



Valuing externalities of cattle and soy- maize systems in the Brazilian Amazon; Application of the TEEBAgriFood Evaluation Framework

Executive Summary

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The Economics of Ecosystems and Biodiversity (TEEB) initiative, coordinated by UN Environment, has developed an Evaluation Framework that provides a comprehensive and universal approach to capture all positive and negative impacts and externalities across eco-agri-food value chains. It is a frame of reference that allows us to answer the question "what should we value and why?" In the case of Brazil, we examined the following issues with respect to the beef and soy chains in the Legal Amazon:

1. What are the factors that motivate, limit and/or impede the conversion of "conventional" production to "sustainable" and low-carbon "good practices"?
2. What socio-environmental externalities are currently recognized, representing correction efforts by the actors in the two value chains, and which ones remain as difficulties to be overcome?
3. Can rural credit incentivize changes in production chains towards more sustainable patterns of production and consumption? What changes in rural credit policies or other measures could encourage greater adoption of "good practices" of production?

Methodology

- ✓ Secondary data search (bibliographical review) ordered by stock and by natural, productive, human and social capital flows, at each stage of the value chains evaluated and the correlated positive and negative externalities.
- ✓ Semi-structured interviews with producers of soy and beef production chains: producers, processors, retailers, banks, certifiers and non-governmental organizations.
- ✓ Open-ended interviews with agribusiness consultants, bankers, civil servants and regulators, a provider of technological solutions to agribusiness, a municipal secretary in Mato Grosso, and representatives of nongovernmental organizations.
- ✓ A "mystery client" consultation was conducted in banks in northern Mato Grosso to identify the extent to which credit takers were able to access the national low-carbon credit line (ABC).

Results

Predominant land use. The two chains together occupy a significant share of the arable land in the Legal Amazon, at least 70% in pasture alone. Deforestation persists as the main cause of externalities. In the case of soy, a moratorium in place since 2005 on commercialization from deforestation areas has been effective in restricting this direct effect, but has led to the expansion of this crop in Amazonia on degraded lands previously converted to cattle raising, in addition to a possible increase in deforestation in the Cerrado. It is estimated that the Legal Amazon holds about 46% of the cattle herd in Brazil (some sources suggest that this proportion is even greater). With reference solely to the animals butchered in the slaughterhouses located in the Legal Amazon, there is an estimated daily volume of around 83,740 animals. Attempts to regulate the origin of meat through control of

slaughterhouses and supermarkets had limited results. Terms of Conduct Adjustment (TACs) imposed on slaughterhouses represented a positive innovation, but there ensued a lack of serious enforcement.

Good livestock practices. A combination of renewal and rotation of pastures, nutritional improvement and genetics imply an increase in stocking rates (up to 4 AU/ha from a current 1 AU/ha), and shortening the fattening period, but these require investment, knowledge and adaptive capacity on the part of producers. Although more intensive systems generate more greenhouse gas (GHG) emissions, these can be neutralized by maintaining Legal Reserves (LR), restoring permanent protection areas (APPs) and reducing deforested areas per animal produced. Pilot experiences in Mato Grosso and southern Pará have had positive results but are difficult to replicate on a sufficient scale - in the absence of credit and policy incentives - to bring about a change in current standards.

Intensification of livestock. In Amazonia there are already intensified systems, characterized by the adoption of rotational grazing systems, as well as for the provision of rations of up to 4 to 5 kg of grains/AU/day that are combined in feeding troughs with mineral salt. There is a significant ongoing transition toward the incorporation of semi-confinement systems (finalization of fattening in short term confinements) or full confinement, which is reflected in higher overall rates of animal stocking. In Mato Grosso, 15% of the animals are produced in feedlots. There are problems in these systems associated with waste disposal and animal welfare that need to be overcome.

The scale of operations is an important factor in the viability of transition to the more sustainable practices studied: cattle ranchers on areas of over 200 ha in pasture have a higher profitability. Small producers represent an essential part of the beef chain by producing calves at lower cost due to the use of family labor. However, the widespread employment calf rearing and fattening by a diverse set of small producers poses challenges for meat traceability systems developed by retail chains.

Integration of crop-livestock-forest (ILPF). Intensification in the production systems via crop-livestock-forest integration (ILPF and variants), has modified the productive landscape rapidly, reaching 11.5 million ha in Brazil registered in 2017. Eucalyptus plantations provide fuel for drying grains. The use of native tree species as a component of integrated systems is almost non-existent. It was verified that the transformation to ILPF including trees in the system has not yet occurred in the Amazon, where the main integration was restricted to crop-livestock rotations. In southern Pará and northern Mato Grosso, for example, the incorporation of such ILP systems has had a strong impact on the landscape. The hypothesis that such systems may assist in conservation of native forests has not yet been adequately validated.

Loss of biodiversity and water sources. The simplification of landscapes and the continuous deforestation to expand the agricultural and cattle frontier, result in loss of biodiversity and reduction of ecosystem services in much of the Legal Amazon. These impacts imply not only loss of forest values (timber and non-timber products), but also in services of pollination and hydrological recharge that are essential for agricultural productivity itself.

