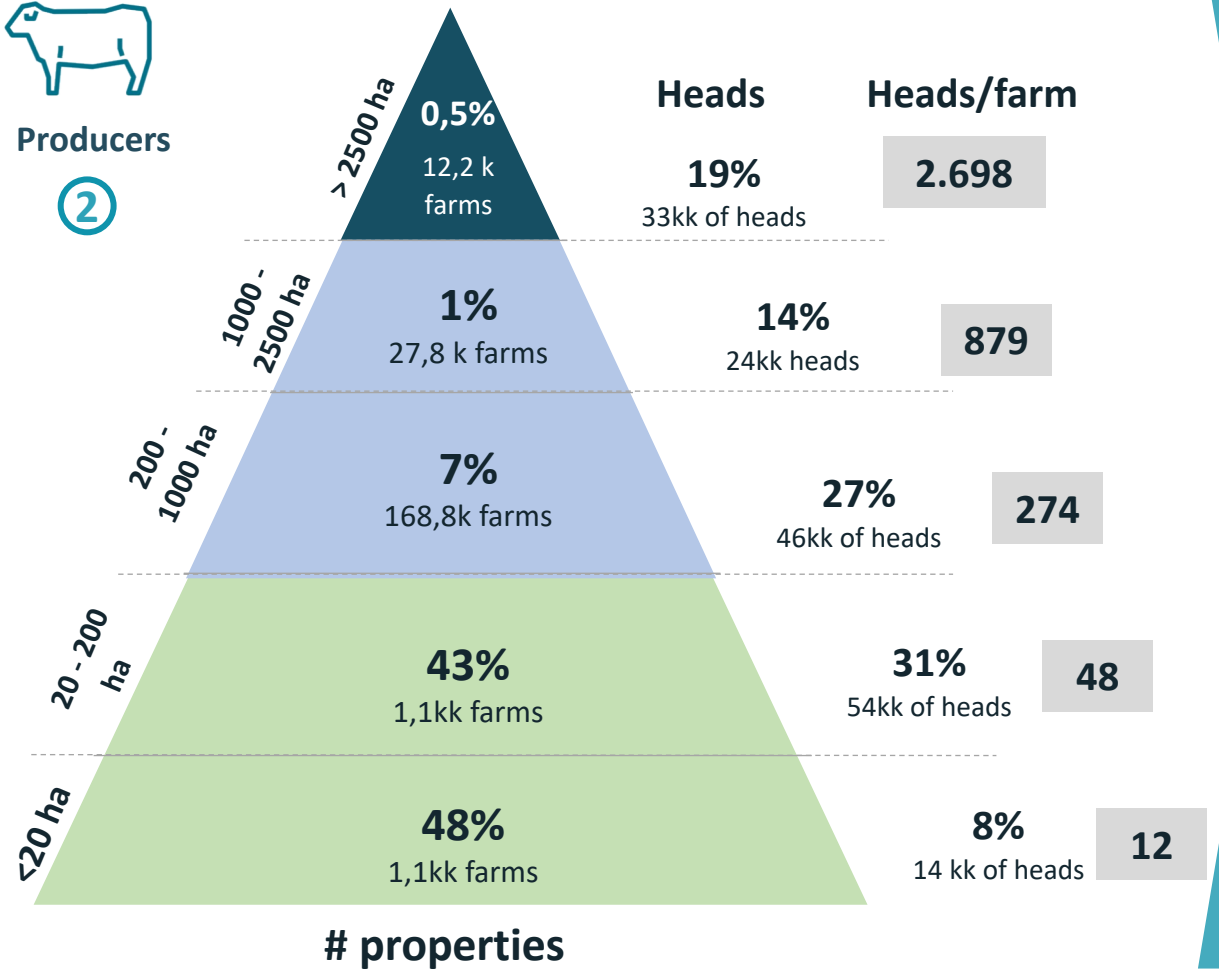


Source: Markestrat Analysis based on desk research; Anualpec, 2020; Proforest Responsible Sourcing and Production Briefings, 2017.

# 2 Mapping the different stages of animal production is a challenge, especially in producers who do not sell animals for slaughter

## LEVEL PLAYERS

Producers ②

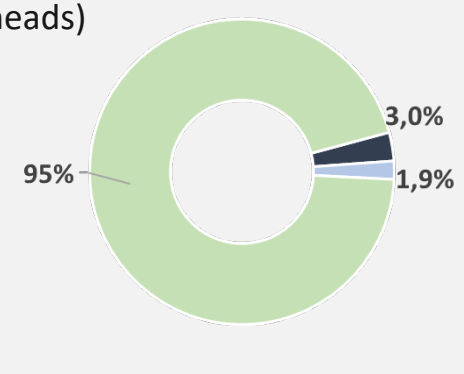



| | Heads | Heads/farm |
|---|---|---|
| > 2500 ha | 19% 33kk of heads | 2.698 |
| 1000 - 2500 ha | 14% 24kk heads | 879 |
| 200 - 1000 ha | 27% 46kk of heads | 274 |
| 20 - 200 ha | 31% 54kk of heads | 48 |
| <20 ha | 8% 14 kk of heads | 12 |

## PRODUCTION SYSTEMS

(% in heads)

Extensive




Feedlots

Pasture Supplementation

## PRODUCERS SEGMENTS

**A**

- Larger producers, with greater participation of feedlots. Agricultural producers who migrated to livestock are also in this group. It tends to have better levels of environmental adequacy and land regulation. Greater capacity for own financing and greater access to credit lines.

**B**

- Producers in the professionalization stage. They represent an important part of Brazilian livestock production. Great opportunities for environmental adjustments, but some of them still do not have land regulation. Greater need and difficulty in accessing credit lines.

**C**

- Smaller producers with low level of professionalization. Mostly in the extensive livestock model and working on degraded pastures. Great difficulty in investing in the business. High incidence of family and subsistence farms.

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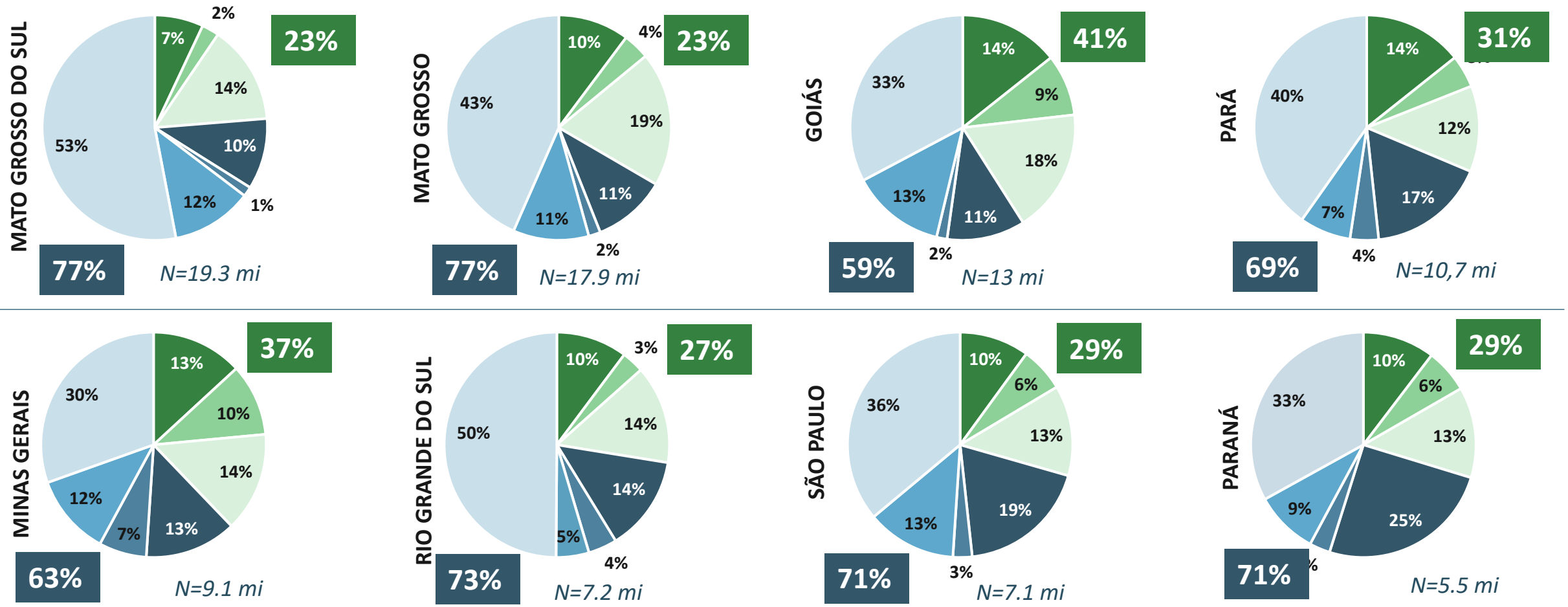
Source: Markestrat Analysis based on desk research; IBGE Censo 2017; Anualpec, 2020.

# 2 MG, GO and PR are the states with the greatest specialization of production, while MS and MT have a high proportion of the complete cycle




Source: Source: Markestrat Analysis based on desk research; IBGE Censo 2006.

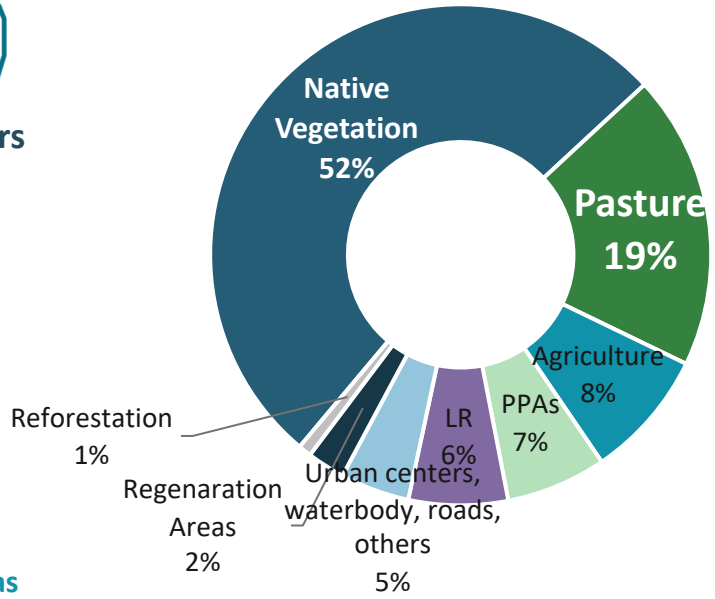
# 2 Land use in Brazil

## LEVEL PLAYERS

Producers

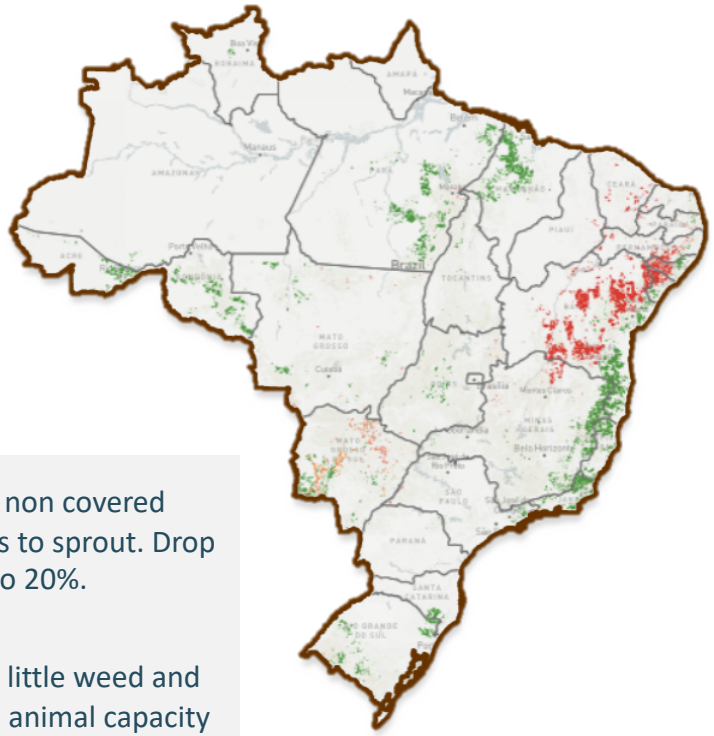
②

### Total Area = 851 mi ha




### Pasture Areas

- Most part of the Brazilian territory is composed by Native Vegetation;
- Producers with high level of technology adoption already have recovered areas;
- The recovered pasture is not significant considering the total pasture area, the mainly opportunity with pasture recovery is in producers with lower technology adoption, most part of them is in the segment B and C (previous slide), which represent almost total pasture area;
- Producers have difficulties to understand and estimate the benefits coming from the pasture recovery. The financial rational should be developed with them.



**Light**: pastures with little non covered areas, but with difficulties to sprout. Drop in animal capacity of up to 20%.

**Moderate**: pastures with little weed and uncovered áreas. Drop in animal capacity of up between 21% and 50%.

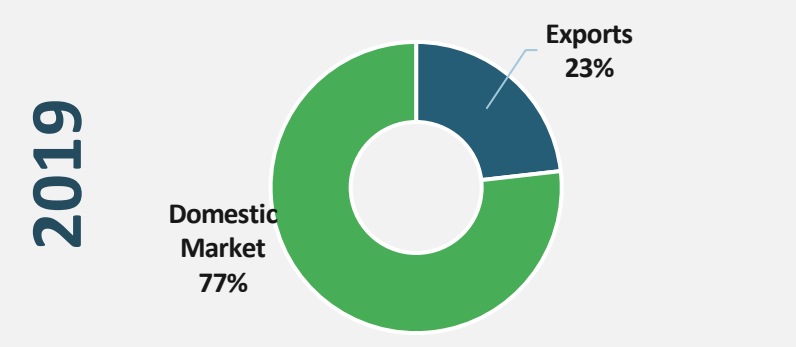
**Severe**: pastures with extensive uncovered áreas, no forage coverage and with signs of erosion. Drop in animal capacity over 80%.

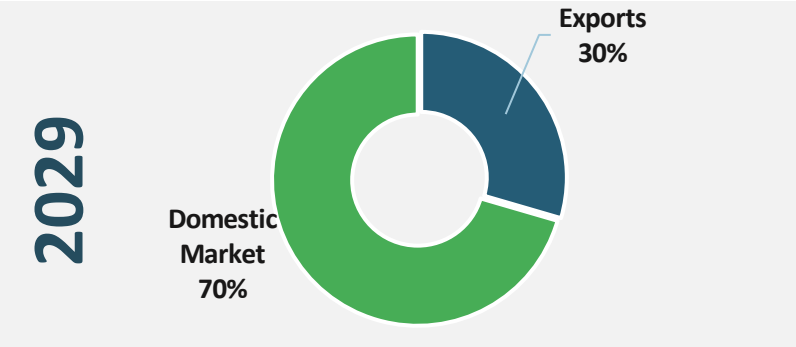


Source: Markestrat Analysis based on desk research; ABIEC, 2020; Athenagro; Agroconsult Data. Agrosatélite; IBGE, 2020.

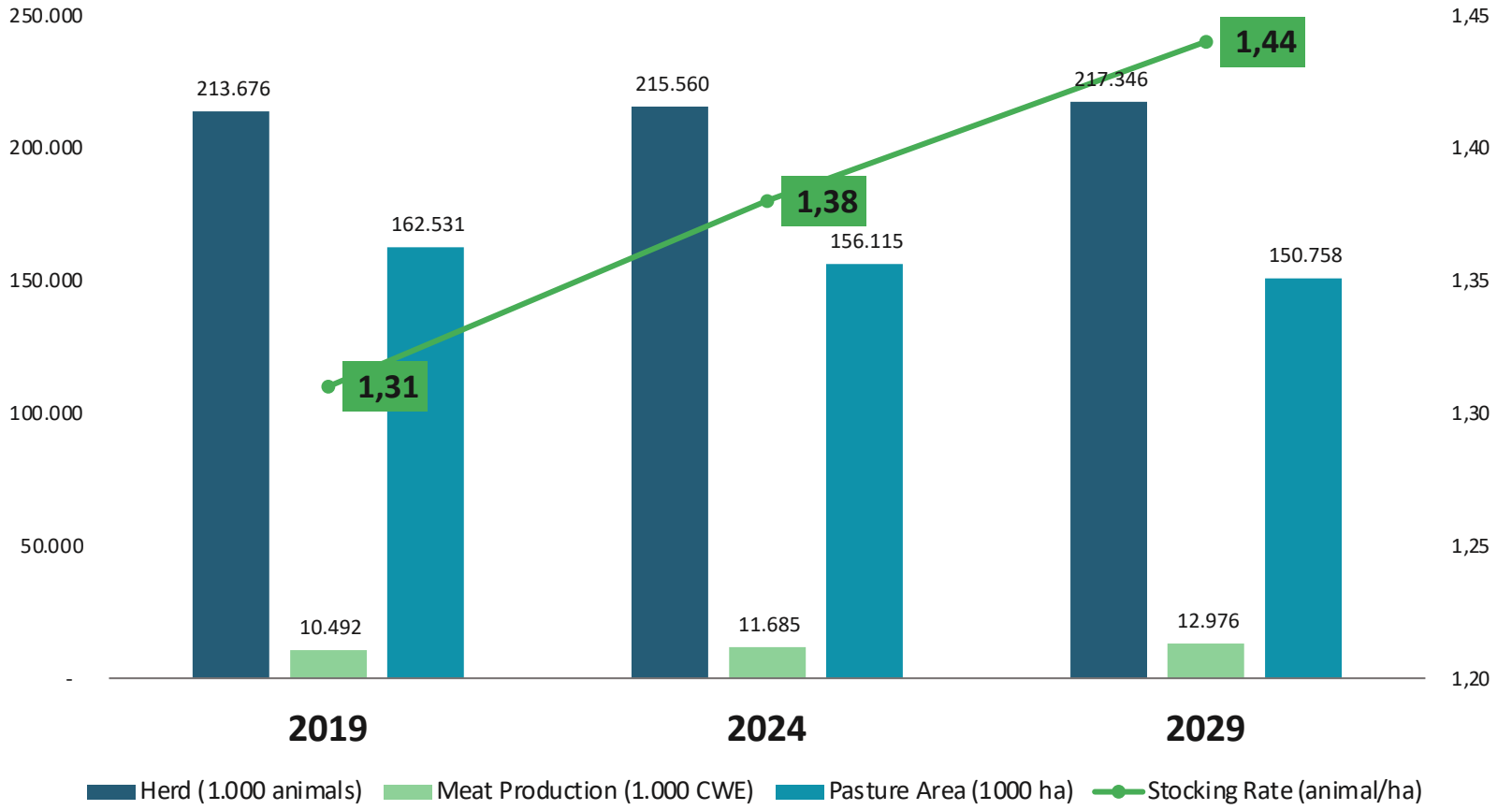
# In the next decade, beef production in Brazil is expected to grow 20%, while pasture area is expected to be reduced in 7%

The pasture area is expected to be reduced in 7% over the next decade, mainly due to the production intensification. The meat demand from the international market will continue to grow.




**Projections in Brazilian Beef Production**
(2019 to 2029)





Source: Markestrat Analysis based on desk research; Athenagro; IBGE; Ministério da Economia; Secex; Projeções do Agronegócio Brasil 19-20 a 29-30.

# 3 After-farm level is composed by slaughterhouses that are responsible to process the beef and sell it in the local or foreign market

## LEVEL PLAYERS

Food Industry

3.1

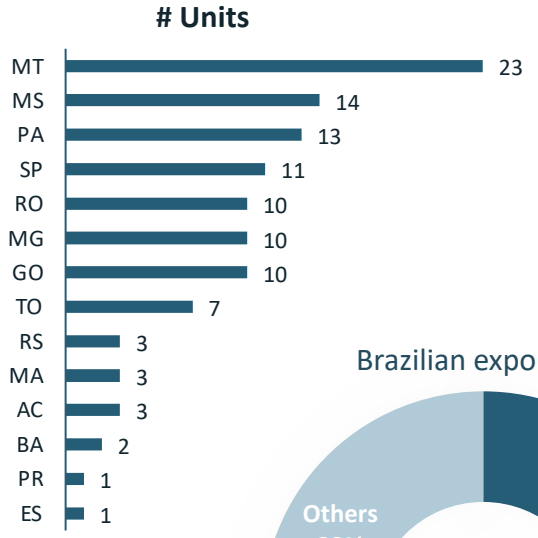
### 3.1 Food Industry

- Industries characterized by their international access as exporters;
- The main product is the in natura meat, but they commercialize processed meat and byproducts too, such as leather, for example;
- The industry in Brazil is very heterogeneous, with large players responding for most part of the slaughter and the international commercialization and local industries developing the regional and municipal markets;
- Big companies are seeking for differentiation in terms of ESG and traceability. The global market is demanding this kind of action. Some slaughterhouses are returning these demands to the farmers and helping them in the transition to adjust to the market requirements.

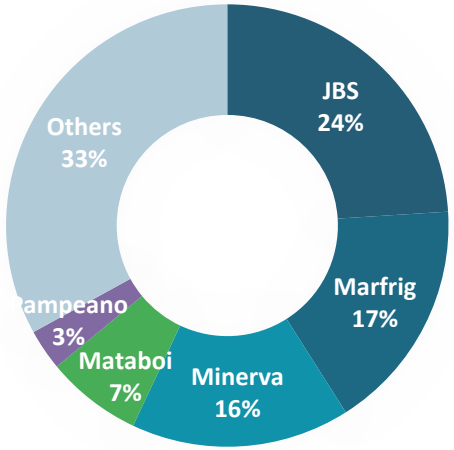
## MAIN ROLE IN THE CHAIN

Responsible to transform the animals in meat and access the consumer market.

## MAP OF SLAUGHTERHOUSES IN BRAZIL


Brazilian exporters





Source: Markestrat Analysis based on desk research; Trase, 2017; ABIEC, 2021.

# 3 After-farm level also comprises the final consumers of meat, which have power of decision for demanding sustainable offers

## LEVEL PLAYERS

3.4 Foreign Market

3.5 Final Consumer

### 3.4 Foreign Market

Countries importing meat mainly in natura or processed. Brazil is the largest exporter in the world. China and Hong Kong are the main Brazilian beef importers.
Commercial barriers and international market requirements make slaughterhouses to seek sustainability differentiators.

### 3.5 Final Consumer

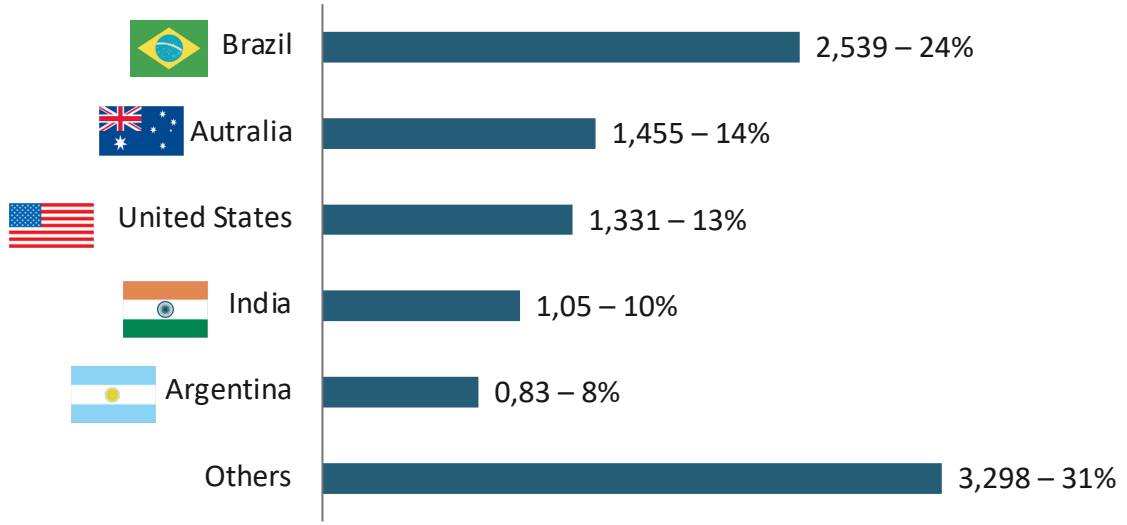
More than 75% of the produced beef in Brazil are commercialized in the domestic market. Brazil is in the top 5 countries regarding per capita beef consumption in the world, just poultry have higher consumption than beef in the country.

## MAIN ROLE IN THE CHAIN

Product consumers. Both in Foreign and Domestic Market consumers are very segmented in terms of purchase criteria such as quality, safety, sustainably and consumption level.

## MEAT WORLD EXPORTS

**Meat World Exports (top 5 countries)**
1.000 MT CWE (2020)




Source: USDA, 2021

# 4 Other agents are relevant and have various roles in the cattle chain

### Financial Companies

Act as funds operators and financers for all players in the chain. Can demand environmental triggers in order to approve loans. Some of the major banks in rural credit in Brazil.

**Rabobank**

**BNDES**

**Banco do Brasil**

**Sicredi**

### Ag-Input Manufacturers Associations

Can help their members to increase the adoption of sustainable practices, related tech nologies, and knowledge.

**SINDAN**

**Sindirações**

**GTPS**

**CNA**

### NGOs

Interact with whole chain, promoting sustainability, educating, mon itoring and communicating the relationship between chain members and environment.

**WWF**

**SOS AMAZÔNIA**

**The Nature Conservacy**

**WORLD RESOURCES INSTITUTE**

**GREENPEACE** **RTRS**

### Producers Associations

Defend producers' interests regarding to legal questions, governmental support and chain development.

**Associação Brasileira de Angus**

**APROVA** **ACRIMAT**

**ABCZ** **Assocon**

**ABC**

### R&D Entities

Related to innovation releasing produc ts and crop handling, being connected with Before farm and on Farm level. They can be government or private owned.

**Embrapa**

**EMATER**

**SENAR**

### Processors Associations

Several associations defending processors interests and providing data for strategic decisions.

**ABIEC**

**ABRAFRIGO**

### Government

Create laws and enforcement regarding to environmental issues and support the development of the chain

**Conab**

**Ministério da Agricultura, Pecuária e Abastecimento**

**Ministério do Meio Ambiente**

**IBAMA**

**Conselho Nacional da Amazônia Legal**

### Traceability Companies

Companies that have technology and methodologies for implementing animal traceability. They can make use of technologies such as blockchain, for example.

**Safe TRACE**

**ecotrace**

**TRACER**

**Rastrovet**

Source: Markestrat Analysis based on desk research.

# Content

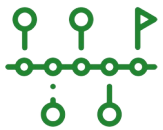
- Step 1: Soybean and cattle main sustainability challenges identification
  - Value Chain Map
  - **Brazil Financing Scenario**
  - Sustainability challenges

# Green bonds: a path to develop a green financial market for a sustainable agriculture in Brazil

The Brazilian Ministry of Agriculture, Livestock and Supply and the Climate Bonds Initiative signed an agreement in November 2019 in order to foster a green financial market for Brazil´s agriculture.

Brazil is the second largest Market for green bond in Latin America: **R$ 27.3 billions (USD 5.3 billions)** (2020 – 37 operations).
Green Bonds in 2020 (world): **R$ 1,387.92 billions (USD 269.5 billions)**

Non-financial companies account for 84% of all emissions, with energy, land use and industry being the most financed categories.



Brazilian green bonds on average cover a term from 5 to 10 years, especially for bigger transactions. Bonds issued for paper & cellulose and renewable energy covered a period over 20 years .

## Examples of green bonds issued in Brazil

| | | |
|---|---|---|
| **brf** | 1st green bond issued in Brazil | Issue date: June 2015<br>Financial Instrument: Senior notes 2.75% p.a. / 7 Years<br>EUR: 500 mn |
| **SUZANO** | 1st sustainability-linked bond issued in Brazil | Issue date: November 2016<br>Financial Instrument: CRA* 96% of CDI 8 years<br>USD: 300 mn<br>Issue date: September 2020<br>**Sustainability-linked bond**: 3.95% p.a. / 10 Years<br>R$ 3.8 billions (USD: 750 mn) |
| **FS Bioenergia** | | Issue date: December 2020<br>Financial Instrument: 10% p.a. / 5 Years<br>R$ 2.8 billions or USD: 550 mn |

*"In three years, Brazil´s agribusiness has the potential to issue **R$ 320 billions (US$ 62 billions)** in green bonds"*

Leisa Cardoso de Souza, Agriculture Coordinator for CBI in Brazil, jan 7th 2021
(Título verde pode injetar R$ 700 bilhões na agricultura brasileira até 2030 | novaCana.com)

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- Source: Destravando o Potencial de Investimentos Verdes para Agricultura no Brasil. Subcomitê de Agricultura. 2020. https://www.climatebonds.net/resources/press-releases/2020/06/lan%C3%A7amento-plano-de-investimentos-verdes-para-agricultura
- Green Bonds – Ecosystem, Issuance Process and Regional Perspectives. Brazilian Edition. https://biblioteca.cebds.org/green-bonds-ecosystem-issuance-process-and-regional-perspectives
- https://www.climatebonds.net/2021/01/record-2695bn-green-issuance-2020-late-surge-sees-pandemic-year-pip-2019-total-3bn
- *Agribusiness Receivables Certificates
- Exchange rate: 2017 – R$ 3,192 / 2018 – R$ 3,6542 / 2019 – R$ 3,9451 / 2020 – R$ 5,1558 / 2021 – R$ 5

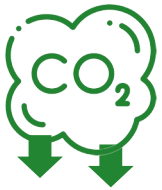
# Brazil´s Investment Plan for Sustainable Agriculture

Brazil has committed to international goals regarding the planet´s climate. The country´s NDC* has established a reduction of 37% (in comparison to 2009) in carbon emissions by 2025, and of 43% by 2030.
In order to achieve these goals, Brazil´s agricultural sector must:

- Increase the use of renewable energy;
- Strengthen the commitment of the producers to the Forest Code;
- Restore 12 million hectares to Forest;
- Strengthen the Low Carbon Agriculture Plan (ABC Plan) as the main strategy for sustainable development in agriculture, including the additional restoration of 15 million hectares of degraded pastures by 2030 and by the increase of 5 million hectares of crop-livestock forest integration systems (iLPF) by 2030
- Achieve the goal of zero illegal deforestation in the Brazilian Amazon.

The Investment Plan for Sustainable Agriculture was designed to provide greater understanding and visibility of the existing green investment opportunities scenario in Brazilian agribusiness, but also to support the creation of a pipeline of projects that can be financed through the issuance of green bonds or other instruments labeled debt.

By 2030, Brazil will need **USD 209.9 to USD 224 billion** to achieve its climate goals, determined in its NDC*. Agriculture, land use and forests are the main sectors in this effort.




It is estimated that **USD 78,9 billions** will be necessary to implemente Brazil´s Forest Code and the Low Carbon Emission Plan (Programa ABC), two central policies for developing a sustainable agriculture.

PRA (Environmental Regularization Program) wil require **USD 32.5 billions** in investments to be implemented – an essential tool for Brazil´s Forest Code. (Accounts for 11 million hectares in Legal Reserves and 8 million hectares in Permanent Preservation Areas)

**Financial instruments available to finance the agricultural sector, with potencial to be 'green', apart from Rural Credit Lines**

| Instrument | Collateral | Issuers | USD 2020 (CETIP) |
|---|---|---|---|
| **CPR/ CPR-F** | Future Agricultural Production / Mortgage or fiduciary alienation of property / assignment of receivables from barter operations | Rural producers, associations and coops | US$ 113 mi (cattle)<br>US$ 425 mi (soybean) |
| **LCA** | Loans backed by agro-business credit between financial institutions and rural producers /cooperatives. | Financial institutions and credit coops | US$ 6.8 Billions |
| **CDCA** | Agribusiness receivables, such as CPR, duplicate Promissory Notes, receivables from the negotiation of agricultural products | Farmers and others engaged in marketing activities, commercialization or industrialization of agricultural inputs** | US$ 246.6 millions |
| **CRA** | CPRs, CDCAs, CDA / WA, Duplicates and Notes Promissory arising from commercialization of agricultural products. | Securitizing companies | US$ 2.1 billions |
| **CDA/WA** | Products in warehouses | Warehouses and deposits | No value informed |

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*NDC – National Determined Contributions, comitted to in the Paris Agreement. The Paris Agreement is a treaty under the United Nations Framework Convention on Climate Change (UNFCCC), which governs measures to reduce greenhouse gas emissions from 2020 and to strengthen the countries' capacity to respond to the challenge, in a context of sustainable development.
Source: Destravando o Potencial de Investimentos Verdes para Agricultura no Brasil. Subcomitê de Agricultura. 2020. https://www.climatebonds.net/resources/press-releases/2020/06/lan%C3%A7amento-plano-de-investimentos-verdes-para-agricultura
**products, supplies, inputs or machines and implements used in agricultural activities

# ABC+ Program is the federal program to tackle Paris Agreement challanges and objectives in Brazil

| ABC+ Program Pillars' | ABC+ Program targets (2030) | ABC+ program results |
|---|---|---|
| Recovery of degraded pastureland | Recovery of 15 million hectares of degraded pastureland and mitigate 83 to 104 million tons of carbon equivalent (t CO2eq) | Between 2010 and 2018 there were recovered 4.46 million hectares of degraded pastureland and mitigation achieved 16% of target; |
| Crop-livestock forest and agroforest systems (ILPF) | Stimulate the adoption of 4 million hectares of ILPF and mitigate 18 do 22 million tons of carbon equivalent (t CO2eq) | Between 2010 and 2016, 146% of ILPF conversion target was achieved and 110% of CO2eq target. |
| No tillage system | Adopt 8 million hectares of no tillage system and mitigate 16 million tons of carbon equivalent (CO2eq). | Until 2016, 125% of no tillage area target was achieved and 101% of mitigation target. |
| Biological Nitrogen Fixation (BNF) | Stimulate the adoption of 5.5 million hectares of BNF and mitigate 10 million tons of CO2eq. | Until 2016, 181% of BNF target was achieved and 182% of CO2eq target was achieved; |
| Planted Forest | Stimulate the forestation of 3 million hectares of economically explored forest and mitigate 8 to 10 million tons of carbon equivalent (CO2eq). | Between 2010 and 2018, 1.1 million hectares of forest were planted (37% of target) and mitigation achieved 25% of target. |
| Animal effluent treatment | Stimulate the treatment of 4.4 million cubic meter of animal effluent and contribute to mitigation of 6.9 million of CO2eq. | Until 2018, 38% of the effluent treatment target was achieved and 39% of CO2eq target achieved. |

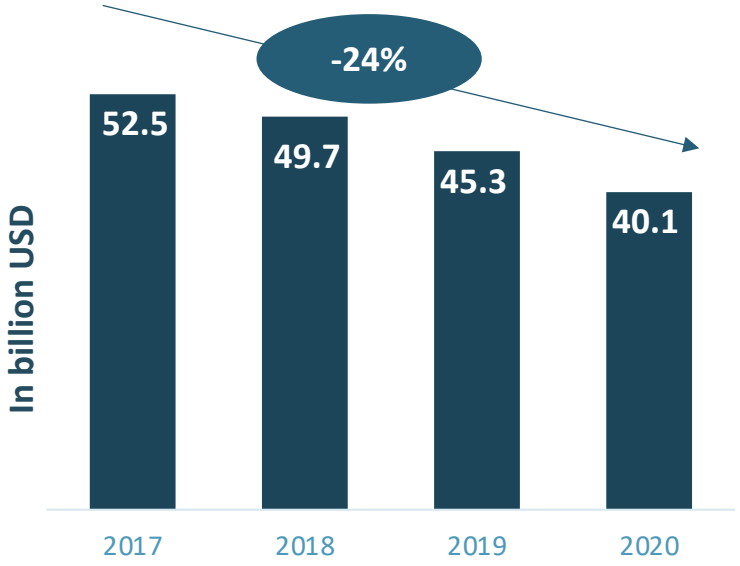


Source: https://wribrasil.org.br/pt/blog/2019/07/entenda-o-plano-abc-politica-brasileira-para-agricultura-de-baixo-carbono. Based on

# Brazil´s Rural Credit: an overview

Rural credit represents the financing mechanisms and programs focused on Brazil´s rural sector. Farmers use the resources granted through credit lines by financial institutions in a variety of ways on their property. For example, they can invest in new equipment and animals or pay for ag-inputs for cultivation. They can also use these resources to commercialize and industrialize their production output. These are called rural credit purposes.

## Evolution of Brazil´s granted rural credit




In R$, the volume increased in 23% during the period.

## Potential beneficiaries

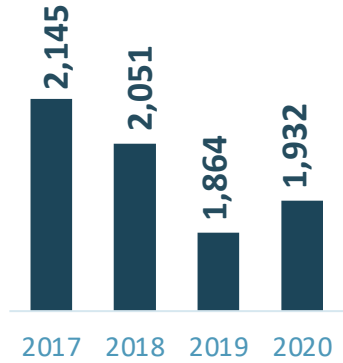
Farmer

Farmer Coops

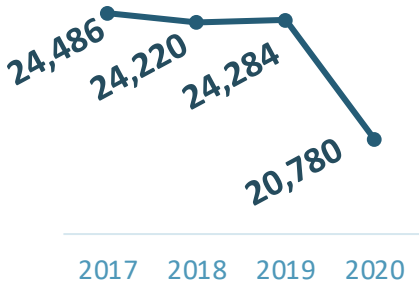
Professional or company involved in researcher or agriculture services. Examples: research or production of certified seedlings or seeds, semen for artificial insemination and embryos and forestry activities.

