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Better, But Not Sustainable: The Impacts of Switzerland's Sector Agreement on Soy Production in Brazil

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Abstract

The production and expansion of soy feed in Brazil generates various environmental and social harms. The vast majority of this soy is genetically modified (GM) and non-certified. But there is a small share of soy feed production that occurs under certification schemes stipulating social and environmental criteria, as well as a small share of production of non-genetically modified (non-GM) soy. These two production modes partly overlap. Based on a sector agreement, Switzerland exclusively imports certified non-GM soy feed. In the present article, we conduct a literature review to explore who drives this decision for non-GM soy feed and, more importantly, whether it has discernible sustainability impacts on the ground in production areas. Literature and data analysing the impacts of certified non-GM soy feed are scarce. Based on the scant but a little less scarce available data on certified soy, we conclude that the Swiss model represents an improvement, but is not truly sustainable. We recommend that more data be made available which enables robust linking of Swiss consumption to production in Brazil. Finally, we recommend conducting more research into how a sustainable Swiss feed–meat nexus could be designed.

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1 Introduction

In 2019, Brazil became the world's biggest soy exporter, accounting for roughly one third of global soy production, with 114.317 million tonnes in 2019 and 121.798 million tonnes in 2020 (FAO, 2022).

An estimated 96% of Brazil's soy production is genetically modified, or GM (Ana Mano, 2017). With the introduction of GM soy in the late 1990s and early 2000s, a high concentration of market power developed (G. Oliveira & Hecht, 2016, pp. 254–255). Today, the soybean seed and related agrochemical markets are dominated by a handful of transnational companies. For example, Oliveira and Hecht (2016, pp. 254–255) point out that just three companies control 55% of the global soybean seed market while five transnational companies control 69.5% of the agrochemicals market. Meanwhile, the companies ADM, Bunge, Cargill and Dreyfuss (also known as the "ABCD" firms) control around 85% of soy exports from South America (Schilling-Vacaflor, 2021, p. 4).

Notably, about 77% of global soy production is used for animal feed (Ritchie & Roser, 2021). Soy is a crucial ingredient in the so-called livestock–soy nexus (G. Oliveira & Hecht, 2016, p. 277), producing to satisfy the global "'cheap meat' demand" (Virah-Sawmy et al., 2019, p. 13).

In 2013, "soybean and its products (meal, oil, and their derivatives)"(G. de L. T. Oliveira, 2016, p. 348) were Brazil's second-most important export commodities, accounting for 12.9% of the corresponding market, just behind iron ore (13.4%). Some critics argue that soy cultivation is an extractive practice, financed by outside countries and mainly fuelling value creation and consumption elsewhere, with expanding soy cultivation increasingly encroaching on native forests in Brazil and causing local environmental and social problems (Baletti, 2014). For its part, China reportedly shifted to importing more soy from Brazil due to tensions with the US (Soja Netzwerk Schweiz, 2022b). In this way, soy production is part of a global production system with geopolitical implications (G. de L. T. Oliveira, 2016).

Soybeans have not always had this place in the global meat supply chain, nor have they held this central position in Brazil's economy. Indeed, since 2000 soy production has increased 160% in Brazil (Song et al., 2021). This expansion has had significant environmental and social impacts.

In recent years, one key focus of the debate over environmental impacts has been deforestation (Gibbs et al., 2015; Song et al., 2021). According to a recent study (Song et al., 2021, pp. 784, 788), about 9% of deforestation in South America is driven directly or indirectly by the expansion of soy cultivation (directly: e.g. forest is cut in order to plant soy; indirectly, e.g. soy is planted on pastureland, which is then moved to freshly deforested areas).

Of course, the negative impacts of soy production go beyond deforestation. For example, replacement of pastureland with intensive soy cultivation relying on machinery and agrochemicals also causes soil erosion and water pollution, with serious implications for long-term productivity and human health (Song et al., 2021, p. 789). Moreover, various studies report of related land and water conflicts (Jia et al., 2020; Schilling-Vacaflor, 2021), harms of agrochemicals on biodiversity (Jia et al., 2020, p. 5), child labour and forced labour, increasing land concentration and foreign control of land (Jia et al., 2020, p. 7). In this way, the social and environmental impacts of soy production are manifold and significant.

On the one hand, Switzerland imports a major share of its soy feed from Brazil. On the other, it is one of the few countries with (almost) no GM-based soy products in its market, with over 90% of Swiss imported soy feed certified and non-GM.

Against this background, it is worth exploring how this special market situation developed and how the decision of Swiss soy feed importers to import only certified non-GM soy has (or has not) impacted production in Brazil in terms of sustainability aspects.

This working paper is therefore looking at the two following research questions based on a literature review:

1. Why does Switzerland only import certified non-GM soy, who drives the decision-making, and what rules apply?
2. Has this decision to only import certified non-GM soy had concrete sustainability impacts on corresponding soy production in Brazil?

In the following section, we introduce the regulations in question and the corresponding soy-sector agreement not to import GM soy. Next, in section 3, we summarize the characteristics of Swiss soy imports and consider them in the wider context of Brazilian soy production. Thereafter, we briefly describe the lack of data and outline the consequences for research question two. Finally, we discuss our findings and attempt to derive conclusions regarding the sustainability of the imported soy.

2 Certified non-GM Soy for Switzerland: Regulations and Sector Agreement

Switzerland allows imports of "Products that are, contain or are derived from genetically modified organisms (GMOS)"(FSVO, 2022) under several conditions. The law "814.91 Federal Act on Non-Human Gene Technology" regulates in *Art. 12. Putting into circulation* that "Genetically modified organisms may be put into circulation only if the Confederation has granted authorisation" (Federal Act of 21 March 2003 on Non-Human Gene Technology [Gene Technology Act, GTA], 2003) and the Federal Council defines the requirements, procedures, and information shared with the public. Besides obtaining authorization, GMOs in circulation must be labelled. Traces of GMO up to 0.5% are allowed in non-labelled products (FSVO, 2022).

However, thanks to a sector agreement encompassing most Swiss soy-feed importers, Switzerland currently refrains from importing genetically modified soy (GM soy). This sector agreement is organized through the Soy Network Switzerland (SNS).

