Estimating the embedded soy footprint of animal-based products

GOOD GROWTH PARTNERSHIP

WWF

proforest

gef

5-element approach

Monitor, verify and report

Understand supply chain risks

Assess and plan implementation

Establish a purchase control system
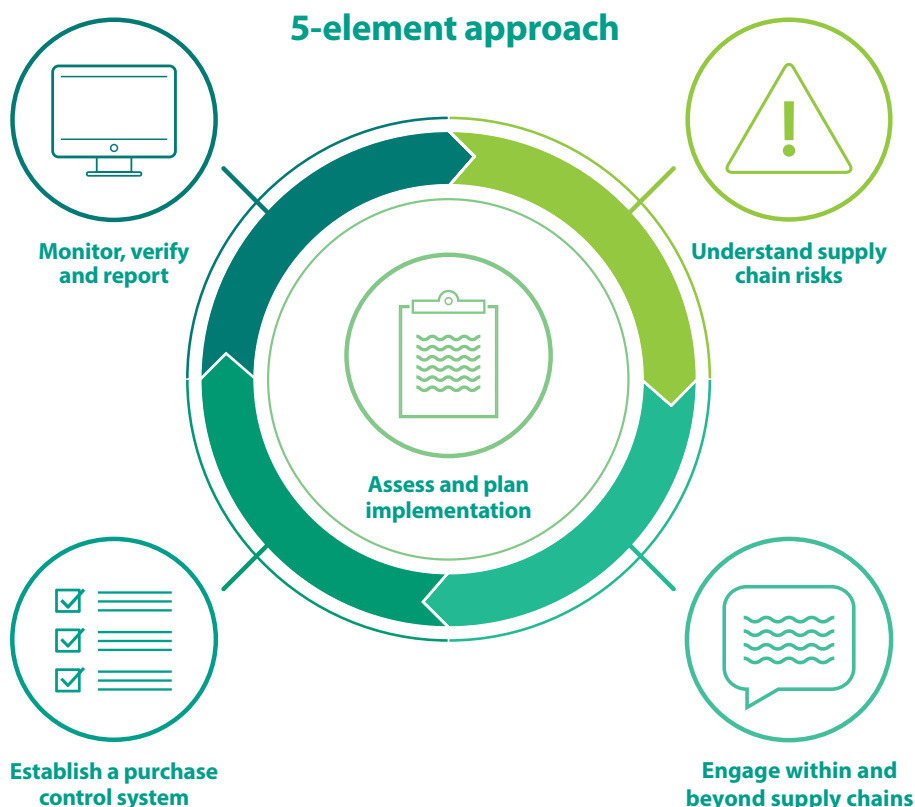
Engage within and beyond supply chains

Figure 1: The 5-element approach for sourcing soy responsibly

Key Points

- Soybean meal is an ingredient widely used as protein in animal feed diets. It is therefore embedded in animal proteins such as meats and farmed seafood, as well as animal products, such as dairy and eggs.

- Downstream companies sourcing animal products can assess their exposure to soy by calculating the soy footprint of these products, along with the footprint from other soy-derived food products including cooking oil, baked goods, confectionery, salad dressings, etc.

- The calculation can be done using conversion factors from the literature, that gives an approximate amount of soy consumed from feed by each animal per kg of animal product, e.g., meat, egg or milk etc, or by taking a more comprehensive approach that accounts for the differences in supply chain structure and production systems.

- The soy footprint results can be used by downstream companies to prioritise products, suppliers and actions where the footprint from high deforestation risk origins is greater. It allows for more effective strategies to ensure responsible soy sourcing commitments are met.

Purpose of this Discussion Paper

This Discussion Paper is part of the series/publication Responsible Sourcing: A Soy Toolkit[1]. It relates to Element 2 (Understand Supply Chain Risks) of the 5-element approach for sourcing environmentally and socially sustainable soy (Figure 1). It provides an overview of how companies sourcing animal proteins and products can estimate the volume of soybeans used as animal feed, meaning the *soy footprint* of these purchases.