Commercialization services

## NUMBER OF RURAL CREDIT CONTRACTS (in thousands)




## AVERAGE TICKET (In USD)




In R$, the average ticket increased by 37%

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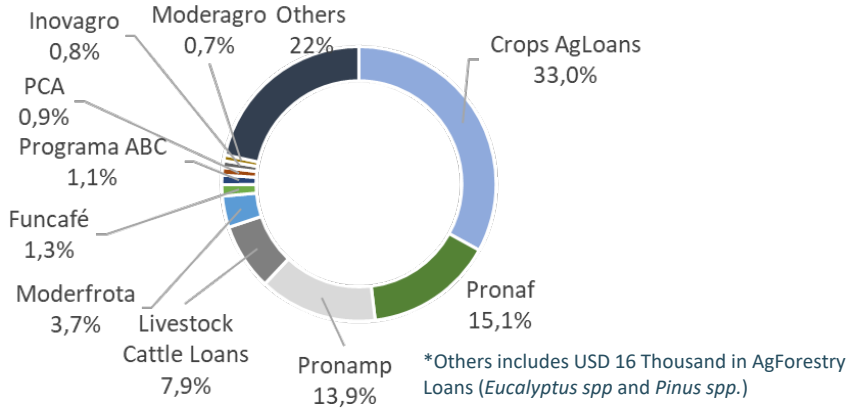
Source: Bacen (Brazil´s Central Bank). https://www.bcb.gov.br/estabilidadefinanceira/creditorural
Exchange rate: 2017 – R$ 3,192 / 2018 – R$ 3,6542 / 2019 – R$ 3,9451 / 2020 – R$ 5,1558

# In 2020, Brazil granted USD 40 bi in rural credit. Only 1% was destinated to "Programa ABC". Majority of loans are short term.

## Credit lines for rural loans granted in 2020.

**US$: 40 billions** **R$: 207 billions**

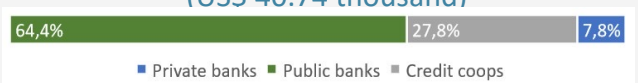



*Others includes USD 16 Thousand in AgForestry Loans (*Eucalyptus spp* and *Pinus spp.*)

| Credit line | Description |
|---|---|
| Crops Agloans | Credit for production costs of agricultural activities and inputs. |
| Pronaf | National Program for Strengthening Family Farming. |
| Pronamp | Financing for funding and investments of medium-sized rural producers in agricultural activities. |
| Livestock Cattle Loans | Credit for production costs of livestock cattle activities and inputs. |
| Moderfrota | Financing for the purchase of tractors, harvesters, cutting platforms, sprayers, planters, seeders and equipment for processing coffee. |
| Funcafé | Credit lines for coffee producers |
| Programa ABC | Credit line for low-carbon agriculture |
| PCA | Financing to producers and rural coops for the construction, expansion, modernization or renovation of warehouses. |
| Inovagro | Financing for incorporating technological innovations in rural properties, aiming at increasing productivity and improving management. |
| Moderagro | Financing for projects to modernize and expand productivity in the agricultural sectors, and for actions aimed at soil recovery and animal protection. |

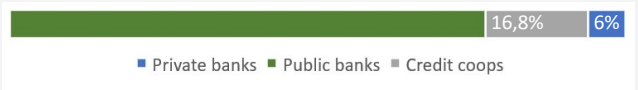
### Crops AgLoans: Soybean

- R$: 33.51 billions (US$ 6.5 bi)
- Area: 13.6 million hectares (36% area)
- Quantity: 159,349 loans
- Average ticket: R$ 209.84 thousand (US$ 40.74 thousand)




### Livestock Cattle Loans

- R$: 16.48 billions (US$ 3.2 billions)
- Area: 10.9 million hectares (6,5% area)
- Quantity: 207,693 loans
- Average ticket: R$ 78.28 thousand (US$ 15.2 thousand)



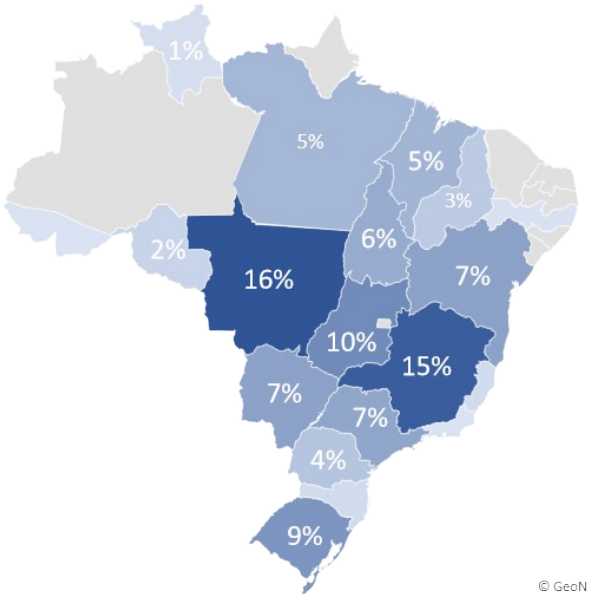

Source: Bacen (Brazil´s Central Bank). https://www.bcb.gov.br/estabilidadefinanceira/creditorural
Exchange rate: 2017 – R$ 3,192 / 2018 – R$ 3,6542 / 2019 – R$ 3,9451 / 2020 – R$ 5,1558

# “Programa ABC” fund is insufficient to meet forestry code adequacy.

**Programa ABC**

- R$ 2.3 billions (US$: 449.7 Million)
- Area: 889 thousand hectares
- Quantity: 4.644 loans
- Average ticket: R$ 498.5 thousand (US$ 96.8 thousand)

**Programa ABC loan distribution in Brazil**




- In 2020, “Programa ABC” granted around R$2.3 billions (US$450 million) for farmers;
- As mentioned before, to adequate to current forestry code Brazil needs a total of R$406.3 billions (US$78.9 billions);
- As a rough estimate, considering that “Programa ABC” is the only relevant federal program to incentive reforestation and forestry code adequacy, it would be necessary 175 years at the current pace to keep up with the code;
- There are other alternatives to raise funds to reforest, such as green bounds, but those are rare and assessable to corporate business;
- Other credit lines could be used to implement forest code adequacy, but this is neither mandatory or designed for that propose;

Source: Bacen (Brazil´s Central Bank). https://www.bcb.gov.br/estabilidadefinanceira/creditorural
Exchange rate: 2017 – R$ 3,192 / 2018 – R$ 3,6542 / 2019 – R$ 3,9451 / 2020 – R$ 5,1558

# Details of credit lines for rural loans

★ Credit line with direct impact on NDC's objectives.

★ Credit line with indirect impact on NDC's objetives. Could generate impact but is not direct related;

| Credit line | Description | Interest rate | Payment term | Maximum value |
|---|---|---|---|---|
| Programa ABC ★ | Credit line for low-carbon agriculture | 4.5% (environmental ABC) to 6% per year | The payment term is up to 12 years, including a grace period of up to 8 years, depending on the purpose of the credit. Principal: semiannual or annual installments, according to the revenue flow of the benefited property, with the base date (payment) always on the 15th. Interest charges: during the grace period, interest must be paid at the same periodicity as the principal. During the amortization phase, interest is paid together with the principal. | Up to 100% of the value of the items subject to financing, limited to up to R$ 5 million (US$ 1 million), per beneficiary, per agricultural year* |
| Pronaf Woman ★ | Investment credit to meet the needs of rural women producers. It is possible to finance investments for the construction, renovation or expansion of improvements and installations on the rural property. And also the acquisition of machinery, equipment and implements, the acquisition of matrices, the formation and recovery of pastures, protection and correction of the soil, the acquisition of goods such as tractors and boats, among other activities. | Groups A, A / C or B: 0.5% per year and Family farmers: 4% per year | Groups A, A / C and B *: up to 2 years. Other farmers: up to 5 years, including up to 1 year grace period for financing motorcycles adapted to rural activity and cargo trucks, except trucks. up to 10 years, including up to 3 years grace period for other financing. | For beneficiaries of groups A, A / C and B: ceiling of R$ 2.5 thousand (US$ 500) per beneficiary. For family farmers: ceiling of R$ 165 thousand (US$ 32 thousand) per beneficiary per agricultural year, regardless of those defined for other investments under Pronaf. |
| Pronaf Agroflorestal ★ | Pronaf Florestal offers credit to invest in agroforestry systems, ecologically sustainable extractive exploitation, forest management plan, including costs related to the implementation and maintenance of the project, restoration and maintenance of permanent preservation areas and legal reserve. Also included are the recovery of degraded areas and the enrichment of areas that already have diversified forest coverage, with the planting of one or more forest species, native to the biome. | 2.75% per year | For agroforestry systems: up to 20 years, with up to 12 years grace period. For other financing: up to 12 years, with up to 8 years grace period. | Exclusively for agroforestry system projects, except for beneficiaries of groups A, A / C and B: ceiling of R$ 60 thousand (US$ 12 thousand) per beneficiary. For other purposes, except for beneficiaries of groups A, A / C and B: ceiling of R$ 27.5 thousand (US$5.33 thousand per beneficiary. For beneficiaries of groups A, A / C and B: ceiling of R$ 15 thousand (US$2.9 thousand) per beneficiary. |

markestrat Agribusiness

Source: Banco do Brasil (www.bb.com.br)
*Agricultural year: months starting July thru June
Exchange rate: 2017 – R$ 3,192 / 2018 – R$ 3,6542 / 2019 – R$ 3,9451 / 2020 – R$ 5,1558 / 2021 – R$ 5

# Details of credit lines for rural loans

| Credit line | Description | Interest rate | Payment term | Maximum value |
|---|---|---|---|---|
| Pronamp Investment | Financing for funding and investments of medium-sized rural producers in agricultural activities. | 6% per year | The payment term is up to 8 years, with a grace period of up to 3 years. The financing is paid in semiannual or annual installments. | The financeable limit is up to 100% of the investment value and the financing ceiling is up to R$ 430 thousand (US$ 86 thousand), per beneficiary, per agricultural year. |
| PCA | Financing to producers and rural coops for the construction, expansion, modernization or renovation of warehouses. | The interest rate is 5% per year for investments related to grain storage of units with a capacity of up to 6 thousand tons and 6% a.a. for other investments. | The payment term is up to 13 years, with a grace period of up to 3 years. The principal amount is paid in semiannual or annual installments, with the base payment date always on the 15th. Interest charges are paid at the same periodicity as the principal payment, including during the grace period. | The financeable limit is up to 100% of the value of the project, and for investments related to grain storage, there is no ceiling. For other investments, the ceiling is R$ 25 millions (US$ 5 million), per beneficiary, per agricultural year. |
| Inovagro (BNDES) | Financing for incorporating technological innovations in rural properties, aiming at increasing productivity and improving management. | 6% per year | The payment term is up to 10 years, including a grace period of up to 03 years, depending on the item financed.<br>The principal amount is paid in semiannual or annual installments and the base payment date must always be on the 15th. When using BNDES resources, the payment follows a specific system. Interest charges are paid at the same periodicity as the principal payment, including during the grace period. | Financeable limit is up to 100% of the proposed amount and the financing ceiling is up to R$ 1,300 millions (US$ 260 thousand), per beneficiary, per agricultural year, for individual enterprise and, up to R$ 3,900 millions (US$ 780 thousand) for collective enterprise, respecting the individual ceiling per participant . |
| Moderagro (BNDES) | Financing for projects to modernize and expand productivity in the agricultural sectors, and for actions aimed at soil recovery and animal protection. | 6% per year | The payment term is up to 10 years, including a grace period of up to 03 years.<br>The principal amount is paid in semiannual or annual installments and the base payment date must always be on the 15th. Interest charges are paid at the same periodicity as the principal payment, including during the grace period. | Up to R$ 880 thousand (US$ 176 thousand), per beneficiary, per agricultural year, for an individual enterprise, and up to R$ 2.64 millions (US$ 528 thousand) for a collective enterprise, respecting the individual ceiling per participant. |



Source: Banco do Brasil (www.bb.com.br)
Exchange rate: 2017 – R$ 3,192 / 2018 – R$ 3,6542 / 2019 – R$ 3,9451 / 2020 – R$ 5,1558 / 2021 – R$ 5

# Details of credit lines for rural loans

| Credit line | Description | Interest rate | Payment term | Maximum value |
|---|---|---|---|---|
| Moderfrota (BNDES) | Financing for the purchase of tractors, harvesters, cutting platforms, sprayers, planters, seeders and equipment for processing coffee. | 7.5% per year | The payment term is up to 7 years for new items and up to 4 years for used items.<br>The payment must be made in semiannual or annual installments, according to the revenue flow of the benefited property, the base date being always the 15th and the first installment should occur within 14 months after contracting. | Up to 85% of the value of the assets being financed. |
| Moderinfra (BNDES) | Credit to support the development of sustainable, economically and environmentally irrigated agriculture, to encourage the use of structures for production in a protected environment and to protect fruit production in regions with a temperate climate against the incidence of hail. With Moderinfra, you, a rural producer, can finance items inherent to irrigation systems, in addition to the acquisition, implantation and recovery of equipment and installations for the protection of crops inherent to olericulture, fruit, floriculture, coffee and production of seedlings of forest species. | 6% per year | The payment term is up to 10 years, with a grace period of up to 3 years. The principal amount is paid in semiannual or annual installments, with the base payment date always on the 15th. Interest charges are paid at the same periodicity as the principal payment, including during the grace period. | The financeable limit is up to 100% of the proposed amount and the financing ceiling is up to R$ 3.3 millions (US$ 660 thousand) per agricultural year, for an individual enterprise, and up to R$ 9.9 millions (US$ 1.98 millions) for a collective enterprise, respecting the individual ceiling per participant. |
| FCO Rural | FCO Rural Investimento Agropecuário is the credit destined to fixed and semi-fixed investments in the Midwest region.<br>With it you can finance the purchase of materials and equipment for use for storage, dams, civil works, machinery, implements, energy, irrigation, among other activities. | 4.3% to 5.6% per year | Up to 20 years, with up to 12 years grace period, depending on the item financed. | The financeable limit is up to 100% of the proposed amount, depending on the size of the producer and the financing ceiling is R$ 20 millions (US$ 4 millions) |

Source: Banco do Brasil (www.bb.com.br)
Exchange rate: 2017 – R$ 3,192 / 2018 – R$ 3,6542 / 2019 – R$ 3,9451 / 2020 – R$ 5,1558 / 2021 – R$ 5

# Content

## Step 1: Soybean and cattle main sustainability challenges identification

- Value Chain Map
- Brazil Financing Scenario
- **Sustainability challenges**

# Challenge´s classification

The sustainable environment challenges were classified according to:

## Scope

The Scope considered represent the key sustainability risks.

- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

## Context

The challenge is related to an institutional context, to a social issue (farmer) or to the production system.

- C1 Inst. Environment
- C2 Farmer
- C3 Production system

## Impact Level

The scope of the impacts of the environmental issues, from local to regional, and national.

- I1 Local
- I2 Regional
- I3 National

## Farm size

Farm size can indicate the impact of challenges.

- F1 Small
- F2 Medium
- F3 Large

## Agri3 Result Area

The Agri3 results areas covered by the challenges.

- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

# Content

- Sustainability challenges: Soybean chain

# Sustainability Challenges: Soybean Chain

| Challenge | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| 1. Weeds and bugs resistance | S1 S2 S4 | C2 C3 | I1 | F1 F2 F3 | R2 |
| 2. Climate change effects | S1 S3 | C3 | I1 | F1 F2 F3 | R2 |
| 3. Soil fertility | S1 S2 S4 | C2 C3 | I2 | F1 F2 F3 | R2 |
| 4. Biodiversity loss | S2 | C3 | I3 | F1 F2 F3 | R1 |
| 5. Water footprint | S1 | C3 | I1 I2 | F3 | R2 |
| 6. Deforestation and traceability | S1 S2 S3 S7 | C2 | I2 | F2 F3 | R1 |

**Scope**

- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

**Context**

- C1 Inst. Environment
- C2 Farmer
- C3 Production system

**Impact Level**

- I1 Local
- I2 Regional
- I3 National

**Farm size**

- F1 Small
- F2 Medium
- F3 Large

**Agri3 Result area**

- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

# Sustainability Challenges: Soybean Chain

| Challenge | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| 7. Forestry code compliance | S1 S2 S3 | C1 | I3 | F1 F2 F3 | R1 |
| 8. Legal deforestation | S1 S2 S3 | C1 | I2 | F2 F3 | R1 |
| 9. Education and knowledge | S5 S9 | C1 | I3 | F1 F2 F3 | R3 |
| 10. Lack of infrastructure and public services | S5 | C1 | I1 I2 | F1 F2 | R3 |

**Scope**

- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

**Context**

- C1 Inst. Environment
- C2 Farmer
- C3 Production system

**Impact Level**

- I1 Local
- I2 Regional
- I3 National

**Farm size**

- F1 Small
- F2 Medium
- F3 Large

**Agri3 Result area**

- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

# 1. WEEDS AND BUGS RESISTANCE

| Criteria | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S1, S2, S4 | C2, C3 | I1 | F1, F2, F3 | R2 |

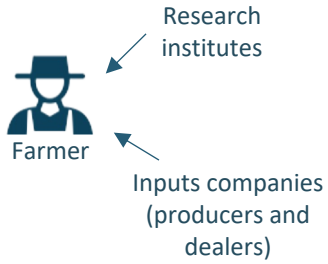
## Description
What is the challenge?

Brazil is the 5th country in the world with more cases of resistance to chemicals commonly used in agriculture. The resistance is the characteristic of a population to survive and reproduce when exposed to a certain dose of a chemical that would be sufficient to control the susceptible population. Weed resistance to herbicides, for example, increases by 6.2% per year and affects soybean yields by 20%.

## Environmental Impacts
Why is this a challenge?

- With the increase of weeds and pest resistance, it is necessary to increase the use of chemicals in the area, causing higher production costs for the producer and greater impact to the environment. In the case of herbicides, there is a recommendation to use 0.5 liters, jumping to 1.5 liters, up to 3 liters per hectare of contact, due to resistance.

## Agents Network




## Root causes
What are the root causes?

- Incorrect use of refugee areas that are necessary to slow resistance development.
- Successive use of the same active ingredient ends up inducing a change in the selection process of plants, even when these are applied in the correct doses
- Inadequate use of agronomic practices such as Integrated Pest Management Systems.

## Initiatives
Which are the current practices or initiatives?

- Rotation of chemicals and weed/pest control methods
- Cleaning the area (both the planting line and between the rows)
- Adoption of Integrated Pest Management System which encompass: Biological control, Crop rotation, Mechanical control, Chemical control and rotation of active ingredients.
- In the past, Monsanto company had a project that rewarded farmers for the use of refugee areas;

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat Analysis based on Interviews; Embrapa (2020); Sparks Companies Inc. (2016)

# 2. CLIMATE CHANGE EFFECTS

| Criteria | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S1, S3 | C3 | I2 | F1, F2, F3 | R2 |

## Description
What is the challenge?

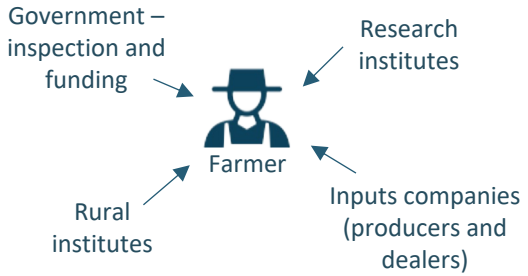
Agriculture is an activity highly dependent on climatic factors, therefore, changes in climate can affect agricultural production in several ways.

## Environmental Impacts
Why is this a challenge?

Climate change can affect agricultural activity in different ways:

- Increased variability in annual rainfall and temperature indices
- Reduction of arable land
- Decrease of irrigation potential and biodiversity
- Reduction of water in the soil
- Change in the occurrence and severity of pests and diseases.

## Agents Network




## Root causes
What are the root causes?

Natural causes such as changes in solar radiation and the Earth's orbital movements or it can be a consequence of human activities that cause global warming or increased GHG emissions, such as:

- Burning fossil fuels for energy generation
- Industrial activities and transportation
- Solid waste disposal (garbage)
- Deforestation

## Initiatives
Which are the current practices or initiatives?

- ABC public program which is a financial tool for farmers to invest in practices such as reforestation, recovery of degraded areas and enhancement of forest sustainable management practices
- Investments in low carbon technologies
- Promoting the use of renewable energy

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat Analysis based on Interviews; WWF (accessed march 2021)

# 3. SOIL FERTILITY

| Criteria | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S1, S2, S4 | C2, C3 | I1, I2 | F1, F2, F3 | R2 |

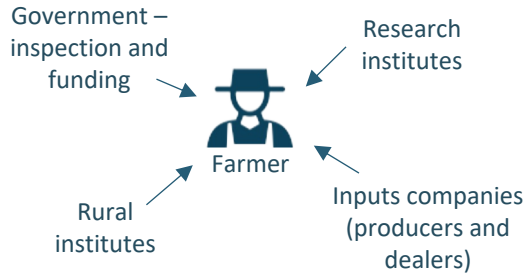
## Description
What is the challenge?

The direct effects caused by erosion and better soil management practices are related to damage to the chemical and physical properties of the soil, such as the loss of nutrients, organic matter, plant-available water, and loss of arable land. Brazil has R$ 25 billions (US$ 5 billions) per year in losses of soil in rural properties.

## Environmental Impacts
Why is this a challenge?

These effects cause producers to have to use additional fertilizers to maintain soil fertility, due to runoff of nutrients and loss of biodiversity and rivers assorting might be a result. Besides, soil erosion might reduce arable land and incentive area expansion. There is a relative increase in production costs as a reflection of the financial costs caused by erosion.

## Agents Network




## Root causes
What are the root causes?

Erosion occurs in nature by the action of winds and, mainly, rainwater. However, human practices can accelerate soil erosion, such as deforestation (especially near riverbank and water springs), planting on steep slopes, burning, use of heavy machinery, inadequate practices of level curve and terrace and removal of organic matter which works as a sponge.

## Initiatives
Which are the current practices or initiatives?

- No-tillage: reduces the occurrence of erosion, increasing soil and water conservation and optimizes the use of fertilizers and correctives
- Crop-livestock-forest integration: production strategy that integrates, in the same area, different production systems: agricultural, livestock, and forestry. The idea is to optimize the use of the land, increasing productivity and reducing the opening of new areas

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat Analysis based on Interviews; FAE – Centro Universitário (2010); press clippings
Exchange rate: 2017 – R$ 3,192 / 2018 – R$ 3,6542 / 2019 – R$ 3,9451 / 2020 – R$ 5,1558 / 2021 – R$ 5

# 4. BIODIVERSITY LOSS

| Criteria | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S2 | C3 | I3 | F1 F2 F3 | R1 R2 |

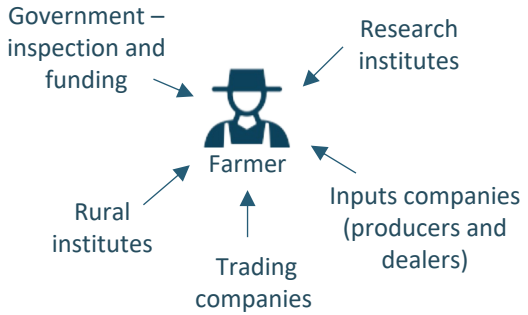
## Description
What is the challenge?

The intensification of agricultural activity, with inadequate crop management practices, inadequate use of agrochemicals and inadequate use of transgenics might contribute to the loss of biodiversity.

## Environmental Impacts
Why is this a challenge?

The loss of biodiversity reduces soil fertility and the population of pollinating agents that contribute to food production, such as bees, which are responsible for pollinating 42% of the 57 most widely planted plant species in the world.

## Agents Network




## Root causes
What are the root causes?

The loss of biodiversity for agriculture is associated with changes in land and water use and management, monoculture, intensive agriculture, climate change, and inappropriate use of chemicals, among others.

## Initiatives
Which are the current practices or initiatives?

- Decreasing use of chemical fertilizers: through the technique of biological nitrogen fixation and use of integrated pest management systems;
- Practicing organic agriculture, avoiding the use of pesticides and chemical fertilizers;
- United Nations - Sustainable Development Goals (SDGs) 15: protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, reverse land degradation

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat Analysis, based on Interviews; UN Stats (2016)

# 5. WATER FOOTPRINT

| Criteria | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S1, S4 | C3 | I1, I2 | F1, F2, F3 | R2, R3, R3 |

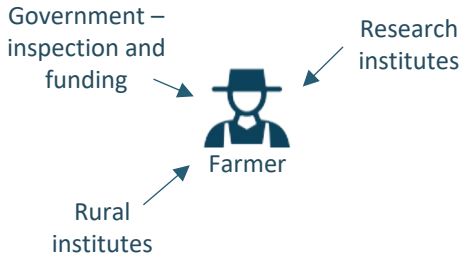
## Description
What is the challenge?

The relevance of soybean in Brazilian use of irrigation water is low, since soybean is grown between spring and summer, the season with the most rainfall volume in Brazil. Thus, the main issue regarding water footprint is related to preservation of water spring and quality of water, that can be affected by soybean production.

## Environmental Impacts
Why is this a challenge?

Lack of forest coverage near to water springs and water courses could reduce water production and water quality. Inadequate crop management practices could lead to water pollution from chemical run off and rivers to silt up.

## Agents Network




## Root causes
What are the root causes?

- Deforestation and lack of forest near water spring;
- Lack of forest along rivers side (permanent preservation areas - APP)
- Inadequate soil management practices;

## Initiatives
Which are the current practices or initiatives?

- Reforestation and techniques to recovery of water springs;
- Production best practices to avoid soil erosion, such as no-tillage and terrace;

**Scope**
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

**Context**
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

**Impact Level**
- I1 Local
- I2 Regional
- I3 National

**Farm size**
- F1 Small
- F2 Medium
- F3 Large

**Agri3 Result area**
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat Analysis based on Interviews; UN Stats (2016)

# 6. DEFORESTATION OF NEW AREAS

| Criteria | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S1 S2 S3 S7 | C2 | I2 | F2 F3 | R1 R2 |

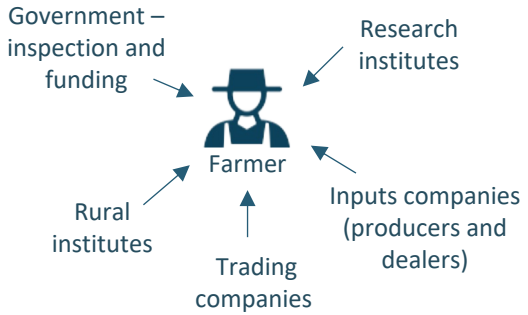
## Description
What is the challenge?

Even with yield growth, farmers still valorize area expansion. The reason is the fact they see it as a patrimony rising opportunity. Between 1988-2019, the area cultivated with soy in Brazil doubled, but production increased 6x. This shows the productivity potential that we have reached.

## Environmental Impacts
Why is this a challenge?

The challenge lies in increasing production on existing agricultural land in a way that puts less pressure on the environment and does not negate the capacity to continue producing food in the future.

## Agents Network




## Root causes
What are the root causes?

- Brazilian farmers are very focused on financial results, whether it's controlling costs or improving income. It is difficult to convince them about anything that does not generate short-term financial results without enforcement of the law.
- Lack of incentives to convert unproductive areas into productive areas
- Landowners of unproductive areas are mainly cattle ranchers, creating a difficulty in matching unproductive areas with expansionists farmers.

## Initiatives
Which are the current practices or initiatives?

- Crop-livestock-forest integration
- No-tillage farming system
- Nutriens' initiative to match unproductive areas and soybean expansionists.
- Precision farming: there are cases where precision farming almost doubles soybean yields in 4 years
- Irrigation use: maximize the use of the land, enabling a third crop in the same area, depending on the region

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat Analysis, based on Interviews; Embrapa (2020); Press clippings

# 7. FORESTRY CODE COMPLIANCE

| Criteria | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S1, S2, S3 | C1 | I3 | F1, F2, F3 | R1 |

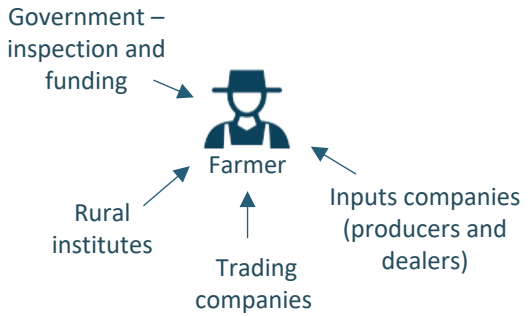
## Description
What is the challenge?

In 2008, a new forest code has been approved implicating in adequation of rural properties. To meet the forest code requirement, farmers need to set aside productive areas for conservation purpose, restore this areas and maintenance. The challenge is to guarantee that farmers area both compliant to the destination of this conservation units and restore its vegetation and take care of it.

## Environmental Impacts
Why is this a challenge?

- The adequation to the forest code and maintenance of conservation unities implies a loss of productive area and the need for investments in reforestation and conservation, impacting farmers revenue and investment capacity.

## Agents Network




## Root causes
What are the root causes?

- The implementation of the Forest Code still faces challenges, such as: lack of knowledge regarding legislation and procedures to adequation, lack of financial instruments to stimulate its implementation, lack of resources for farmers to keep conservation units, diverging interpretations of some of its provisions and lack of enforcement of the law by the competent agencies.

## Initiatives
Which are the current practices or initiatives?

- Law no. 12.651/2012 provides that: i) the APPs have a twenty-year term for recovery; ii) the LR (Legal Reserve) can have sustainable exploitation of natural resources; and iii) the recompositing of vegetation can be done with the use of native and exotic species, aiming at economic exploitation, which facilitates the viability of the LR;
- Low-cost and high-quality environmental restoration methodologies.

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat Analysis, based on Interviews; USDA; SFB; EMBRAPA Territorial (Evaristo de Miranda); IBGE (2018)

# 8. LEGAL DEFORESTATION

| Criteria | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S1 S2 S3 | C1 | I2 | F2 F3 | R1 |

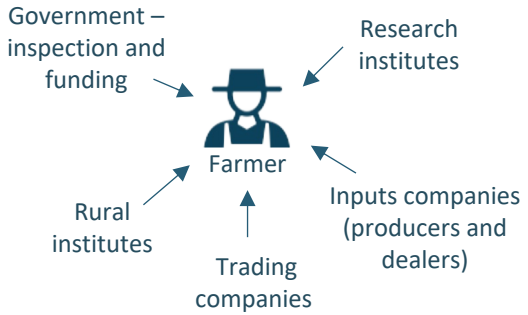
## Description
What is the challenge?

Producers who have a surplus in forest area (above legal requirements from the Forestry Code), by law, can legally clear off the surplus area for production purposes. This could lead to increase of deforestation, even though allowed by law.

## Environmental Impacts
Why is this a challenge?

- Guarantee some kind on financial incentive to encourage landowners to give up from opening new areas is a challenge. Currently Rabobank and trading companies are not financing producers that are legally cleaning off areas for production.

## Agents Network




## Root causes
What are the root causes?

- The producer can legally explore preserved areas, as long as he respects the minimum preservation required by law
- The producer is not rewarded for protecting more areas than he protects or has difficulty in accessing compensatory resources
- There is a demand for gains of scale in the commodity activity

## Initiatives
Which are the current practices or initiatives?

- Payment for environmental services
- Forest management for the extraction of products (timber, among others)
- Incentives for practices that increase productivity or production added value;

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat Analysis based on Interviews

# 9. EDUCATION AND KNOWLEDGE

| Criteria | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S5, S9 | C1 | I3 | F1, F2, F3 | R3 |

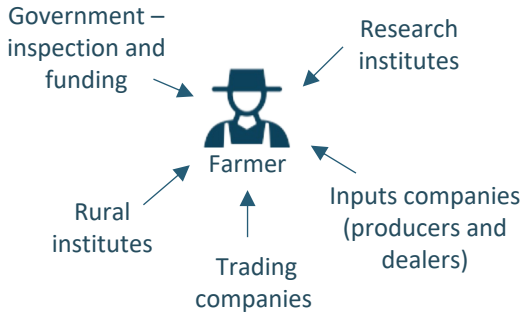
## Description
What is the challenge?

Illiteracy is still a reality in Brazil and achieve more than 10% of rural population. In Some regions specially in North Brazil, education and knowledge are worse.

## Environmental Impacts
Why is this a challenge?

Education and knowledge affect general living conditions, but also the capacity and ability of rural workforce to make proper use of crop management best practices, deployment of technology, adequate use of chemicals.

## Agents Network




## Root causes
What are the root causes?

- Poor public education system and lack of infrastructure in rural areas
- Lack of general livelihood conditions

## Initiatives
Which are the current practices or initiatives?

- Implementation of rural schools by public sector and proper transportations;
- Education of adults;
- Technical assistance programs from public sector and associations;

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat Analysis, based on Interviews

# 10. LACK OF INFRASTRUCUTURE AND PUBLIC SERVICES

| Criteria | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S5 | C1 | I1 I2 | F1 F2 | R3 |

## Description
What is the challenge?

Rural areas suffer from lack of general public services coverage, such as garbage collection, proper energy lines and internet. Although nowadays producers are generally connected to new technologies, according to the Brazilian Institute of Geography and Statistics (IBGE), 21% of the rural population has no access to broadband Internet. This reality impact more small farmers that can not invest in rural infrastructure.

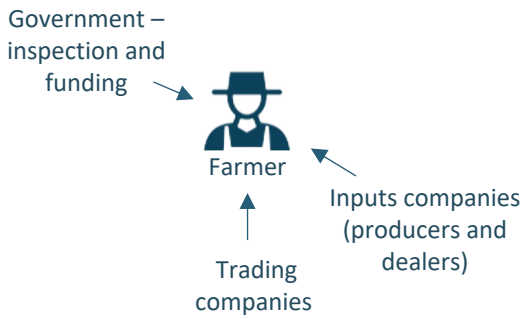
## Environmental Impacts
Why is this a challenge?

Lack of connectivity restricts access to information, technical knowledge, and the use of technologies that can improve productivity for producers.

Lack of garbage collection forces improper disposal contributing to rural pollution.

Lack of proper energy lines hinders farmers from attract and retention of good workforce and use of modern equipment for irrigation lowering productivity.

## Agents Network




## Root causes
What are the root causes?

- Lack of structure in rural areas that enable broadband connectivity
- Lack of public network for energy and wired service, specially in North region.
- Lack of finance products to support projects on rural areas internet connection, installation of alternatives powerhouse and garbage treatment.

## Initiatives
Which are the current practices or initiatives?

- Agribusiness and telecom companies join forces to bring 4g to the field: AGCO (Massey and Valtra), Bayer (Climate), CNH Industrial (Case IH and New Holland), Jacto, Nokia, Solinftec, TIM, and Trimble in the ConectarAgro initiative, which also has the differential of bringing to the field an open 700 MHz 4G solution, a technology that allows greater range with smaller investments and is already available in urban centers.

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat Analysis based on Interviews; Press clippings

# Content

- Sustainability challenges: Cattle chain

# Sustainability Challenges: Cattle Chain

| Challenge | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| 1. Biodiversity Loss | S2 | C3 | I2 | F1 F2 F3 | R1 |
| 2. Climate Change Effects | S3 S4 | C3 | I3 | F1 F2 F3 | R2 |
| 3. Water footprint | S1 S4 | C3 | I2 | F1 F2 F3 | R2 |
| 4. Animal welfare | S6 S8 | C3 | I2 | F2 F3 | R2 |
| 5. Livestock effluents | S1 S4 | C3 | I2 | F2 F3 | R2 R3 |
| 6. Deforestation and traceability | S2 S3 S7 S9 | C2 C3 | I2 | F1 F2 | R1 R2 |
| 7. Soil compaction and erosion | S1 | C3 | I1 | F1 F2 F3 | R2 |
| 8. Degraded pasture | S2 | C3 | I2 | F2 F3 | R1 R2 |

**Scope**

- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

**Context**

- C1 Inst. Environment
- C2 Farmer
- C3 Production system

**Impact Level**

- I1 Local
- I2 Regional
- I3 National

**Farm size**

- F1 Small
- F2 Medium
- F3 Large

**Agri3 Result area**

- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

# Sustainability Challenges: Cattle Chain

| Challenge | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| 9. Production practices improvement | S2 S7 S8 | C2 | I1 | F1 F2 | R2 |
| 10. Management practices | S5 | C2 | I2 | F1 F2 | R3 |
| 11. Sustainability in feed production chain | S3 S7 | C2 | I2 | F2 F3 | R2 |
| 12. Forestry code Compliance | S2 S9 | C1 | I3 | F1 F2 | R1 |
| 13. Traceability on beef chain | S8 S9 | C1 | I3 | F3 | R2 |
| 14. Education and knowledge | S2 S5 S7 | C1 | I3 | F1 F2 | R3 |

**Scope**

- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

**Context**

- C1 Inst. Environment
- C2 Farmer
- C3 Production system

**Impact Level**

- I1 Local
- I2 Regional
- I3 National

**Farm size**

- F1 Small
- F2 Medium
- F3 Large

**Agri3 Result area**

- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

# 1. BIODIVERSITY LOSS

| Criterial | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S2 | C3 | I2 | F1 F2 F3 | R1 |

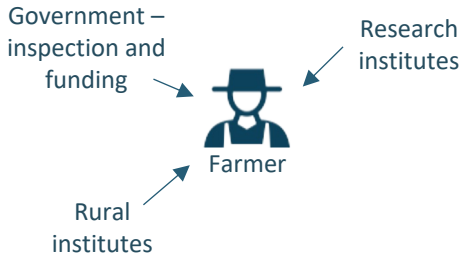
## Description
What is the challenge?