In 2004, the production conditions of soy imported to Switzerland first began to be scrutinized in earnest. That year, the Basel Criteria were written, an initiative for "responsible soy" that was launched by WWF and the Swiss retailer Coop in collaboration with ProForest (ProForest & WWF, 2004). Based on these criteria, the certification scheme ProTerra was also created in 2004 (Jia et al., 2020). Meanwhile, around this time, soy production was rapidly expanding worldwide without much attention paid to its negative impacts. Gradually, growing consumer awareness and concern put pressure on retailers and other actors (Chandrasekhar, 2020). The Basel Criteria further gave rise to the Roundtable on Responsible Soy (RTRS) in 2006 (Chandrasekhar, 2020), a multi-stakeholder initiative also certifying soy according to its own scheme (Jia et al., 2020, p. 9).

Against this background, the SNS was initially created in 2010 as a loosely organized "community of interest".[1] In 2016, it was formally established as an association (Soja Netzwerk Schweiz, 2016).Today, nearly all Swiss soy importers belong to this network.

Indeed, as of 2021, 93% of soy imports to Switzerland were imported by a member of SNS. Of these, 99% were certified according to one of the six guiding certifications of the SNS (Grenz & Angnes, 2020, p. 13). These six certification schemes are (Birke, 2020):

- Bio Suisse Guidelines
- Pro Terra Standard
- RTRS Non-GM Standard
- Donau Soja
- Europa Soja Standard
- ISCC PLUS Non-GMO

The categories of soy feed on the global market relevant to this working paper are as follows: (1) GM soy feed; (2) non-GM soy feed; (3) certified GM soy feed; and (4) certified non-GM soy feed. Switzerland only imports the last category.

The relevant certifications include a number of social and environmental standards in most cases based on the Basel Criteria mentioned above. The requirements of the six certification schemes above also ensure that these products are non-GM.

Of the six non-GM certification schemes, the following are applied to soy feed produced in Brazil: ProTerra, RTRS, and ISCC PLUS Non-GM (Grenz & Angnes, 2020; ISCC, n.d.). Notably, while ProTerra only certifies non-GM soy, RTRS and ISCC also certify GM soy under different certification schemes. Again, Switzerland only imports soy certified under the non-GM certification schemes. BioSuisse does not list Brazil as a country of origin for its soy (BioSuisse, 2021), and Donau Soja and Europe Soja are by definition produced in Europe (Donau Soja, n.d.). According to Virah-Sawmy et al. (2019, p. 3,9), ProTerra and RTRS are the most influential certifications, though they still only cover 2% of global production and 9% of Brazilian production (Grenz and Angnes 2020, p. 59). According to a 2017 report, Brazil had the highest percentage of ProTerra- and RTRS-certified soy out of the top ten soy-exporting countries (de Koning & Wiegant, 2017, p. 27). Though the soy network publishes data outlining how much soy it imports from which countries – as well as how much it imports per certification (Kausch, 2022) – it was not possible to fully confirm under which certification(s) the Swiss soy imported from Brazil is certified. In the present study, we mainly focus on RTRS and ProTerra, as they are the most influential certifications.

RTRS and ProTerra stipulate various principles that must be observed. These principles include the following elements: legal compliance, good labour conditions and community relations, environmental responsibility (e.g. soil/water management and deforestation regulations) (ISCC System GmbH, 2021, 2022; Pro Terra, 2019; RTRS, 2021), and, finally, rules on the segregation of the commodity chain in order to ensure proper separation of non-GM and GM soy (see e.g. RTRS, 2018). Various sub-principles

[1] *Interessensgemeinschaft* in German

are defined by each certification for individual elements –describing them in detail would go beyond the scope and aim of the present working paper.

3 Swiss Soy Feed Imports from Brazil in a Broader Context

3.1 Swiss Soy Feed Imports from Brazil

According to the SNS, 17.9% of the soy feed imported by its members in 2021 came from Brazil (Kausch, 2022, p. 7). This likely only includes the soy feed imported directly to Switzerland [2] – not "indirectly" imported soy feed, for example, when Brazilian soy is purchased from other European countries, or via imports of meat and dairy produced with Brazilian soy (feed).

The SNS states that the amount of soy imported from Brazil has been declining continuously in recent years, whereas the amount of soy imported from Europe has been rising (Soja Netzwerk Schweiz, 2022a). According to the SNS, this is due, on the one hand, to Swiss efforts to import better soy feed in terms of sustainability. On the other hand, the availability of non-GM soy from Brazil has declined significantly because the premium paid for it has been too low, especially in 2020, disincentivizing production and proper division of non-GM from GM trade flows. Meanwhile, demand from China for conventional GM Brazilian soy has been rising, due to tensions between China and the US (Soja Netzwerk Schweiz, 2022b).

The following graphic by Orler et al. (2022, p. 8 [manuscript]) illustrates the corresponding dynamics.