This is relevant for downstream companies since it allows them to understand their exposure to soy and to prioritise products and suppliers for further engagement to ensure soy sourcing commitments are met and responsible soy policies are being followed. There are different approaches to estimating the soy footprint, ranging from simple to sophisticated models. This discussion paper presents the general steps and resources available, as well as practical examples of how downstream companies can estimate their soy footprint and how to use the results of this analysis for positive actions.

Why estimating the soy footprint matters

Soy as it gets transformed into soymeal is mainly used in animal feed and, therefore, is found embedded in animal products such as meat, dairy and eggs. In fact, animal feed is the most common use of soy, as 75% of the soy produced in the world is used in it[2]. Figure 2 shows an estimate of the soy embedded in different products in the United Kingdom (UK) according to a study by WWF. Soy has innumerous uses from food to personal care products, to biofuels and wax candles[3]. It is the main ingredient of food products such as soy milk, soy sauce and tofu, but it can be used in smaller quantities in forms such as lecithin, a soy derivative, which is used in chocolate.
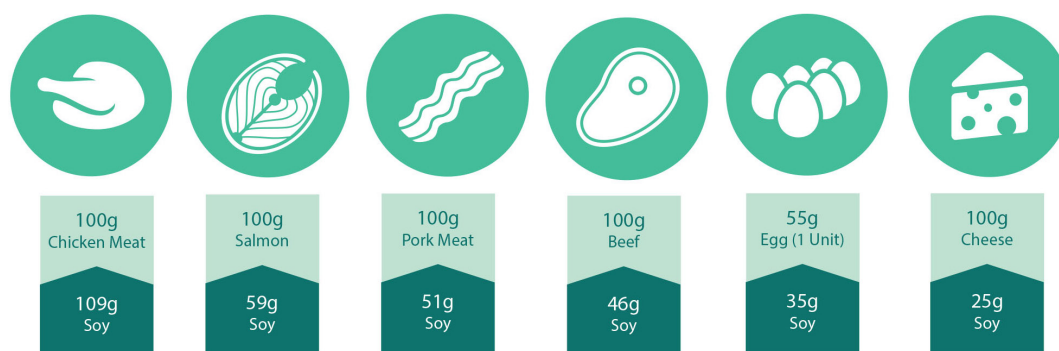
100g Chicken Meat	100g Salmon	100g Pork Meat	100g Beef	55g Egg (1 Unit)	100g Cheese
109g Soy	59g Soy	51g Soy	46g Soy	35g Soy	25g Soy

Figure 2: Hidden soy in human diets: an estimate of the amount of soy used to produce each product, i.e., the soy footprint of each product (*Derived from WWF 2019[4]*)

Downstream companies committed to sourcing soy responsibly need to identify the soy embedded in the products they buy. Estimation of soy volumes sourced directly is straightforward, but determining the soy embedded as animal feed in animal products or in finished products that have animal product ingredients will require the calculation of the soy footprint. To begin the process of identifying which products a company is sourcing that might contain embedded soy, the Consumer Goods Forum (CGF) provides a framework, called the Soy Ladder, that groups products into 5 Tiers. The Tiers are groupings *of similar products where soy usage appears at the same point in the supply chain* (Figure 3).

Tier 5 | Soy by-products
Soy used to produce soy derivatives used as an ingredient such as lecithin, methyl soyate etc.

Tier 3 | Eggs and dairy
Soy used in feeds for dairy and egg animals. Includes milk, yoghurt etc.

Tier 4b | Dairy/egg ingredients
Soy used in feeds for animals where the milk or eggs are used as an ingredient in a sold product.

Tier 2 | Meats
Soy used in feeds for meats such as beef, pork, chicken, duck, fish etc.

Tier 4a | Meat as ingredient
Soy used in feeds for animals where the meat is an ingredient in a sold product.