Biodiversity is an important sustainability driver, considering the diversity of life and co-evolutionary relationships, and the need for their preservation going into the future.

## Environmental Impacts
Why is this a challenge?

- Activities involved in livestock production (e.g. land use without environmental concerns) may cause an unbalance in the ecosystem where the activity is held
- In extreme cases, may lead to the extinction and degradation of the local biome, flora or fauna specie

## Agents Network




## Root causes
What are the root causes?

Deforestation in order to expand production. Lack of Permanent Preservation Areas or Legal Reserves. Hunting activities in order to protect livestock from natural predators (jaguar).

## Initiatives
Which are the current practices or initiatives?

- Permanent Preservation Areas (APPs);
- LR (Legal Reserve);
- Non conversion of forests into new production areas
- Biodiversity passages: passages of native forests interlinking preservation areas from one location to the other.

**Scope**
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

**Context**
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

**Impact Level**
- I1 Local
- I2 Regional
- I3 National

**Farm size**
- F1 Small
- F2 Medium
- F3 Large

**Agri3 Result area**
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat analysis, based in internal and external interviews; Integração Lavoura Pecuária: Sistemas integrados e a biodiversidade aliada à produção agropecuária. https://www.portaldoagronegocio.com.br/

# 2. CLIMATE CHANGE EFFECTS

| Criterial | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S3, S4 | C3 | I3 | F1, F2, F3 | R2 |

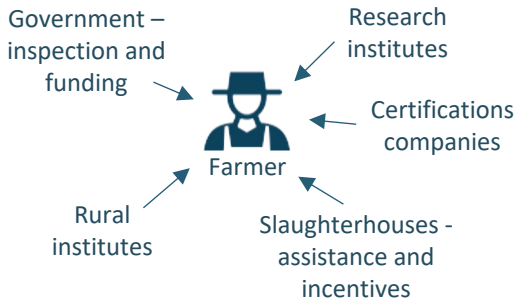
## Description
What is the challenge?

To reduce the carbon footprint inherent to livestock due to their digestive fermentation that leads to methane (CH4) emissions.

## Environmental Impacts
Why is this a challenge?

- The green house gas (GHG) emissions lead to climate change

## Agents Network




## Root causes
What are the root causes?

Livestock is responsible for about 15% of the planet´s accumulated GHG emissions, with approximately 44% of this resulting from the enteric fermentation of cattle.

## Initiatives
Which are the current practices or initiatives?

- Adequate pasture management can reduce significantly or even neutralize the carbon footprint due to its potential for carbon sequestration
- Rotated grazing on fertilized pastures
- Recovery of degraded pastures
- Crop, livestock and forest integration
- Increase in productivity
- Nutrition additive capable of reducing GHG emission in up to 30% (DSM technology)
- Carbon credits' certification and market development

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

markestrat Agribusiness

Source: Markestrat analysis, based in internal and external interviews; Investing in sustainable livestock guide. World Bank Group. https://www.sustainablelivestockguide.org/; Abrão, F. O.; Fernandes, B. C.; Pessoa, M.S. Produção sustentável na bovinocultura: princípios e possibilidades. Rev. Bras. de Agropecuária Sustentável (RBAS), v.6, n.4, p.61-73, Dez, 2016

# 3. WATER FOOTPRINT

| Criterial | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S1, S4 | C3 | I2 | F1, F2, F3 | R2 |

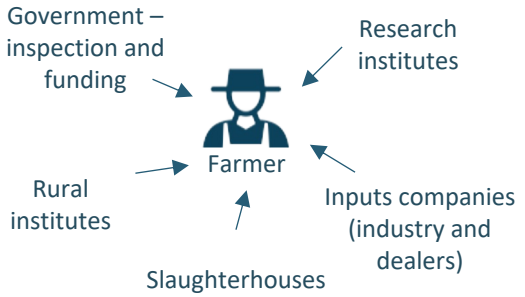
## Description
What is the challenge?

The challenge is to minimize water pollution and reduce the water footprint in the production system.
The water demanded can be divided in 3 different categories: blue, in reference to superficial (rivers, lakes) or underground water; green, in reference to the consumption through the transpiration of plants and soil evaporation; and grey, which refers to the natural water needed to dilute inputs and residues such as fertilizers and effluents (these are mainly from the industry).

## Environmental Impacts
Why is this a challenge?

- Water (surface or groundwater) pollution from inputs used to manage the pastures, from livestock effluents (such as nitrogen and phosphor) or from procedures to clean facilities
- The polluted surface water can kill fish, cause odors, spread infectious bacteria, and inhibit water-related activities
- The main livestock and industry pollutants in surface water are organic matter, excess nutrients and pathogen contamination.

## Agents Network




## Root causes
What are the root causes?

Mismanagement of cattle herd, such as letting the cattle have direct access to natural water sources (rivers, lakes).
Mismanagement of manure applications and conducting pastures.

## Initiatives
Which are the current practices or initiatives?

- Increase productivity, especially through nutrition improvements
- Fence animals out of riparian areas located next to surface waters
- Maintain grass buffer strips near surface water
- Manage manure and/or effluents applied to cropland
- Consider using retention ponds or lagoons for runoff/waste collection from feedlots
- Prevent overgrazing of pasture and rangeland through rotational grazing
- Reduce cropland runoff with no-till or low-till tillage practices

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat analysis, based in internal and external interviews; Responsible, sustainable beef production. Dept. of Primary Industries, NSW Government. https://www.dpi.nsw.gov.au/animals-and-livestock/beef-cattle/husbandry/general-management/production

# 4. ANIMAL WELFARE

| Criterial | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S6, S8 | C3 | I2 | F2, F3 | R2 |

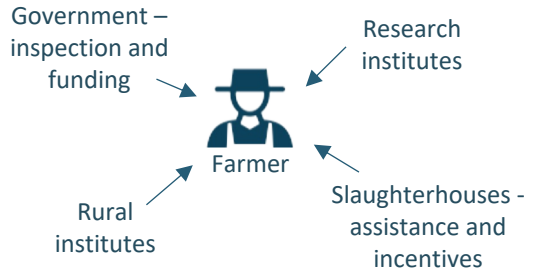
## Description
What is the challenge?

The farm animal welfare is included as one of the criteria to promote sustainability in livestock production, since they influence the intrinsic quality of the final products (meat). Despite the growing concerns about the topic, producers are resistant to invest in animal welfare practices. Animal welfare can be translated as: animals without hunger, thirst, discomfort, pain, injuries, illnesses, fear and stress and free to express behavior.

## Environmental Impacts
Why is this a challenge?

- Increased greenhouse gases emission
- Low productivity rates
- Reduction of animal longevity
- Animal suffering

## Agents Network




## Root causes
What are the root causes?

Lack of awareness, knowledge and transparency about the processes and practices adopted in livestock production.
Lack of knowledge about the benefits in productivity related to animal welfare

## Initiatives
Which are the current practices or initiatives?

- Management and production practices promotion
- Civil society awareness
- Frequent animal inspection through certification initiatives
- Strategies for environment management

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat analysis, based in internal and external interviews; Responsible, sustainable beef production. Dept. of Primary Industries, NSW Government. https://www.dpi.nsw.gov.au/animals-and-livestock/beef-cattle/husbandry/general-management/production. Barbosa, B. et al. Tópicos em Sustentabilidade & Conservação. Juiz de Fora, 2017.

# 5. LIVESTOCK EFFLUENTS

| Criterial | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S1, S4 | C3 | I2 | F2, F3 | R2, R3 |

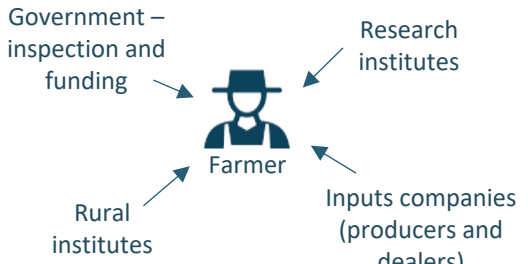
## Description
What is the challenge?

Even though the feedlot represents 3% of the animals slaughtered, this number has been growing.
The maintenance of large numbers of animals in dense confinement leads to problems with the volume of effluents produced by the livestock in these systems and with potential diseases.
Also, nutritional additives and medications (such as hormones or antibiotics) may cause negative side effects when present in the livestock effluents and/or in the final product.

## Environmental Impacts
Why is this a challenge?

- Interference with the life cycle of regional fauna and flora
- Potential health hazards to regional communities and consumers, especially when there is an accumulation process throughout the food chain (soil – plant – animal - man
- Antibiotic resistance
- Water pollution
- Soil contamination

## Agents Network




## Root causes
What are the root causes?

Lack of adequate procedures to dispose of high concentrations of livestock effluents, especially in confinements. Inadequate nutritional supplementation with additives (copper, zinc, potassium, phosphor, and nitrogen). Use of contaminated effluents as raw material for organic fertilizers. Inadequate medicine administrations to livestock, especially hormones and antibiotics.

## Initiatives
Which are the current practices or initiatives?

- Responsible and safe use of animal medicines on the farm
- Adoption of good management practices in order to prevent or reduce the use of medicines on the farm
- Adequate nutritional program
- Proper treatment and destination of livestock effluents in confinements
- Bio digestion systems
- Circular economy

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
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- F1 Small
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- F3 Large

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- R1 Forest protection
- R2 Sust. Agriculture
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markestrat Agribusiness

Source: Markestrat analysis, based in internal and external interviews; Responsible, sustainable beef production. Dept. of Primary Industries, NSW Government. https://www.dpi.nsw.gov.au/animals-and-livestock/beef-cattle/husbandry/general-management/production

# 6. DEFORESTATION AND TRACEABILITY

| Criterial | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S2 S3 S7 S9 | C2 C3 | I2 | F2 F1 | R1 R2 |

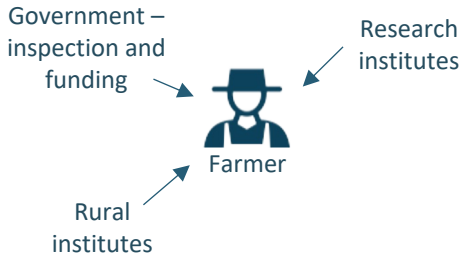
## Description
What is the challenge?

Currently, Brazil has a relevant forest area, and producers see the opportunity to increase production by advancing in these areas. The forest code determines a minimum percentage of preserved area per property, however there are still several farms with a surplus of legal reserves, and others that lack the legal formalization, which still represents a risk of deforestation.
Smallholders in the board of the Amazon without traceability, credit and contact with slaughterhouse are a challenge to be addressed.

## Environmental Impacts
Why is this a challenge?

- Biodiversity loss
- Harm general carbon balance, favoring greenhouse effect
- Siltation of water bodies and rivers
- Impact on the water cycle, with potential to extinguish natural water springs

## Agents Network




## Root causes
What are the root causes?

The main causes related to the opening of new areas for livestock are:
- an ineffective institutional environment that tends to encourage the legal deforestation in detriment of prioritizing the preservation of surplus legal reserves;
- laws and rules that are not totally adequate;
- lack of professionals for proper orientation and inspection;
- lack of producer awareness regarding sustainable practices.

## Initiatives
Which are the current practices or initiatives?

- Payment for environmental services and other incentives that encourage producers to preserve surpluses of legal reserves
- Intensification of already opened production areas
- Training and awareness of the population and producer
- Intensification of enforcement and enforcement of laws
- Technological solutions for restoration of degraded pastures
- Restoration of degraded pastures and adequate pasture management

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat analysis, based in internal and external interviews; Garcia, E. et. al. Costs, Benefits and Challenges of Sustainable Livestock Intensification in a Major Deforestation Frontier in the Brazilian Amazon. Sustainability, January 2017.includ

# 7. SOIL COMPACTION AND EROSION

| Criterial | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S1 | C3 | I1 | F1 F2 F3 | R2 |

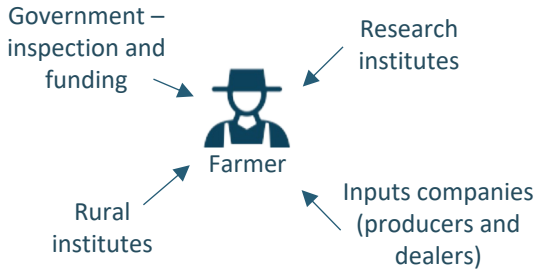
## Description
What is the challenge?

When soil compaction occurs, it hinders the infiltration of water and increases surface runoff, which can lead to erosion. Soil erosion is characterized by the loss of the superficial layer of the soil, reducing its productive capacity.

## Environmental Impacts
Why is this a challenge?

- Wear and tear and soil impoverishment
- Reduced soil fertility (loss of nutrients)
- Productivity loss
- Siltation of water bodies and rivers

## Agents Network




## Root causes
What are the root causes?

The displacement of livestock is the main cause of soil compaction.

## Initiatives
Which are the current practices or initiatives?

- Soil management techniques for resting and recuperation of soil fertility (such as green manures)
- Adequate pasture management and rotation of the livestock.

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat analysis, based in internal and external interviews; Responsible, sustainable beef production. Dept. of Primary Industries, NSW Government. https://www.dpi.nsw.gov.au/animals-and-livestock/beef-cattle/husbandry/general-management/production

# 8. DEGRADED PASTURE

| Criterial | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S2 | C3 | I2 | F2 F3 | R2 R1 |

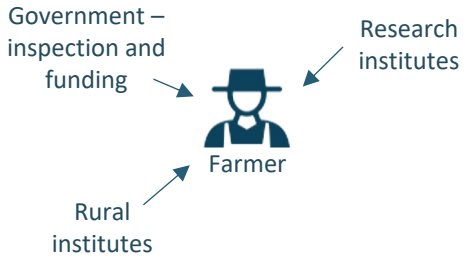
## Description
What is the challenge?

Restoration of degraded pasture areas allows the reuse of deforested areas which are currently abandoned or underutilized, thus increasing productivity, reducing deforestation, fostering soil carbon sequestration, decreasing greenhouse gas emissions and rendering the activity more sustainable.

## Environmental Impacts
Why is this a challenge?

- Reduced carbon sequestration
- Biodiversity loss
- Erosion and soil impoverishment (nutrients and voçorocas)
- Siltation of water bodies and rivers

## Agents Network




## Root causes
What are the root causes?

Opening areas to increase production (cattle), higher land value (open and productive areas are valuated), lack of investment in adequate land management. Lack of cattle producers' investment capacity and/or mindset towards having a more productive operation.

## Initiatives
Which are the current practices or initiatives?

- Management techniques for the recovery of degraded areas (e.g. crop-livestock integration)
- Awareness and communication to the ranchers
- The investment for restoring 1 ha of degraded pasture is estimated to be around R$ 1,000 (US$ 200)

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat analysis, based in internal and external interviews; Techniques for the restoration of degraded pastures in the Amazon region. Embrapa 2018. https://www.embrapa.br/en/busca-de-projetos/-/projeto/205682/tecnicas-de-recuperacao-de-pastagens-degradadas-na-amazonia. Ferreira, M.N, 2018.
Exchange rate: 2017 – R$ 3,192 / 2018 – R$ 3,6542 / 2019 – R$ 3,9451 / 2020 – R$ 5,1558 / 2021 – R$ 5

# 9. PRODUCTION PRACTICES IMPROVEMENT

| Criterial | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S2, S7, S8 | C2 | I1 | F1, F2 | R2 |

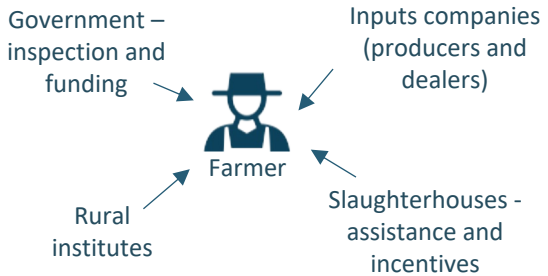
## Description
What is the challenge?

This challenge is related to the continuous improvement of good production practices in the areas of nutritional management, reproductive management, health management, etc. The consequence of using good practices is a more productive, rational and sustainable business.

## Environmental Impacts
Why is this a challenge?

- Water, soil and air contamination
- Productivity loss
- Loss of natural resources
- Increased production costs

## Agents Network




## Root causes
What are the root causes?

The main causes for the lack of production management are associated with:

- lack of knowledge and education of the producers: not knowing how to implement improvements, not attributing the proper importance
- lack of incentives to have sustainable production management.
- Lack of resources to invest in best practices and technologies for some producer profiles.

## Initiatives
Which are the current practices or initiatives?

- Input industries and coops developing and delivering knowledge and new practices:
  - Pasture management
  - Responsible use of chemicals products
  - Reproductive management
  - Manure management (cattle confinement)
- Rural extension initiatives (governmental)
- Private consultancy (just affordable for some producer profiles)

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

markestrat Agribusiness

Source: Markestrat analysis, based in internal and external interviews; Investing in sustainable livestock guide. World Bank Group. https://www.sustainablelivestockguide.org/

# 10. MANAGEMENT PRACTICES

| Criterial | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S5 | C2 | I2 | F1 F2 | R3 |

## Description
What is the challenge?

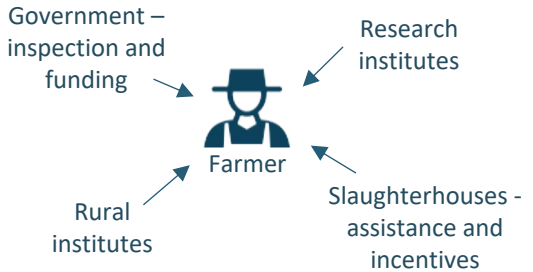
Farm management includes planning administrative processes to improve results. The manager must pay attention to a macro vision of the business and measure KPIs to understand the general performance, either through spreadsheets or specific software. This practice is fundamental both for profitability and sustainability.

But, in Brazil, administrative and financial management in livestock farms is a challenge, with only a small percentage of farms with adequate processes in place.

## Environmental Impacts
Why is this a challenge?

- Inadequate or lack of measurement and KPIs to accompany performance
- Lack of adequate information to support decision making and negotiations
- Low efficiency in the use of natural resources as well as financial.
- Inability to properly analyze or measure sustainable project impacts

## Agents Network




## Root causes
What are the root causes?

- In general, small and medium sized producers lack the proper education or knowledge to implement an adequate management process;
- Consultants or professionals with the capacity to implement management processes within livestock farms are expensive for small or medium sized producers to access;
- Cultural issue: livestock producers with a traditional profile tend to be reluctant to improve management processes.

## Initiatives
Which are the current practices or initiatives?

- Creating awareness among livestock producers regarding the importance of property management and planning
- Good monitoring and recording systems which gather useful information about the enterprise and allow assessment of financial and environmental sustainability

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

markestrat Agribusiness Source: Markestrat analysis, based in internal and external interviews; Gestão de fazendas: veja como melhorar e rentabilizar mais. https://blog.aegro.com.br/gestao-de-fazendas/

# 11. SUSTAINABILITY IN FEED PRODUCTION CHAIN

| Criterial | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S3, S7 | C2 | I2 | F2, F3 | R2 |

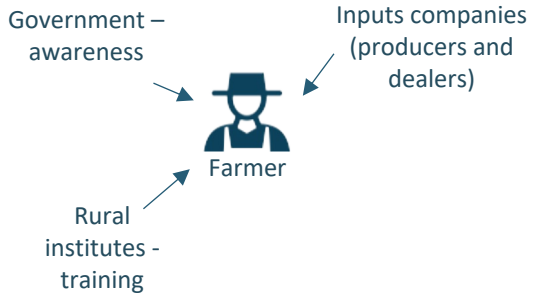
## Description
What is the challenge?

Cattle feed is based on grains and livestock consumes more than one-third of the world's cereal grain and 70% of the grain used in developing countries. So, sustainable feed sourcing can contribute to global food and nutrition security. Key aspects of sustainable feed production include precision use of irrigation water, fertilizers, and pesticides.

## Environmental Impacts
Why is this a challenge?

- These practices contribute to agricultural resilience
- Avoid feed-driven deforestation
- Difficulties in locating a supplier with sustainability practices (certificate) and a trustworthy chain of custody

## Agents Network




## Root causes
What are the root causes?

Sustainability challenges regarding the feed production chain (mainly corn). The low demand for sustainable feed sourcing is related to knowledge and higher animal production costs.

## Possible solutions
Which are the current practices or initiatives?

- Certifications may relate to the use of fertilizer, approved pesticides, and water in feed production
- Initiatives to increase knowledge and awareness among livestock and feed producers
- Increased consumer awareness
- Market differentiation for environmentally sustainable products
- Traceability.

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat analysis, based in internal and external interviews; Investing in sustainable livestock guide. World Bank Group. https://www.sustainablelivestockguide.org/

# 12. FORESTRY CODE COMPLIANCE

| Criterial | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S2, S9 | C1 | I3 | F1, F2 | R1 |

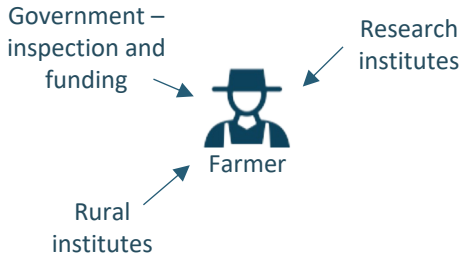
## Description
What is the challenge?

The New Forest Code creates a series of obligations for landowners and rural owners, from the registration of properties in the Rural Environmental Registry (CAR) to the need to recover thousands of hectares in Permanent Preservation Areas, compensation or recovery of Legal Reserves, licensing of works such as dams, construction of bridges, among others.

## Environmental Impacts
Why is this a challenge?

- Deforestation increase
- Biodiversity loss
- Carbon sequestration
- Preservation of springs and water bodies

## Agents Network




## Root causes
What are the root causes?

Some challenges include divergent interpretations of some of its provisions, the absence of collection of compliance with the law by the environmental policy enforcement agencies, and the lack of specification of economic instruments that stimulate its application by rural producers. Plus, legal uncertainty, bureaucracy, complexity, lack of guidance and enforcement.

## Initiatives
Which are the current practices or initiatives?

- Government control and inspection
- Adequacy needs to operationalize activities like:
  - Access to credit lines
  - Access to the market (commercialization)

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat analysis, based in internal and external interviews; Código Florestal exigirá R$ 25 bilhões de pecuaristas. BeefPoint, 2015. https://www.beefpoint.com.br/codigo-florestal-exigira-r-25-bilhoes-de-pecuaristas

# 13. TRACEABILITY ON BEEF CHAIN

| Criterial | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S8 S9 | C1 | I3 | F3 | R2 |

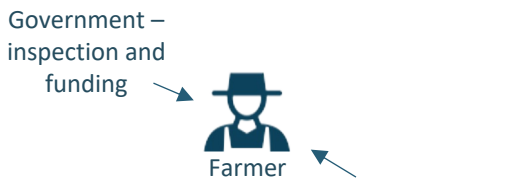
## Description
What is the challenge?

The increased importance of sanitary issues came together with concerns from consumer markets related to food safety, sustainability and animal welfare. But maintaining the traceability of animal origin and transit is a challenge because there are many players involved in cattle breeding, rearing and fattening, and farms are widespread among Brazil´s territory. The different levels of maturity regarding farmer´s education and professional production systems enhances the challenge.

## Environmental Impacts
Why is this a challenge?

- In general, breeding and rearing farmers are small to medium sized producers with low levels of management.
- It is hard for sustainability incentives to reach the initial players of the production chain (breeding and rearing farmers);
- It is difficult to guarantee to the final consumers a chain of custody for sustainable meat products.

## Agents Network




## Root causes
What are the root causes?

- Farmers are widespread among Brazil´s territory;
- Different levels of technology adoption and management regarding the production systems;
- High costs for complying with the environmental legislation and to access certificates;
- Social issues such as low levels of education among farmers, different cultural aspects from production region to production region

## Initiatives
Which are the current practices or initiatives?

- The environmental concerns, aligned with social and economic pressures, will continue to motivate the beef industry to redefine various aspects of its supply chain, such as offering financial incentives for farmers to comply with the environmental legislation and investments in traceability systems.
- Slaughterhouses´ programs and relationship with ranchers to setup a sustainability initiative across the supply chain.

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
- R1 Forest protection
- R2 Sust. Agriculture
- R3 Imp. livelihoods

Source: Markestrat analysis, based in internal and external interviews. Souza, D. et all. A Review of Sustainability Enhancements in the Beef Value Chain: State-of-the-Art and Recommendations for Future Improvements, 2017.

# 14. EDUCATION AND KNOWLEDGE

| Criterial | Scope | Context | Impact Level | Farm Size | Agri3 Result area |
|---|---|---|---|---|---|
| | S2, S5, S7 | C1 | I3 | F1, F2 | R2, R3 |

## Description
What is the challenge?

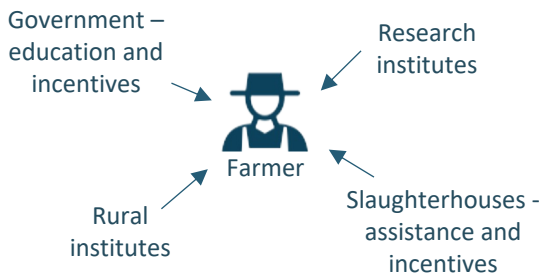
The challenge relates, in general, to the low levels of education received by livestock producers in Brazil, mainly the owners of small to medium sized properties.

These farmers tend to maintain traditional production practices carried out through the generations and have more difficulties to access technical assistance, information and qualified workforce.

## Environmental Impacts
Why is this a challenge?

- It is more difficult for livestock producers to adopt sustainable practices if there is low awareness regarding the issue
- There is less motivation to invest in sustainable initiatives that aim to recover or reduce the impacts upon the environment
- It is more challenging to implement initiatives that require a collective consensus and decision-making process

## Agents Network




## Root causes
What are the root causes?

Structural educational deficiency in Brazil and unqualified workforce. In general, small and medium properties have little knowledge on the main sustainability issues in evidence through the livestock supply chain as well as the technology to mitigate them.

## Initiatives
Which are the current practices or initiatives?

- Identify and analyze the knowledge, awareness, policy, and institutional challenges to implement the relevant principles
- Include resources to address these challenges

### Scope
- S1 Water Use & Scarcity
- S2 Deforestation & Biodiversity
- S3 Greenhouse gas emissions
- S4 Waste & Pollution
- S5 Working Conditions
- S6 Antibiotics
- S7 Food Safety
- S8 Animal Welfare
- S9 Governance

### Context
- C1 Inst. Environment
- C2 Farmer
- C3 Production system

### Impact Level
- I1 Local
- I2 Regional
- I3 National

### Farm size
- F1 Small
- F2 Medium
- F3 Large

### Agri3 Result area
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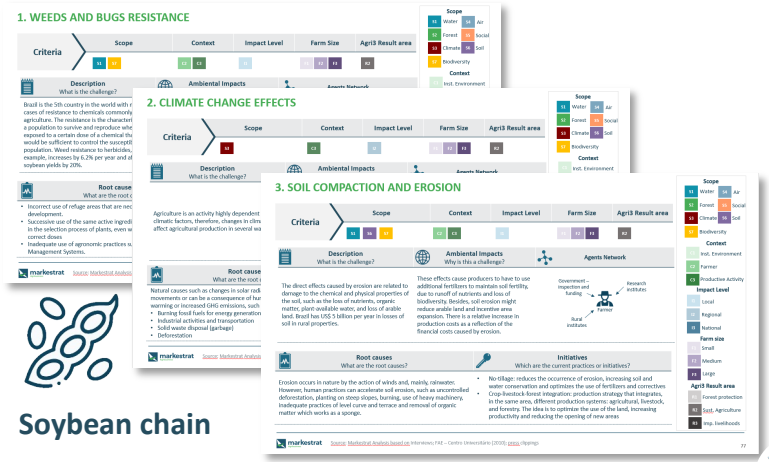
- R3 Imp. livelihoods

# Content

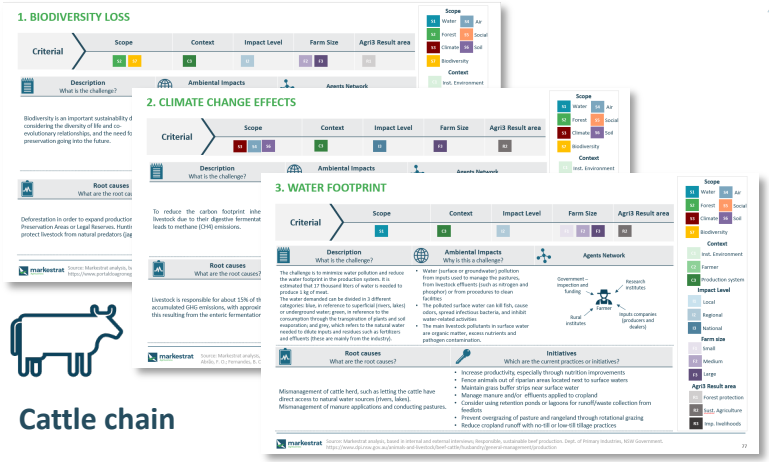
- Introduction and Methodology
- Step 1: Soybean and cattle main sustainability challenges identification
  - Chain Description
  - Brazil Financing Scenario
  - Sustainability challenges
- **Step 2: Potential Interventions Mapping**
- Step 3: High Potential Interventions Deep Dive
- Step 4: Suggested Models and Roadmap
- Conclusions

# The challenges gave rise to several possible interventions that were grouped into financeable projects

## Challenges




Soybean chain




Cattle chain

## Interventions (initiatives and solutions)

| | Interventions (iniciatives and solutions) |
|---|---|
| 1 | Fund farmers that need to invest in reforestation to meet the Brazilian **forest code law.** |
| 2 | Fund **crop-livestock-forest integration.** |
| 3 | Support projects that promote the **matching of farmers** with surplus of natural forest and farmers in need of aditional natural forest. |
| 4 | Create a matching mechanism to allow soybean farmers and cattle ranchers to encounter and settle **agreements to implement crop-livestock or crop-livestock-forest integration on cattle ranchers areas** |
| 5 | Offer **training**, information and support regarding sustainable production and how to meet the Brazilian forest code law; |
| 6 | Fund farmers to implement projects aiming to **exploit legal forest products** |
| 7 | Offer training, information and support regarding how to economically **explore natural forest;** |
| 8 | Fund initiatives related to the **education of rural workforce** |
| 9 | Fund investment that provide **internet acess** at rural areas; |
| 10 | Fund investment on **garbage disposal** alternatives; |
| 11 | Fund initiatives that seek to grant (or to accelerate) **land titles to owners** |
| 12 | Promote **traceability** of production that comes from critical regions in terms of deforastation risks |
| 13 | Support farmers with **PRA** (Environmental Recovery Plan) |
| 14 | Fund investments related to **precision agriculture and livestock** (acquisition of modern machinery and equipment) |
| 15 | Fund investments on capacity building to generate on farm's **renewable energy** (solar, wind and biofuel) |
| 16 | Fund investments that increase **productivity gains** and, as counterpart, they require the surplus of forest areas to be protected; |
| 17 | Fund investmenta for the acquisition of **modern machinery** that avoids soil compactation - special tires, crawler tractor |
| 18 | **Alternative cultivation techniques** (Regenerative Agriculture and regenerative livestock) |
| 19 | Fund **efficient irrigation** methods that may replace less efficient ones, such as thetransition to precision irrigation and novel techniques (e.g. underground dripping irrigation for row crops). |
| 20 | Fund projects that foster the adoption of **best agricultural practices** (Integrated Pest Management, no-tillage, biological nitrogen fixation) |
| 21 | Fund farmers to recover **degraded pastures** |
| 22 | Fund projects that foster the adoption of **best livestock practices** (feedlots, breeding programs, pasture management, intensification) |
| 23 | Fund projects for better **effluent treatment** |
| 24 | Support processes that promote **carbon neutral or organic leather and meat** |
| 25 | Fund investments on **certification** beef production processes |
| 26 | Fund the development of **Low Carbon Protocols** |
| 27 | Fund implementation of **animal monitoring systems** |

## Financeable Projects

1. Forest Recovery and Maintenance
2. Production Intensification / Best Practice
3. Certification and Traceability
4. Digital and Precision/IoT

# The interventions were grouped into financeable projects according to similarities with each other

## Interventions (initiatives and solutions)

| | |
|---|---|
| 1 | Fund farmers that need to invest in reforestation to meet the Brazilian **forest code law**. |
| 6 | Fund farmers to implement projects aiming to **exploit legal forest products** |
| 11 | Fund initiatives that seek to grant (or to accelerate) **land titles to owners** |
| 13 | Support farmers with **PRA** (Environmental Recovery Plan) |
| 21 | Fund farmers to recover **degraded pastures** |
| 24 | Support processes that promote **carbon neutral or organic leather and meat** |
| 26 | Fund the development of **Low Carbon Protocols** |

| | |
|---|---|
| 2 | Fund **crop-livestock-forest integration**. |
| 16 | Fund investments that increase **productivity gains** and, as counterpart, they require the surplus of forest areas to be protected; |
| 17 | Fund investments for the acquisition of **modern machinery** that avoids soil compactation - special tires, crawler tractor |
| 18 | **Alternative cultivation techniques** (Regenerative Agriculture and regenerative livestock) |
| 20 | Fund projects that foster the adoption of **best agricultural practices** (Integrated Pest Management, no-tillage, biological nitrogen fixation) |
| 22 | Fund projects that foster the adoption of **best livestock practices** (feedlots, breeding programs, pasture management, intensification) |
| 19 | Fund efficient **irrigation** methods that may replace less efficient ones, such as the transition to precision irrigation and novel techniques (e.g. underground dripping irrigation for row crops). |

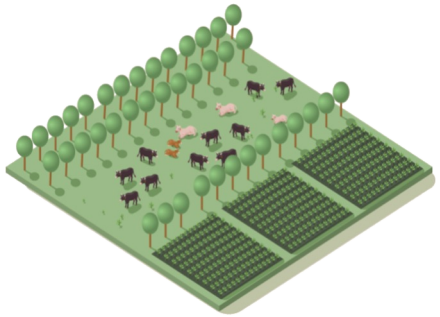
## Financeable Projects

### 1. Forest Recovery and Sustainable Management

Fund projects on forest recovery and management

### 2. Production Intensification / Best Practice

Fund projects on production Intensification and best practices adoption



# The interventions were grouped into financeable projects according to similarities with each other

## Interventions (initiatives and solutions)

| | |
|---|---|
| **12** | Promote **traceability** of production that comes from critical regions in terms of deforestation risks |
| **25** | Fund investments on **certification** beef production processes |
| **27** | Fund implementation of **animal monitoring systems** |
| **10** | Fund investment on **garbage disposal** alternatives; |
| **23** | Fund projects for better **effluent treatment** |

| | |
|---|---|
| 9 | Fund investment that provide **internet access** at rural areas; |
| 14 | Fund investments related to **precision agriculture and livestock** (acquisition of modern machinery and equipment) |
| 15 | Fund investments on capacity building to generate on farm's **renewable energy** (solar, wind and biofuel) |

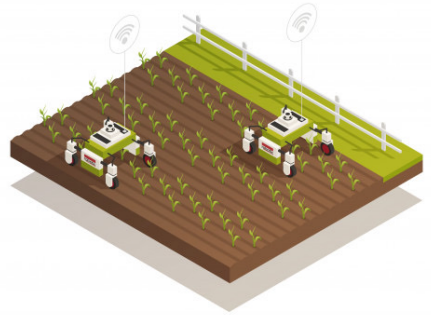
## Financeable Projects

### 3. Certification and Traceability

Fund investments on certification and traceability, which coverage either meat processor or producers;


### 4. Digital Farming and Sustainability

Fund projects on Digital Agriculture, Precision Farming and smart farming;



# Why working with financeable project and not isolated investments opportunities?

1. Convenience: One Stop Shopping
2. Be more inclusive than exclusive
3. Systemic approach
4. Easier to communicate and promote to partners and potential customers
5. Allow minor items normally not financed to be included (IT infrastructure)
6. Solutions are intertwined
7. Increase the potential for revenue generation
8. Higher chances to engage players across the supply chain
9. Clear roles for different stakeholders

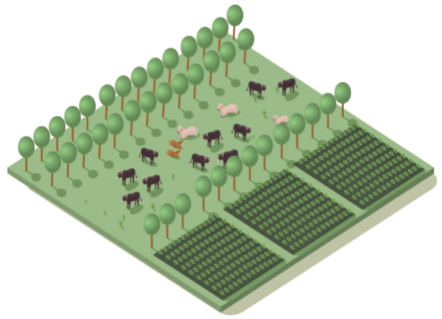
# The financeable projects cover the various operations of the farm

## 1. Forest Recovery and Sustainable Management

Fund projects on forest recovery and maintenance

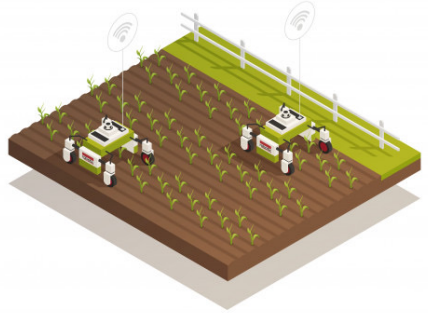
## 2. Production Intensification / Best Practice

Fund projects on production Intensification and best practices adoption




## 3. Certification and Traceability

Fund investments on certification and traceability, which coverage either meat processor or producers;



## 4. Digital Farming and Sustainability

Fund projects on Digital Agriculture and Precision Agriculture

# Financeable Project 1: Forest Recovery and Management

## Financeable items

1. **Recovery of PPA (permanent preservation areas)**
2. **Recovery of water spring**
3. **Recovery of LR (legal forestry reserve)**
4. **Purchase of areas for LR (Legal Reserve) purpose;**
5. **Project to economically explore forestry product to generate income**
6. **Carbon finance models**
7. **Training on sustainable practices implementation and carbon market.**

### INTERVENTION CONTEXT

To meet Forest Code rules, farmers must follow PRA (Environmental Recovery Plan) which demands financial resources and other means (knowledge and expertise).
The challenge for implementation is that NPV of this kind of project is negative and it is key to create conditions to generate income (e.g. environmental services, carbon market).