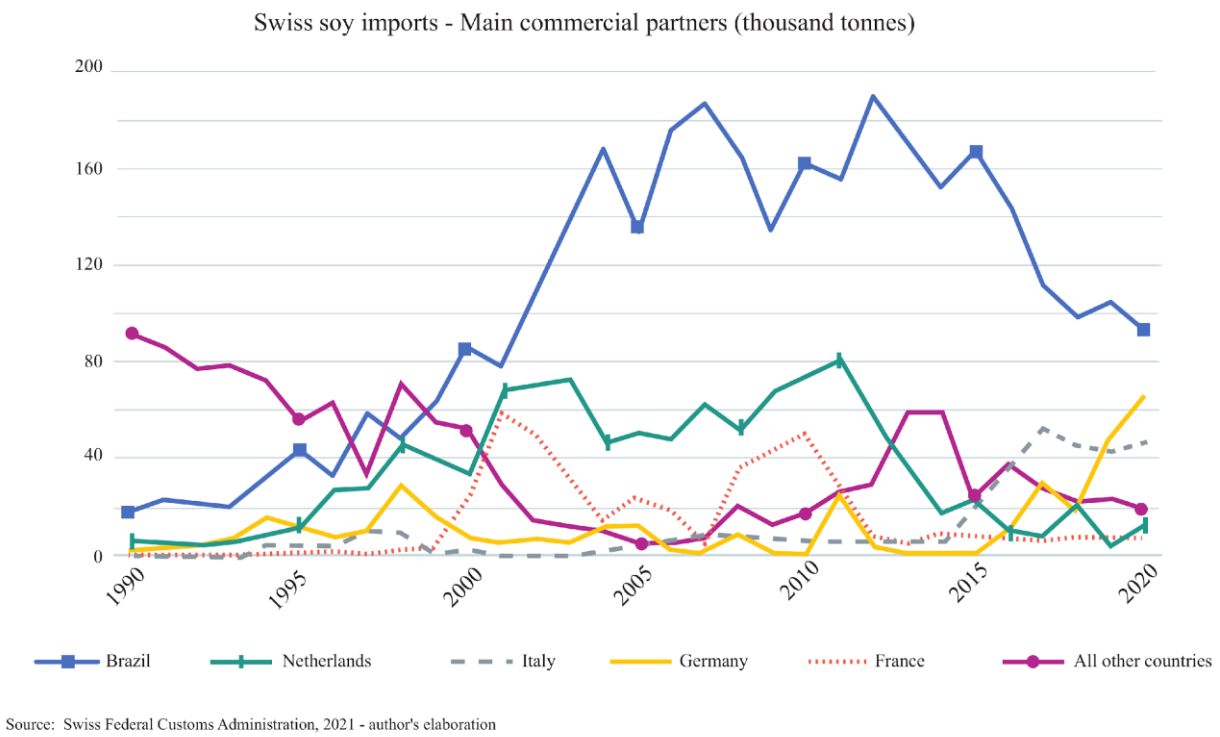

Figure 1 elaborated by Orler 2022, p.8 manuscript

[2] The source, a yearly report by the SNS, does not distinguish between soy directly or indirectly imported from Brazil. We deduct from comparison to similar sources that 17.9 % are likely to include only directly imported soy.

To understand the importance of Brazilian soy feed imports, it is crucial to look at indirect and direct imports. The most recent estimate found, explicitly including both, is based on data from 2018. According to this estimate (Grenz & Angnes, 2020, p. 13), about 35% of soy imports to Switzerland were directly imported from Brazil, and another 5% of Brazilian soy feed was bought from other countries, such that 40% of all Swiss imported soy feed came from Brazil that year. If we include indirectly imported soy feed (e.g. soy-fed meat, dairy) estimated for that year, this figure rises to 49% of the total soy feed import to Switzerland in 2018. In absolute terms, a total of about 169,000 tonnes (t) of Brazilian soy was imported to Switzerland that year (Grenz & Angnes, 2020, pp. 12–13).

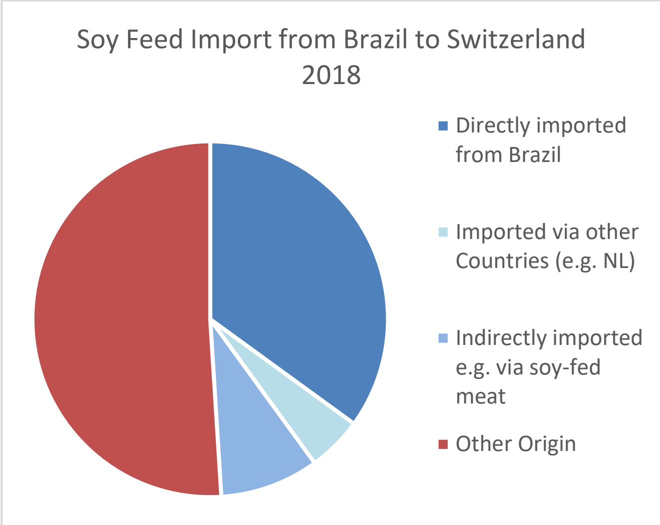

Figure 2: elaborated using data from Grenz and Agnes (2020)

On behalf of the Federal Office of Agriculture, Agroscope conducts tests to ensure that soy imported to Switzerland is non-GM (BLW, 2022). The Swiss Customs Administration collects samples of imported feed and Agroscope collects samples on the market. Out of 183 samples tested in 2021, only three were found to have inadmissible traces of GMOs (Hardegger, 2021).

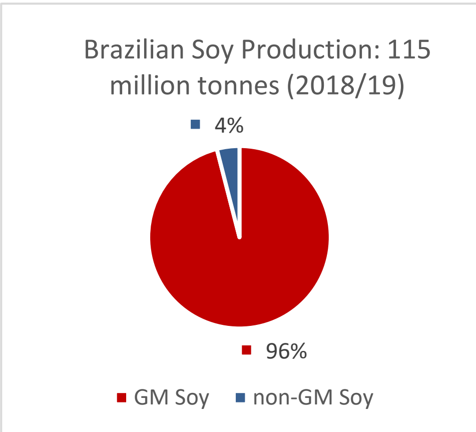

Figure 3, elaborated using data of the Soja Netzwerk Schweiz, n.d.

However, these figures should be considered in the larger context. For the 2018–2019 production cycle, total Brazilian soy output (GM and non-GM) was estimated at around 115 million tonnes (including soy produced for domestic consumption) (Grenz & Angnes, 2020, p. 15). Approximately 96% of the soy produced in Brazil is GM soy (Ana Mano, 2017; Soja Netzwerk Schweiz, n.d.) Thus, according to our estimates, Switzerland only imports about 0.15% of Brazil's total output. Clearly, this is an extremely small share. By contrast, according to Grenz and Angnes, a total of 68% of Brazil's soy exports went to China, and about 13% went to the EU (Grenz & Angnes, 2020, p. 15).