Externalities of the application of agrochemicals and wildfires. Soy and maize production systems are highly dependent on agrochemicals, in many cases applied by airplane, resulting in contamination of watercourses and neighboring communities, with potentially harmful impacts on public health. In combination with the presence of particulate matter from the smoke from the opening of forests

and the burning of wood for the drying of grains, a veritable cauldron of externalities is formed. On the other hand, no-till cultivation has significantly reduced soil erosion and runoff, although not significantly reducing the use of agrochemicals, particularly herbicides, whose application has increased exponentially.

A switch from GMO soy to conventional soy has occurred in some regions, with the following main stimuli: i) price premium (up to US \$ 3.00/sack of 60kg); ii) increased resistance of weeds to herbicides; as well as iii) better control of nematodes in the conventional system and consequent reduction of costs of agrochemicals, due to the greater resistance observed in the conventional genetic material.

Inadequate transport and logistics. The two value chains face obstacles related to transport and logistics, involving additional costs due to the poor state of conservation of roadways, which are mostly in precarious condition. There are also problems related to the absence of adequate storage facilities, causing losses and emissions of greenhouse gases with vehicular storage. Slaughterhouses cause significant waste, in addition to consuming large amounts of energy and water. The profitability of beef processing is partly due to co-products such as leather, tallow (a major biodiesel component), horns, etc. When the animals are marketed on the hoof and exported to countries of the Middle East, a significant volume of the herd being disposed of in this fashion, such co-product revenues are captured by the buyers. There is no evidence that these values are being internalized in prices.

Inordinate market power of meatpackers. The concentration of the livestock sector in oligopolies that dominate the occupation of the slaughterhouses throughout Brazil distorts the costs of the inputs and the value of beef. The slaughterhouses manipulate the market through the opening or closing of plants in response to the perceived viability of their operation, always aiming at a larger scale of production to reduce fixed costs; with this the (finished) animal ends up travelling as far as is necessary to ensure viable plant scale. This process results in an increase in logistics costs, GHG emissions and a decline in animal welfare.

Rising costs of production. The value of beef has remained nominally stable in the last five years, between R\$ 140 and 150/@ (15 kg), on average. All production costs (seed, diesel, wire, medicines, vaccines) have experienced annual average increases in line with inflation. As a result, the value chain is very tight, causing producers to stop reinvesting in their properties and resulting in losses of natural capital (soils, fertility, zootechnical indices).

Role of NGOs in the retail sector: observed changes towards the production of more sustainable soy and meat, in properties free of deforestation, have been provoked by the actions of NGOs that through campaigns denounce the economic agents along the respective value chains. These, in order not to lose market share, react with the announcement and adoption of sustainability commitments. Particularly strong is the case of NGO pressure on the retail sector in the case of meat, which reacted with the creation of traceability systems and for soy, with the Moratorium on Amazon soy producers and processors. Thus, the drivers of change toward more sustainable production patterns stem from both market forces and incentives from public policy and the finance sector.

Role of buyers and consumers. Slaughterhouses and supermarkets play a key role in communicating with consumers, but the sustainable supply initiatives highlighted in the study show limited constraints due to price signals or access to preferential markets for producers.

Financing and incentives for change

Positive pilot intensification experiments in livestock production are still limited. In the absence of credit and policy incentives, such as rural extension, it is difficult to replicate them on a large scale, reducing the possibility of changing current patterns.

Ranchers are generally resistant to investing in improved productive systems, even if it is profitable, requiring they be “brought to water” through induction. It is even more difficult, in the absence of an induction credit system, to target investments aimed at providing ecosystem services (e.g., restoration of APPs), even when they are beneficial to the sector itself.

It is therefore recommended to transform the Harvest Plan (*Plano Safra*) overall to incorporate an inductive character into best production practices rather than piecemeal approaches through differentiated “sustainable” credit such as Pronaf Agroecology or the ABC Plan. Such incentives need to be meaningful, allowing greater ease to take credit, comparatively cheaper interest rates for environmental lines, and prioritization of resources for producers who have made or want to make an environmental transition.

Large producers should only have access to lines that provide greater environmental benefits, while small and medium producers should be favored not only with credit but with access to technical assistance and mentoring through the transition toward more sustainable production models.

Our study recommendations point to the need for changes in agricultural credit policy as follows:

- To carry out an adequate evaluation of environmental factors as a basis for granting credit, such as the creation and consultation of an "Environmental Serasa" mechanism for creditworthiness screening.
- Facilitate access to resources of the Low Carbon Agriculture Credit (ABC Credit) facility: ABC resources should become available through a banking correspondent, promoting equity in access to the request and interest in the business, through intermediary agents.
- Improve the attractiveness of ABC credit. There has been no lack of demand for environmentally sound credit, but there is a lack of relative attractiveness and inducibility in credit policy, and there are bottlenecks in ABC's business model regarding access.
- Rely on predetermined production models to provide estimates of reasonable results per ABC-funded project. This greatly simplifies the project and reduces unnecessary transaction costs, while ensuring more robust estimates of results. Monitoring the benefits in terms of reducing emissions would also be more practical.
- Create differentiated credit for forest restoration. Producers have either received the traditional credit offer or applied the ABC investment resources only on "pasture reform". The other low-carbon loan lines are not well publicized.
- Perform technical monitoring of investment operations with direct reporting to the financing bank. Such monitoring should be contracted directly by the bank, in order to monitor the operation.
- Favor the credit for investment and seek a long-term view with stable rates.