### WHAT ARE THE ASSOCIATED CHALLENGES?

Deforestation, forest code compliance, biodiversity loss and climate change. Lack of access to payment for environmental services.

### REACH (Coverage and Farmers Size)

National importance and reach all sizes of farmers.

### FINANCIAL CHALLENGE OR BARRIER

- Lack of public funding or incentives;
- Lack of financial return from the investment;
- Long adequacy period (does not encourage adaptation in the short term).
- Lack of knowledge and other means to access payment for environmental services or carbon market.
- Producers tend to omit their status to avoid trade restrictions.

### WHO IS ELIGIBLE?

Farmer and industry

### EXISTING FINANCIAL PRODUCTS*

3,5,9,11,12,19,25,26,33,39

### IMPACT SCORE - KPI AGRI3

(🔴 Low; 🟡 Medium; 🟢 High)

**FOREST PROTECTION AND REFORESTATION**

🟢

**SUSTAINABLE AGRICULTURE**

**N/A**

**IMPROVED RURAL LIVELIHOODS**

🔴

### POSSIBILITIES FOR AGRI3/RABOBANK

- Act in partnership with input dealers and coop's to fund crop season with lower interest rate and as counterpart dealers/coops provides technical assistance for implementation of recovery plan of natural forest;
- Direct finance projects for recovery of APP and LR (Legal Reserve) and/or implementation of sustainable forest exploitation;
- Fund initiatives that connect producers with deficit and surplus of preserved areas (e.g.: Agri3 fund a cooperative that act as a hub selecting and matching potential farmers);

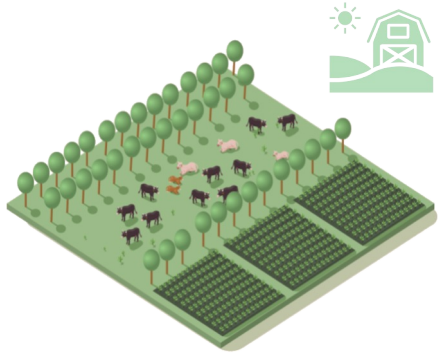
[1]The existing financial products are offered by comercial banks and, in general, will only attend to one investment need, which is insuficient to carry out the proposed Project

*Number of financial product in table 'Financial products and which projects they address'

# Financeable Project 2: Production Intensification / Best Practice

## Financeable items

1. Crop-livestock and crop-livestock-forest systems
2. Recovery of degraded pastureland
3. Alternative cultivation techniques (e.g. regenerative techniques)
4. Machinery and equipment
5. Education and technical assistance on best practices of production
6. Soil correction and fertilizing
7. Investment on erosion management techniques (e.g. terrace and contour)
8. Efficient irrigation methods



### INTERVENTION CONTEXT

Intensification of production is key to reduce area expansion while increasing farms profitability. Besides, using modern and sustainable production techniques reduces the use of chemicals, fertilizers and promotes an increase in soil biodiversity. This usually requires technical knowledge and a wide spectrum of investments.

### WHAT ARE THE ASSOCIATED CHALLENGES?

Legal and illegal deforestation (pressure on area expansion), education and knowledge, weed and bugs resistance, soil erosion and water footprint

### REACH (Coverage and Farmers Size)

National importance and reach all sizes of farmers (more critical to small and medium farmers)

### FINANCIAL CHALLENGE OR BARRIER

- For small producers: low access to technical assistance services (very expensive and low attractiveness to investments from retailers and industries).
- Farmers with limited financial capacity within this segment.
- Insufficient public resources to support long term projects to increase productivity.

### WHO IS ELIGIBLE?

Farmer

### EXISTING FINANCIAL PRODUCTS

1,2,4-8,10,11,13-15,17-23,25,27-30,34-36,38,42

### POSSIBILITIES FOR AGRI3/RABOBANK

- Finance and guide the farmer to reach the 'next stage' in terms of sustainability.
- Carry out the necessary improvements focusing on production intensification techniques and the adoption of best practices with goals as to reduce the volume of ag inputs introduced into the system, increase overall efficiency in processes, reduce environmental impacts and increase profitability.
- Have clear, objective and measurable sustainability goals to be achieved.

### IMPACT SCORE - KPI AGRI3

(🔴 Low; 🟡 Medium; 🟢 High)

**FOREST PROTECTION AND REFORESTATION**

🟡

**SUSTAINABLE AGRICULTURE**

🟢

**IMPROVED RURAL LIVELIHOODS**

**N/A**

[1]The existing financial products are offered by commercial banks and, in general, will only attend to one investment need, which is insufficient to carry out the proposed project.

*Number of financial product in table 'Financial products and which projects they address'

# Financeable Project 3: Certification and Traceability

## Financeable items

1. **Animal monitoring systems (incl. indirect producers)**
2. **Traceability in deforestation risk areas**
3. **Soybean certification**
4. **Other certifications (e.g. beef and low carbon certifications)**
5. **Effluent treatment systems and garbage disposals**


### INTERVENTION CONTEXT

A sustainable product origin is crucial for a sustainable supply chain, with special attention for products from areas with high deforestation risk. But many cattle or soybean buyers (beef industries, traders and cattle producers - feed, breeding, rearing and fattening) have difficulties in identifying an origin and assuring a chain of custody for sustainable products along the supply chain. Some farmers also lack the resources for orientation and verification processes that validates the sustainability of their products by a third party.

### WHAT ARE THE ASSOCIATED CHALLENGES?

Deforestation and traceability, forest code compliance, animal welfare, sustainability in feed production chain, traceability on beef chain, supply chain governance.

### REACH (Coverage and Farmers Size)

National importance.
Farmers of all sizes and production chain.

### FINANCIAL CHALLENGE OR BARRIER

There are no specific credit lines for financing traceability systems or certification processes.

### WHO IS ELIGIBLE?

Farmers, coops and industries

### EXISTING FINANCIAL PRODUCTS

9,10,12,13,19,25,26,29,36,37

### POSSIBILITIES FOR AGRI3/RABOBANK

- Structure a credit line that comprehends all the necessary activities and steps to enable farmers to identify their products as sustainable;
- Allow industries to ascertain a chain of custody that will guarantee a 'green product' for the final consumer;
- Some initiatives exist (such as Marfrig´s blockchain initiative), but a specific credit line has the potential to accelerate the process and broaden the spectrum of producers involved in order to include small and medium farmers and direct and indirect producers.

### IMPACT SCORE - KPI AGRI3

(🔴 Low; 🟡 Medium; 🟢 High)

**FOREST PROTECTION AND REFORESTATION**

🟢

**SUSTAINABLE AGRICULTURE**

🟢

**IMPROVED RURAL LIVELIHOODS**

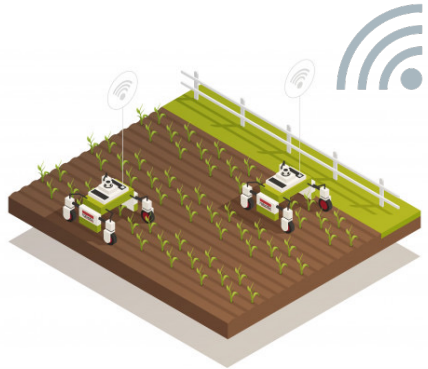
🔴

[1]The existing financial products are offered by commercial banks and, in general, will only attend to one investment need, which is insuficient to carry out the proposed project.
*Number of financial product in table 'Financial products and which projects they address'

# Financeable Project 4: Digital Farming and Sustainability

## Financeable items

1. Machinery and equipment
2. Hardware and software
3. Internet Access
4. Smart irrigation systems
5. Team training
6. Renewable energy projects;



### INTERVENTION CONTEXT

Digital agriculture is related to precision agriculture and management improvement, that in turn are key to make better use of resources, improve productivity and reduce pressure on area expansion. The adoption of digital technology requires a series of investments through the property: from adequate internet infrastructure, machinery and implements, hardware and software, as well as improvements in productive processes and management.

### WHAT ARE THE ASSOCIATED CHALLENGES?

Pressure on area expansion; legal deforestation; weed and bug resistance; soil erosion; water footprint.

### REACH (Coverage and Farmers Size)

National importance and reach all sizes of farmers, but farmers with more professional management systems (mostly large and medium) are more inclined to adopt digital technology and precision agriculture.

### FINANCIAL CHALLENGE OR BARRIER

Public funding is available for some necessary investments, such as machinery and equipment, as well as irrigation systems. But for other investments, there aren´t any available credit lines, such as for hardware or software, necessary infrastructure for internet access and team training.

### WHO IS ELIGIBLE?

Farmers and coops

### EXISTING FINANCIAL PRODUCTS[1]

1,2,4,6,9,10,16,24,29,31,32,36,42

### POSSIBILITIES FOR AGRI3/RABOBANK

- Adopt a 'one stop shop' concept and offer a unique financial credit line focused on digital and precision agriculture;
- Concentrate the approval process into one, reducing bureaucracy and time consumption in order to analyze a grant application;
- Rabobank already operates some credit lines and Agri3 could widen their reach for the farmer to be able to execute a complete project.

### IMPACT SCORE - KPI AGRI3

(🔴 Low; 🟡 Medium; 🟢 High)

**FOREST PROTECTION AND REFORESTATION**

🟡

**SUSTAINABLE AGRICULTURE**

🟢

**IMPROVED RURAL LIVELIHOODS**

🔴

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[1]The existing financial products are offered by commercial banks and, in general, will only attend to one investment need, which is insuficient to carry out the proposed project.
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# Content

- Introduction and Methodology
- Step 1: Soybean and cattle main sustainability challenges identification
  - Chain Description
  - Brazil Financing Scenario
  - Sustainability challenges
- Step 2: Potential Interventions Mapping
- **Step 3: High Potential Interventions Deep Dive**
- Step 4: Suggested Models and Roadmap

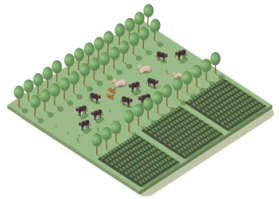
# The suggested financeable projects were the basis for the business-as-usual immersion and the existing cases mapping

### 1. Forest Recovery and Sustainable Management

Fund projects on forest recovery and management

### 2. Production Intensification / Best Practice

Fund projects on production Intensification and best practices adoption

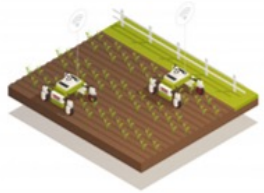


### 3. Certification and Traceability

Fund investments on certification and traceability, which coverage either meat processor or producers;

### 4. Digital Farming and Sustainability

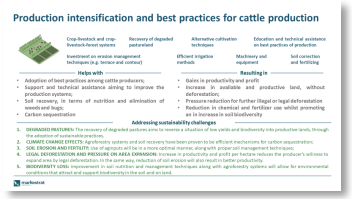
Fund projects on Digital Agriculture, Precision Farming and smart farming;



MATERIAL STRUCTURE

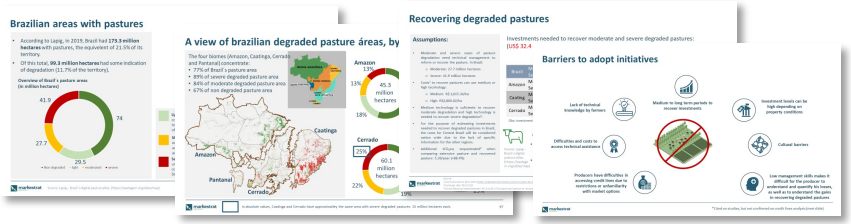
## 1. Cover slide

(connection between projects and mapped challenges)




## 2. BAU Deep Dive

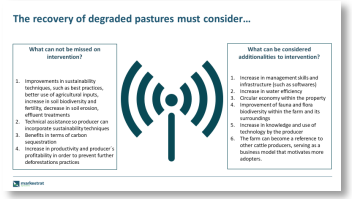
(business as usual immersion and barriers)




## 3. Conclusions and learnings

(main insights that will be considered in Phase 4:

- What can't be missed;
- Potential additionalities
- Case studies



# The suggested financeable projects were the basis for the business-as-usual immersion and the existing cases mapping

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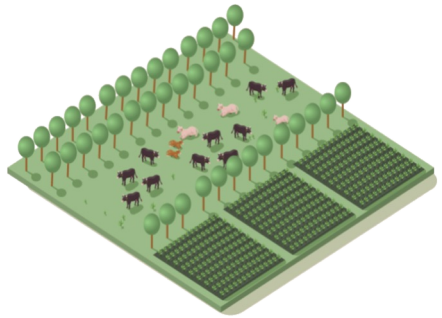
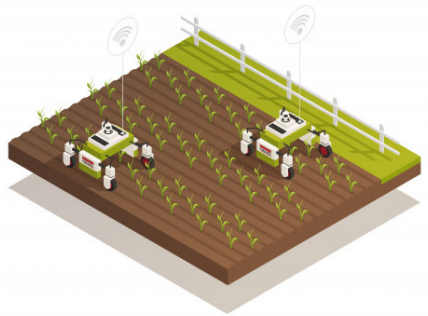




## 4. Digital Farming and Sustainability

Fund projects on Digital Agriculture and Precision Agriculture

# Forest Recovery and Management intervention to meet Forest Code rules, demand financial resources, knowledge and expertise

- Recovery of PPA (permanent preservation areas)
- Recovery of LR (legal forestry reserve)
- Purchase of areas for LR (Legal Reserve) purpose;
- Carbon finance models

## Helps on

- Adequacy to Brazilian forestry code
- Recover degraded areas
- Recovery of water springs
- Maintenance of forest surplus

## Resulting in

- Acceleration of legal compliance
- Carbon emission reduction and carbon sinks
- Control of erosion and landslides
- Compliance with The Paris Agreement

## Addressing sustainability challenges

**DEFORESTATION; FOREST CODE COMPLIANCE; BIODIVERSITY LOSS; CLIMATE CHANGE; LACK OF ACCESS TO PAYMENT FOR ENVIRONMENTAL SERVICES**

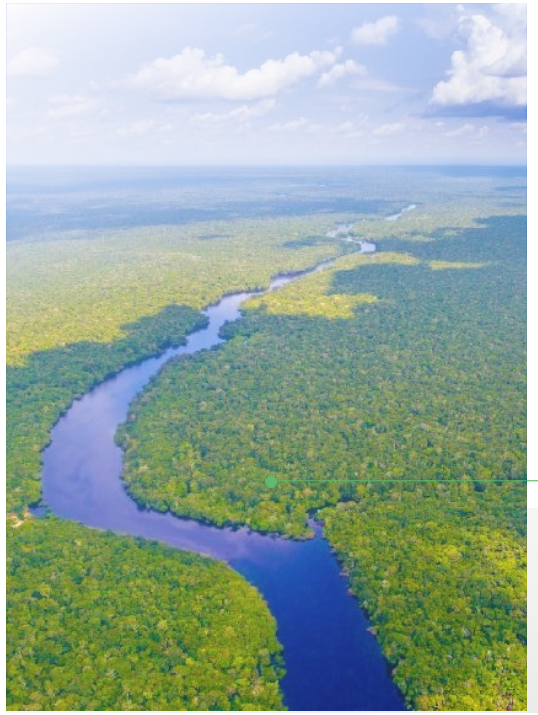
## How does this technology help to solve these challenges?

- Acceleration of sustainable forest management and legal environmental realignment of irregular properties to improve soil fertility, carbon sequestration, water management and biodiversity, including through: reforestation, forest landscape restoration, transition from cropland to agroforestry and protection of high conservation value (HCV) areas/high carbon stock (HCS) forests. (Agri3)
- Implementation of innovative agricultural solutions, such as Integrated Crop-Livestock-Forest (ICLF) systems, that have an impact on reducing GHG emissions, restoring degraded land, improving water management, enhancing soil fertility, sequestering carbon, building resilience to climate change and/or protecting biodiversity, while maintaining or substantially increasing the income of local farmers and smallholders. (Agri3)

markestrat Agribusiness Source: Markestrat Analysis based on ESALQ Júnior Florestal; Agri3.

# The new Brazilian Forest Code is in force since 2012, a key factor to promote environmental regularization and combat deforestation’

## Highlights in the evolution of the Brazilian Forest Code over the years



### 1988 - Federal Constitution

First Brazilian constitution to have a **chapter exclusively dedicated to the protection of the environment**, which fully received the environmental legislation in force at the time.

### 2000 – Law No. 9.985/2000

It established the National System of Nature Conservation Units, in addition to establishing **criteria and norms to create, implement and manage these territorial spaces**.

### 2009 - Law No. 12.187/2009

The legislation instituted the National Policy on Climate Change and established its guidelines. Adopted the national voluntary commitment on **reduction of greenhouse gas emissions in the national territory** and provided mitigation actions for its reach.

### 2012 – NEW FOREST CODE

It established general **rules on vegetation protection**, permanent preservation areas and legal reserve areas; forest exploitation; forest raw material supply; control of the origin of forest products; and control and prevention of forest fires. CAR PRA

### 2014 - Normative Instruction 02

Establishes the procedures for the integration, execution and compatibilization of the Rural Environmental Cadastre System - SICAR and defines the general procedures for the execution of the **Rural Environmental Cadastre - CAR.**

### 2018 - Constitutionality of the code

The Federal Supreme Court decided that the **Forest Code is constitutional**. Clearing the discussions and doubts that existed about the constitutionality of the code.

**The new Forest Code brought some instruments that once properly implemented, would allow the monitoring of land use in Brazil**

CAR **Rural Environmental Register:** National electronic public registry, mandatory for all rural properties, with the purpose of integrating the environmental information of rural properties.

PRA **Environmental Regularization Program:** Sets of initiatives to be developed by rural landowners and landholders with the aim of adapting and promoting environmental regularization.

## Code range

The **Brazilian Forest Code** is **modern** and it’s at the **federal instance**, furthermore, there is the **possibility** of **other spheres to create laws** to **support** or **complement the code**, such as **states and municipalities.**

However, **some gaps** persist in the state's performance in **monitoring** and **enforcing environmental legislation** in **Brazil**, especially with regard to **inspection** and the **transparency of information** that should be public. This **threatens** the **conservation objectives** of the **code**.



Source: Machado Meyer (2018); SICAR

# The code seeks to protect Native Vegetation, including Areas of Permanent Preservation and Legal Reserves

## Main implications of the Brazilian Forest Code

**Legal reserve**: portion of each property that **must be preserved**. Currently it is **20%, except in the Legal Amazônia and Cerrado areas:**

**Area of Permanent Preservation** (APP): fragile places, such as hilltops, slopes and river banks that **cannot be deforested**. A **minimum of 30-meter strip of forest** must be **preserved on the riverbank**.

### Conservation Areas Within Properties

**Forest areas in the Legal Amazônia**

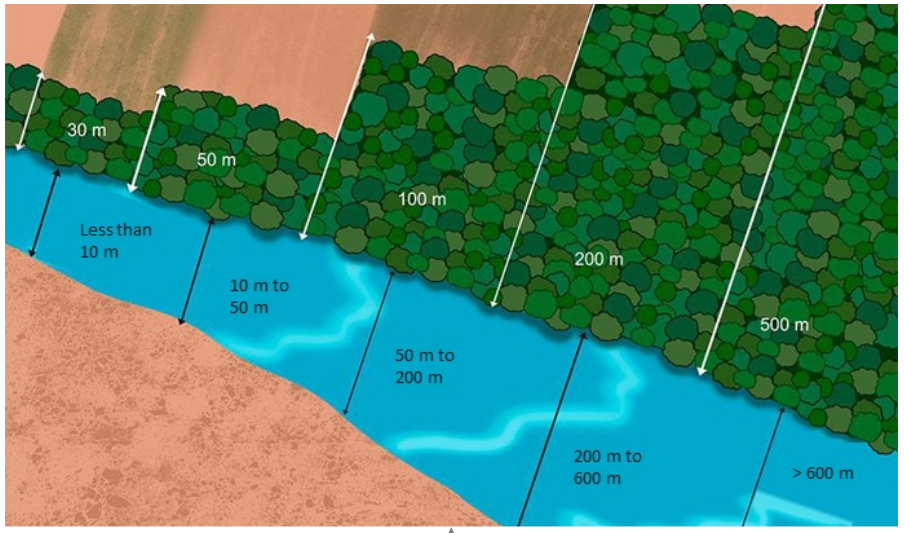
**80%**

**Cerrado areas**

**35%**

**Other Areas**

**20%**


Source: CI Florestas; Embrapa; Agência Câmara de Notícias; G1 Globo

# According to estimates, the gap needed to be filled to meet forestry code obligations is to reforest 19 million hectares in Brazil…

**…from this, 11 million of LR (Legal Reserve) and 8 millions of Area of Permanent Preservation (APP).**

## To attend to those obligations

Farmers must submit a project on PRA (Program for Environmental Recovery). Once PRA is signed, **farmers** have **up to 20 years to develop the plan**.

Estimates are that for **recovering LR (Legal Reserve) and APP areas** will **consume** around **R$ 162.5 billions (US$ 32.5 billions)**.

**EMBRAPA** shows **4 methods for legal recovery**, producers tend to adopt the 1st method because it doesn't reacquire many investments, but it takes time to happen (long term);

**Natural regeneration** is the strategy **most adopted**, which implies in sealing the area and no further action is taken*;

**Cost to regenerate** can demand up to R$ 15,000/hectare (US$3,000/hectare), which **is high**. Cost might be variable according to biomes, forest stand and regeneration technique.

**4. Agroforestry Systems (SAFs)**

**3. Full Area Planting**

**2. Natural regeneration with management**

**1. Natural Regeneration without management**

Source: Markestrat Analysis based on EMBRAPA, 2020; Agri Roadmap Brazil, 2020; TNC, 2020 and interviews with specialists;*Specialists opinion, there is no stats regarding this aspect;
Exchange rate: 2017 – R$ 3,192 / 2018 – R$ 3,6542 / 2019 – R$ 3,9451 / 2020 – R$ 5,1558 / 2021 – R$ 5

# The carbon credit market related to forests (REDD+) is still barely established in Brazil. Lack of liquidity and need for triangulation are key factors to overcome

## How does it work?

The main aim of the "Reducing Emissions from Deforestation and Degradation (REDD)" mechanism is to make forests more valuable standing than they would be cut down by creating a financial value for the carbon stored in the trees. Once this carbon is standardized and quantified, REDD+ will allow polluters to purchase cheap carbon offsets (or "pollution licenses") from countries in the South instead of reducing their own greenhouse gas emissions at source.

Farmers might have the right to have assess to Certified Emission Reductions if he/she adopt practices that reduce emissions or conserve forests beyond legal requirements or that are under pressure for deforestation;

## Then why is accessing the carbon market unattractive to rural producers?

- High cost to implement (R$ 2.5 million (US$500,000) on the process)
- Difficulty in commercializing credits (need to have a buyer)
- The value of the carbon credit is not attractive (lower than USA and EU)
- Lack of standardization and metrics for measuring carbon emissions

There is a lack of financial interest on the part of rural producers to make carbon credit operations feasible in their farming activities. Also the lack of feasible business models to facilitate the market access to these producers is an important barrier.

Source: based on desk research and interviews with specialists.
Exchange rate: 2017 – R$ 3,192 / 2018 – R$ 3,6542 / 2019 – R$ 3,9451 / 2020 – R$ 5,1558 / 2021 – R$ 5

# Economically exploiting Legal Reserve and forest surplus through sustainable management is a legal incentive, but not adopted.

## What does the law say (Law 12.651/2012)?

The harvesting of non-timber forest products, such as fruits, vines, leaves and seeds is permitted.

Sustainable management for eventual forest exploration without commercial purposes, for consumption on the property itself, does not require authorization from the competent agencies.

The environmental agency must only be previously declared the reason for the exploration and the volume to be explored, annual exploration being limited to 20 cubic meters.

Sustainable forest management of the Legal Reserve vegetation for commercial purposes depends on the authorization of the competent agency and must meet some guidelines and orientations.

## If the law allows to economically exploit the surplus area, why is it generally not practiced?

- It would be a path to generate incentives for farmers by its environmental services but, apparently, there is a lack of mechanisms to make it happen .
- There seems to be a lack of knowledge/expertise/incentive for the producer to exploit that area.
- In agricultural frontier, on Amazon and Cerrado Biome, there are cases of lease of the forest by landowners to wood companies that legally explore the forest.



Source: EMBRAPA – Brazilian Forest Code; Interviews with specialists;

# There are several public financial instruments but either funding is scarce or focused on small farmers which represent a fraction of soybean production.

**Program for Reduction in GHG emissions (ABC Program):** Program to Reduce Greenhouse Gas Emissions in Agriculture - ABC Program, aimed at reducing greenhouse gas emissions from agricultural activities.

**National Program to Strengthen the family agriculture (PRONAF):** It finances investments, including infrastructure, aimed at the improvement, storage, processing and commercialization of agricultural production, forest products and extraction, or artisanal products, and the exploitation of rural tourism.

**Rural sustainable Amazon:** Financing Program for the Sustainable Development of the Amazon, which supports the financing of projects characterized as rural located in the North Region, with FNO resources for the purpose of implantation, expansion, diversification, modernization, reform and relocation.

**FNO Biodiversity for legal reserve and PPA:** It is a FNO Financing Line - Biodiversity Program, destined to undertakings aimed at the regularization and recovery of areas of legal reserve and degraded / altered permanent preservation areas of rural properties.

**PRONAF Florestal:** Credit line for the implantation, maintenance and management of commercial forests, including those destined to the restoration of legal reserves or permanent preservation areas, and to produce legal coal.

**Green FNE (FNE Verde):** Promote the development of enterprises and economic activities that promote the preservation, conservation, control and / or recovery of the environment, with a focus on the sustainability and competitiveness of companies and production chains.

**Environmental financing:** Finances the generation of alternative energy, energy conversion, forest management, organic farming, including conversion and certification, use of local biodiversity, cleaner production, pollution control equipment, recovery of degraded areas, waste treatment, among others.

**Reforestation financing:** Banco do Nordeste seeks to enable the expansion of business and the growth of this strategic sector for the Region, contributing to the generation of jobs and the recovery of deforested areas.

**PRONAF Agroecology Investments:** Credit line for the financing of agroecological production systems.

- Although there are several public funding lines related to forestry recovery and management, due shortage on public budget, lines become scarce quickly. Besides, public resources are less than necessary to meet international agreement targets.
- Moreover, many lines are destinated to small farmers, which represent a fraction of total area, specially on soybean production.

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Source: Markestrat Analysis based on Portal da Indústria

# Several barriers exist, but negative ROI is the most important to be overcome (either for recovery or to keep forestry surplus).

## Barriers to forestry recovery and maintenance:

**State did not return the processed CAR to the producers**
According to Insper, only 3% of the producers are warned of their CAR status

**Negative return on investment**
Recovery of natural forestry has no economic surplus for farmers.

**Lack of incentive to keep forestry surplus**
To keep additional forest areas farmers must receive incentives, which are scarce

**Producers lack understanding of the carbon credits**
According to McKinsey, of a sample of 560 producers, 66% said they did not have enough understanding about carbon credits

**Long adequacy period**
After PRA is approved, farmers have 20 years to implement a recovery plan. Thus, recovery might be postponed;

**Producers have difficulty accessing financial resources to do the recovery**
The recovery process generally requires financial investment

**Lack of knowledge of producers about what to do**
Producers lack instructions on how to recover forest areas

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Source: Markestrat Analysis based on Insper, 2021; McKinsey, 2021; EMBRAPA, 2020 and Interviews;

# Besides lower EIR, Forest Recovery and Maintenance intervention must consider technical assistance and training.

### What can not be missed on intervention?

1. Incentive farmers with lower EIR to invest on recovery and maintenance activities;
2. Resources must be granted to other objectives besides socio-environmental, such as financing production;
3. Technical assistance and training, specially to smallholders;
4. Monitoring/Management system control for results tracking.

### What can be considered additionalities to intervention?

1. Incentives to farmers to accelerate legal deadlines;
2. Additional incentives for farmers to keep forest surplus;
3. Triangulation with cooperatives or associations that allows for greater coverage (number of farmers).



Source: Markestrat Analysis based on Agri3 and interviews.

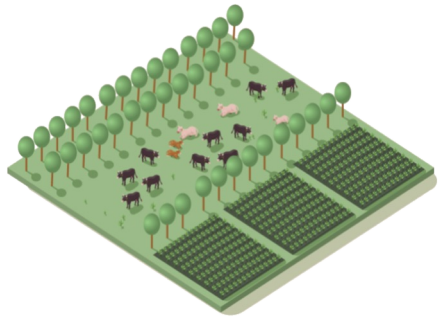
# The suggested financeable projects were the basis for the business-as-usual immersion and the existing cases mapping

## 1. Forest Recovery and Sustainable Management

Fund projects on forest recovery and maintenance

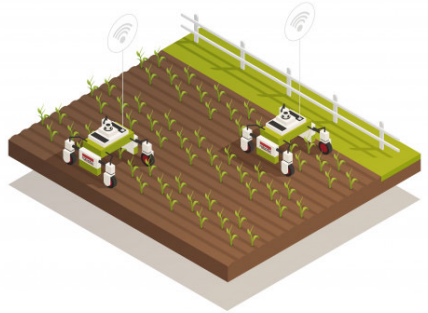
## 2. Production Intensification / Best Practice

Fund projects on production Intensification and best practices adoption




## 3. Certification and Traceability

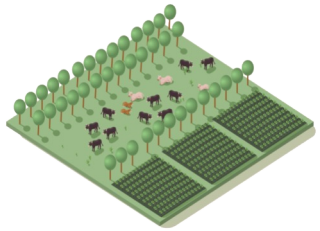
Fund investments on certification and traceability, which coverage either meat processor or producers;



## 4. Digital Farming and Sustainability

Fund projects on Digital Agriculture and Precision Agriculture

# Production intensification and best practices for cattle production



**Agroforestry, crop-livestock and crop-livestock-forest systems**

**Recovery of degraded pastureland**

**Alternative cultivation techniques (ex.: regenerative agriculture)**

**Soil correction and fertilizing**

**Investment on erosion management techniques (e.g. terrace and contour)**

**Efficient irrigation methods**

**Machinery and equipment**

**Education and technical assistance on best practices of production**

**Credit lines***
**ABC Program, Moderagro, Inovagro, FNO Biodiversity, Credit for livestock investments.**

## Helps with

- Adoption of best practices among cattle producers;
- Support and technical assistance aiming to improve the production systems;
- Soil recovery, in terms of nutrition and elimination of weeds and bugs;
- Carbon emission reduction and carbon sink

## Resulting in

- Gains in productivity and profit
- Increase in available and productive land, without deforestation;
- Pressure reduction for further illegal or legal deforestation
- Reduction in chemical and fertilizer use whilst promoting an in increase in soil biodiversity

## Addressing sustainability challenges

1. **DEGRADED PASTURES:** The recovery of degraded pastures aims to reverse a situation of low yields and biodiversity into productive lands, through the adoption of sustainable practices.
2. **CLIMATE CHANGE EFFECTS:** Agroforestry systems and soil recovery have been proven to be efficient mechanisms for Carbon emission reduction and carbon sink;
3. **SOIL EROSION AND FERTILITY:** Use of ag inputs will be in a more optimal manner, along with proper soil management techniques;
4. **LEGAL DEFORESTATION AND PRESSURE ON AREA EXPANSION:** Increase in productivity and profit per hectare reduces the producer's wiliness to expand area by legal deforestation. In the same way, reduction of soil erosion will also result in better productivity.
5. **BIODIVERSITY LOSS:** improvement in soil nutrition and management techniques along with agroforestry systems will allow for environmental conditions that attract and support biodiversity in the soil and on land.

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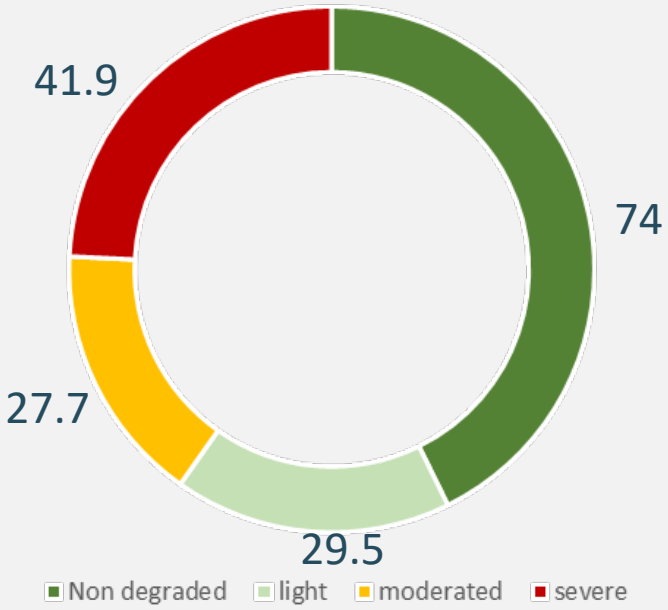
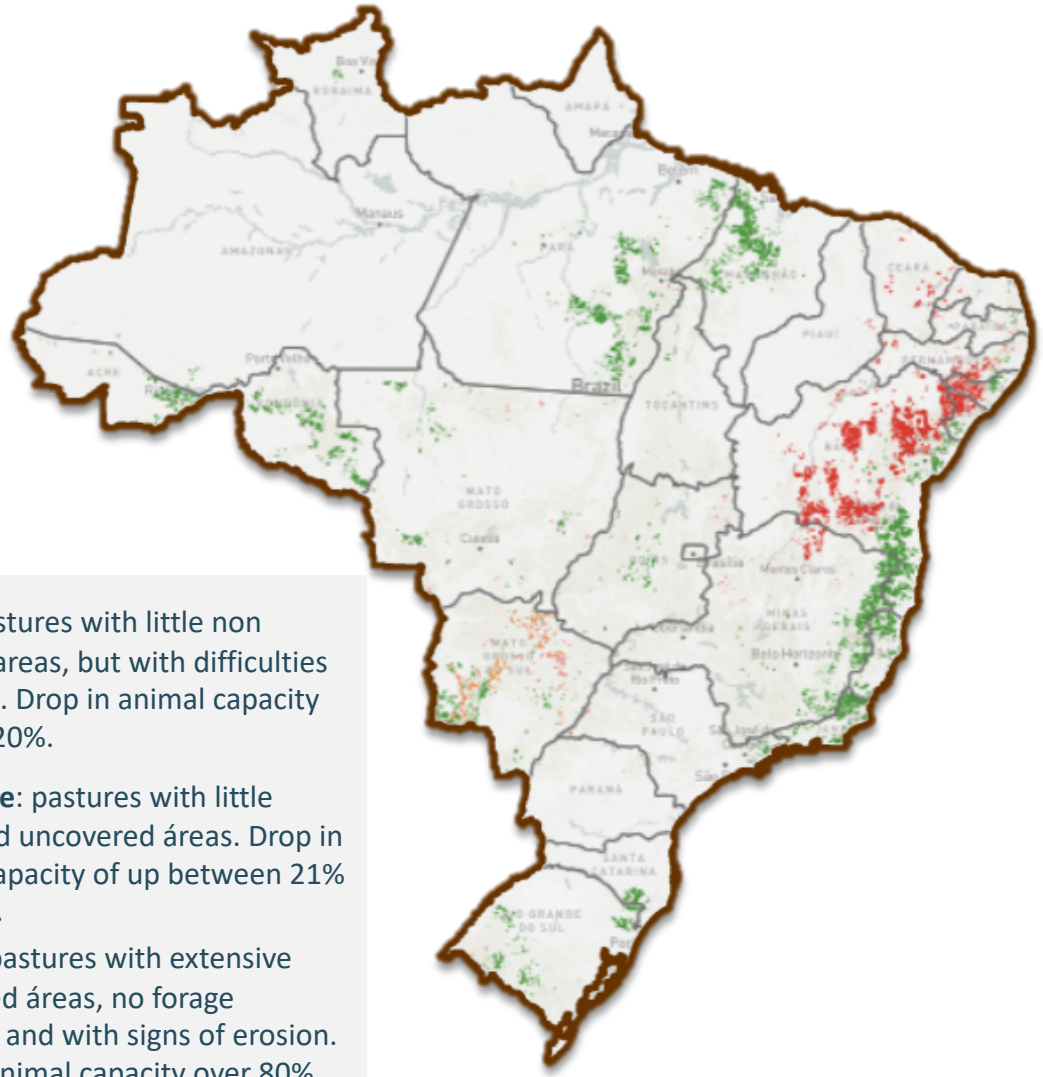
*The credit lines mentioned have been previosly explained in the material. They represent the financial products available through goverment programs more directly involved with recorvery of degraded pastures. Other credit lines can also be used for this purpose, such as Pronamp and Pronaf, although they are not specifically destined for the recovery of degraded pastures.