3.2 Swiss Imports in the Context of European Imports of Non-GM Soy and Certified Soy

In 2015, the Joint Research Centre of the European Commission analysed the European market for non-GM soy (Tillie & Rodríguez-Cerezo, 2015). They focused on the 14 most-important importing countries and based their report on data from 2012. The European countries they analysed imported about 2.7 million tonnes of non-GM soy (Tillie & Rodríguez-Cerezo, 2015, p. 25). The report does not distinguish certified non-GM soy from non-certified non-GM soy. Similar to Switzerland, Hungary and

Sweden (and, outside the EU, Norway) did not import GM soy (Kuepper & Riemersma, 2019, p. 66; Tillie & Rodríguez-Cerezo, 2015). In total, 10.2% of the soybean meal equivalent imported by the 14 most-important soybean importers in the EU was non-GM. Germany and the Netherlands made up about 57% of the total imports of non-GM soy in this group. Importantly, the analysists assume that a major portion of the imports into the Netherlands, in particular, are subsequently re-exported (Tillie & Rodríguez-Cerezo, 2015). So, while only a handful of European countries similarly to Switzerland limit their import to non-GM soy, other countries also import considerable shares of the total non-GM soy output.

If we compare the 2012 data of European imports with the 2012 data of soy imports to Switzerland, we get a more detailed impression of how small the share of imports to Switzerland are compared with the total non-GM imports to the EU. Specifically, the 2012 Swiss consumption of roughly 190,000 tonnes[3] of Brazilian soy (FOCBS, 2020) is equivalent to about 7% of the total non-GM imports of the 14 most-important European soy importers that same year.

In other words, the total Swiss imports are small in comparison to the collective imports of this European group. Indeed, Switzerland's small share of total non-GM soy imports does not enable any robust conclusions concerning its possible sustainability impacts based on this type of general data.

At present, the biggest market for *certified* soy is Europe (certified soy is *not necessarily non-GM* soy). In 2016, total output of certified soy was between 15 and 20 million tonnes, which is between 4% and 6% of total global production. The most important share of certified soy comes from Brazil. Taken together, in 2016, 7.4 million tonnes were Pro Terra- and RSRT-certified soy from Brazil (Grenz & Angnes, 2020, p. 24). According to Grenz and Angnes (2020, p. 59), 9% of the total production area in Brazil was either ProTerra- or RTRS-certified soy in 2017 (note, again, not all RTRS-certified soy is non-GM).

According to Garret et al, (2013, p. 6) Brazil was the world's most-important certified non-GM ProTerra and RTRS soy grower in 2012, producing about 4.3 million tons[4], of which approximately 79% was ProTerra certified.

To date, there is only one study (Grenz & Angnes, 2020) that partly links Swiss soy imports to the production side. Overall, it is virtually impossible to trace the impact of Swiss soy feed imports in Brazil with the available data and literature. There is also a near total lack of published studies on certified non-GM soy production and export. At the same time, while there are a few studies on certified soy feed production, they do not differentiate between non-GM and GM soy feed (see next section on data availability). In order to at least partly address our second research question – i.e. whether the Swiss decision to import only certified non-GM soy has an impact on Brazilian soy production in terms of sustainability – we can opt instead to ask the following broader question:

> *To what extent (if at all) has the certified-soy importation of specific European countries – including Switzerland, Sweden, and Hungary – and, more importantly, their use of the*

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[3] Data taken from SWISS IMPEX(FOCBS, 2020) under the following categories:2304 oilcake and other solid residues, whether or not ground or in the form of pellets, resulting from the extraction of soya-bean oil; 1201 Soya beans, whether or not broken; 1507 - Soya-bean oil and its fractions, whether or not refined (excl. chemically modified)

[4] This paper makes no clear distinction between the slightly different measures of tons and tonnes/ metric tons, we therefore use their spelling of tons here.

certification schemes ProTerra and RTRS, an impact on the production of soy in Brazil from a sustainability perspective?

Or, more concisely: To what extent does Brazil's ProTerra- and RTRS-certified soy production represent an improvement over non-certified production from a sustainability perspective?

3.3 Data availability

There are virtually no publicly available data directly linking Swiss soy feed imports to their production sides in Brazil. Publicly available databases like TRASE remain incomplete in tracing the commodity chain and corresponding actors between Brazil and Switzerland (Orler et al., 2022, pp. 2–3 [manuscript]). The areas of origin of non-GM soy can only be roughly approximated: According to a survey by the instituto soja livre, 53% of non-GM soy are from Mato Grosso, 18% are from Paraná, 10% are from Goia, and 7% are from Mato Grosso do Sul (Baur & Krayer, 2021, p. 44). However, not all non-GM soy is necessarily certified (Heron et al., 2018).

Orler et al.(2022) have taken a closer look at the soy supply chain. Available data sources on exports from Brazil to Switzerland differ widely – in particular, the Brazilian Comex Stat provides distinctly lower estimates of exports to Switzerland when compared with the numbers of the Swiss Customs administration. One difficulty is that the exports in question generally transit through the EU and, as a result, may be registered as exports to other European countries (Orler et al., 2022, pp. 8, 11). The TRASE platform mentioned above also builds on this data, which may partly explain its large gaps in terms of identifying the origin of Swiss imports (Orler et al., 2022, p. 11).

The most comprehensive study of Swiss soy imports that also looks at impacts is that of Grenz and Angnes (2020). However, it does not fully differentiate between non-GM and GM soy. Indeed, of the 35 producers researched, 23 cultivated non-GM soy (the ProTerra certified producers) while the remaining 12 solely cultivated GM varieties (Grenz & Angnes, 2020, pp. 40, 43). As a result, it is unlikely that all the identified farms produce soy that is exported to Switzerland.

Other than the Grenz and Angnes study, no impact studies could be found in our literature review that directly link Swiss soy imports to production in Brazil. Broadly speaking, impact assessments of certifications are rare (Grenz & Angnes, 2020, p. 8). Schilling-Vacaflor et al. note that the "effectiveness of private sustainability standards has been widely debated, but there remains a lack of data on how such standards function in specific contexts" (2021, p. 3).

Additionally, Schilling-Vacaflor et al.(2021) authored the only other study identified that collected data in specific regions and analysed the impacts of RTRS certification on the ground in Brazil. The authors mainly focus on land and water conflicts and how these are considered in the auditing process testing the implementation of RTRS. They also discuss the general sustainability of the RTRS model. The authors do not distinguish between non-GM soy and GM soy. Moreover, RTRS-certified goods only accounted for a small share of the total imports of soy feed to Switzerland in 2021.[5]

Nevertheless, RTRS is often cited as one of the most influential certifications, and the amounts of RTRS-certified goods imported to Switzerland may vary from year to year. While we cannot directly link the Swiss soy feed imports to the case described by Schilling-Vacaflor et al, their study nevertheless usefully indicates how RTRS is implemented and some of the sustainability challenges that can arise.