Tier 1 | Direct soy
Directly purchased and controlled soy including edamame beans and soy milk.
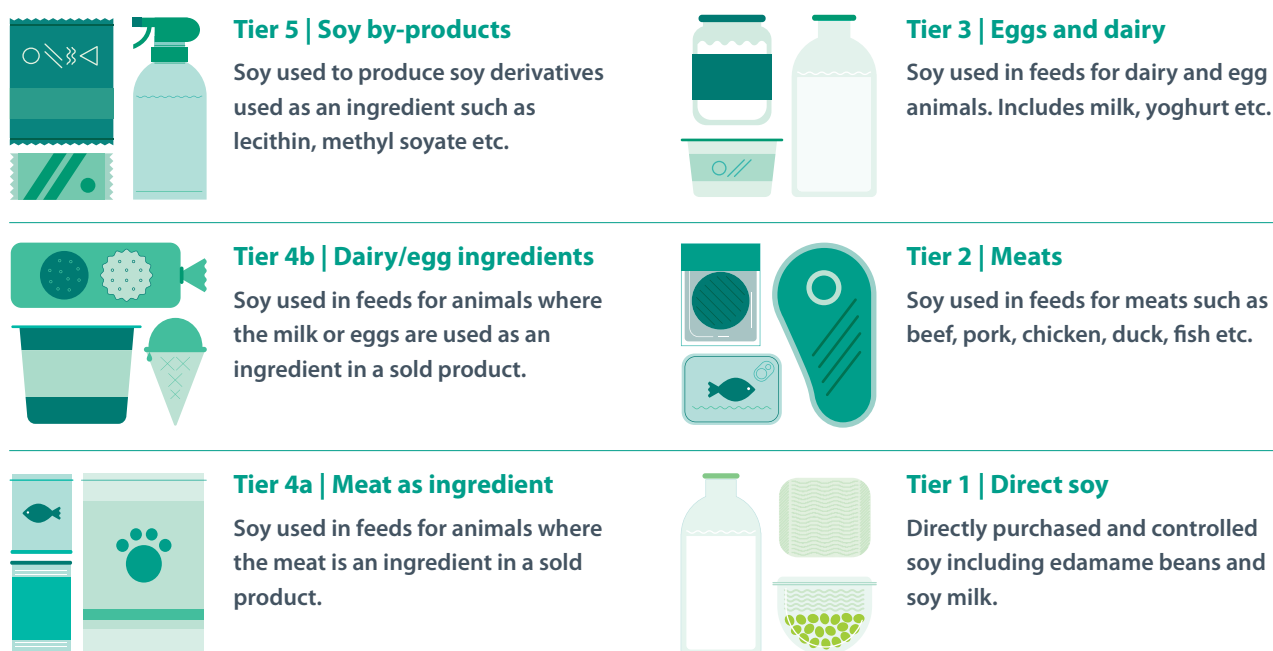
Figure 3. Soy Ladder. Based on the diagram from the *KPMG and IDH Sustainable Trade Initiative: Soy Reporting Initiative: Final public report (March 2017)*

Once downstream companies identify which products are the most material and present a higher risk of non-compliance with their soy policy, the result can be used to inform:

- The purchase of certification credits in high risk regions to offset the footprint as a first step in implementing a policy by demonstrating a clear action to support sustainable soy production in priority origins;

- Further work on **traceability to country and subnational jurisdiction where possible**, to understand the soybean origin;

- **Risk analysis**, which allows the company to understand where there is likelihood of the policy being breached and potentially where being met, and;

- **Supplier engagement**, which allows buyers to liaise with suppliers to agree on actions to ensure the soy policy will be met whenever there is not enough evidence of that already.

For a short-term strategy, credits can be a first step in addressing soy sourced from high deforestation/conversion risk origins. Companies should, however, devise a time-bound plan to move to certified physical volumes or volumes that come from demonstrated or verified deforestation/conversion-free landscapes to eliminate deforestation and conversion from their soy supply chains for the long run.