# Brazilian areas with pastures

- According to Lapig, in 2019, Brazil had **173.3 million hectares** with pastures, the equivelent of 21.5% of its territory.
- Of this total, **99.3 million hectares** had some indication of degradation (11.7% of the territory).

**Overview of Brazil´s pasture areas (in million hectares)**



**Light**: pastures with little non covered areas, but with difficulties to sprout. Drop in animal capacity of up to 20%.

**Moderate**: pastures with little weed and uncovered áreas. Drop in animal capacity of up between 21% and 50%.

**Severe**: pastures with extensive uncovered áreas, no forage coverage and with signs of erosion. Drop in animal capacity over 80%.

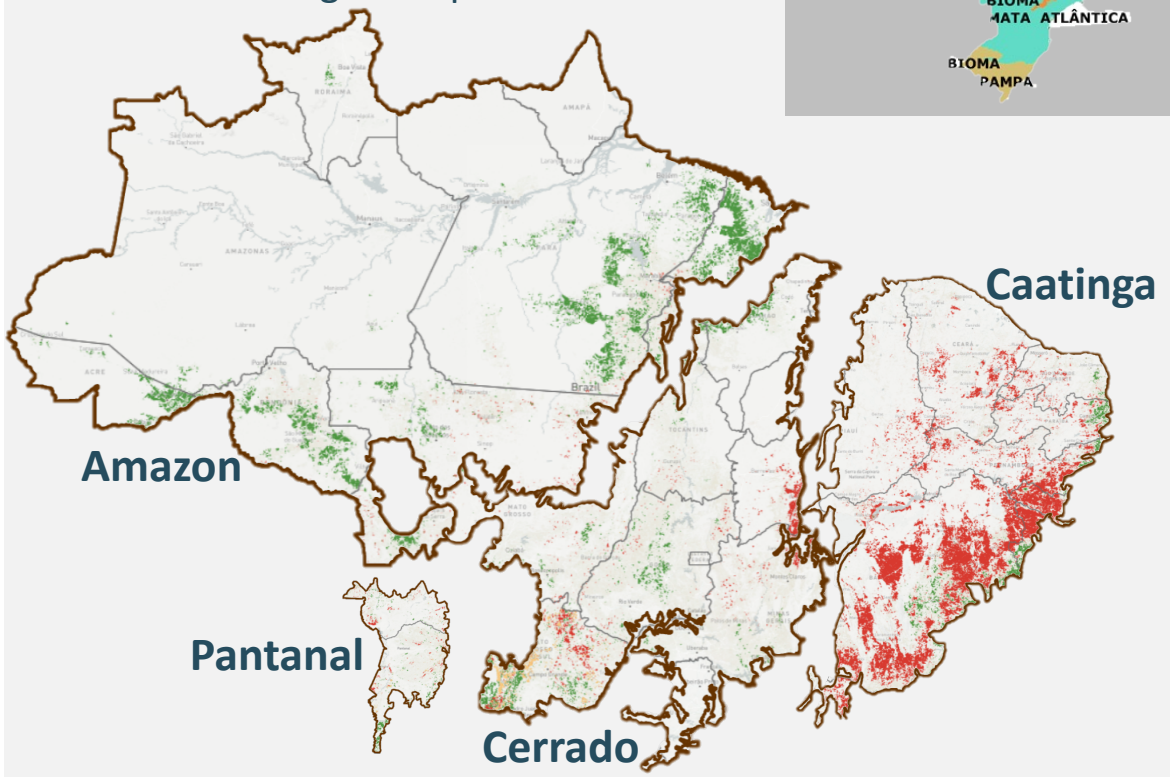


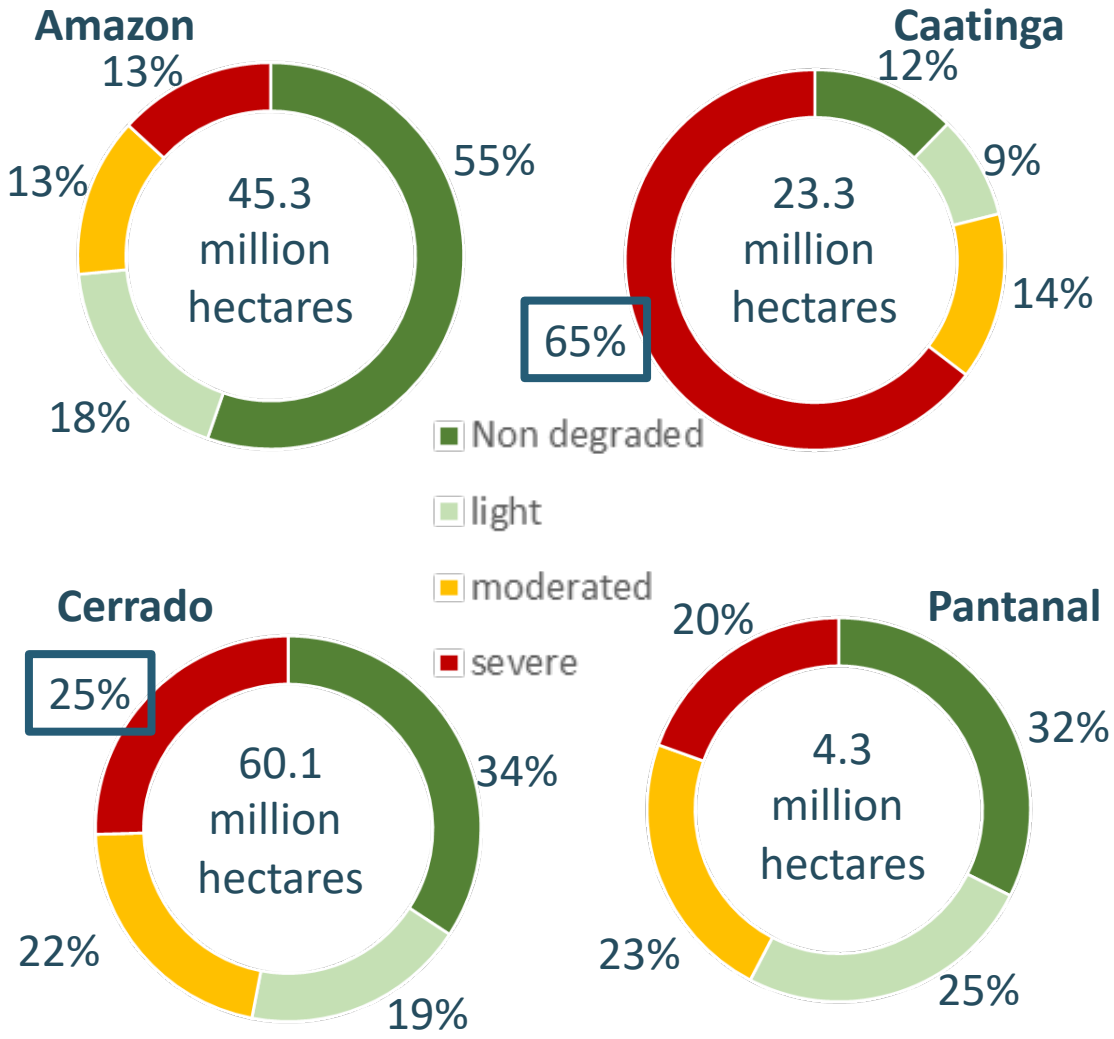
Source: Lapig – Brazil´s digital pasture atlas. (https://pastagem.org/atlas/map)

# A view of Brazilian degraded pasture areas, by biomes

The four biomes (Amazon, Caatinga, Cerrado and Pantanal) concentrate:

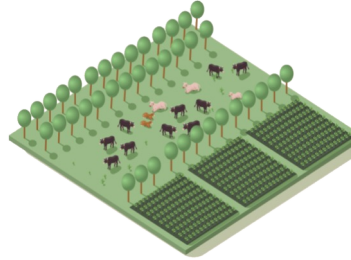
- 77% of Brazil´s pasture area
- 89% of severe degraded pasture area
- 84% of moderate degraded pasture area
- 67% of non degraded pasture area


In absolute values, Caatinga and Cerrado have approximatley the same area with severe degraded pastures: 15 million hectares each.

# Recovering degraded pastures



## Assumptions:

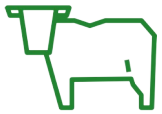
- Moderate and severe cases of pasture degradation need technical management to reform or recover the pasture. In Brazil:
  - Moderate: 27.7 million hectares
  - Severe: 41.9 million hectares
- Costs[1] to recover pastures can use medium or high tecnnology:
  - Medium: USD 323/ha
  - High: USD 560/ha
- Medium technology is sufficient to recover moderate degradation and high technology is needed to recover severe degradation[3].
- For the purpose of estimating investments needed to recover degraded pastures in Brazil, the costs for Central Brazil will be considered nation wide due to the lack of specific information for the other regions.
- Positive net difference in carbon balance of 7.68 tons per hectare of $CO_2$ sequestered annually in recovered pastures compared to natural vegetation[4].

  (*Obs: this data was generalized for degraded pasture areas in Brazil for the purpose of estimating the potential impacts*).

## Investments needed to recover moderate and severe degraded pastures: (R$ 162 billion (US$ 32.4 billion))

| | | Pasture area (million hectares) | Recovery Costs (per hectare) | Investments needed (million R$) | Investments needed (million US$[2]) |
|---|---|---|---|---|---|
| Brazil | Moderate | 27,7 | 1.615 | 44.745 | 8.949 |
| | Severe | 41,9 | 2.800 | 117.321 | 23.464 |
| Amazon | Moderate | 6 | 1.615 | 9.748 | 1.950 |
| | Severe | 6 | 2.800 | 16.723 | 3.345 |
| Caating | Moderate | 3 | 1.615 | 5.366 | 1.073 |
| | Severe | 15 | 2.800 | 42.230 | 8.446 |
| Cerrado | Moderate | 13 | 1.615 | 20.887 | 4.177 |
| | Severe | 15 | 2.800 | 42.851 | 8.570 |

Obs: investments during 1 agricultural year and live usage of the recovered pastures ranging from 4 to 10 years.



Source: Lapig – Brazil´s digital pasture atlas. (https://pastagem.org/atlas/map)

## Animal capacity:

- Moderate degradation after recovery: increase of up to 50%;
- Severe degradation after recovery: increase of up to 80%

## Positive net difference in C sequestration balance (Brazil):

- Moderate degradation after recovery: + 212.7 million tons $CO_2$ eq per year
- Severe degradation after recovery: + 321.8 million t$CO_2$eq per year

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Source:
[1]Scot Consultoria, abril 2021 (https://pastoextraordinario.com.br/custos-de-reforma-e-recuperacao-de-pastagem/). Values for Central Brazil.
[2]Exchange rate: R$ 5/ US$
[3]Solidariedad estimates between R$ 3 to R$ 4 Thousand per hectare to recover severe degraded pastures. (In Solidariedad´s 'Good Practices for Recovery of Degraded Pastures' manual)

Source:
[4]https://www.embrapa.br/en/busca-de-noticias/-/noticia/3170006/eficiencia-da-producao-pecuaria-reduz-emissao-de-gases-estufa

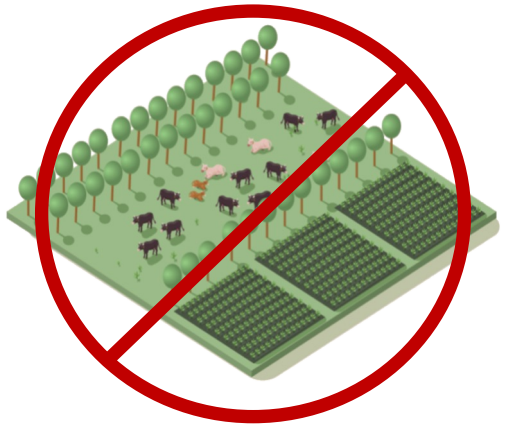
# Barriers to adopt production intensification and best practices for cattle production

Lack of technical knowledge by farmers

Medium to long term periods to recover investments

Investment levels can be too high for small and medium sized producers, depending on property conditions

Difficulties and costs to access technical assistance



Cultural barriers

Producers have difficulties in accessing credit lines due to restrictions or unfamiliarity with market options

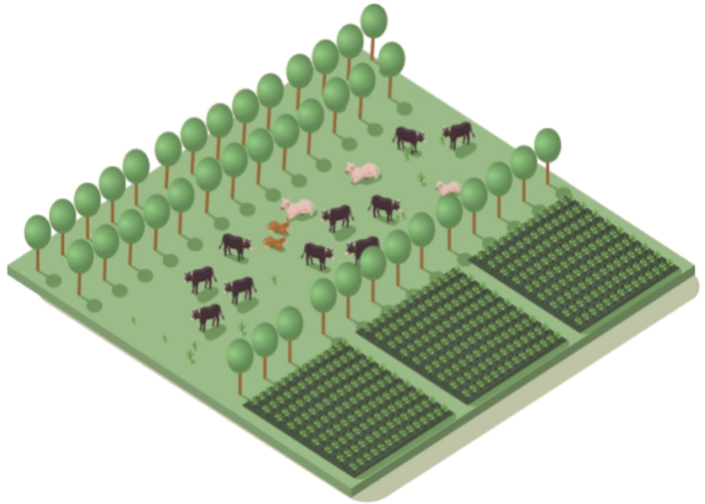
Low management skills makes it difficult for the producer to understand and quantify his losses, as well as to understand the gains in recovering degraded pastures

*Cited on studies, but not confirmed on credit lines analysis (next slide)

# Interventions that focus on the recovery of degraded pastures must consider…

## What can not be missed on intervention?

1. Improvements in sustainability techniques, such as best practices, better use of agricultural inputs, increase in soil biodiversity and fertility, decrease in soil erosion, effluent treatments
2. Technical assistance so producer can incorporate sustainability techniques
3. Benefits in terms of carbon emission reduction and carbon sink
4. Increase in productivity and producer´s profitability in order to prevent further deforestations practices



## What can be considered additionalities to intervention?

1. Increase in management skills and infrastructure (such as software)
2. Increase in water efficiency
3. Circular economy within the property
4. Improvement of fauna and flora biodiversity within the farm and its surroundings
5. Increase in knowledge and use of technology by the producer
6. The farm can become a reference to other cattle producers, serving as a business model that motivates more adopters.

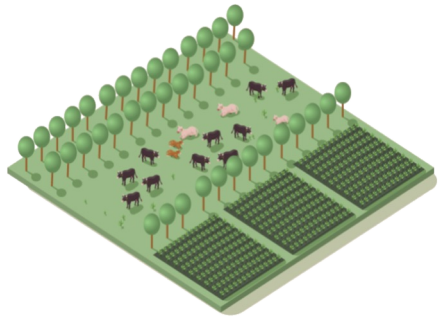
# The suggested financeable projects were the basis for the business-as-usual immersion and the existing cases mapping

## 1. Forest Recovery and Sustainable Management

Fund projects on forest recovery and maintenance

## 2. Production Intensification / Best Practice

Fund projects on production Intensification and best practices adoption

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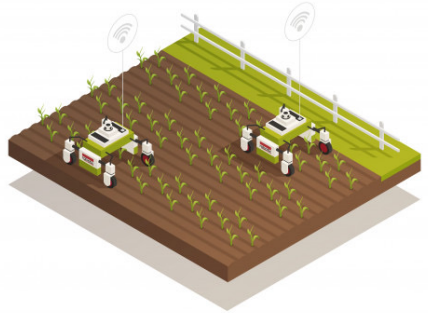


## 4. Digital Farming and Sustainability

Fund projects on Digital Agriculture and Precision Agriculture

# Traceability and monitoring for the beef chain in Brazil to meet deforestation and sustainability

**Traceability in deforestation risk areas**

**Animal monitoring systems**

**Origin certificate on beef chain**

**Traceability of indirect producers (breeding and rearing)**

## Helps on

- Increases forest and biodiversity;
- Adoption of best practices among cattle producers;
- Improves general carbon balance, favoring positive results to reduce the greenhouse effect.

## Resulting in

- Monitoring of indirect producers increasing efficiency and reducing deforestation levels;
- CO2 reduction;
- Biodiversity conservation;
- Meat quality assurance;
- Greater chances to stay in distinct markets.

## Addressing sustainability challenges

1. **DEFORESTATION:** monitoring deforestation and achieving sustainability in agribusiness;
2. **FOREST CODE COMPLIANCE:** adequation to the forest code and maintenance of conservation;
3. **ANIMAL WALFARE:** to improve the practices production and reduce greenhouse gases emission;
4. **SUSTAINABILITY IN FEED PRODUTION CHAIN:** pasture intensification to reducing the environmental impact of ranching, and Increasing stocking rate per hectare reduces pressure for deforestation and increases producer income;
5. **SUPPLY CHAIN GOVERNANCE:** communication between the players in the production chain, and Interaction between the public and private sectors in the production chain.

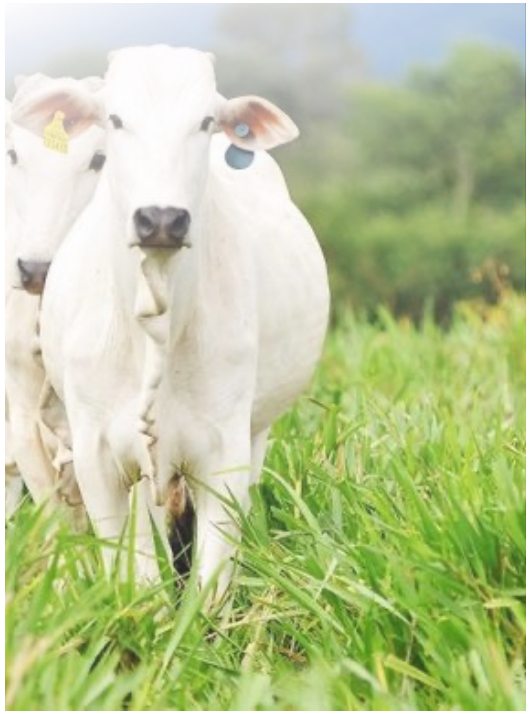
markestrat Agribusiness Source: Markestrat Analysis based on ESALQ Júnior Florestal; Agri3.

# Traceability and monitoring system for the beef chain in Brazil

Deforestation can be associated with agricultural and livestock practices, and traceability and monitoring system is a challenge in all biomes to meet the environment issues. In the Amazon biome, the traceability for tier 1 suppliers is a reality for the past decade, and the inclusion of indirect suppliers is a challenge. In other biomes, the challenge is bigger as the traceability systems, as not as embracing as in Amazon, and requires new purchase policies and time for producers to adapt to these policies.

Traceability and monitoring system for the beef chain was developed in 2000, with the foreign markets and demands for sanitary control and food safety.

## The traceability and monitoring system in Brazil is represented by:



### 2002 - SISBOV

Brazilian System of Identification and Certification of Beef and Bubaline Origin

Official system for **individual identification of cattle and buffaloes. Is** a sanitary control tool that supervises farms regarding the activities of meet production and commercialization. It is regulated by the Normative Instruction published in 2002 by the Agriculture Ministry (MAPA) and is a voluntary tool.

### Health surveillance system

The Federal, Estadual an Municipal Inspection Service (SIF, SIE, SIM) are responsible for **ensuring the quality of animal products** in the internal and global market.

### 2009 - Voluntary agreements and TAC

Agreement between the Federal Public Ministry (MPF) and slaughterhouses, **regarding the Conduct Adjustment Terms (TAC).**

### Traceability and monitoring models

**Partnerships** between governmental institutions or associations and non-governmental institutions to **establish traceability and monitoring systems.**

### Traceability and monitoring tech

There is a lot of companies **developing technologies to improve the cattle chain** traceability and monitoring system.

# SISBOV is a traceability system focused on the sanitary aspects

## SISBOV - Brazilian System of Identification and Certification of Beef and Bubaline Origin

The objective of the system is the **identification, registration and individual monitoring** of cattle. Only the **exporting farms** were obliged to adhere to SISBOV. Once it meets all the requirements, the farm receives the Approved Rural Establishment (ERAS) certificate and is added in Trace List.

A positive point of SISBOV is that it is an **integral and ready system.** With private and public efforts, it can be scaled. The weaknesses of the system are related to the **high implementation costs, specially for** smaller herds, the requirements of **technical capacity** for implementation, and the fact that it **does not trace the animal from the origin.**

**SISBOV costs***

| Itens | Up to 500 animals | Up to 5.000 animals | Up to 10.000 animals |
|---|---|---|---|
| Earring + bottom | USD 0,52 | USD 0,49 | USD 0,43 |
| Certification | USD 0,6 | USD 0,6 | USD 0,6 |
| Monitoring | USD 0,6 | USD 0,06 | USD 0,03 |
| Total Cost/animal | USD 1,72 | USD 1,15 | USD 1,06 |

Source: Scot Consultoria, 2019. *Value/animal

### SISBOV in Brazil

**Properties on Trace List**

**1.672**

**0,07%**

total

**Animals on SISBOV**

**4,3 mi**

**2,0%**

total

SISBOV is a **well-structured system that was created to meet the sanitary demands of the European market**, ensuring the individual traceability of animals, but not since the origin.

The way it is structured, the **system cannot map environmental issues** related to the production.

### SISBOV Requirements and Steps

**Registration**

Search for a certifier, and register the producer and the farm (documents)

**Animal identification and inventory**

100% animals (earring tag), identified at weaning or 10 months of age (max.), report all movements with GTA

**Inspection and audit by the certifier**

Get the certification and periodic inspections

### Challenges

- Implementing **cost** (smaller producers have, proportionally, higher cost);
- **Rancher's profile (**not open to technologies);
- **Precarious information system** and deficient support infrastructure in rural regions.

Some animals enter in the system just 90 days before slaughter. So, it doesn't ensure the traceability of the animal from its origin. As a result, the environmental impact caused for the indirect producers (raising farms) are not considered or mapped.



Source: A rastreabilidade da cadeia de carne bovina no Brasil, 2020; MAPA, 2019. Scot Consultoria, 2019.

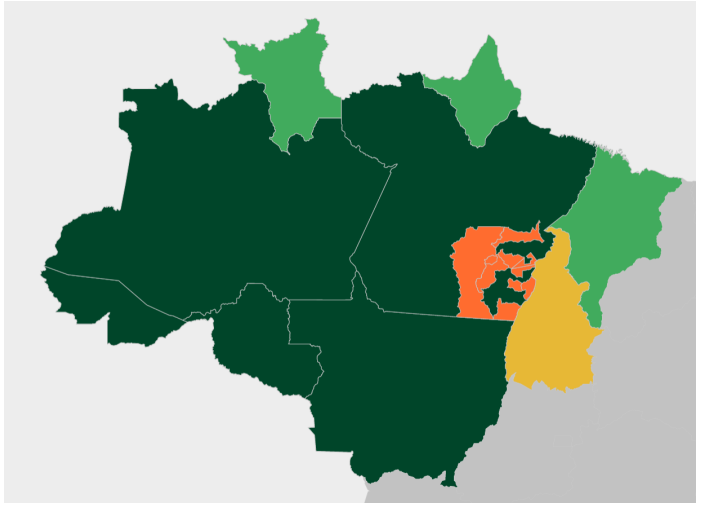
# The voluntary agreements can be used for traceability and monitoring to meet the sustainable production chain

## Voluntary Agreements and Conduct Adjustment Term (TAC)

The commitments involving the beef production chain in the Amazon biome had stared in 2009. **These agreements aim to eliminate production practices that involve illegal deforestation, slave work and the invasion of public lands.** The companies commit not to buy animals from properties with socioenvironmental irregularities.

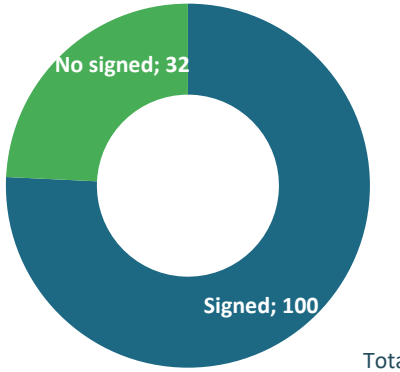
The public livestock commitment details the process related to the **origin** of the production areas **using information from databases, documents, cross checking, lists, analysis and others.** The data analysis and cross-checking are essential to **identify the irregularities of the production processes** related to the areas of origin of the animals.

The voluntary agreements and TAC **outcomes have reached the direct suppliers, leaving the gap related to indirect suppliers** still to be addressed. The established dynamic has a gap since indirect producers sell their animals regardless of their sustainability degree. In the direct producer's farm, this information is lost, and the status of the animal becomes the status of the direct producer's farm.



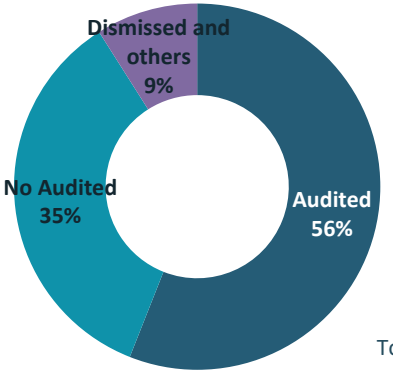

To comply the commitments the **slaughterhouse groups and retail must established their individual protocols for monitoring the ranchers.**

**Number of slaughterhouses signed commitments in the Amazon biome**




Total: 132

**Number of audited slaughterhouses**




Total: 100



Source: A rastreabilidade da cadeia de carne bovina no Brasil, 2020; Beefontrack-Imaflora, 2021.

# Partnership between private and public agents to implement traceability model solutions that address environmental issues

## Models in the Cerrado, Pantanal, and Amazon biomes

These systems are optional agreements that include ranchers, slaughterhouses and retailers, public or private. Partnership projects between agents with **technical and financial support** to comply with **protocols and controls that guarantee the traceability and monitoring of the production areas and animals.**

**Project "Sustainable Livestock of the Amazon" (PECSA):** all cattle traded by participating farms are registered on a platform and receive audit based on GTA data.

**Associação Brasileira da Pecuária Orgânica (ABPO), Cerrado:** association of ranchers from Pantanal, they have the objective of systematizing their production to meet the Certified Organic Cattle Raising and SISBOV requirements.

**Project "Sustainable Meat - from field to table", Amazonia:** partnerships between Walmart and Marfrig to ensure both the slaughter and distribution of meat, cross-checking data with GTA and CAR.

**Associação Sul-Mato-grossense dos Produtores de Novilho Precoce (ASPNP), MS:** implementation of the Best Practices Program (GAP); and Early Calf Protocol (PNP). According to market requirements: nutritional, sanitary, reproductive and meat quality.



Source: A rastreabilidade da cadeia de carne bovina no Brasil, 2020; Markestrat interviews.

# The traceability and monitoring technologies are very important for transparency

## Traceability and monitoring technologies

The **technology development** is a very relevant issue when we are talking about traceability. Different companies and startups are developing new models to ensure the information transparency and security along the value chains.

There are companies accredited by the Agriculture Ministry to comply with SISBOV and companies providing services in Voluntary Agreements. **These companies and initiatives act directly to meet the requirements of the TACs through monitoring systems.**

Other initiatives seek how to extend traceability and identify the animal origin of indirect producers.

In Brazil, the only centralized database is SISBOV for exportation. At this moment, there is no public database for the national market.

| | | | |
|---|---|---|---|
| **Safe TRACE** | Tech blockchain to identifies each item individually, all origin control with traceability tag. | **agrotools** | Geographic platform, to identify products origin locations. |
| **AGRI TRACE ANIMAL** | Computerized system. Ranchers receive a bonus for certified animals. | **Visipec** | Integrated data crossing tool. Connecting direct and indirect producers. |
| **EcoTrack** | Monitoring direct and indirect cattle commercialized (project PECSA). | **proforest** | Integrate monitoring and traceability system, connecting leather and beef products buyers. |



Source: A rastreabilidade da cadeia de carne bovina no Brasil, 2020; Companies websites, 2021.

# An important part of deforestation problems occurs in indirect  farms (breeding and rearing properties)

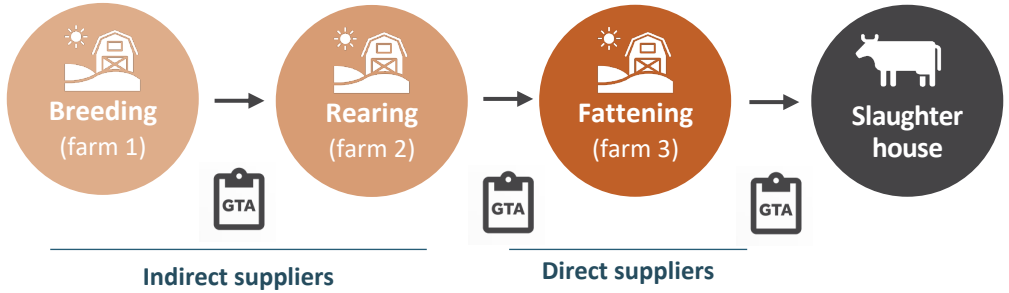
## Traceability and monitoring challenge for indirect producers

Most of deforestation occurs at **indirect producers (48%),** so monitoring of indirect suppliers should be a priority for traceability and monitoring system initiatives.

The cattle production can be developed in **phases** (breeding, rearing, and fattening), or combinations of phases during the process, so the **animals can be transported and go through several farms**. This is a challenge for cattle production chain, especially for indirect producers.

Tracking the origin of the animals becomes an issue when there is **lack of information from the breeding and rearing producers**, normally they just provide the GTA to the producer that buys the animals for fattening.

**Production Farms in the beff chain**



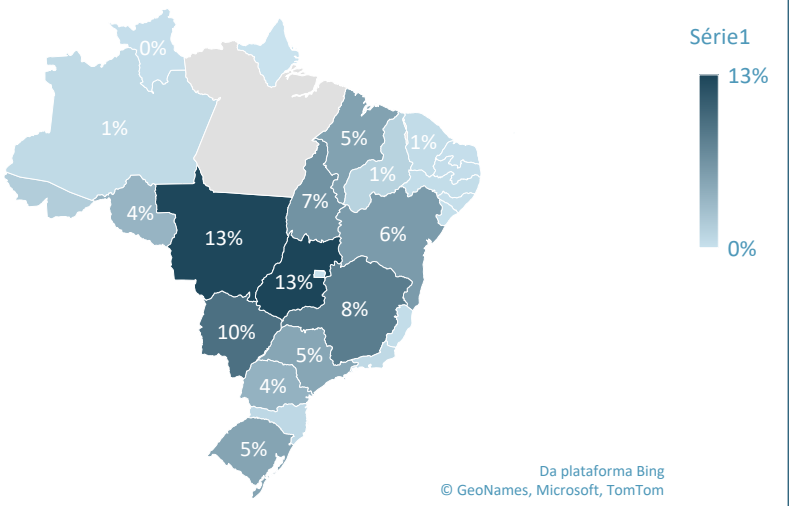

Thus, the **animals sold to the slaughterhouses only have information from the fattening farm**. So, the company is not able to have information about bad production practices, like deforestation, during the breeding and rearing stages.

**Support and technical assistance for indirect producers** (breeding and rearing) can help fill some of the current gaps in traceability and monitoring  system, reducing risks of deforestation and illegal activities, and help ensure a supply chain.

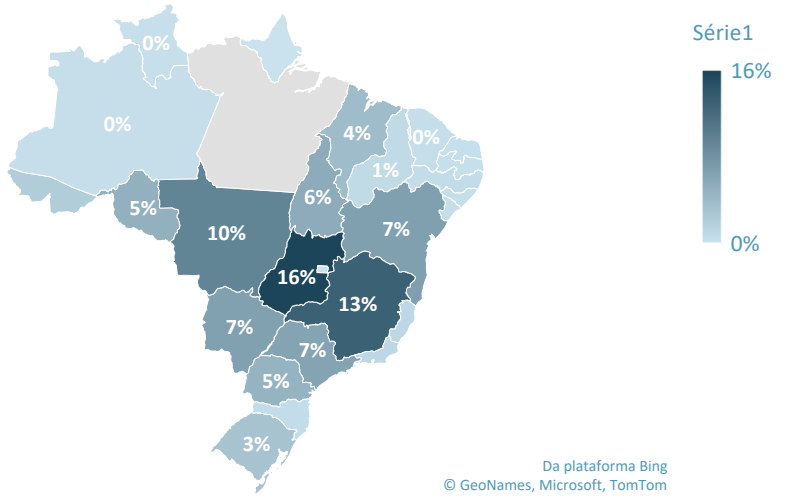
Source: A rastreabilidade da cadeia de carne bovina no Brasil, 2020; TAC da Carne, Amigos da Terra, 2019.

# Location of breeding, raising, fattening and complete cycle farms in Brazil, herd distribution by stage of production (in heads)

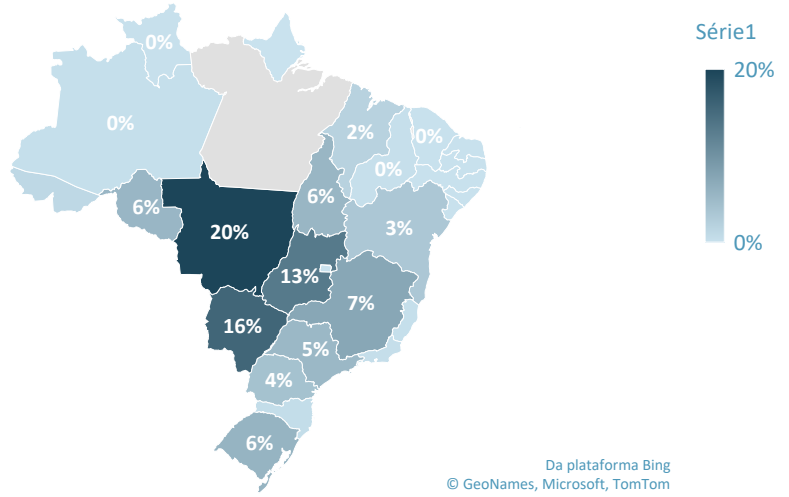
## Breeding



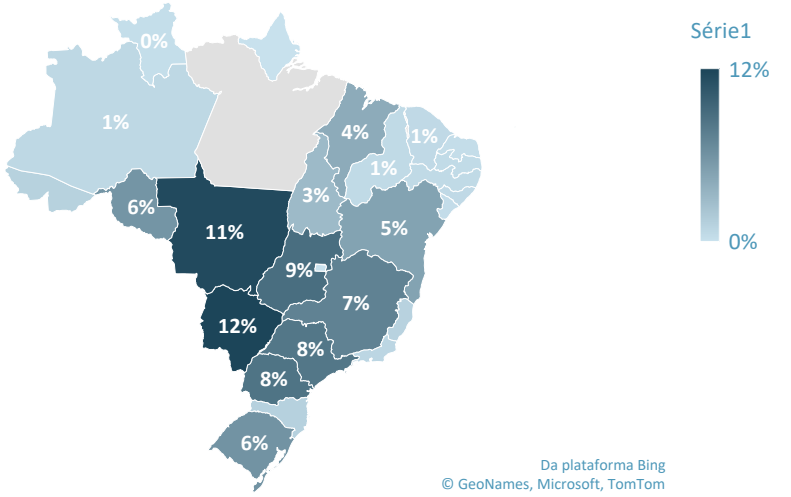

## Rearing



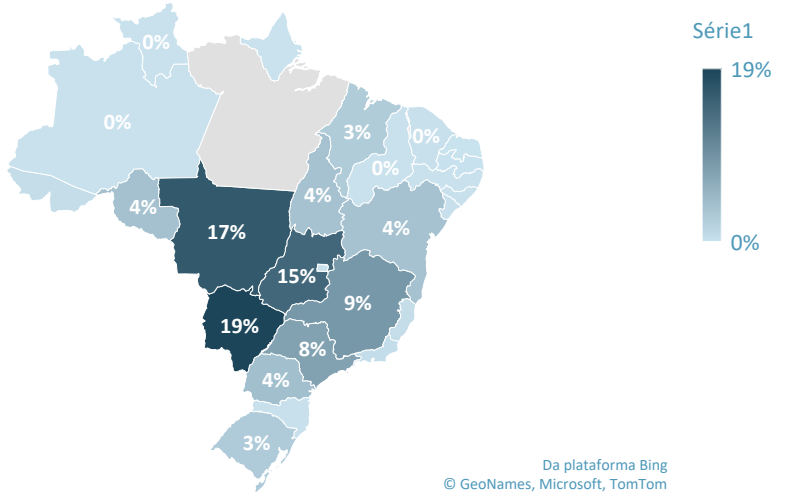

## Breeding and Rearing



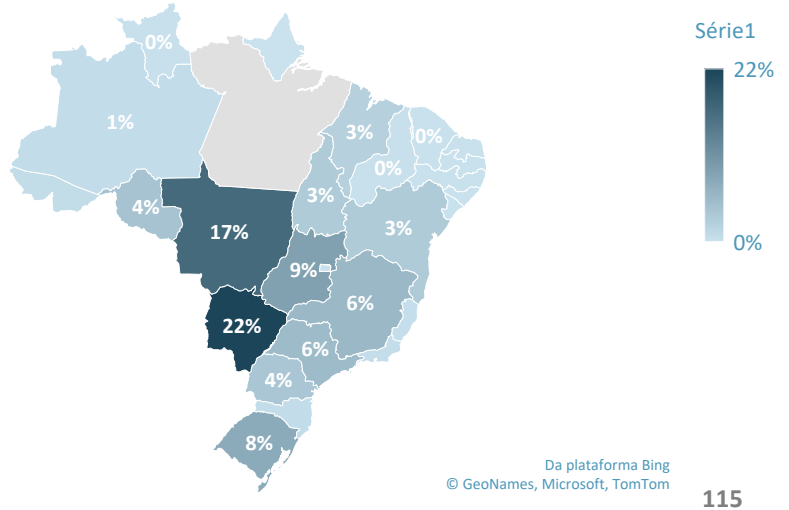

## Fattening




## Rearing and Fattening




## Complete Cycle




Source: IBGE censo agropecuário 2006.