[5] In 2021 only 0.4 of total Swiss feed imports (from all regions) have been RTRS certified (Kausch, 2022)

Consequently, in the next section, we seek to summarize some of the relevant aspects of the Grenz and Agnes and the Schilling-Vacaflor studies.[6]

4 The Impact of Importing Certified Soy on Sustainability Aspects in Production

In general, the factors that make soy production in Brazil unsustainable are highly complex (Jia et al., 2020). Determining the impact of such a small consumer market as Switzerland is not possible with the available data. Nevertheless, as introduced above, there is relevant research on soy certified by the two schemes ProTerra and RTRS[7].

Some indications suggest that soy certified by the ProTerra and RTRS schemes represent improvements over conventional non-certified GM soy. However, this does not necessarily mean that they ensure "sustainable" soy. Indeed, some findings point in the other direction.

Grenz and Angnes (2020, pp. 46–47) found that 13 substances considered potentially highly toxic to the environment were used on the researched farms (among them, six pesticides produced by Syngenta). They also found that eight ProTerra-certified farms (of 23) used pesticides considered highly toxic to humans by the WHO Ib list. In fact, the latter finding violates the terms of the certification scheme.

While ProTerra bans such pesticides, RTRS does not. A benchmark study of certification schemes on behalf of the SNS recommended that RTRS ban use of highly hazardous pesticides according to the WHO Ib list (Birke, 2020, p. 7). The researched RTRS-certified farms were found to use higher amounts of pesticides than the researched ProTerra- or the non-certified farms. Grenz and Angnes (2020, p. 47) conclude that at least some farms could reduce the amount of pesticides they use. They also found that the soils suffered similar pesticide pollution to soils in other agricultural regions around the world (Grenz & Angnes, 2020, p. 57).

Grenz and Angnes (2020, p. 48) further point out that the researched soy monocultures lack structures supporting landscape connectivity on behalf of biodiversity. In addition, few areas exist serving as links between habitats, despite the fact that a law regulating landscape connectivity is in place.

Grenz and Angnes (2020, p. 57) conclude that soy exported from the farms they studied represents an improvement over conventionally exported soy. For example, they found that while conversion of Cerrado to cultivated land/pasture remains ongoing, virtually none of the producers they studied were contributing to deforestation (with one possible exception).

Continuing on, the impact study of Schilling-Vacaflor et al. (2021) mainly focuses on the rights of local communities in Bahía to access water and land resources. A particular emphasis is given to assessing

[6] Some studies are available only focusing on the design of the lables ProTerra and RTRS (and in a few cases ISCC PLUS) (de Koning & Wiegant, 2017; Englund & Berndes, 2015; Garrett et al., 2013; van der Ven et al., 2018) without looking at implementation or collecting field data. While the design is an important element, the implementation of these certification schemes has the actual potential of changing production, we have therefore focused on impact studies including data from the field.

[7] Almost no information was found for the ISCC Plus standard.

the auditing processes of RTRS as an important element of implementation. Soy-producing countries are encouraged to develop national interpretations of RTRS. The Brazilian interpretation includes guidelines for auditors that specify, for example, who must be taken into account as local stakeholders, at minimum, as well as appropriate communication channels, etc. (RTRS, 2016). Auditing is seen as the central tool for verifying whether certification standards are actually upheld in the field.

In addition, Schilling-Vacaflor et al. challenge the RTRS certification model's general claim of producing "sustainable" or "responsible" soy. Within their focus on the auditing process of RTRS they point out a number of inadequacies. RTRS requires under its Principle 3.1. *community relations* that stakeholders are involved in the process of auditing, that communication occurs between producers and communities, and that there are opportunities to raise grievances that have to be addressed. The study criticizes the limited number of stakeholders that are actually asked to participate in the auditing process but also points out that many stakeholders are also hesitant to participate because they see it as legitimizing an "agricultural model they deeply reject"(Schilling-Vacaflor et al., 2021, p. 9).

Further, Schilling-Vacaflor et al. criticize that the auditors generally merely check whether the contact details for grievances and other communications and feedback channels are made available. They find that the grievance mechanisms are rarely used in practice and identify several reasons for this: people do not know about the mechanisms nor the certification of farms, communication channels are minimal, and in areas where physical threats and harm to farmers are prevalent, speaking up can be dangerous (Schilling-Vacaflor et al., 2021, p. 9).

Moreover, the authors find that the auditing firms in question tend to rely on documentation from individual farms and recorded property titles to assess whether land conflicts exist. However, land conflicts often exist between large(r) farms and more traditional users or *geraizeiros,* comprising family farmers, peasants, indigenous communities, etc. These latter conflicts cannot be identified by relying solely on formalized property titles, for example, as the affected "traditional" communities do not necessarily have titles to the land they are using for their activities. However, "Brazilian law recognizes their right to occupy and utilize the lands" (Schilling-Vacaflor et al., 2021, p. 5).

Further, in the researched area in Bahia, the Brazilian forest code stipulates that 20% of each landowner's property must remain forested and set aside for protection, as so-called *reserva legal*. Meanwhile, landowners tend to use all the land suitable for cultivation for their production. In order to comply with the 20% *reserva legal* requirement, they then buy additional land that is not suitable for cultivation. Unfortunately, this land frequently overlaps with the sometimes informal land use of the *geraizeiros*, which then results in land conflicts (Schilling-Vacaflor et al., 2021, p. 5). Yet the audits which were studied did not visit the areas of *reserva legal* – only the sites of agricultural production. In order to identify land conflicts, however, it is crucial to visit the areas where the land conflicts are most likely to manifest. While no conclusion is possible concerning land conflicts under the RTRS scheme in this region, the mechanisms to identify them through the auditing processes appear insufficient (Schilling-Vacaflor et al., 2021, pp. 7–8).