How companies can calculate their soy footprint

In 2016 the CGF launched the *Calculation guidelines for the measurement of embedded soy usage in consumer goods businesses*[5], a guide with a stepwise approach to estimate a company's soy footprint. The steps below build on the CGF guidelines in combination with other relevant references.

Figure 4 presents a diagram that summarises the steps for calculating a soy footprint which are detailed in the next sections. Once downstream companies have determined the scope of the calculation and collected the data, they can proceed with the calculation of their footprint using soy conversion factors (default conversion factors based on global data), or using actual data from suppliers or sector/geography-specific data. Then, companies can use these results to make decisions and take action, including working with suppliers and disclosing and monitoring their soy footprint.

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
Determine the scope of the soy measurement	Collect and prepare the volumes' data	Calculate the footprint	Use the soy footprint to make decisions	Disclose and monitor the soy footprint

Figure 4: Steps to calculate a company's soy footprint

Step 1. Determine the scope of soy footprint calculation

To determine the scope of the analysis, downstream companies can select where to focus, considering:

- Business units or markets where exposure to soy harvested in high risk origins is higher, as determined through risk analysis methods described in **Briefing Note 2.B**.

- Supply chains, over which the company has more control. For example, retailers can focus on their own brand products first.

- Products that are likely to contain the highest volumes of soy or products that are more material to the company's revenue. For example, a KPMG study with UK retailers found that their soy footprint was concentrated in tiers 2 (meat) and 4a (meat as ingredient) of the Soy Ladder (Figure 5).

KPMG soy mapping results for four UK retail supply chains 2017

SOY TONNAGE ('000s)

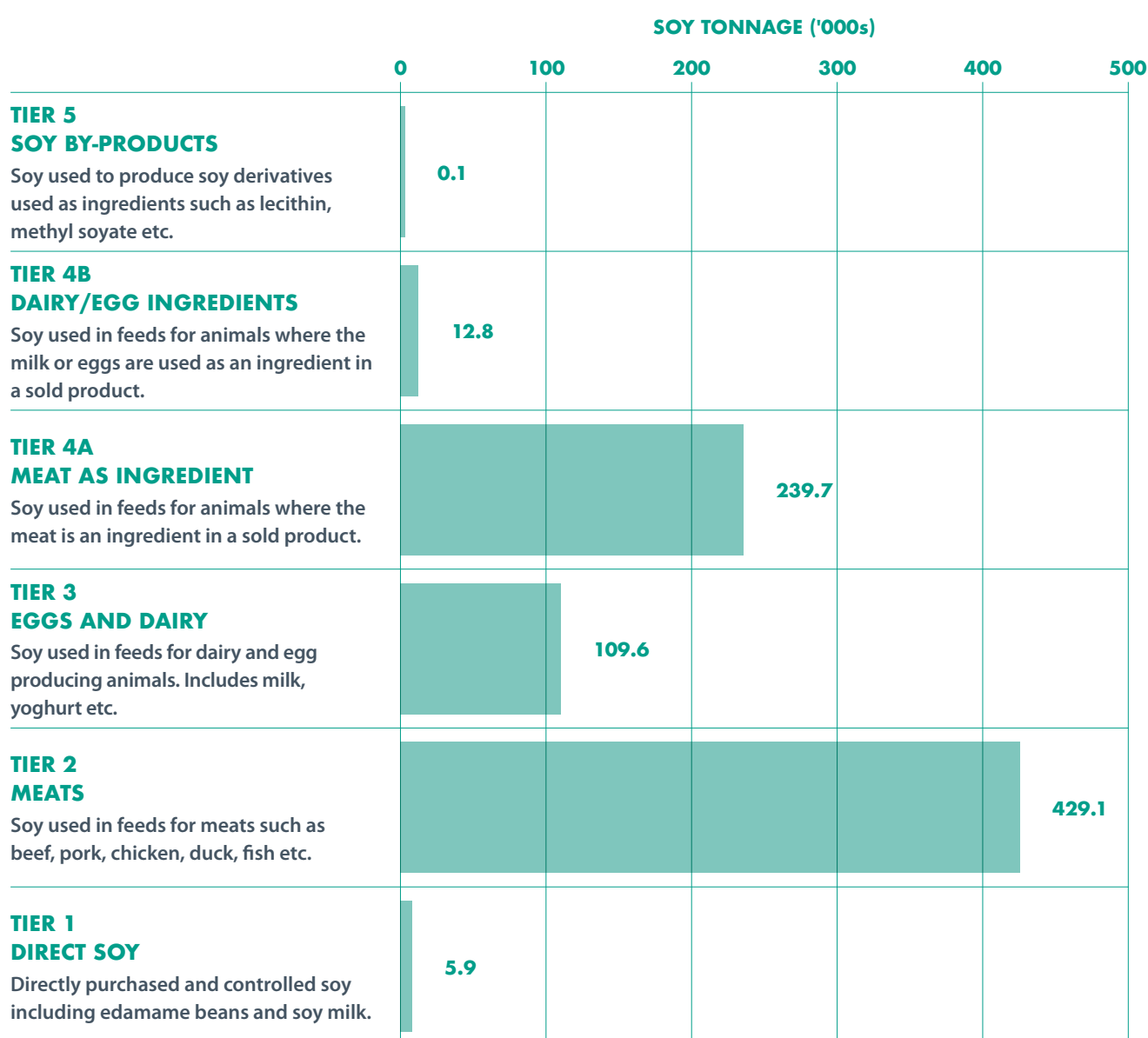|		
TIER 5 **SOY BY-PRODUCTS** Soy used to produce soy derivatives used as ingredients such as lecithin, methyl soyate etc.	0.1	
TIER 4B **DAIRY/EGG INGREDIENTS** Soy used in feeds for animals where the milk or eggs are used as an ingredient in a sold product.	12.8	
TIER 4A **MEAT AS INGREDIENT** Soy used in feeds for animals where the meat is an ingredient in a sold product.	239.7	
TIER 3 **EGGS AND DAIRY** Soy used in feeds for dairy and egg producing animals. Includes milk, yoghurt etc.	109.6	
TIER 2 **MEATS** Soy used in feeds for meats such as beef, pork, chicken, duck, fish etc.	429.1	
TIER 1 **DIRECT SOY** Directly purchased and controlled soy including edamame beans and soy milk.	5.9	