# Barriers to adopt traceability and monitoring system for the beef chain in Brazil

Need of technical assistance for the small and medium producers, to the improvement of cattle production systems.

Weak information systems.


There is no unique traceability system that ensures the management of the whole beef chain, for the external and internal demands.

Difficulties to trace down the indirect producer, due the stages of production and animal transportation (farm to farm) to complete this process.

Weak structure inspection services, offered by public institutions.

Costs for the chain players to implement new technologies at scale for the whole supply chain. Also, the lack of adequate models for cost sharing among players.

Conservative profile and mindset of cattle producers, not open to new technologies.

Producers is often trading on the spot market, with no future or long-term contracts.

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Source: Markestrat analisys based in desk research and interviwes .

# The financial model that addresses the traceability and monitoring system for beef chain must consider…

## What can not be missed on intervention?

1. **Technical assistance** and support to the small and medium producer (breeding and rearing)
2. Models and technologies to **monitoring and control** the traceability systems
3. **Efficient inspection and control structure** to guarantee good practices and production improvement
4. **Benefit-cost to implementation of the traceability system** (production improvement and profit)


## What can be considered additionalities to intervention?

1. Improvement of the **socio-environmental conditions of small and medium producers**: better management practices, technology, credit access;
2. **Calf track**, it can by use as guarantee in financial transitions
3. Increasing the **efficiency, scalability and productivity at beef chain**
4. Take advantage in the **increase of world beef consumption**

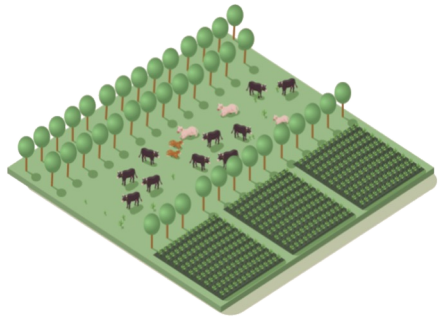
# The suggested financeable projects were the basis for the business-as-usual immersion and the existing cases mapping

## 1. Forest Recovery and Sustainable Management

Fund projects on forest recovery and maintenance

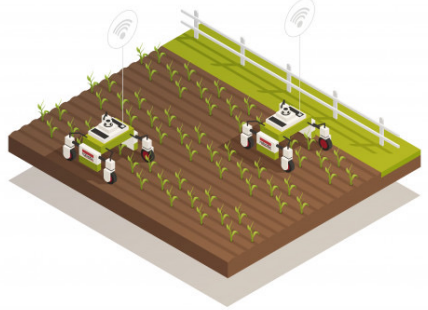
## 2. Production Intensification / Best Practice

Fund projects on production Intensification and best practices adoption




## 3. Certification and Traceability

Fund investments on certification and traceability, which coverage either meat processor or producers;

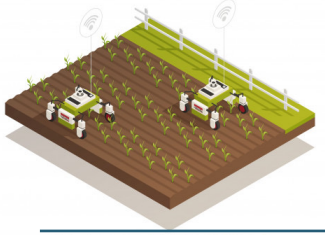


## 4. Digital Farming and Sustainability

Fund projects on Digital Agriculture and Precision Agriculture

# Digital farming drives sustainability issues through both productivity gain and resources optimization

## Atributes & Technology:



**Variable Rate Application**

**Machine Section Control**

**Auto Guidance**

**Fleet Analytics and Telematics**

### Helps on

- Remote monitoring of crop development and pests;
- Measurement of nutrients and water deficiencies on soil and plant
- Application of inputs according to exact need
- Reduction of machinery entry into the field
- Preventive action on pest management

### Resulting in

- Increase of productivity
- Reduction of use of ag inputs, such as chemicals and fertilizers (reduce carbon footprint)
- Reduction of fuel use and waste
- Increase of profit per hectare

### Addressing sustainability challenges

1. **LEGAL DEFORESTATION AND PRESSURE ON AREA EXPANSION:** Increase in productivity and profit per hectare reduces the producer's villigness to expand area and grow by legal deforestation. In the same way;
2. **WEEDS AND BUG RESISTANCE:** Better use of pesticides and herbicides will result, in long term, in reduction of weeds and bug resistance;
3. **SOIL FERTILITY:** Reduction of machinery entrance into the field tend to contribute with reduction of soil erosion and, consequently, increase soil fertility, that in turn, tend to reduces fertilizers application;
4. **WATER FOOTPRINT:** less use of fertilizers reduce water pollution caused by fertilizer run off;

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1 Precision farming solutions are enabled by ag Technologies, such as yield mapping, GPS Tracking, Remote Sensing, imagery and soil sampling. Although not brought as solutions, there are not precision farming without this enabling technologies.

# Recent study developed in US quantified the economical and environmental gains of precision agriculture technologies use


**Solutions considered[1]:** Auto Guidance, Machine Section Control, Variable Rate Application, Fleet Analytics & Telematics, Precision Irrigation.

**Crops included:** Corn, Soybeans, Cotton, Peanuts, Wheat, Sorghum, Tubers, Sugarbeets, Hay and Alfalfa.

## Environmental benefits identified and quantified as a result of Precision Agriculture technology adoption

| | Productivity | Fertilizer Use | Herbicide Use | Fossil Fuel Use |
|---|---|---|---|---|
| **Direct Outcomes** *(quantified)* | ▪ Yield benefit from accurate spacing (pass-to-pass, end/point rows) and population rate | ▪ Optimization of fertilizer applications (reduced overlap, avoid skips, best placement and rate of inputs) | ▪ Optimization of herbicide applications (reduced overlap, avoided skips, best placement and rate of inputs) | ▪ Fuel savings from fewer field passes, variable depth of tillage, and/or more efficient harvest |
| **Indirect Outcomes** | ▪ Avoid unproductive/ preserved land from being in production<br>▪ Reduced soil compaction | ▪ Improved water quality (reduced nutrient runoff)<br>▪ Improved soil health<br>▪ Net GHG reduction (including in production of inputs) | ▪ Improved soil health, and reduced erosion through less tillage<br>▪ Net GHG reduction (including in production of inputs)<br>▪ Improved water quality<br>▪ Reduced weed resistance development | ▪ Net GHG reduction |

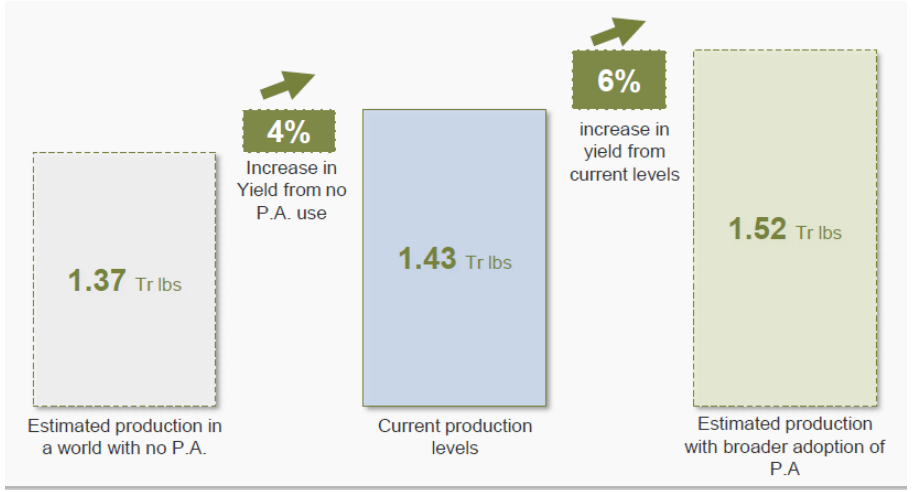


Source: The Environmental Benefits of Precision Agriculture in the United States, 2021

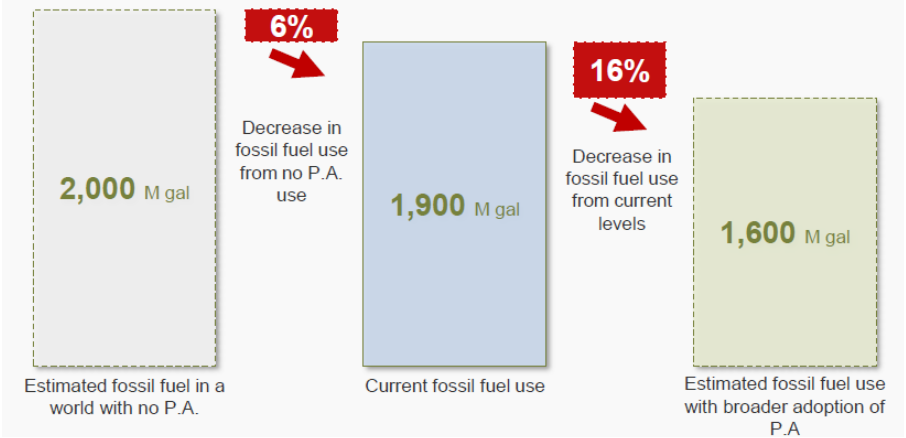
[1]: These Technologies are considered as a group. Emerging technologies, such as Targeted spraying and Smart Combines, are not considered.

# Results indicate productivity increasement, fossil fuel use decrease, and herbicide use reduction due to precision agriculture use

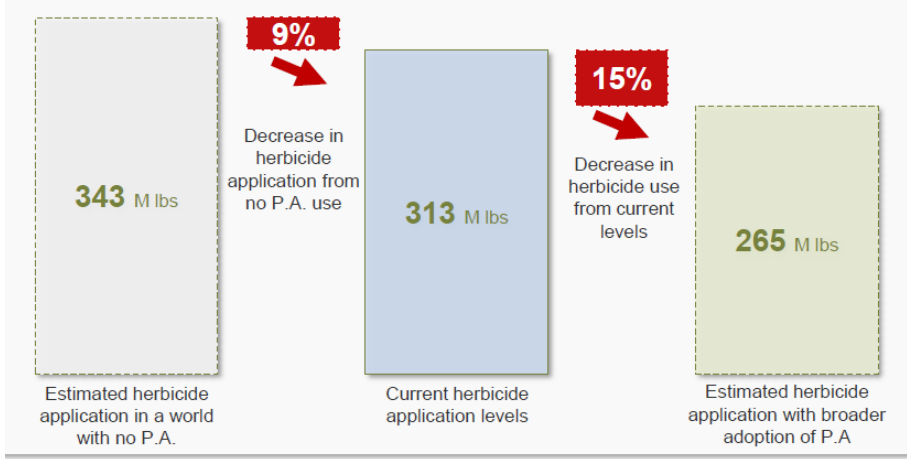
## Productivity increasement due to P.A use




## Fossil fuel use decrease due to P.A use



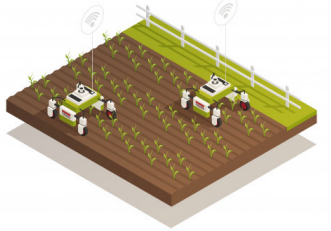

## Herbicide use reduction due to P.A use



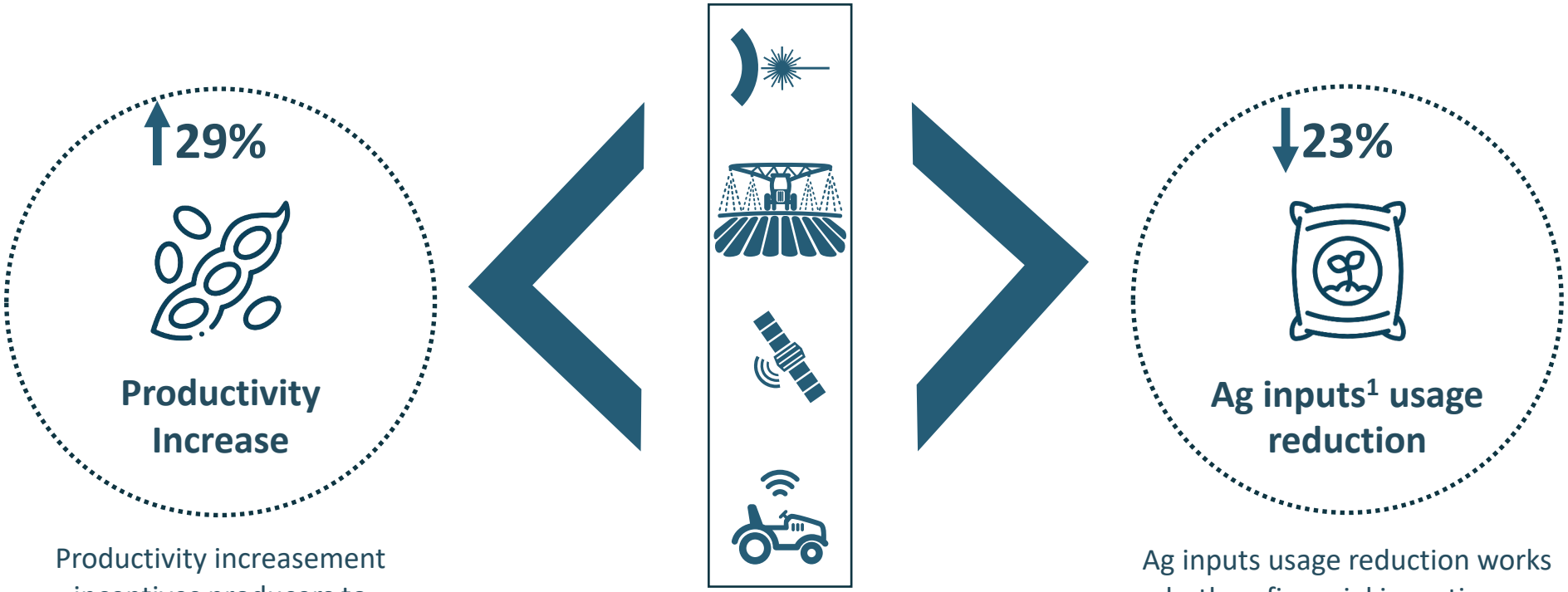



Source: The Environmental Benefits of Precision Agriculture in the United States, 2021

# Brazilian case indicates that use of technology could reduce carbon footprint while increasing productivity



Study developed by FEMASUL with small, medium and large producers indicate that Precision Farming is a potential ally on environmental protection matters, once it gives producers the financial incentive to adopting, solving the main barrier for environmental practices investment.



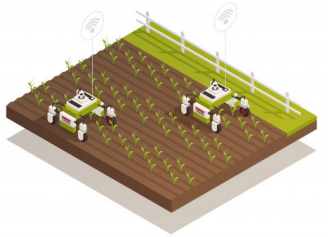

Productivity increasement incentives producers to invest on technology solutions

Ag inputs usage reduction works both as financial incentive as well as environmental good practices



Source: FAMASUL, 2021; [1] Fertilizers and Crop Protection

# Majority of small and medium farms does not adopt Precision Agriculture tools but are willing to adopt




## Zero Category Adoption (ZAC)[1] of Precision Agriculture tools by farmers' size

| | > 2,500 ha | 500-2,500 ha | 100 – 500 ha | 50 – 100 ha | <50 ha |
|---|---|---|---|---|---|
| ZAC | 23% | 41% | 54% | 54% | 58% |

## Maximum Disposal Adoption (MDP[2]) of Precision Agriculture tools by region

| Brazilian Region | Total Proprieties (% of total) | Total Area (k ha and % of total area) |
|---|---|---|
| MATOPIBA | 818 (25%) | 575.4 (16%) |
| Cerrado | 25,167 (21%) | 1,973 (12%) |
| Sul | 479,878 (23%) | 1,996 (23%) |
| TOTAL | 505,863 | 4,554 |

**Estimated costs of digital farming (Soybean R$.ha$^{-1}$)*:**

- Connectivity: R$75 (US$15) to R$150 (US$30) per hectare
- Area systematization: R$100/hectare (US$20/hectare)
- Soil analysis: R$50 (US$10) per hectare
- Technical assistance for adoption support: R$150 per hectare (US$30/hectare)
- **Total cost of technology package: from R$450 (US$90) per hectare**

Currently, adoption of precision agriculture is reality for soybean farmers with areas greater than 2,500 hectares, but not for smaller farmers. To farmers smaller than 500 hectares, adoption is bellow 50%. However, adoption interest achieves around 20% of non-adopters.

Source: Elaborated by Markestrat, based on McKinsey 2020 and IBGE 2017. [1] ZCA – Zero Category Adoption: Percentage of producers that haven't adopted any kind of AP technologies yet (farm size view). Considered categories were VRA, Drone, Telemetry and Automation, Remote Sensing and IoT. [2] MDP - Maximum Disposal do Adoption: Percentage of producers that intend to adopt at least one of AP technologies (region view).* Interview with Eliseu Santos (Sr. Manager Nutrien for Digital Adoption & Services)
Exchange rate: 2017 – R$ 3,192 / 2018 – R$ 3,6542 / 2019 – R$ 3,9451 / 2020 – R$ 5,1558 / 2021 – R$ 5

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# Barriers to adopt initiatives include lack of structure, return over investment analysis and farmers knowledge

**Lack of knowledge**
Excess of information and unclear alternatives hiders the adoption.

**High investment and uncertainty**
Investments are high and there are doubts regarding the level of return that can be achieved.

**Lack of Internet/ troubles on internet connection on rural areas**
Most solutions are internet dependent, being it a bottleneck for implementation

**Qualified/trained work force for technologies usage**
Technologies must be operated and managed by skilled labor

**Specific credit lines access**
Perception that there is not funding lines for digital investments

**Costs of equipment and structure**
Initial investments in machinery, devices and structure

**Mindset changing**
Producers are getting results with traditional solutions, being reticent of new ones

Source: McKinsey, 2021; EMBRAPA, 2020; Interviews with market specialists;

# Although existing credit lines for machinery and equipment, it is excessively dependent on public funding which became scarce

**Main existing lines on commercial Banks:**

**BNDES Automatic:** Rural producers can be funding until 150 MM, including buildings, projects, training and equipment acquisition (national ones).

**BNDES INOVAGRO:** Funding to rural producers and cooperatives. Specification for precision farming investments, consulting services and technical assistance.

**BNDES PRONAMP:** Funding equipment (national or without similar in Brazil). Using it implicates in not receiving other credits related to PRONAMP in the same year.

**BNDES MODERFROTA:** Funding to rural producers and cooperatives. Funding crop machines (new ones or second hand).

**FNE:** Technological innovation projects, from 50% to 100% of funding.

**FNE Rural:** Funding Fix and Semi Fix investments on farm expansion and modernization. It does not consider irrigation.

- Although there are several public funding lines related to machinery and equipment acquisition, due to shortage on public budget, lines become scarce quickly.
- Long term loans are less attractive for financial institutions that focus on short term loans. Thus, the lack of public resources lead to untapped demand;

# Digital intervention must consider minimum structure, support to producers and intermediation of partners, such as cooperatives

### What can not be missed on intervention?

1. Internet and power structure as prerequisite, eventually as a financeable item;
2. Resources either to purchase machinery, equipment, hardware and software or full service hiring;
3. Technical assistance for installation and usage training;
4. Alternatives for small and medium farmers that can not afford investment amount;

### What can be considered additionalities to intervention?

1. Scale up intervention in association to intermediaries that can assess a wide range of farmers;
2. Enable the assess of small and medium farmers to technologies that are sensitive to economies of scale;
3. Set a system that measures sustainability gains from engaged farmers, potentially linking these gains to carbon credits or other certification programs.

# Brazilian case studies overview:

| PROGRAMS | PILLAR | AGENTS INVOLVED | MAIN OBJECTIVE | Financial Mechanism | CURRENT STATUS |
|---|---|---|---|---|---|
| **SAFF** | 2 | • Cattle and Soybean Producers;<br>• Assignor (Cocamar);<br>• Asset Management (JPG);<br>• Investors; | Encouraging the adoption of ILPF | FIDC | Structured pilot in producer adhesion stage |
| **Crédito Rural Traive** | 1 | • Soybean producers;<br>• Fintech (Traive);<br>• Investors;<br>• Securitizer; | Monetizing investors through green financing | Green CRA | First deal already closed and structuring the next two |
| **Programa Carbon Trust** | 1 | • Cattle producers;<br>• NGO (Carbon Trust);<br>• Climate fund;<br>• Commercial bank. | Reduction of $CO_2$ emission | Non-reimbursable resources from ESG funds | Resource approved waiting for bureaucratic procedures to unfold |
| **IDH-Carrefour - Sustainable Production of Calves Program** | 3 | • Calf producers;<br>• Rearing and fattening farm (São Marcelo and Agrojacarezinho);<br>• Implementing partner (Acrimat, NatCap);<br>• Funder and coordinator (IDH);<br>• Funder (Carrefour). | Strengthen the calf production chain by creating a sustainable production area;<br>Increase the income and productivity of small calf producers. | No producer financing.<br>Institutional investments in AT | Running Pilots |
| **Solidariedad: cattle program in the Amazon region** | 2 | • Cattle producers;<br>• NGO (Solidariedad);<br>• Sustainability fund (JBS); | Provide technical assistance and knowledge for the adoption of best practices and prevent deforestation in the Amazon region | No producer financing.<br>Institutional investments in AT | Running Pilots |
| **Coopercitrus** | 4 | • Cooperated farmers<br>• Cooperative technical office | Provide services that can leverage farmers income while economizing inputs and operations. | No producer financing<br>Direct payment for services by producers | Project operational |

# How are the challenges fulfilled?

| PROGRAMS | GUARANTEES | TECHNICAL SUPPORT | LAND USE CHANGE INCENTIVES (SUSTAINABILITY) | ACCESS TO CREDIT LINE BY THE PRODUCER | DIVERSITY IN PRODUCER PROFILE (SIZE AND LEVEL OF ENVIRONMENTAL COMPLIANCE) | CLEAR INCENTIVE TO JOIN THE PROJECT |
|---|---|---|---|---|---|---|
| **SAFF** | 🟢 | 🟢 | 🟢 Progressive fee according to adopted practices | 🟢 | 🟡 | Reduced financing rate |
| **Crédito Rural Traive** | 🟢 | 🟢 | 🟢 Contract parameters / prerequisite | 🟢 | 🟡 | Reduced financing rate |
| **Programa Carbon Trust** | 🟢 | 🟢 | 🟢 Minimum bank parameters<br>Positive side effect of AT | 🔴 | 🟢 | Free AT<br>Facilitator in the access to credit (guarantor) |
| **IDH-Carrefour - Sustainable Production of Calves Program** | 🔴 | 🟢 | 🟢 Pre-requisite for traceability<br>Positive side effect of AT | 🔴 | 🟢 | Free AT<br>Access to differentiated buyer market (5%) |
| **Solidariedad: cattle program in the Amazon region** | 🔴 | 🟢 | 🟢 Positive side effect of AT | 🔴 | 🟢 | Free AT<br>Agricultural Input Subsidy |
| **Coopercitrus** | N/A | 🟢 | 🟡 Indirect incentive to current area (productivity vs. area expansion) | 🔴 | 🟢 | Profit increase |

🟢 Well fulfilled 🟡 Partially fulfilled 🔴 Not fulfilled N/A – not applicable

# Content

- Introduction and Methodology
- Step 1: Soybean and cattle main sustainability challenges identification
  - Chain Description
  - Brazil Financing Scenario
  - Sustainability challenges
- Step 2: Potential Interventions Mapping
- Step 3: High Potential Interventions Deep Dive
- **Step 4: Suggested Models and Roadmap**

# The financeable projects were the basis for the business-as-usual immersion, the existing cases mapping and the business models suggestions

## 1. Forest Recovery and Sustainable Management

Fund projects on forest recovery and maintenance


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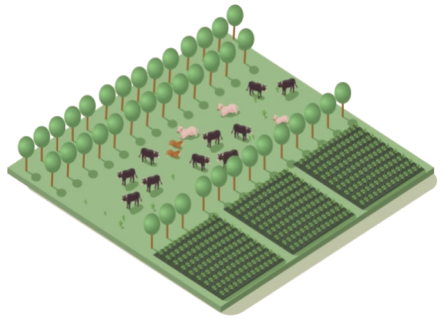
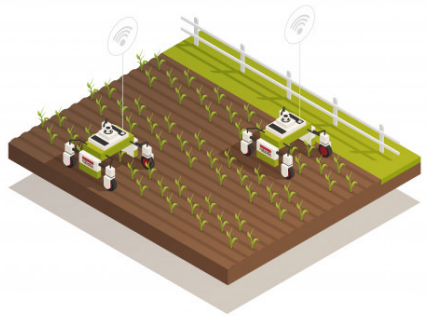




## 4. Digital Farming and Sustainability

Fund projects on Digital Agriculture and Precision Agriculture

# Financeable Project 1: Forest Recovery and Sustainable Management

## Financeable items

1. Recovery of PPA (permanent preservation areas)
2. Recovery of water spring
3. Recovery of LR (legal forestry reserve)
4. Purchase of areas for LR (Legal Reserve) purpose;
5. Project to economically explore forestry product to generate income
6. Carbon finance models
7. Training on sustainable practices implementation and carbon market.

### SUGGESTED PRODUCT FEATURES

| Loan Tenor | Grace | Interest Rate (annual) | Incentive Mechanisms for Sustainability Practices | Financial Mechanism | Monitoring costs (TA and satellite) |
|---|---|---|---|---|---|
| Short term (1 to 3 Years) in case of reforestation and long term in case of land purchase. | 0 to 5 Years, depending on the financeable item | According to credit/risk analysis | Resources to finance overall activities and sustainable practices as counterparts | Green bond (FIDC, CRA) and Green loan | 0.3%, incl. in the interest rate (in partnership with co-obligated) |

### Producer´s sustainability maturity

**Initial**

- Purchases of legal reserve areas (ex: item 4) or investment on recovering existing areas;
- Natural recover of the area without any investment in adequacy but seal the preservation area;
- Most producers are in this stage of sustainability maturity;

**Intermediate**

- Producer in the process of recovering PPA, water springs and legal reserve, investing in recovery (e.g. items 1, 2 and 3);
- Producer investing and doing forest recovery management, accelerating the legal term for recovery;

**High**

- Producer with mature forest in areas of legal reserve, water springs and PPA;
- Explore economically the legal reserve area, doing sustainable management of the forest;
- Preserves surplus of legal reserve
- Has access to the carbon credit market;

Obs: the maturity stage of the producer´s sustainability (initial, intermediate or high) must be identified, and the goal must be to take the producer to the next stage

## Potential Additionalities

**Initial**

- Producer actively plants forests in PPA and legal reserve areas;
- Technical assistance to support moving to the next stage;
- Promote anticipation of reforestation;
- Collective action of producers to access carbon credit market;
- Improvement in landscape and biodiversity;

**Intermediate (in addition)**

- Generate income from the forest through sustainable management;
- Accessing the carbon credit market;
- Accelerate Improvement in landscape and biodiversity;

**High (in addition)**

- Overall improvement in the community´s livelihood;
- General benefits from positive environmental impacts;



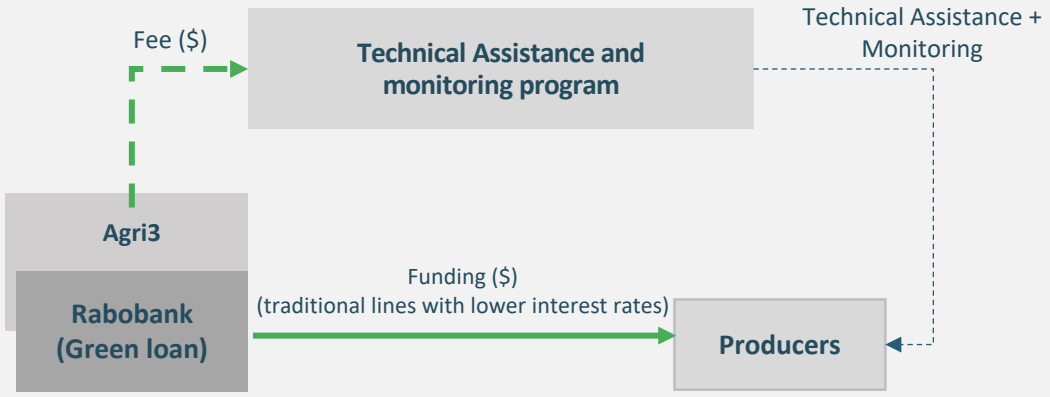
Source: Markestrat Analysis

# Financeable Project 1: Forest Recovery and Sustainable Management

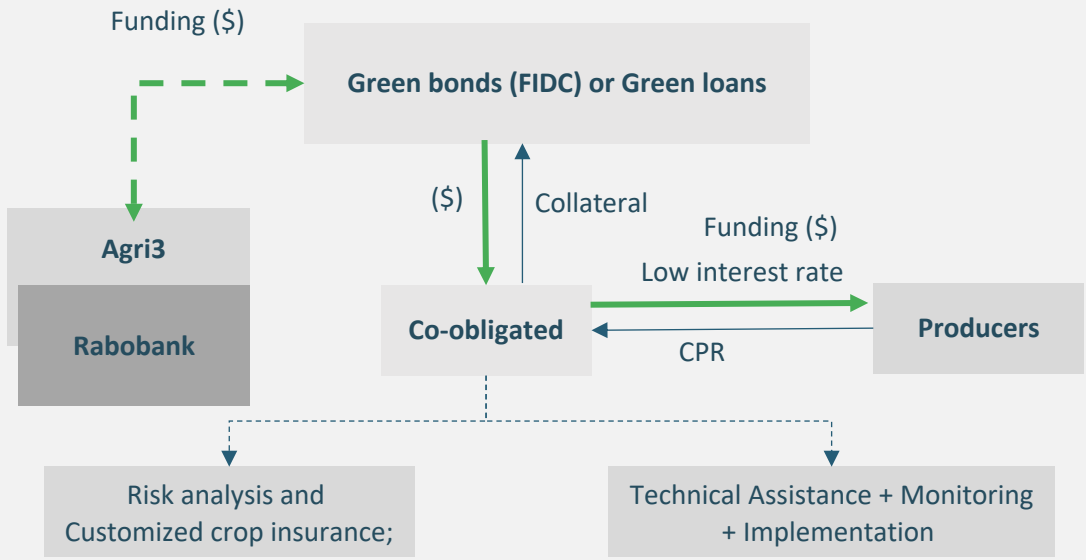
The financial flow in business model A is to offer credit to Producers and provide technical assistance and monitoring, in exchange of its commitment to implement environmental interventions. Farmers could use part of the money to operational costs and part to the environmental intervention;

The financial flow in business model B is to offer credit to an intermediary (co-obligated), so that he takes over the risk analysis, as well as providing technical assistance and monitoring of the intervention to the producer.

**BUSINESS MODEL A:** indicated to producers on upper intermediary to high degree of sustainability maturity.




**BUSINESS MODEL B:** indicated to producers on initial degree of sustainability maturity *.




* The project will bring additionalities to that group.

# Financeable Project 1: Forest Recovery and Sustainable Management

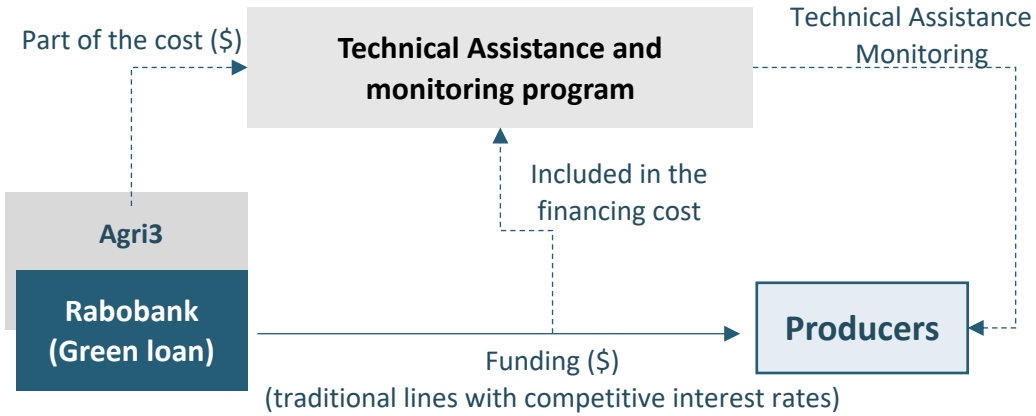
## AGRI3/RABOBANK

**Obligations:**
- Risk analysis and Lend money on attractive interest rate;
- Coordinate the program and hire the technical assistance and monitoring services;

**Benefits:**
- Producer's commitment to sustainability investments
- Foster and anticipate forest recovery;
- Stimulate best recovery practices

## TECHNICAL ASSISTANCE AND MONITORING
- Pre-select eligible farmers;
- Provision of technical assistance to Producers
- Program for monitoring the intervention
- Report on going status to investor

## BUSINESS MODEL A




AGRI3 can contribute by providing a maturity subordination guarantee, extending the life of the loan to allow longer repayment, decrease repayment costs and allow for repayment associated with non cash generating activities - also share some of the risk throughout

**Restoration methods and estimated costs to recover* (US$.ha$^{-1}$):**
- Seedling planting: R$ 11,640.3 +/- R$ 2,325 (US$ 2,328.06 +/- US$ 465)
- Direct seeding: R$ 8,772.4 +/- R$ 4,955 (US$ 1,754.48 +/- US$ 991)
- Enrichment planting: R$ 3,942.6 +/- R$ 2,390 (US$ 788.52 +/- US$478)
- Assisted natural regeneration: R$ 1,720.35 +/- R$ 780 (US$344.07 +/- US$156)
- Natural regeneration: R$ 244.35 +/- R$ 3.5 (US$ 48.87 +/- US$ 0.7)

Up to 80% of the total investment is disbursed up to the 30th month of the recovery project.

High
Sustainability Impact
Low

## PRODUCER

**Obligations:**
- Provide guarantee to the investors
- Implement interventions and counterparts;
- Interact with technical assistance and monitoring company
- Use part of the money to the intervention;

**Benefits:**
- Reduced (or null) guarantee needs
- Increase production
- Receive technical assistance
- Access money to the intervention and use part to crop costs;

**Limitations:** direct finance turn the project less prone to be scaled up and achieve small and medium farmers.

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*Source: Based on the study: P.H.S. Brancalion, et al. What makes ecosystem restoration expensive? A systematic cost assessment of projects in Brazil. Biological Conservation 240 (2019).
Exchange rate: 2017 – R$ 3,192 / 2018 – R$ 3,6542 / 2019 – R$ 3,9451 / 2020 – R$ 5,1558 / 2021 – R$ 5

# Financeable Project 1: Forest Recovery and Sustainable Management

## AGRI3/RABOBANK

**Obligations:**

- Provides financing in the green bond structure or triangulate a green loan with a co-obligate;
- Apport to subordinated and mezzanine share to turn bonds attractive for other investors;
- Takes responsibility for a higher percentage of defaults risk.

**Benefits:**

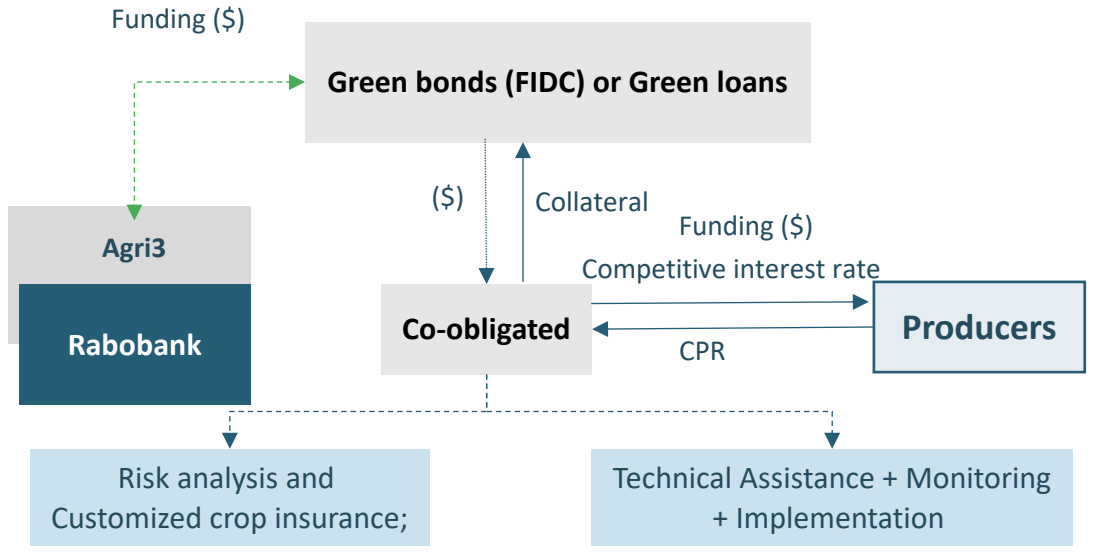
- Producer's commitment to sustainability
- Takes the guarantee from the co-obligated, that receives a CPR of the producer

## CO-OBLIGATED

- Cooperative, retailer, associations, trading companies;
- Pre-select eligible farmers;
- Coordinate the program with producers and build bridges with Rabobank/Agri3;
- Provision of technical assistance to Producers
- Monitoring intervention implementation;
- Provides customized risk analysis for both, credit score and customized crop insurance;

Agri3 can contribute by taking on higher risk tranches of the funding - either in a subordinated or a first loss position - or guarantee the longer tenors on some of the funding - encouraging the mobilization of commercial finance - potentially offsetting early defaults.