More broadly, several authors emphasize that successful production of certified and/or non-GM soy depends on the price premium offered to farmers for cultivation of RTRS-, ProTerra-, and non-GM soy. These premiums also depend on demand-and-supply dynamics and suffer from high volatility (Garrett et al., 2013; ProTerra Foundation, 2021; van der Ven et al., 2018). In the area researched by Schilling-Vacaflor et al. (2021, p. 7), no smallholder farms had RTRS certification. One reason for this is that the certification process is relatively expensive, while the premium received for certified soy is small. For smallholders, the cost of certification is too much relative to the premium received for certified soy.

Finally, Schilling-Vacaflor et al. (2021, p. 6) argue that the present soy–livestock model is unsustainable, and the present certification schemes are embedded within this:

> The RTRS standard is concerned with 'good conduct', but it remains fully compatible with the expansionist and monocultural logic underlying the global soy commodity chain and the dominance of large corporate actors therein. The standard does not aim for systemic change of the way soy is produced, for instance by establishing stringent rules on biodiversity, or by fostering organic or smallholder production. RTRS permits the use of pesticides that are prohibited in the importing countries, the use of genetically modified seeds, and the practice of aerial spraying.

Overall, the studies summarized above show that – even under the certification schemes – various environmental and social harms of soy production remain, and wider, more systemic challenges are not addressed.

5 Conclusion

In conclusion, more data are urgently needed in order to answer our research questions satisfactorily. Most studies focus on the design of the certification schemes – very few studies focus on the actual impact. However, such impact studies of certified non-GM soy are crucial to understanding the effects on the ground from a sustainability perspective. While traceability theoretically exists based on the certification schemes, the corresponding data are not publicly available. This makes it especially difficult to understand where the soy comes from, precisely, and what its location-specific actual impacts may be – as impacts can vary according to origin on the subnational level as well. In this way, disclosure obligations would be invaluable to trace and evaluate the impact of the Swiss soy sector agreement comprehensively.

Nevertheless, the existing evidence suggests that Switzerland's soy feed importers improve soy production with their sector agreement to only import certified non-GM soy from Brazil. Compared to many other countries, Switzerland's approach is exemplary. It is better than importing non-certified-GM soy feed. Still, on the basis of the limited existing data, we must also conclude that many environmental and social difficulties persist in Brazil. In particular, existing studies recommend restricting pesticide use, improving landscape connectivity for biodiversity, improving auditing practices, and better accounting for existing land conflicts. They also stress the difficulty for small-scale farmers of obtaining RTRS certification. In general, several authors emphasize the inadequacy of the premiums paid to farmers for certified soy and for non-GM soy. One key study concluded that the certification schemes in question cannot spur the necessary systemic change to build a sustainable model. The schemes merely enable incremental improvements within an overall context of unsustainable business-as-usual large-scale agriculture.

Thus, from a sustainability perspective, we must conclude that these certification schemes are insufficient. For Switzerland's feed to be truly sustainable, its production must respect planetary boundaries and be socially just. The current Swiss model, though ahead of other countries, still appears far from this urgent goal.

Based on the reflections in this working paper, we recommend two pathways for future research to explore on behalf of a more sustainable soy production model. On the one hand, we recommend research focused on the design of a truly sustainable Swiss livestock–feed nexus, and, on the other, research focused on government schemes with an impact beyond Switzerland's comparatively small consumer market.

In this way, the first pathway could include research on strategies to decrease the amount of soy feed needed for livestock on behalf of meat and milk production. We do not see the solution as that of shifting soy production from Brazil to European countries, as this would still entail large-scale, intensive monocultural production – just in a different location. Instead, a steady decrease of soy feed purchases should go hand in hand with a decline in meat and milk consumption more broadly, eventually settling at a level that is compatible with livestock fed on grass and local Swiss feed production. Switzerland could be more of a pioneer and experiment with different forms of governing processes towards more sustainable livestock production[8], including differentiation in trade[9].

The second pathway to explore could be that of Switzerland's role as a trading hub. Most of the few key companies in this highly concentrated market have an important branch in Switzerland. In future research, a greater emphasis should be placed on investigating the potential for regulations to improve the sustainability impacts of trade.

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[8] See the following working paper, written for the same research project, the NRP 73 Project on 'Sustainable Trade Relations for Diversified Food Systems':

Scharrer B. (2022). *Fördert die Schweizer Agrarpolitik die Entwicklung einer nachhaltigen und standortgerechten Landwirtschaft ausreichend? Eine Analyse der aktuellen Instrumente, Zielkonflikte und des Handlungsbedarfs* (Working Paper No. 04; NRP 73 Project 'Sustainable Trade Relations for Diversified Food Systems). CDE, University of Bern. https://boris.unibe.ch/172674/

[9] See also the following publications written for the same research project, the NRP 73 Project on 'Sustainable Trade Relations for Diversified Food Systems':

This working paper:
Musselli, I., Solar, J., Tribaldos, T., & Bonanomi, E. B. (Forthcoming November 2022) *Livestock Farming Act & WTO Compliance. Preferential tariff treatment based on PPMs. A case study* (Working Paper; NRP 73 Project 'Sustainable Trade Relations for Diversified Food Systems'., p. 48). CDE, University of Bern.