Figure 5: Soy footprint breakdown by Tiers. Source: *3Keel: Moving to deforestation free animal feed: 2018 Retail Soy Initiative (October 2019) (original data from KPMG and IDH Sustainable Trade Initiative: Soy Reporting Initiative: Final public report (March 2017).*

Although the calculation prioritises business units and markets with a greater exposure to high-risk soy origins, low-risk origins should not be overlooked. The same goes for the products chosen for the analysis: to be truly impactful, companies should expand their focus to all the products they purchase from other brands and manufacturers in addition to their own brand products. These scope choices should be clearly communicated when the results of the soy footprint calculation are presented in sustainability reports or policies.

Step 2. Collect and prepare the volumes' data

Once the scope of soy footprint calculation is defined, downstream companies need to list all products that will be the focus of the soy footprint calculation and compile data on the volumes of each product sourced in the focal time period, for example, the last calendar year or fiscal year. The level of detail will depend on how simple or comprehensive the calculation will be. At a minimum, it should include the volumes of meat, dairy and eggs sourced, including the proportion of those products in Tier 4a and 4b products. For example, when sourcing ice cream, companies need to input the total volume of milk used to produce the sourced volume of ice cream (Table 1). Companies can also compile the volumes per supplier to inform the supplier engagement process (Table 2).