## BUSINESS MODEL B




Rabobank could seek and partner up with a co-obligated with a wide network of potential farmers. This could lever the project to a large group of producers;

Rabobank can structure investment products and attract investors for the project. Some could be clients or prospect of the bank.

Agri3/Rabobank could create a sustainability label for the soybean producer, offering as an advantage the priority in the disposing of grains to trading companies

## PRODUCER

**Obligations:**

- Implement interventions and counterparts;
- Interact with technical assistance and monitoring company;
- Follow indicated regeneration techniques;
- Provide guarantee to the co-obligated (CPR)
- Use part of the money to the sustainability intervention;

**Benefits:**

- Low interest rate
- Higher production
- Receive technical assistance and monitoring
- Access money to the intervention and use part to crop costs;

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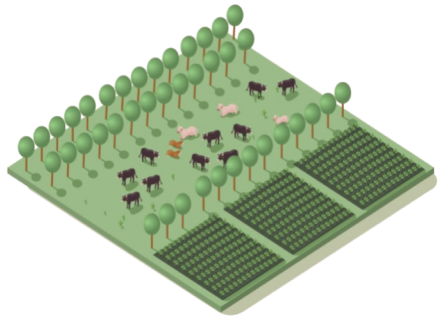
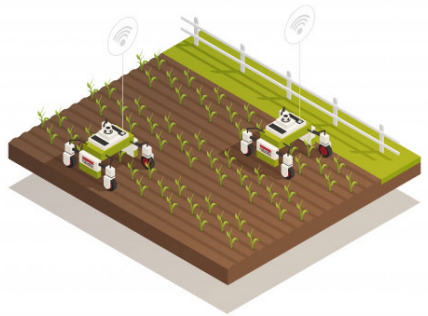



## 3. Certification and Traceability

Fund investments on certification and traceability, which coverage either meat processor or producers;



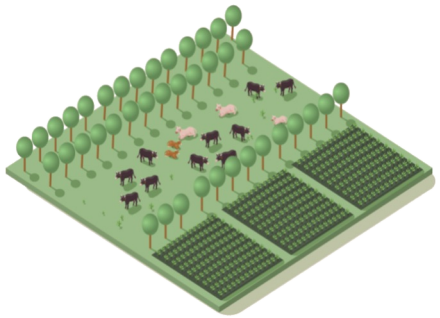
## 4. Digital Farming and Sustainability

Fund projects on Digital Agriculture and Precision Agriculture

# Financeable Project 2: Production Intensification / Best Practice

## Financeable items

1. Crop-livestock and crop-livestock-forest systems
2. Recovery of degraded pastureland
3. Alternative cultivation techniques (e.g., regenerative techniques)
4. Machinery and equipment
5. Education and technical assistance on best practices of production
6. Soil correction and fertilizing
7. Investment on erosion management techniques (e.g., terrace and contour)
8. Efficient irrigation methods



### SUGGESTED PRODUCT FEATURES

| Loan Tenor | Grace | Interest Rate (annual) | Incentive Mechanisms for Sustainability Practices | Financial Mechanism | Monitoring costs (TA and satellite) |
|---|---|---|---|---|---|
| It should target long terms such as 5 to 10 years | 2 to 5 Years, depending on the financeable item | According to credit/risk analysis | Decreasing interest rate depending on the producer´s sustainability maturity | FIDC, CRA | 0.3% (in partnership with co-obligated) |

### Producer´s sustainability maturity

**Initial**

- Commitment to deforestation-free and adequate across the whole farm to the environmental legislation (recovering permanent preservation areas and legal reserves);
- Producer´s adopt sustainable practices (ex.: items 2, 6, 7)
- Provide technical assistance and education among producers

**Intermediate**

- Focus on potentializing the environmental impacts;
- Producers adopt credited sustainable production systems (ex.: items 1 and 3)
- Minimum requirements for farm management, including basic environmental and economic improvements.
- Sustainable trainings and education improvement offered to the farm´s team

**High**

- Sustainable property management (ex.: water efficiency projects, circular economy, management including environmental KPIs)
- Producer´s access other avenues of income due to the adoption of sustainable production systems (ex.: carbon Market)
- Participates or supports social initiatives, benefiting local communities (ex: supporting local schools, environmental programs, social programs)

Obs: the maturity stage of the producer´s sustainability (initial, intermediate or high) must be identified, and the goal must be to take the producer to the next stage

## Potential Additionalities

**Initial**

- Accelerates producer adaptations to comply with the forest code.
- Land restoration for sustainable use
- Deforestation avoidance
- Avoidance of C02 eq emissions
- Access to small and medium sized producers with support to overcome general barriers towards professionalization
- Increase in producer´s income
- Overall improvement in rural livelihood

**Intermediate (in addition)**

- Initiatives are more efficient in terms of positive environmental impacts.
- Producers gain profitability through sustainable production systems
- Improvement in the livelihood of the farm´s team

**High (in addition)**

- Model farms to be considered as benchmarks in the sector
- Overall improvement in the community´s livelihood

# Financeable Project 2: Production Intensification / Best Practice

Further participation for AGRI3 in order to bring the project towards a **Transformational** status.

Parameters that were taken into consideration for the proposed structure (along with previous slide): product features, potencial additionalities, targeted producer segment and potencial further actions towards a transformational project.

**PRODUCER**

**Guarantees offered:**

- Crop or cattle (traceability): monitored throughout the loan

**Obligations:**

***Initial maturity stage:***

- Must meet the sustainability goals pre-determined
- The sustainability goals must take the producer to the next stage of sustainability maturity
- Receives technical assistance to comply with the technical parameters of the loan

***Intermediate maturity stage:***

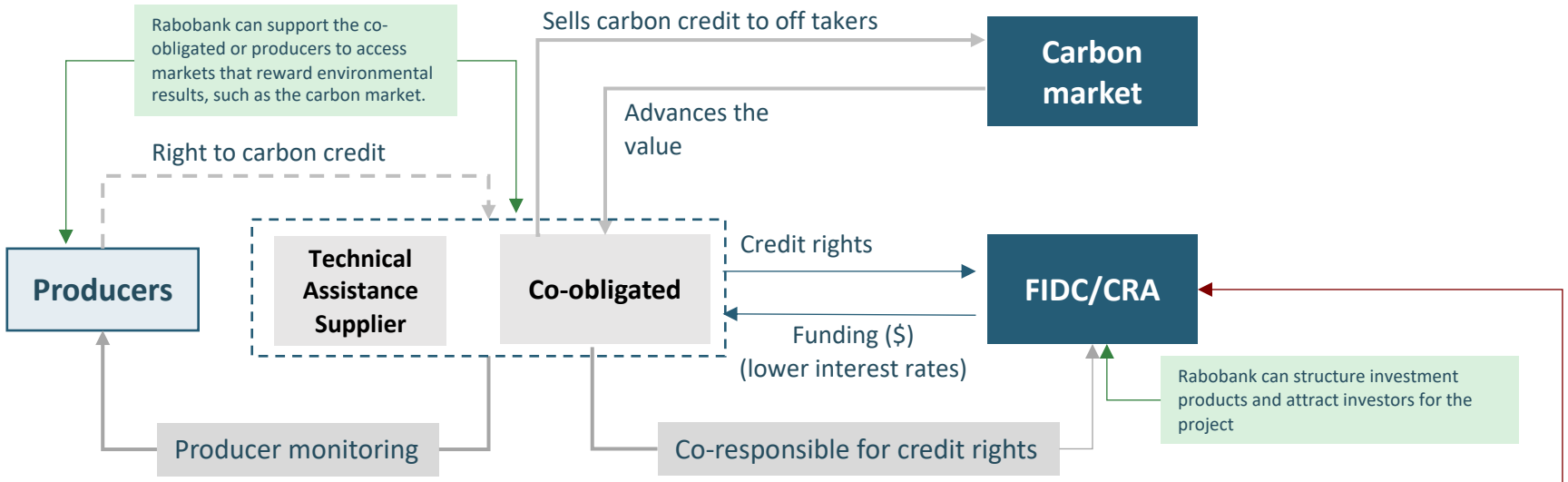
- Provides sustainability training and education for the farm´s team
- Must develop a sustainable production system within the farm
- Meet basic management requirements, with basic KPI´s for environmental and economic results

***High maturity stage:***

- Sustainability project expands within the farm, beyond the production system
- Access to new avenues of revenue due to environmental results, such as the carbon market.
- Participates actively or supports social programs within the community

**Benefits:**

- Resource to intensify the production
- Reduced (or null) guarantee needs
- Receptance of technology transfer
- Benefits from the intensification.




## Co-obligated

- Determines producers that will be accessed by the Project according to its risk assessment
- Provides operational services for farmers to help implement sustainable practices or production systems (technology transfer). These are reimbursed by sharing the profits with the producer.
- Monitors producers to verify if project goals are perceived
- Supports Rabobank and AGRI3 in determining viable sustainable goals and monitoring parameters for the Project.
- Potential players: coops, dealerships, trading, slaughterhouses.

Agri3 provides guarantees and subordinated debt - a subordinated/first loss position in the fund or guaranteeing the longer tenor portion of the loans in the structure

markestrat Agribusiness

[1]Details are presented through the material.

[2]Exchange rate R$5/US$. Time period evaluated: August 2009 to March 2012, production prices used were of July 2019. Source: Embrapa document 268, November 2019. Avaliação econômica de sistemas de Integração Lavoura-Pecuária-Floresta: as experiências da Embrapa (https://ainfo.cnptia.embrapa.br/digital/bitstream/item/209464/1/Avaliacao-economia-de-sistemas.pdf)

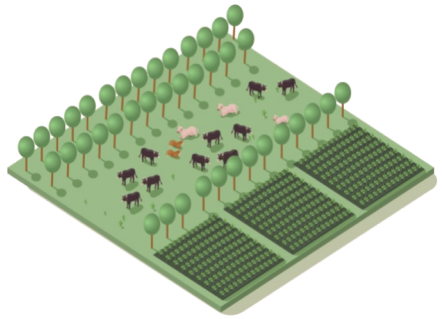
# The financeable projects were the basis for the business-as-usual immersion, the existing cases mapping and the business models suggestions

## 1. Forest Recovery and Sustainable Management

Fund projects on forest recovery and maintenance

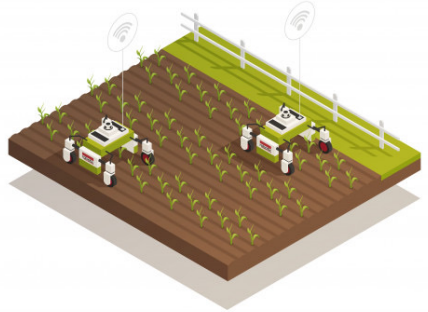
## 2. Production Intensification / Best Practice

Fund projects on production Intensification and best practices adoption




## 3. Certification and Traceability

Fund investments on certification and traceability, which coverage either meat processor or producers;



## 4. Digital Farming and Sustainability

Fund projects on Digital Agriculture and Precision Agriculture

# Financeable Project 3: Certification and Traceability – Beef Chain

## Financeable items

1. Animal monitoring systems (incl. indirect producers)
2. Traceability in deforestation risk areas
3. Origin certification
4. Other certifications
5. Effluent treatment systems and garbage disposals


### SUGGESTED PRODUCT FEATURES

| Loan Tenor | Grace | Interest Rate | Incentive Mechanisms for Sustainability Practices | Financial Mechanism |
|---|---|---|---|---|
| It should target medium terms such as 5 years | Up to 2 years, depending on the financeable item | According to credit/risk analysis | Pre-requisites to access the financing line | FIDC, CRA or traditional lines offered to direct and indirect prod. |

### Producer´s traceability and certification maturity

**Initial**

- Commitment to deforestation free and to adequate the property to the environmental legislation (permanent preservation areas and legal reserves)
- Producer´s without individual animal register system (sheets, documents)

**Intermediate**

- Producers adopt some structure of traceability and monitoring animal system (e.g., earing tag);
- Animal welfare management and production practices
- Producer´s have some level of technical assistant

**High**

- Great part of producers already with a full traceability system;
- Production certification relate to the use of fertilizer, approved pesticides, and water in feed production
- Sustainable property management (ex.: animal welfare, water efficiency projects, management practices with KPIs)
- Social initiatives, benefiting local communities (ex: supporting local schools, environmental programs, social programs)

Obs: the maturity stage of the producer´s sustainability (initial, intermediate or high) must be identified, and the goal must be to take the producer to the next stage

## Potential Additionalities

**Initial**

- Accelerates producer adaptations to comply with the forest code.
- Basic technical assistance that also helps to overcome general barriers towards professionalization
- Individual animal registering and monitoring (first step to a traceability process)
- Hectares of deforestation avoided
- Avoidance of C02 eq emissions
- Increase in producer´s income
- Origin certification

**Intermediate (in addition)**

- Producers gain profitability through traceability and monitoring systems (direct and indirect producers)
- Initiatives are more efficient in terms of better animal welfare practices
- Improvement in the sustainability and technical practices

**High (in addition)**

- Promote a good management of a monitoring and traceability system
- Overall improvement in the sustainable feed in beef chain

# Financeable Project 3: project architecture

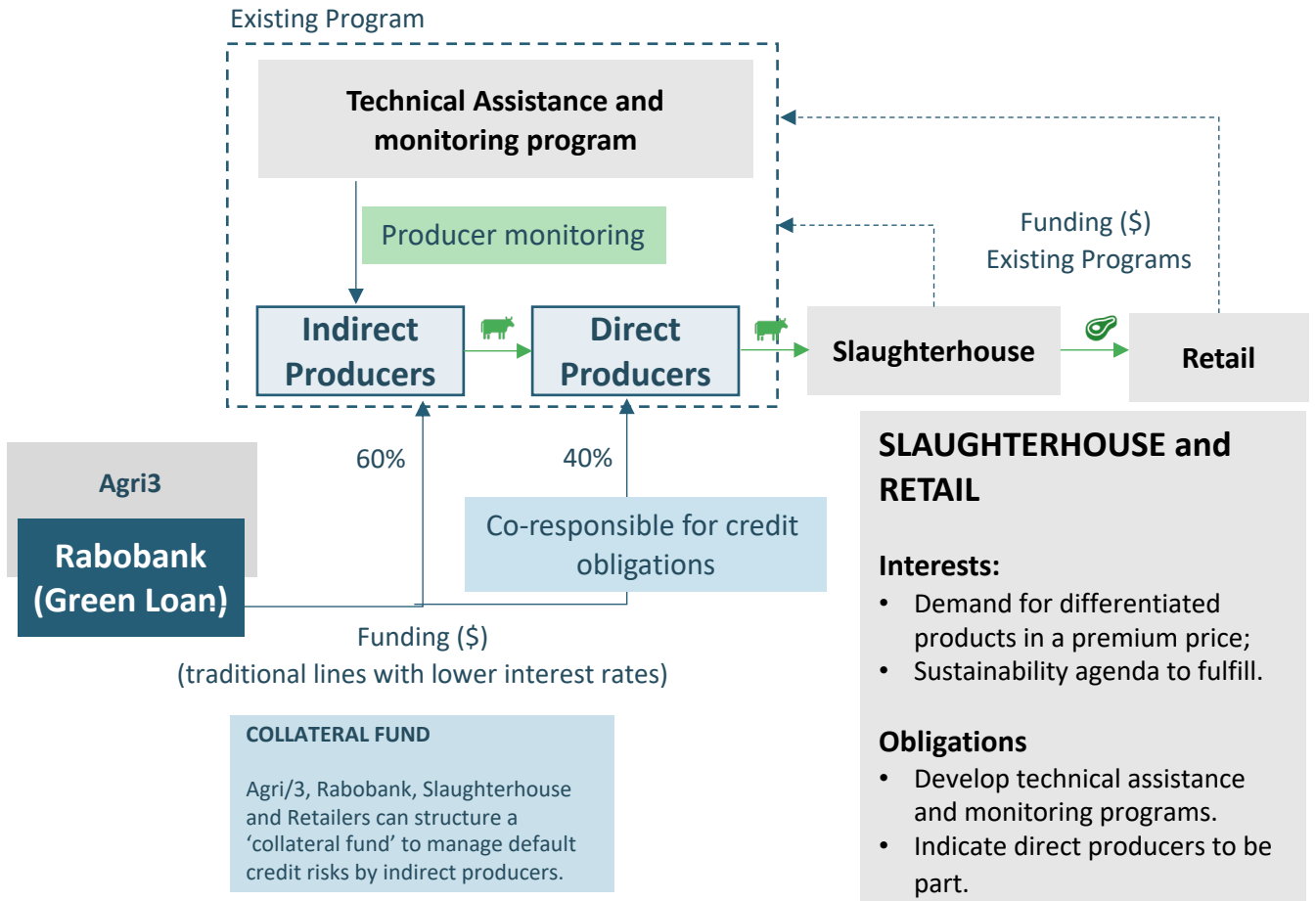
## INDIRECT PRODUCER

**Guarantees offered:**
- Crop or cattle (traceability): monitored throughout the loan

**Obligations**
- Must meet the sustainability goals pre-determined
- Receives technical assistance to comply with the technical parameters of the loan
- Adoption of a traceability system;
- Deliver the production to the direct producer.

**Benefits**
- Resource to intensify the production
- Reduced (or null) guarantee needs
- Premium price in the product (calf).
- Benefits from the intensification.

## BUSINESS MODEL A




## SLAUGHTERHOUSE and RETAIL

**Interests:**
- Demand for differentiated products in a premium price;
- Sustainability agenda to fulfill.

**Obligations**
- Develop technical assistance and monitoring programs.
- Indicate direct producers to be part.

**Benefits**
- Tracked animals

## DIRECT PRODUCER
**(CO-OBLIGATED)**

**Guarantees offered:**
- Direct producer current guarantees used;
- Crop or cattle (traceability): monitored throughout the loan

**Obligations**
- Must meet the sustainability goals pre-determined
- Financial risk sharing (co-obligated)
- Be part or enter in a program that will provide technical assistance for indirect producers or develop independently its suppliers.
- Determines producers that will be accessed by the Project according to its risk assessment

**Benefits**
- Lower interest rate
- Producers' commitment
- Lower premium price transferred to indirect producers (3%) during the financial period
- Higher production.

Source: Interviews; Scot Consultoria, 2019.

*Exchange rate R$5/US$.

# Financeable Project 3: project architecture

## INDIRECT PRODUCER

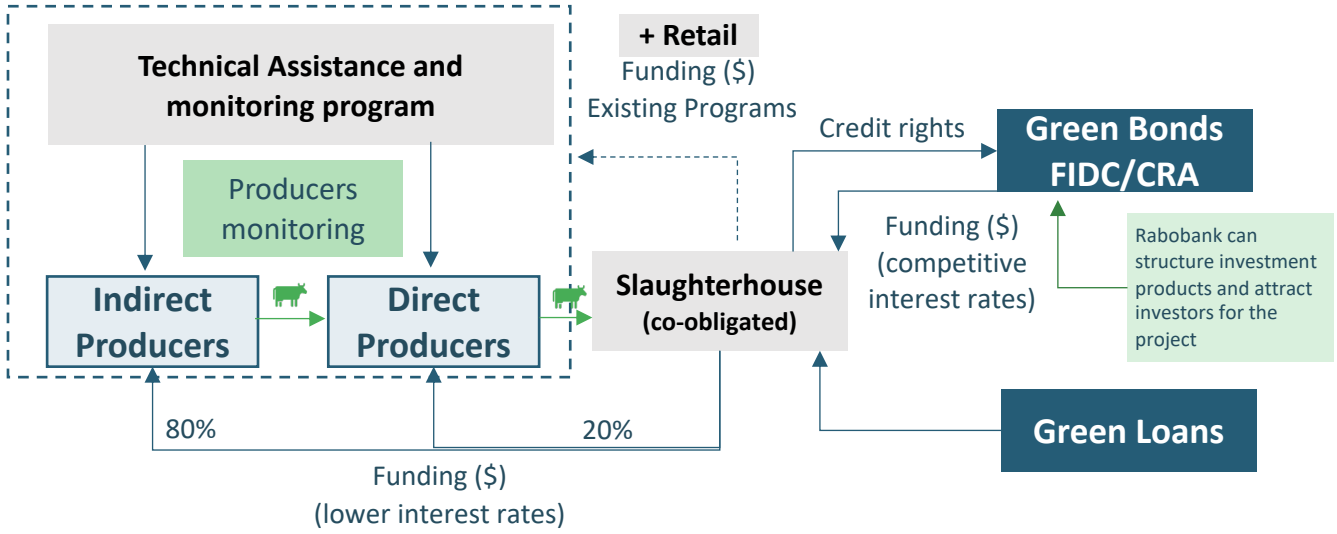
**Guarantees offered:**
- Crop or cattle (traceability): monitored throughout the loan

**Obligations**
- Must meet the sustainability goals pre-determined
- Receives technical assistance to comply with the technical parameters of the loan
- Adoption of a monitoring system;
- Deliver the production to the direct producer.

**Benefits**
- Resource to intensify the production
- Reduced (or null) guarantee needs
- Premium price in the product (calf).
- Benefits from the intensification.

**COLLATERAL FUND**
Agri/3, Rabobank, Slaughterhouse and Retailers can structure a 'collateral fund' to manage default credit risks by indirect producers.

## BUSINESS MODEL B




### Co-obligated

- Determines producers that will be accessed by the Project according to its risk assessment
- Provides operational services for farmers to help implement sustainable practices or production systems (technology transfer). It could be in an existing program.
- Monitors producers to verify if project goals are perceived
- Supports Rabobank and AGRI3 in determining viable sustainable goals and monitoring parameters for the Project.

## DIRECT PRODUCER

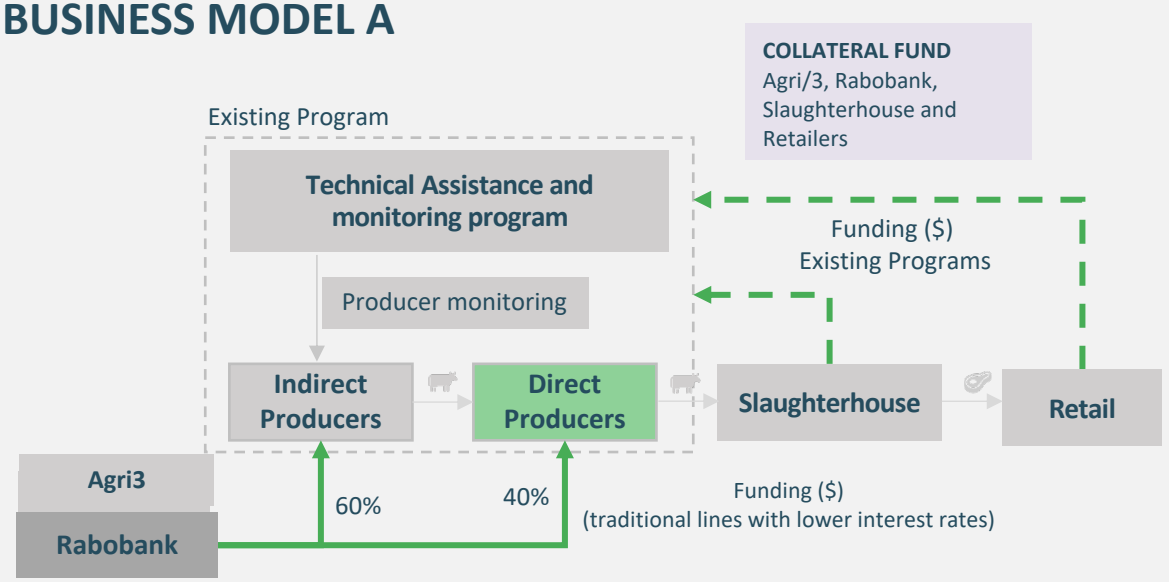
**Obligations**
- Must meet the sustainability goals pre-determined
- Be part or enter in a program that will provide technical assistance for indirect producers or develop independently its suppliers.
- Support in the determination of the producers that will be accessed by the Project according to its risk assessment

**Benefits**
- Producers' commitment
- Higher production
- Sustainable production

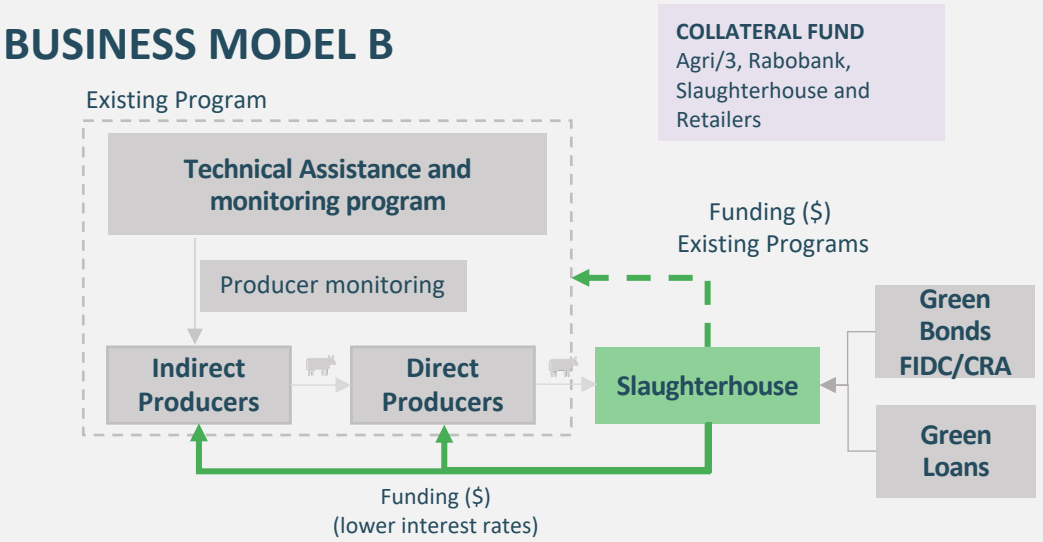
Agri3 can contribute by taking on higher risk tranches of the funding - either in a subordinated or a first loss position - or guarantee the longer tenors on some of the funding - encouraging the mobilization of commercial finance - potentially offsetting early defaults.

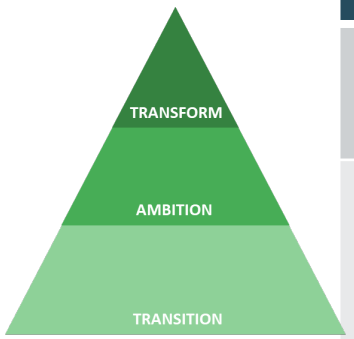
# Financeable Project 3: Financial flow at Business Model A and B

## BUSINESS MODEL A




## BUSINESS MODEL B




| | Agri 3 Role | Additionalities |
|---|---|---|
| MODEL A | • Enabling longer tenor;<br>• Assume some of the risk coverage<br>• Participate in collateral fund | • Indirect producers tracking<br>• Indirect producers financing<br>• Indirect producers' development<br>• High value in the chain production<br>• Scale gain |
| MODEL B | • Enabling longer tenor;<br>• Assume some of the risk coverage<br>• Participate in collateral fund | |
| | • Seniorinvestor in green bond structuring | |

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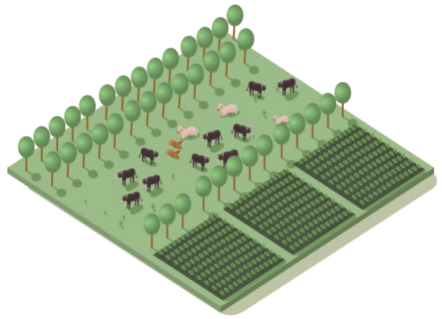


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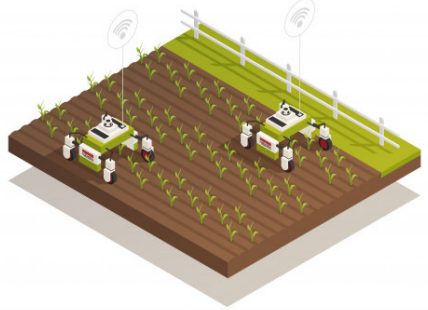


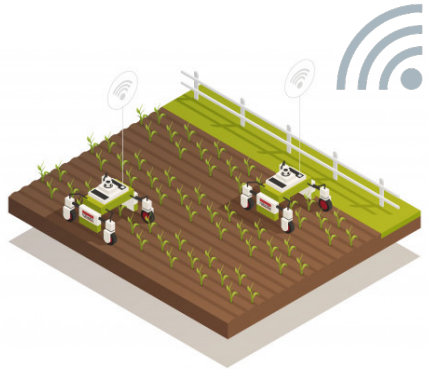
## 4. Digital Farming and Sustainability

Fund projects on Digital Agriculture and Precision Agriculture

# Financeable Project 4: Digital Farming and Sustainability

## Financeable items

1. Machinery and equipment;
2. Hardware and software
3. Internet Access on farm;
4. Technical assistance;
5. Team training;
6. Services on digital farming;



### SUGGESTED PRODUCT FEATURES

| Loan Tenor | Grace | Interest Rate (annual) | Incentive Mechanisms for Sustainability Practices | Financial Mechanism | Monitoring costs (TA and satellite) |
|---|---|---|---|---|---|
| 5 to 10Y for machinery and equipment. 2Y for services and setup; | 2 to 5 Years, depending on the financeable item | According to credit/risk analysis | Increase of productivity and costs reduction | Green bonds (FIDC, CRA) and Green loan; | 0.3% (in partnership with co-obligated) |

### Producer´s sustainability maturity

**Initial**

- Internet connection on farmhouse for everyday activities;
- Soil analysis for better use of specific resources;

**Intermediate**

- Variable rate application (fertilizer and crop protection products);
- Yield monitor, maps and imagery (through use of drones and/or satellites);
- GPS Tracking for machinery;
- Resources economy measurement (ag inputs, fuel);

**High**

- Connection between already cited technologies and meteorological tools;
- Machine automation, auto guidance and telematics;
- Renewable energy as source of power for farm operations;
- Big data and Analytics;
- Access to carbon credit market;

Obs: the maturity stage of the producer´s sustainability (initial, intermediate or high) must be identified, and the goal must be to take the producer to the next stage

## Potential Additionalities

**Initial**

- Capacitation of labor force for environmental practices
- Use of biological ag inputs and less pollutant fertilizers;
- Increase producer's profit through reduction of costs
- Collective action of producers for soil analysis
- Overall improvement in rural livelihood

**Intermediate (in addition)**

- Increase producer's profit through reduction of ag inputs usage
- Reduction of soil erosion due to machine course optimization
- Water Spring and groundwater preservation

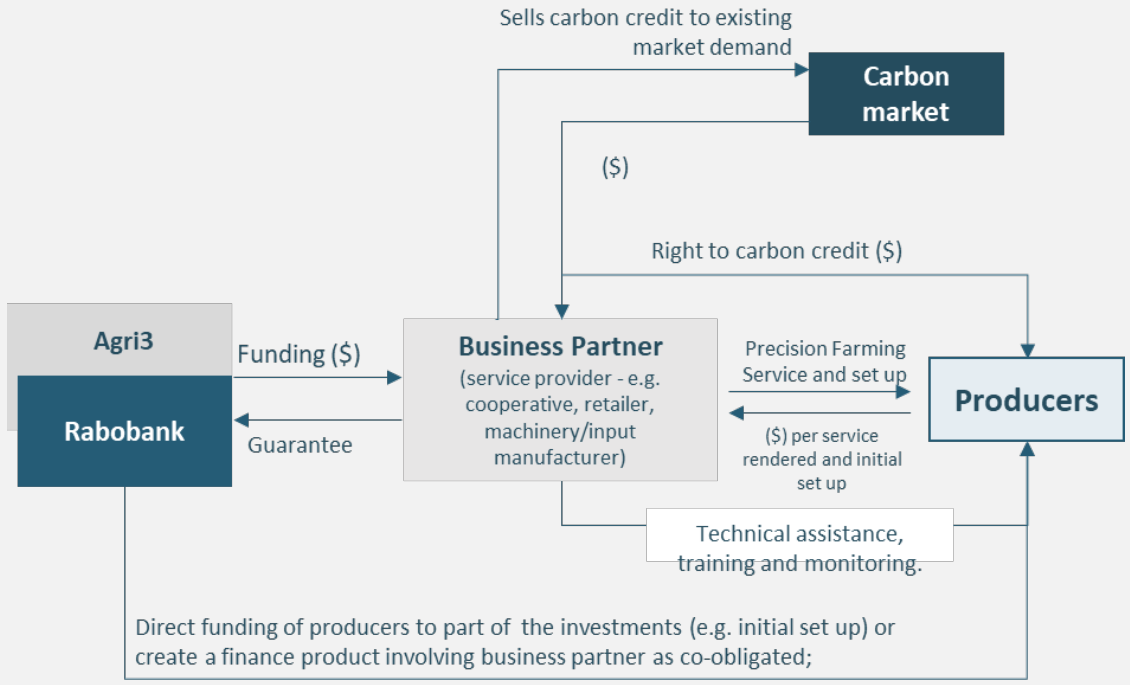
**High (in addition)**

- Model farms to be considered as benchmarks in the sector
- Overall improvement in the community´s livelihood
- Integration between farm operations and suppliers/trading and traceability automation

# Financeable Project 4: Digital Farming and Sustainability

The financial model is to offer credit to **a Business Partner of digital agriculture** to provide services to a group of selected producers that will implement digital agriculture practices with positive impact on sustainability. Besides, directly financing farmers to purchase machinery and equipment/hardware is important to allow farm adaptation and set up and the national credit lines do not favor the acquisition of imported technologies (e.g., drones). Business partner coordinates access to carbon market to incentivize adoption.

## BUSINESS MODEL




Agri3 to take on the higher risk portion of the loan - e.g. to extend tenor or Paripassu to manage some of the risks of more innovative technologies

Agri3/Rabobank could track sustainability KPIs improvement indirectly through business partner monitoring system. For instance, monitoring soil organic matter and water pollution could be easily measured through installed sensor such as soil moister optical sensor.

# Financeable Project 4: Digital Farming and Sustainability

## Agri3/Rabobank

**Obligations:**

- Partner up with a business partner that will offer setup investments and digital farming services;
- Provides financing to the business partner;
- Define parameters to qualify eligible producers

**Benefits:**

- Engagement of valued business partner to foster digital farming and sustainability practices;
- Producer's commitment to sustainability investments

## Business Partner

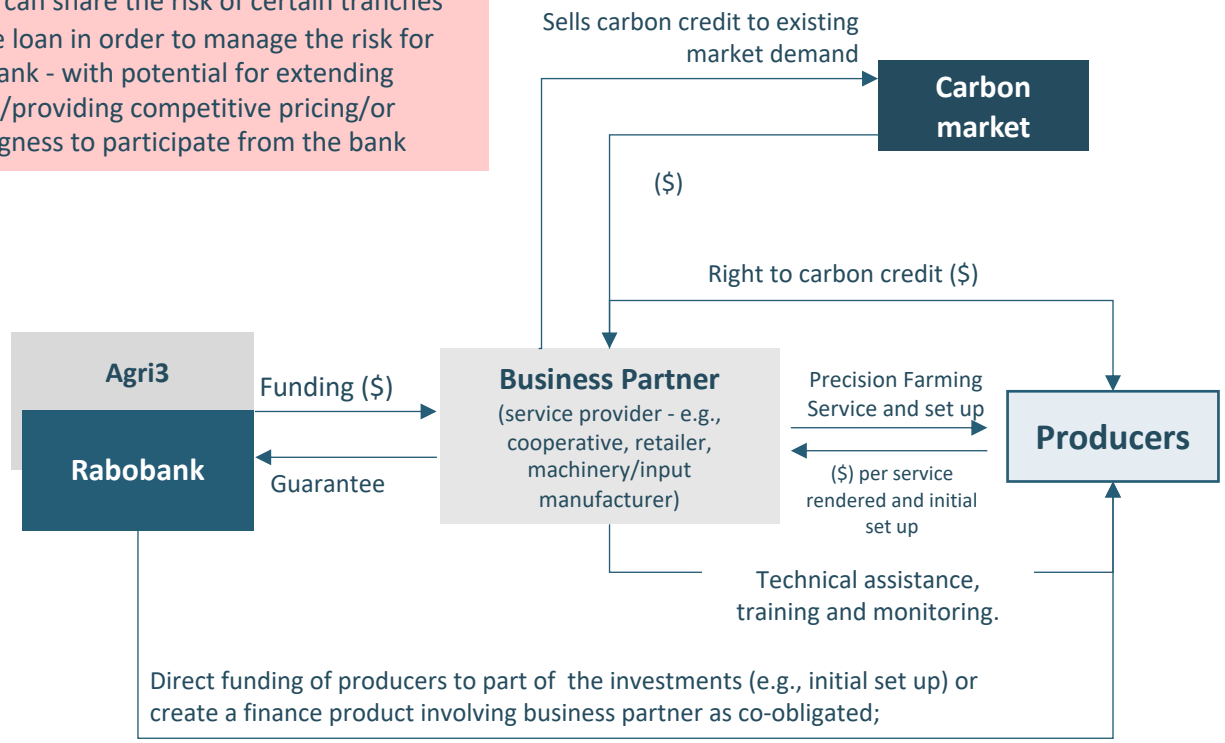
**Obligations:**

- Use money to acquire precision equipment, techs that enable the provision of precision farming services to producers;
- Structure operations to seek carbon credit market and compensate farmers;
- Renders precision farming service to the producers;
- Provision of training and technical assistance to the producers
- Prepare the technical project to support the implementation of the producer and to serve as an instrument to obtain the credit to be presented to the Agri3/Rabobank

**Benefits**

- Receives funds from the green investor to enable operations;

Agri3 can share the risk of certain tranches of the loan in order to manage the risk for the bank - with potential for extending tenor/providing competitive pricing/or willingness to participate from the bank




## Producer

**Obligations:**

- Pays for precision farming services;
- Give access to monitoring and be open to technical assistance recommendations and training program.
- Comply with socio-environmental standards defined by Agri3/Rabobank;

**Benefits:**

- Access to precision farming technologies without making large investments and at competitive service cost;
- Receives credit so he can access precision farming services
- Increase of production
- Agri inputs cost reduction
- Access to carbon credit market revenue;

Agri3/Rabobank could track sustainability KPIs improvement indirectly through business partner monitoring system. For instance, monitoring soil organic matter and water pollution could be easily measured through installed sensor such as soil moister optical sensor.