And the following book chapter:
Bonanomi, E. B., & Tribaldos, T. (2020). PPM-Based Trade Measures to Promote Sustainable Farming Systems? What the EU/EFTA-Mercosur Agreements Can Learn from the EFTA-Indonesian Agreement. In M. Bungenberg, M. Krajewski, C. J. Tams, J. P. Terhechte, & A. R. Ziegler (Eds.), European Yearbook of International Economic Law 2020 (Vol. 11, pp. 359–385). Springer International Publishing. https://doi.org/10.1007/8165_2020_64

6 Bibliography

Ana Mano. (2017, May 11). Brazil's Mato Grosso leads push for GM-free soy. *Reuters*. https://www.reuters.com/article/brazil-grains-gmo-idUSL1N1IA0KW

Baletti, B. (2014). Saving the Amazon? Sustainable Soy and the New Extractivism. *Environment and Planning A: Economy and Space*, *46*(1), 5–25. https://doi.org/10.1068/a45241

Baur, P., & Krayer, P. (2021). *Schweizer Futtermittelimporte: Entwicklung, Hintergründe, Folgen* [102,application/pdf]. Zürcher Hochschule für Angewandte Wissenschaften ZHAW. https://digitalcollection.zhaw.ch/handle/11475/21943

BioSuisse. (2021, November). *Herkunft importierter Knospe-Rohstoffe—International*. BioSuisse. https://international.bio-suisse.ch/de/herkunftsliste.html?search=Brasilien

Birke, M. (2020). *Benchmarking study on sustainability standards in the soy market*. soy network switzerland and SECO. https://www.sojanetzwerk.ch/fileadmin/user_upload/Benchmark_Soja_Standards_2020_summary.pdf

BLW. (2022, January 10). *GVO-Kontrollen*. Bundesamt für Landwirtschaft. https://www.blw.admin.ch/blw/de/home/nachhaltige-produktion/gentechnologie/gvo-bei-futtermittel.html

Bonanomi, E. B., & Tribaldos, T. (2020). PPM-Based Trade Measures to Promote Sustainable Farming Systems? What the EU/EFTA-Mercosur Agreements Can Learn from the EFTA-Indonesian Agreement. In M. Bungenberg, M. Krajewski, C. J. Tams, J. P. Terhechte, & A. R. Ziegler (Eds.), *European Yearbook of International Economic Law 2020* (Vol. 11, pp. 359–385). Springer International Publishing. https://doi.org/10.1007/8165_2020_64

Chandrasekhar, A. (2020, July 17). Switzerland is a sustainable soy pioneer, but not yet a game changer. *SWI Swissinfo.Ch*. https://www.swissinfo.ch/eng/business/switzerland-is-a-sustainable-soy-pioneer--but-not-yet-a-game-changer/45907688 de Koning, P. C., & Wiegant, D. A. (2017). *Certification Standards and Deforestation*. Mekon Ecology. https://mekonecology.net/wp-content/uploads/2018/12/MEKON-ECOLOGY-2017-Certification-standards-Deforestation.pdf

Donau Soja. (n.d.). *Unsere Logos und Produkte*. Donau Soja Europa Soja. Retrieved June 17, 2022, from https://www.donausoja.org/de/organisation/unsere-logos-und-produkte/

Englund, O., & Berndes, G. (2015). How do sustainability standards consider biodiversity? *WIREs Energy and Environment*, *4*(1), 26–50. https://doi.org/10.1002/wene.118

FAO. (2022, February 17). *Crops and livestock products*. FAOSTAT. https://www.fao.org/faostat/en/#data/QCL

Federal Act of 21 March 2003 on Non-Human Gene Technology (Gene Technology Act, GTA), 814.91 (2003). https://www.fedlex.admin.ch/eli/cc/2003/705/en

FOCBS. (2020, December 15). *Swiss-Impex—Commodities domain*. FOCBS Federal Office for Customs and Border Security. https://www.gate.ezv.admin.ch/swissimpex/public/bereiche/waren/query.xhtml

FSVO. (2022, January 17). *Authorisation of genetically modified organisms (GMOs)*. Federal Food Safety and Veterinary Office. https://www.blv.admin.ch/blv/en/home/lebensmittel-und-ernaehrung/rechts-und-vollzugsgrundlagen/bewilligung-und-meldung/gentechnisch-veraenderte-organismen-gvo.html

Garrett, R. D., Rueda, X., & Lambin, E. F. (2013). Globalization's unexpected impact on soybean production in South America: Linkages between preferences for non-genetically modified crops, eco-certifications, and land use. *Environmental Research Letters*, *8*(4), 044055. https://doi.org/10.1088/1748-9326/8/4/044055

Gibbs, H. K., Rausch, L., Munger, J., Schelly, I., Morton, D. C., Noojipady, P., Soares-Filho, B., Barreto, P., Micol, L., & Walker, N. F. (2015). Brazil's Soy Moratorium. *Science*, *347*(6220), 377–378. https://doi.org/10.1126/science.aaa0181

Grenz, J., & Angnes, G. (2020). *Wirkungsanalyse: Nachhaltigkeit der Schweizer Soja-Importe* (p. 77). Berner Fachhochschule. https://www.bafu.admin.ch/dam/bafu/de/dokumente/wirtschaft-konsum/externe-studien-berichte/wirkungsanalyse-nachhaltigkeit-der-schweizer-soja-importe.pdf.download.pdf/Sojabericht_BAFU_FINAL.pdf

Hardegger, M. (2021). *Agrarbericht 2020—GVO in importierten Futtermitteln*. https://www.agrarbericht.ch/de/produktion/produktionsmittel/gvo-in-importierten-futtermitteln

Heron, T., Prado, P., & West, C. (2018). Global Value Chains and the Governance of 'Embedded' Food Commodities: The Case of Soy. *Global Policy*, *9*(S2), 29–37. https://doi.org/10.1111/1758-5899.12611

ISCC. (n.d.). *ISCC Certification Examples*. Process - ISCC for Food and Feed. Retrieved June 17, 2022, from https://www.iscc-system.org/process/market-applications/certification-examples/

ISCC System GmbH. (2021). *ISCC EU 202-1 Agricultural Biomass: ISCC Principle 1*.

ISCC System GmbH. (2022). *ISCC EU 202-2 Agricultural Biomass: ISCC Principles 2-6*.

Jia, F., Peng, S., Green, J., Koh, L., & Chen, X. (2020). Soybean supply chain management and sustainability: A systematic literature review. *Journal of Cleaner Production*, *255*, 120254. https://doi.org/10.1016/j.jclepro.2020.120254

Kausch, S. (2022). *Jahresbericht 2021* [Jahresbericht]. Soja Netzwerk Schweiz.