Table 1. Example of database by product sourced

Product sourced	Total volume sourced in 2019 (in tonnes)	Tier classification (according to CGF Soy Ladder)	Total volume of meat, dairy or egg in the products sourced (in tonnes)
Chicken breast	500,000	Tier 2	500,000
Milk	850,000	Tier 3	850,000
Sausage	90,000	Tier 4a	80,000 (pork)
Ice cream	300,000	Tier 4b	90,000 (milk)
Ice cream	300,000	Tier 5	50 (soy lecithin)

Table 2. Example of database per supplier

Supplier	Product type	Total volume sourced in 2019 (in tonnes)	Tier	Total volume of meat, dairy or egg in the product sourced (in tonnes)
Supplier A	Chicken breast	500,000	Tier 2	500,000
Supplier C	Chicken wings	100,000	Tier 2	100,000
Supplier B	Milk	850,000	Tier 3	850,000
Supplier C	Sausage	90,000	Tier 4a	80,000 (pork)

Step 3. Calculate the footprint

The goal of calculating a soy footprint is to get a final amount of soybeans. To get these numbers, downstream companies can either use conversion factors or use supplier information. Both ways are presented in the following sections. Companies calculating their soy footprint for the first time and whose supply chain is known to be highly complex can use conversion factors for the calculation. However, to get to a more precise estimate and to use the footprinting exercise as an engagement tool with their suppliers, companies should proceed with the calculation using supplier data.

Using soy conversion factors

A conversion factor gives the approximate amount of soy consumed from feed by each animal per kg of animal protein or product, i.e., these factors convert quantities of these products *into the indirect- or embedded- levels of soy used in the production of these products and can be tailored to each country or region*[6]. Table 3 presents conversion factors found in soy footprint reports for countries or companies for chicken, pork, beef, milk, and egg. Conversion factors can vary significantly as they use different assumptions[7] in the calculations based on parameters of production systems in specific countries or regions (see box 1). Therefore, they may either under or overestimate the embedded soy, but are good proxies for soy usage.

Table 3: Examples for conversion factors.

Name of Reference	Year	Conversion Factor (kg of soy/ kg of product)				
		Chicken	Pork	Beef	Milk	Egg
RTRS[8]	-	0.88	0.35	0.29	0.017* (in litres)	0.030** (units)
Soy supply chains in Europe[9]	2013	0.95	0.34	0.29	0.033	0.035
Dutch Soy Barometer[10]	2014	0.60	0.33	0.40	0.034	0.036
Soy use in Belgium[11]	2016	0.40	0.36	0.21	0.019	0.023
WWF Risky Business[12]	2017	0.58	0.26	0.17	0.017	NA
Soy Reporting Initiative[13]	2017	0.82 (approx.)	0.50 (approx.)	0.24 (approx.)	0.010 (approx.)	0.048 (approx.)

1

Conversion factor is also a common term in Life Cycle Assessment[14] (LCA), which has a broader scope of analysing environmental and social impact by combining information on resources and energy used and produced by products and processes. This information, the datasets, are available in several different databases[15], that can be accessed freely in some cases, or through membership in related initiatives, such as the Life Cycle Initiative[16]. Many companies perform LCA for their products as part of their sustainability strategies and report on results per environmental aspect, like carbon or water footprint. Companies working on LCA for animal products can use conversion factors in their reference database to estimate the volume of embedded soy.