## Estimated costs of digital farming (Soybean R$.ha$^{-1}$):

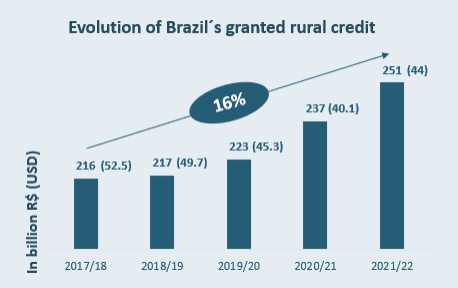
- Connectivity: R$75 to R$150 per ha (US$ 15 to US$ 30/ha)
- Area systematization: R$100/hectare (US$ 20/hectare)
- Soil analysis: R$50 per hectare (US$10/hectare)
- Technical assistance for adoption support: R$150/ha (US$30/ha)
- **Total cost of technology package: from R$450/ha (US$90/ha)**

# Content

# Executive Summary

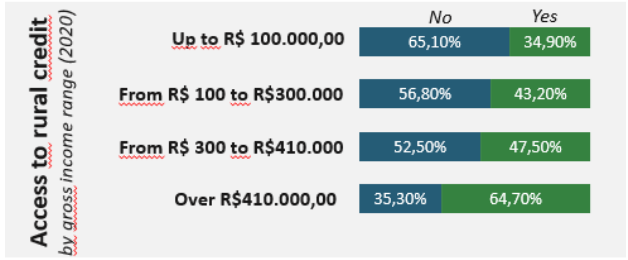
## ① There are public resources available in Brazil and are competitive, but they are not enough

To adequate to current forestry code, Brazil need a total of R$ 406.3 billions (US$78.9 billions);




## ② Producers face several challenges to access rural credit, especially small and medium farmers.

Majority of farmers does not access public funding which could be used to sustainability interventions.




## ③ Some initiatives are addressing the challenges with innovative mechanisms.

Key enablers identified on studied initiatives:

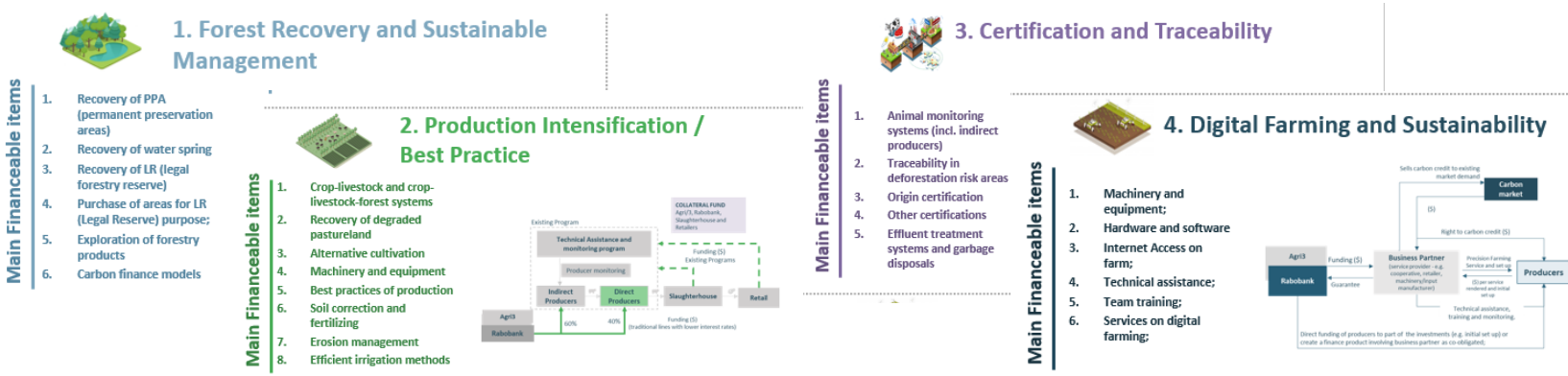
1. Attractiveness of operation as incentive for sustainability
2. Efficient monitoring
3. Producers' knowledge and relationship
4. Revenue generation
5. Innovative credit rating
6. Technical assistance and communication

## ④ …thus, we suggest that structuring a green loan should address the following challenges

Challenges that must be addressed:

1. Collateral alternatives and flexibility
2. Technical support
3. Land use change incentives
4. Financial attractiveness
5. Diversity in producers' profile
6. Communication and clear incentive to join

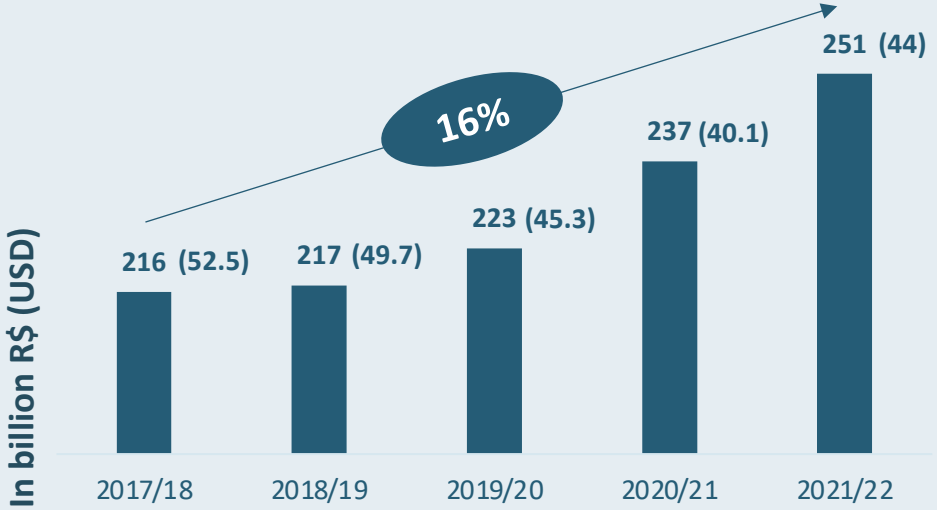
## ⑤ We came to 4 financial projects using the solutions mapped. Each project with its variations and possibilities for Agri3 to act.



# There are public resources available in Brazil and they are competitive, but not enough to met Brazilian sustainability challenge

## Rural Credit in Brazil

- To adequate to current forestry code, Brazil need a total of **R$ 406.3 billions** (US$78.9 billions);
- In 2021/22, Brazil will grant **R$ 251 billions** in Rural Credit, 29% will be destined to investments and 71% to costing and selling improvements;
- Considering the investment to environment challenges, and better management practices production the mainly programs available are “Programa ABC” with **2%**, “Pronamp” **2%** and “Pronaf” **7%** of the total amount;
- Considering programs above, the Loan Tenor range is **8 to 12 years**, Grace **3 to 8 years,** and the Interest Annual Rate **3-7%**;

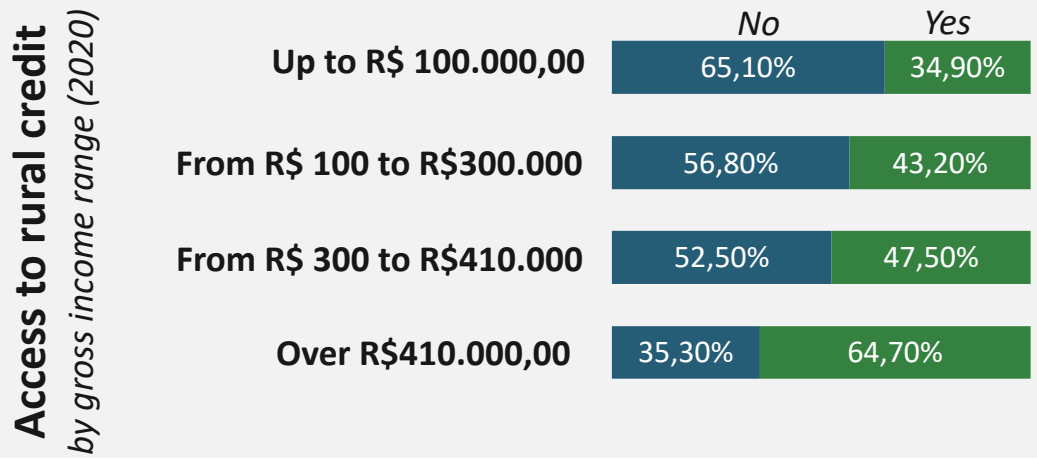



The main increases in the rural credit 2021/22 were in the “Pronaf” and “Pronamp”, 19% and 4% respectively.

Source: Plano Safra 2021/22 - Secretaria do Tesouro Nacional, 2021; MAPA, 2021.

# Producers face several challenges to access rural credit, especially small farmers.

*Small and less structured producers have greater difficulty in accessing rural credit*

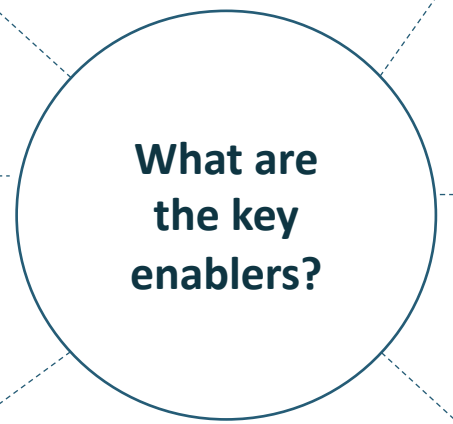



- Producer with debts
- Unfamiliarity with the lines and how to access
- Required guarantees
- Land regularization
- Non-compliance with the forest code
- Delay in the releasing credit process
- Low individual credit limit
- Excessive bureaucracy
- Guarantor requirement



Source: Prioridades e principais dificuldades no acesso ao crédito e seguro rural plano agrícola e pecuário 2021/2022, CNA/Senar, 2021

# Some initiatives are addressing the challenges with innovative mechanisms with key enablers




### ATTRACTIVENESS OF OPERATION AS INCENTIVE FOR SUSTAINABILITY

Traive's case showed low EIR incentivizes producers to jump in sustainability initiatives. Besides, flexibility in use of resources turn investment more attractive.

### EFFICIENT MONITORING

Monitoring systems, to assess implementation is key. Could be either based on an existing one (e.g., Satellite) or created, but low cost is key.

### PRODUCERS KNOWLEDGE AND RELATIONSHIP

Knowledge of who is the producers, its reality and connection with them is key. At least on part of the solution must have the knowledge and relationship.

### REVENUE GENERATION

Producers will be more intended to sustainability initiative when is possible to capture financial gains, such as premium price, carbon market resources or savings in input purchase;

### INNOVATIVE CREDIT RATING METHODOLOGY

Reduction of risks attract more partners for the funding and allow reduction of costs such as insurance;

### TECHNICAL ASSISTANCE AND COMMUNICATION

Initiatives succeeded when producers understand the mechanisms and link with sustainability at the same time have support to implement.

# …thus, we suggest that structuring a green loan should address the following challenges

## 1. Collateral alternatives and flexibility

- Land title regularization issue could derail funding and is key in areas more susceptible to deforestation;
- Farmers fund their yearly production with 3rd party resources and can not dispose an important share of traditional guarantees to green investments.

## 2. Technical support

- Due to the low capacity of producers, technical assistance is essential for the activity to advance
- Low training, especially of the small producer

## 3. Positive land use incentives

- The financing line must be clear on how it will encourage land use change as it requires investment and returns may not be direct.
- Minimum requirement according to Brazilian laws are already a challenge to be met (at least 20% of area must be preserved). Thus, additional demands could turn funding lines less attractive;
- Payment for current environmental services or additional services are rare and is a bottleneck to create additionalities;

## 4. Financial attractiveness

- Current financing models (especially public lines) do not require an environmental counterpart at similar rates and are attractive in terms of grace and loan tenor;

## 5. Diversity in producers' profile

- Trend is to keep with already structured producers and mainly large ones. To achieve small and medium is important to think of lowering barriers and overcome requirements and investments that are sensitive to economics of scale;

## 6. Communication and clear incentive to join

- The diversity of players and profiles requires clarity in the value proposition and efficient communication of benefits and segmented communication strategy;
- There is a cultural challenge: traditional producers with low propensity to adopt innovative credit models;

# How can Agri3 accelerate the funding of green loan considering the challenges identified?

## 1. Collateral alternatives and flexibility

- Use of innovative credit analysis tools with better measurement of systemic risk;
- Reduce cost of insurance by applying customized crop insurance;
- Create surety fund that “buys” part of the risk
- Involve co-obligated who know and are close to the producers
- Flexibility in collaterals (e.g., Calves traced or future soybean bag production as collateral)

## 2. Technical support

- Partnership with existing programs.
- Co-obligated who already have a team and technical assistance service and are specialized.
- Non-repayable investment in technical assistance companies.
- Include the amount of technical assistance in the final financing rate.
- Investment shared with other agents in the chain that have an interest in the cause (slaughterhouse, retail)

## 3. Positive Land use incentives

- Search for producers with signed TACs (conduct adjustment term);
- Include environmental aspects as counterparts or as prerequisites for access;
- Progressive fee according to adopted practices
- Payments for environmental services could be created connecting producers with forest surplus with other in need;;
- Indirect benefits: increased productivity and business profitability
- Technology transfer by the technical assistance team (ex ILPF)
- Longer tenors or competitive pricing as a result of Agri3 participation in the loan

## 4. Financial attractiveness

- Use carbon credit to reduce the financial fee.
- Competitive interest rate (not necessary bellow current rate, but competitive).
- Simplification of processes, less bureaucracy.
- Have a producer trustworthy intermediary.
- Agri3 could take part in a piece of Rabobank's financing.

## 5. Diversity in producers' profile

- Increased flexibility in the use of the resource according to the producer's level of sustainability
- Partnership with players who are closer to the producers (e.g., Cooperatives)

## 6. Communication and clear incentive to join

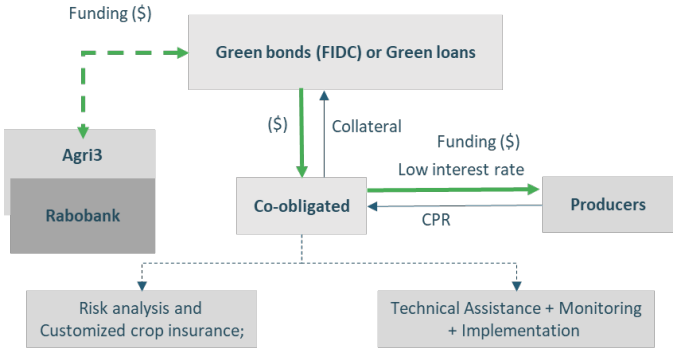
- Connection with buyers that pay premium price for the product originated;
- Attractive financing interest rate;
- Provide technical assistance
- Consider the need to subsidy agricultural Input purchase;
- Value proposition to farmers must show that there is a profit increase opportunity related to interventions (through productivity increase, cost reduction, access to higher selling prices).

# We came to 4 financial projects using the solutions mapped

## 1. Forest Recovery and Sustainable Management

Main Financeable items

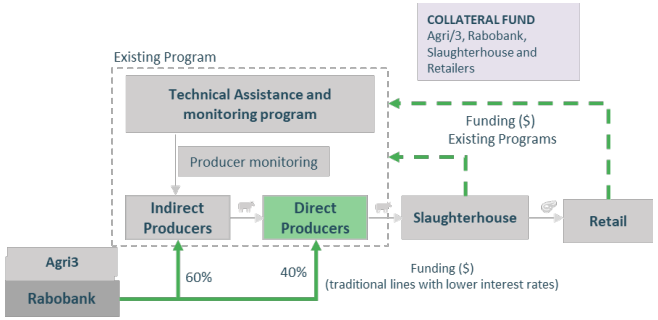
1. Recovery of PPA (permanent preservation areas)
2. Recovery of water spring
3. Recovery of LR (legal forestry reserve)
4. Purchase of areas for LR (Legal Reserve) purpose;
5. Exploration of forestry products
6. Carbon finance models




## 2. Production Intensification / Best Practice

Main Financeable items

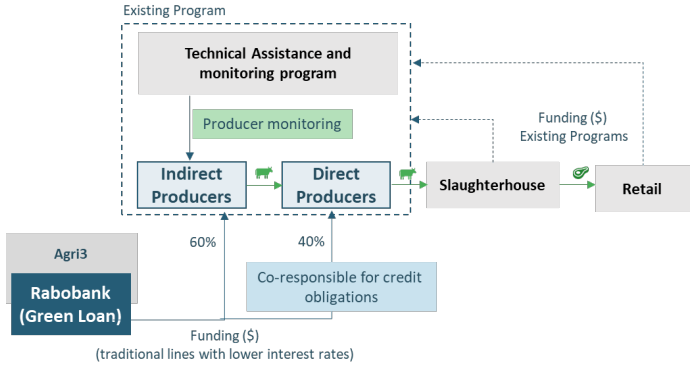
1. Crop-livestock and crop-livestock-forest systems
2. Recovery of degraded pastureland
3. Alternative cultivation
4. Machinery and equipment
5. Best practices of production
6. Soil correction and fertilizing
7. Erosion management
8. Efficient irrigation methods

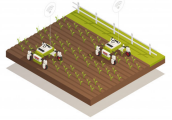



## 3. Certification and Traceability

Main Financeable items

1. Animal monitoring systems (incl. indirect producers)
2. Traceability in deforestation risk areas
3. Origin certification
4. Other certifications
5. Effluent treatment systems and garbage disposals

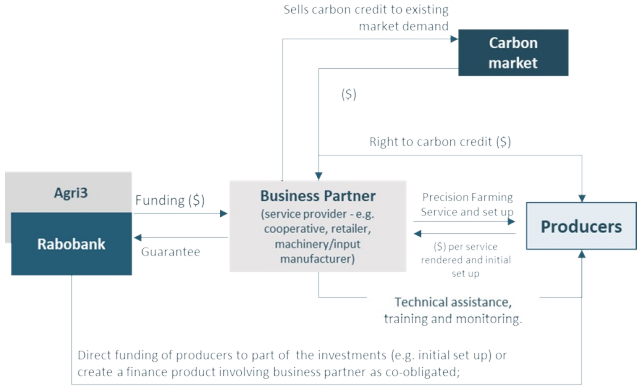


## 4. Digital Farming and Sustainability

Main Financeable items

1. Machinery and equipment;
2. Hardware and software
3. Internet Access on farm;
4. Technical assistance;
5. Team training;
6. Services on digital farming;



# ANNEX – EXISTING FINANCIAL INSTRUMENTS DETAILMENT

# Financial products and which projects they address

1-Digital and Precision/IoT
2- Production Intensification / Best Practice
3-enhance Water Footprint
4-Forest Recovery and Maintenance
5-Certification and Traceability
6-Renewable Energy

| # | Comercial banks existing financial products | Description of the financial product | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 1 | BNDES Automatic (BNDES Automático) | Credit line that aims to finance investment projects for expansion, modernization, technological innovation, implantation and relocation of the company, through investment projects. | X | X | | | | |
| 2 | FNE Innovation (FNE Inovação) | Credit line that aims to promote innovative activities and enterprises, through financial support for the development or significant improvement of products, services and / or processes, with an emphasis on the search for a better competitive position and new market opportunities for entrepreneurs and companies in the Region. | X | X | X | | | |
| 3 | Ecoefficiency (Ecoeficiência) | Credit line designed to promote the reduction of environmental impacts by incorporating sustainability practices in the production process. It is a special stimulus for the entrepreneur who is always looking towards the future | | | X | X | | |
| 4 | FNE Rural (FNE Rural) | Credit line designed to finance fixed and semi-fixed investments, agricultural and livestock costs and commercialization. | X | X | X | | | |
| 5 | Program for Reduction in GHG emissions (ABC - Programa para Redução da Emissão de Gases de Efeito Estufa na Agricultura) | Program to Reduce Greenhouse Gas Emissions in Agriculture - ABC Program, aimed at reducing greenhouse gas emissions from agricultural activities. | | X | | X | | |
| 6 | National Program to support the medium farmer (Programa Nacional de Apoio ao Médio Produtor Rural – PRONAMP) | Credit destined to support the medium rural producer, in order to promote the development of its rural activities. Program to finance the purchase of agricultural tractors and agricultural implements, cutting platforms, harvesters and equipment for preparing, drying and processing coffee. | X | X | | | | |
| 7 | Program to support irrigation and storage (Moderinfra - Programa De Incentivo À Irrigação E À Armazenagem) (BNDES) | The Irrigation and Storage Incentive Program is a line that supports the development of sustainable irrigated agriculture and storage, increasing the supply of food and expanding production capacity. | | X | X | | | |
| 8 | Program to modernize agriculture and conserve natural resources (Moderagro - Programa De Modernização Da Agricultura E Conservação Dos Recursos Naturais) (BNDES) | The Program for the Modernization of Agriculture and Conservation of Natural Resources serves rural producers and their cooperatives, broadly and focused on agriculture, livestock and soil recovery and for the sectors of beekeeping, aquaculture, fishing, poultry, floriculture, horticulture, sheep, sheep, ranching, sericulture, swine, dairy farming and animal protection. | | X | | | | |
| 9 | National Program to Strengthen the family agriculture (Pronaf-Programa Nacional de Fortalecimento da Agricultura Familiar) | It finances investments, including in infrastructure, aimed at the improvement, storage, processing and commercialization of agricultural production, forest products and extraction, or artisanal products, and the exploitation of rural tourism. | X | | | X | X | |
| 10 | Program to support innovation and technology in agricultural production (Inovagro Programa de Incentivo à Inovação Tecnológica na Produção Agropecuária) (BNDES) | Supports necessary investments for the incorporation of technological innovation in rural properties, aiming at increasing productivity, the adoption of good agricultural practices and the management of rural properties, and the competitive insertion of rural producers in different consumer markets. | X | X | X | | X | |
| 11 | Rural sustainable Amazon (Amazônia Sustentável Rural) | Financing Program for the Sustainable Development of the Amazon, which supports the financing of projects characterized as rural located in the North Region, with FNO (Fundo Constitucional de Financiamento do Norte) resources for the purpose of implantation, expansion, diversification, modernization, reform and relocation, stock formation and acquisition of material raw materials and inputs for production. | | X | | X | | |
| 12 | FNO Biodiversity foi legal reserve and PPA (FNO Biodiversidade - Reserva Legal e APP) | It is a FNO Financing Line -Biodiversity Program, destined to undertakings aimed at the regularization and recovery of areas of legal reserve and degraded / altered permanent preservation areas of rural properties. | | | | X | X | |


Source: Portal da Indústria (http://www.portaldaindustria.com.br)

# Financial products and which projects they address

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| # | Comercial banks existing financial products | Description of the financial product | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 13 | FNO Biodiversity - alternative use of the soil (FNO Biodiversidade - Uso Alternativo do Solo) | It is a FNO Financing Line-Biodiversity Program, designed to contribute to the maintenance and recovery of biodiversity in the Amazon, through the granting of financing to projects that privilege the rational use of natural resources, with the adoption of good management practices. | | X | X | | X | |
| 14 | RO finance (RO Custeio) | It is a product financed with Mandatory Resources. Credit intended to cover the expenses of day-to-day production of agricultural and livestock activities. Finances inputs, cultural treatments, harvesting, processing or industrialization of the financed product, production of certified and supervised seedlings and seeds, as well as costing expenses, related to cattle, swine, poultry, buffalo, sheep and goat farming, beekeeping, aquaculture and fishing activities related to the capture, cultivation, conservation, processing or commercial breeding of fish, crustaceans, mollusks, amphibians and algae. | | X | | | | |
| 15 | RPR finance (RPR Custeio) | It is a product backed by Resources from Rural Savings - RPR | | X | | | | |
| 16 | Program for Modernization of the Fleet of Agricultural Tractors and Associated Implements and Harvesters (Moderfrota - Programa De Modernização Da Frota De Tratores Agrícolas E Implementos Associados E Colheitadeiras) (BNDES) | Financing program for the Modernization of the Fleet of Agricultural Tractors and Associated Implements and Harvesters | X | | | | | |
| 17 | Agribusiness Card (Cartão Agronegócio) | Finance the cost of agricultural and livestock activities, regardless of the existence of a partnership term, agreement or protocol between the Bank and other entities and provided that the budget (amount up to R$ 1 million (US$ 200 thousand)) of the costing plan contemplates, exclusively or no, the acquisition of inputs. | | X | X | | | |
| 18 | FNE financing (Créditos de Custeio Programas do FNE) | Finance the cost of agricultural, livestock activities and processing or industrialization of agricultural products. | | X | X | | | |
| 19 | Green FNE (FNE Verde) | Promote the development of enterprises and economic activities that promote the preservation, conservation, control and / or recovery of the environment, with a focus on the sustainability and competitiveness of companies and production chains | | X | X | X | X | |
| 20 | Grain production (Produção de grãos) | The Northeast can contribute a lot to the growth of grain exports in Brazil, strengthening its economy and generating thousands of jobs. To this end, BNB is making available to producers Cresce Nordeste, a line of financing with lower interest rates and longer terms | | X | | | | |
| 21 | Cattle pro-weight gain (Proengorda) | Develop the agricultural sector with the financing, exclusively, of the isolated acquisition of bovine animals for rearing and fattening on pasture or for fattening on pasture | | X | | | | |
| 22 | Program to support the rural development in the northeast (Programa de Apoio ao Desenvolvimento Rural do Nordeste Rural) | Promote the development of agriculture and the forestry sector when there is suppression of native forest, with the observance of environmental legislation and the consequent increase in the supply of agro-industrial raw materials. | | X | | | | |
| 23 | FNE Irrigation (FNE Irrigação) | Promote the development of irrigated agriculture in the area where SUDENE operates, aiming at diversifying productive activities, adopting sustainable practices, using modern and eco-efficient technologies and increasing the supply of agro-industrial food and raw materials. | | X | X | | | |

Source: Portal da Indústria (http://www.portaldaindustria.com.br)
Exchange rate: 2017 – R$ 3,192 / 2018 – R$ 3,6542 / 2019 – R$ 3,9451 / 2020 – R$ 5,1558 / 2021 – R$ 5

# Financial products and which projects they address

1-Digital and Precision/IoT
2- Production Intensification / Best Practice
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4-Forest Recovery and Maintenance
5-Certification and Traceability
6-Renewable Energy

| # | Comercial banks existing financial products | Description of the financial product | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 24 | BNDES Agriculture financing (BNDES Finame Agrícola MPME BK) | BNDES FINAME Agrícola Product Line, aims to finance the acquisition of new agricultural machines and implements of national manufacture, registered with FINAME, destined to the agricultural sector, exclusively in the "financing to the buyer" modality | X | | | | | X |
| 25 | Environmental financing (Financiamentos - Meio Ambiente) | Finances the generation of alternative energy, energy conversion, forest management, organic farming, including conversion and certification, creation of wild animals, use of local biodiversity, cleaner production, pollution control equipment, recovery of degraded areas, waste treatment , associated working capital, and other activities with an environmental emphasis. | | X | | X | X | X |
| 26 | Reforestation financing (Financiamentos - Reflorestamento E Agrofloresta) | With the Cresce Nordeste Reflorestamento & Sistemas Agroflorestais, Banco do Nordeste seeks to enable the expansion of business and the growth of this strategic sector for the Region, contributing to the generation of jobs and the recovery of deforested areas. Tailor-made for forestry, Cresce Nordeste Reflorestamento & Sistemas Agroflorestais offers low interest rates and longer terms and is part of the solution to a serious problem: the scarcity of wood | | | | X | X | |
| 27 | BNDES woman investments (BNDES Pronaf Mulher Investimento) | Credit line designed to finance and support agricultural and non-agricultural activities exploited through direct employment of the woman rural producer and her family's workforce. | | X | | | | |
| 28 | Credit for agricultural investments (Crédito de Investimento Agrícola) | Credit line for the acquisition of goods, services and constructions for the formation of permanent crops and the improvement of agricultural production. | | X | | | | |
| 29 | Credit for livestock investments (Crédito de Investimento Pecuário) | Credit line designed to finance the acquisition of goods, services and buildings designed to improve livestock farming. Can finance the acquisition of sows and breeders, the acquisition of beef cattle, the acquisition of animals for milk production, (cows, goats and buffaloes); formation, reform or recovery of pastures; acquisition of machinery and equipment and rural buildings. | X | X | | | X | |
| 30 | More water more income program (Programa Mais Água Mais Renda) | Program aimed at investments in implantation, expansion and adaptation of irrigation systems, as well as for the construction, expansion and adaptation of water reservoirs and the construction of cisterns, provided that they are necessarily associated with irrigation systems through the sprinkler methods, located (micro-sprinkling and dripping) and grooves (lines and strips) | | X | X | | | |
| 31 | Agropampa machinery and equipment (Maq. e Equip. Agropampa) | Credit line to finance the acquisition of new or used, national or imported machinery and equipment (with invoice from a national company) for use in rural properties. Aimed at rural landowners and farmers with the main source of income from the rural sector. | X | | | | | |
| 32 | Rural machinery and equipment savings (Poupança Rural Máquinas e Equipamentos) | Financing line for the purchase of new and used rural machinery and equipment, not registered in FINAME, sold by resellers, dealerships, workshops or representatives of machines, and it is forbidden to be used in negotiations directly between producers. | X | | | | | |
| 33 | Pronaf Agroecology Investments (Pronaf Investimento Agroecologia) | Credit line for the financing of agroecological production systems. | | | | X | | |
| 34 | FCO Rural | Credit intended to cover the production costs of agricultural and livestock activities in enterprises located in the Midwest region. | | X | | | | |

Source: Portal da Indústria (http://www.portaldaindustria.com.br)
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# Financial products and which projects they address

1-Digital and Precision/IoT
2- Production Intensification / Best Practice
3-enhance Water Footprint
4-Forest Recovery and Maintenance
5-Certification and Traceability
6-Renewable Energy

| # | Commercial banks existing financial products | Description of the financial product | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 35 | Pronaf financing (Pronaf Custeio) | Credit to cover the costs of agricultural and livestock production. Finances seeds, fertilizers, pesticides, vaccines, feed, among others. | | X | | | | |
| 36 | Traditional Agricultural and livestock investments (Investimento Agropecuário Tradicional) | Credit for financing goods and services related to agricultural activity. | X | X | X | | X | |
| 37 | Forest Certification (CDC Certificado Florestal) | An exclusive credit solution for the entrepreneur, who is concerned with social development, the preservation of the environment and wants to achieve Forest Certification | | | | | X | |
| 38 | Irrigation (Irrigação) | Credit line for the implantation, expansion, reform and adaptation of irrigation systems - individually or collectively - including: weirs, dams, canals, slats, electrical networks, irrigation equipment (central pivot, self-propelled, sprinklers, drip systems, hydraulic risers). | | X | X | | | |
| 39 | Forest implantation (Agropecuária Plantio de Florestas) | Credit line for the implantation, maintenance and management of commercial forests, including those destined to the restoration of legal reserves or permanent preservation areas, and to produce legal coal. | | | | X | | |
| 40 | Tractors and Harversters (Agropecuária Tratores e Colheitadeiras) | Credit line to finance tractors and associated implements and harvesters and cutting platforms. | | | | | | |
| 41 | Electrical energy infrastructure (Infraestrutura - Energia Elétrica) | It finances the expansion and modernization of the sector, in order to guarantee the supply of electricity with quality, safety and lower tariffs. It is also sought to increase alternative sources of energy. | | | | | | X |
| 42 | Investment Credit (Crédito Investimento) | A credit indicated to expand and modernize agribusiness with the purchase of new machinery and equipment, animals, as well as formation or recovery of pastures and construction of fences, barns and warehouses | X | X | | | | |


Source: Portal da Indústria (http://www.portaldaindustria.com.br)

# Other market initiatives and the projects they address

1-Digital and Precision/IoT
2- Production Intensification / Best Practice
3-enhance Water Footprint
4-Forest Recovery and Maintenance
5-Certification and Traceability
6-Renewable Energy

| # | Market initiatives | Description of the initiatives | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 43 | Long term financing / Bunge, Santander and TNC | • Catalyze the conversion of degraded pastures to soy areas through loans for the acquisition of new lands (7-10years) and/or investments to increase yields in current or leased properties (3-7 years);<br>• R$ 250M (US$50M) committed with expectations to expand to R$ 1 billion (US$200M);<br>• Actively seeking borrowers. | | X | | | | |
| 44 | Program of long-term loans / Louis Dreyfus, WWF | • Catalyze the conversion of degraded pastures to soy areas through loans for investments in current properties (3-7 years). Acquisition of new lands is not included;<br>• First loan disbursed in Q3 of 2019. | | X | | | | |
| 45 | Green CRA (Agribusiness Receivables Certificates) / WWF and companies, partner banks | • Guarantees' securitization of deliveries backed by owner's assets; requires compliance with environmental terms including DCF production;<br>• Seeking partner companies and banks. | | | | | | |
| 46 | Irupé Creditech / Vision Brazil Investment and Pawa Finance | • Loans with discounted interest rates tied to the achievement of measurable forest conservation goals;<br>• Long term objective of R$ 5B (USD 1B) in loans | | | | X | | |
| 47 | Reverte / Syngenta | • Finances producers' investments in sustainable practices, primarily focusing on restoring degraded pastures for crop expansion;<br>• Promotes increased productivity in the short term to improve ROI (return over investment) through production practices | | X | | | | |
| 48 | Responsible Commodity Facility / BVRio-SIM | • Offers financing at competitive cost for DCF production and/or restoration of Legal Reserves;<br>• R$ 200 Million (US$40 million) available;<br>• Seeking transaction partners. | | | | X | | |
| 49 | &Green / IDH, NICFI**, Unilever | • Global fund offering risk reduction (first loss) mechanisms to companies and banks for investments in agricultural production that support tropical forest protection or restoration;<br>• R$ 625M (US$125 M) in hand of the expected R$ 2B (US$400 M) to be capitalized;<br>• Eligibility limited to operations in Mato Grosso and Pará states Brazil. | | X | | X | | |
| 50 | Land Innovation Fund for Sustainable Livelihoods / Cargill + Chemonics International | • Funded with a R$ 150 million (US$30 million) contribution by Cargill and managed by Chemonics International for the purpose of contributing to make the soy supply chain deforestation- and conversion-free.<br>• The Fund is designed to engage key stakeholders in Argentina, Bolivia, Brazil, Paraguay and Uruguay, through the award of grants, delivery of technical assistance, and building of partnerships to:1)ensure that the soy that flows into the supply chain is produced responsibly; 2)support innovations that achieve higher productivity through sustainable practices; 3) design, test and pilot tools, mechanisms, practices and approaches for farmers to conserve and restore forests and native vegetation; 4)consolidate networks and resources to promote and inform sector-wide transformation | | X | | X | | |



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# Other market initiatives and the projects they address

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| # | Market initiatives | Description of the initiatives | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 51 | Sustainable Agriculture Facilitated Financing (SAFF) / Rede ILPF, public-private partnership between Embrapa, John Deere, Syngenta, Cocamar, Ceptis, Bradesco, Soesp, Instituto Brasileiro para o Desenvolvimento e Sustentabilidade (IABS) and JPG Asset Management. | • Saff will make available approximately R$ 340 millions (US$ 68 millions) in the first year, with R$ 310 millions (US$ 62 millions) in credit for the producer and R$ 30 millions (US$ 6 millions) in financing certification, research, technical assistance for technology transfer and certification. The increase in the fund will happen progressively, year by year, and may reach R$ 7 billions (US$ 1.4 billions) in 2026.<br>• The fund was one of the projects selected, in 2020, by the Global Innovation Lab for Climate Finance (Lab), a program to accelerate investment options that mobilize resources for sustainable development in emerging markets.<br>• The first criterion for accessing the fund will be the monitoring and approval of the property by the TrustScore system. Only farms that reach a minimum score will be financed. Then, the higher the sustainability index, the lower the interest.<br>• The pilot project will be implemented until July 2021 and will cover properties in seven Brazilian states: Paraná, São Paulo, Bahia, Minas Gerais, Goiás, Mato Grosso and Mato Grosso do Sul, totaling 90 thousand hectares.<br>• Today, Brazil has 16 million hectares with ILPF systems, and the goal is to reach 30 million by 2030<br>• According to studies carried out for the creation of Saff, the implementation can mitigate the emission of 2.5 million tons of carbon dioxide in 10 years. | | X | | | | |



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