Kuepper, B., & Riemersma, M. (2019). *European Soy Monitor Insights on the European supply chain and the use of responsible and deforestation-free soy in 2017*. IDH, The Sustainable Trade Initiativel, IUCN NL,. https://www.iucn.nl/app/uploads/2021/03/european_soy_monitor.pdf

Musselli, I., Solar, J., Tribaldos, T., & Bonanomi, E. B. (2022). *Livestock Farming Act & WTO Compliance. Preferential tariff treatment based on PPMs. A case study* (NRP 73 Project 'Sustainable Trade Relations for Diversified Food Systems'., p. 48) [Working Paper]. CDE, University of Bern.

Oliveira, G. de L. T. (2016). The geopolitics of Brazilian soybeans. *The Journal of Peasant Studies*, *43*(2), 348–372. https://doi.org/10.1080/03066150.2014.992337

Oliveira, G., & Hecht, S. (2016). Sacred groves, sacrifice zones and soy production: Globalization, intensification and neo-nature in South America. *The Journal of Peasant Studies*, *43*(2), 251–285. https://doi.org/10.1080/03066150.2016.1146705

Orler, F., Pezza Cintrâo, R., Caravalho, T., & Tribaldos, T. (2022). *From Brazil to Switzerland: How soy for feed travels along it supply chain* [Manuscript in Preparation].

Pro Terra. (2019). *ProTerra Standard Social Responsibility and Environmental Sustainability Version 4.1*. https://www.proterrafoundation.org/wp-content/uploads/2020/10/ProTerra-Standard-V4.1_EN.pdf

ProForest, & WWF. (2004). *The Basel Criteria for Responsible Soy Production*. https://wwfint.awsassets.panda.org/downloads/05_02_16_basel_criteria_engl.pdf

ProTerra Foundation. (2021, February 16). The non-GM production: How volatility is killing the supply chain in Brazil. *ProTerra Foundation*. https://www.proterrafoundation.org/news/the-non-gm-production-how-volatility-is-killing-the-supply-chain-in-brazil/

Ritchie, H., & Roser, M. (2021, February 9). *Soy*. Our World in Data. https://ourworldindata.org/soy

RTRS. (2016). *Brazilian National Interpretation of RTRS Standard for Responsible Soy Production Version 3.1*. https://responsiblesoy.org/wp-content/uploads/2020/01/Brazilian-National-Interpretation-of-RTRS-Standard-for-Responsible-Soy-Production-V3-1-ENG.pdf

RTRS. (2018). *RTRS Non-GMO Standard for Producers Version 1.0*. https://responsiblesoy.org/wp-content/uploads/2020/01/RTRS-Non-GMO-Standard-for-Producers-V1.0-ENG-1.pdf

RTRS. (2021). *RTRS Standard for Responsible Soy Production Version 4.0*. https://responsiblesoy.org/wp-content/uploads/2021/12/RTRS-Standard-for-Responsible-Soy-Production-V4.0.pdf

Scharrer, B. (2022). *Fördert die Schweizer Agrarpolitik die Entwicklung einer nachhaltigen und standortgerechten Landwirtschaft ausreichend? Eine Analyse der aktuellen Instrumente,* *Zielkonflikte und des Handlungsbedarfs* (Working Paper No. 04; NRP 73 Project 'Sustainable Trade Relations for Diversified Food Systems). CDE, University of Bern. https://boris.unibe.ch/172674/

Schilling-Vacaflor, A. (2021). Integrating human rights and the environment in supply chain regulations. *Sustainability (Switzerland)*, *13*(17). Scopus. https://doi.org/10.3390/su13179666

Schilling-Vacaflor, A., Lenschow, A., Challies, E., Cotta, B., & Newig, J. (2021). Contextualizing certification and auditing: Soy certification and access of local communities to land and water in Brazil. *World Development*, *140*, 105281. https://doi.org/10.1016/j.worlddev.2020.105281

Soja Netzwerk Schweiz. (n.d.). *Gentechfreie Soja für die Schweiz vermehrt aus Europa*. Soja Netzwerk Schweiz. Retrieved March 29, 2022, from https://www.sojanetzwerk.ch/de/soja/#p-gentechnik

Soja Netzwerk Schweiz. (2016). *Soja Netzwerk gründet Verein—Eine Branche übernimmt Verantwortung. Medienmitteilung vom 10. Mai 2016*. Soja Netzwerk Schweiz. https://www.sojanetzwerk.ch/fileadmin/user_upload/Downloads/160510_MM_Soja_Netzwerk_D.pdf

Soja Netzwerk Schweiz. (2022a). *Faktenblätter*. https://www.sojanetzwerk.ch/fileadmin/user_upload/soja-factsheet-de_220221.pdf

Soja Netzwerk Schweiz. (2022b). *80 Prozent der Futter-Soja stammt aus Europa. Medienmitteilung vom 24. Februar 2022*. https://www.sojanetzwerk.ch/fileadmin/user_upload/220224_MM_Soja_Netzwerk.pdf

Song, X.-P., Hansen, M. C., Potapov, P., Adusei, B., Pickering, J., Adami, M., Lima, A., Zalles, V., Stehman, S. V., Di Bella, C. M., Conde, M. C., Copati, E. J., Fernandes, L. B., Hernandez-Serna, A., Jantz, S. M., Pickens, A. H., Turubanova, S., & Tyukavina, A. (2021). Massive soybean expansion in South America since 2000 and implications for conservation. *Nature Sustainability*, *4*(9), 784–792. https://doi.org/10.1038/s41893-021-00729-z

Tillie, P., & Rodríguez-Cerezo, E. (2015). *Markets for non-genetically modified, identity-preserved soybean in the EU.* European Commission. Joint Research Centre. Institute for Prospective Technological Studies. https://data.europa.eu/doi/10.2791/949110

van der Ven, H., Rothacker, C., & Cashore, B. (2018). Do eco-labels prevent deforestation? Lessons from non-state market driven governance in the soy, palm oil, and cocoa sectors. *Global Environmental Change*, *52*, 141–151. https://doi.org/10.1016/j.gloenvcha.2018.07.002

Virah-Sawmy, M., Durán, A. P., Green, J. M. H., Guerrero, A. M., Biggs, D., & West, C. D. (2019). Sustainability gridlock in a global agricultural commodity chain: Reframing the soy–meat food system. *Sustainable Production and Consumption*, *18*, 210–223. https://doi.org/10.1016/j.spc.2019.01.003

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