Estimating the embedded soy footprint of animal-based products

Figure 6 presents the results of a calculation of the total soy embedded in the products sourced by a downstream company using the RTRS calculator[8] online. The calculator also provides the soy footprint in hectares, i.e., the amount of land that was needed to plant the soy embedded in the products.
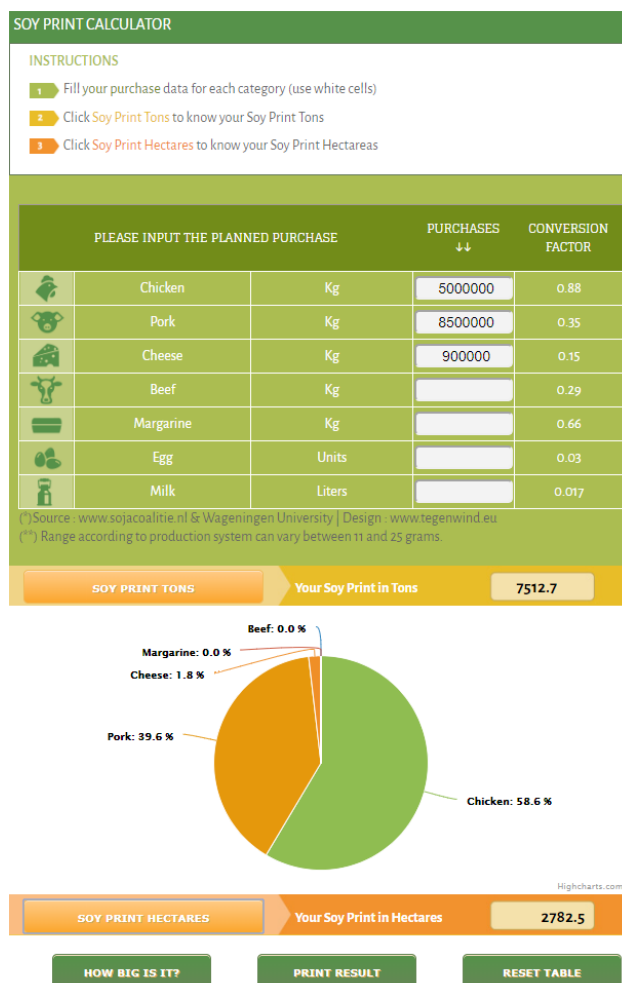

Figure 6: Soy footprint results in tons of soy and hectares using the **RTRS calculator** available online.

The selection of the appropriate conversion factor will influence the results, so the recommendation is that downstream companies choose factors that provide the best approximation for their footprint calculation either looking for factors developed for their countries or the countries where the products are from.

Using suppliers and sector information

The use of conversion factors can lack precision due to diet changes by species and location, so using parameters pertaining to production systems and types of product can provide a more realistic footprint and knowledge of the suppliers companies engage through the process.

The data collected will usually refer to the feed composition, meaning the amount of soy meal and soy oil in feed, and the production system, including the amount of feed that the animal eats in its lifespan and the meat or product yield (amount of eggs or milk) from the animal. For beef, for instance, the amount of embedded soy in cattle meat coming from Brazil or Australia will vary since a lower proportion of cattle is terminated in feedlots in Brazil[17] and these animals stay less time in feedlots and eat feed that has slightly less soybean meal compared to animals in Australia[18].

8

For suppliers with a more vertically integrated structure, in which the same company operates in different links of the supply chain and provides inputs, including feed, to their chicken suppliers[19], companies can collect data specific to the supply chain. On the other hand, collecting such information might be a challenge for companies far removed from production with suppliers that have little visibility to their suppliers' suppliers, several links down the supply chain as seen in Figure 7.

SHORT AND INTEGRATED SUPPLY CHAIN

SOY SUPPLY CHAIN MODELS
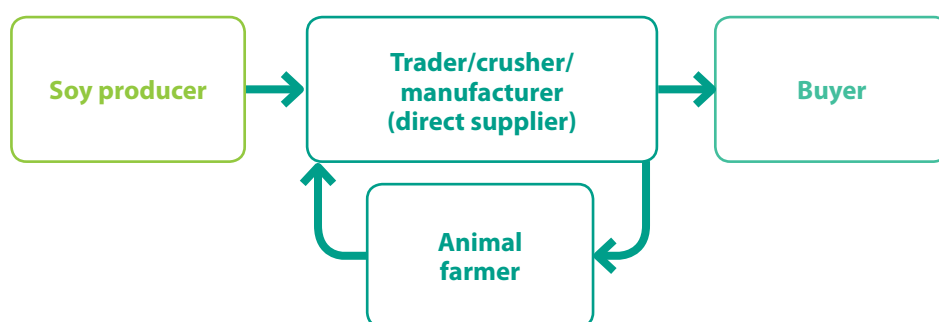
LONG SUPPLY CHAIN
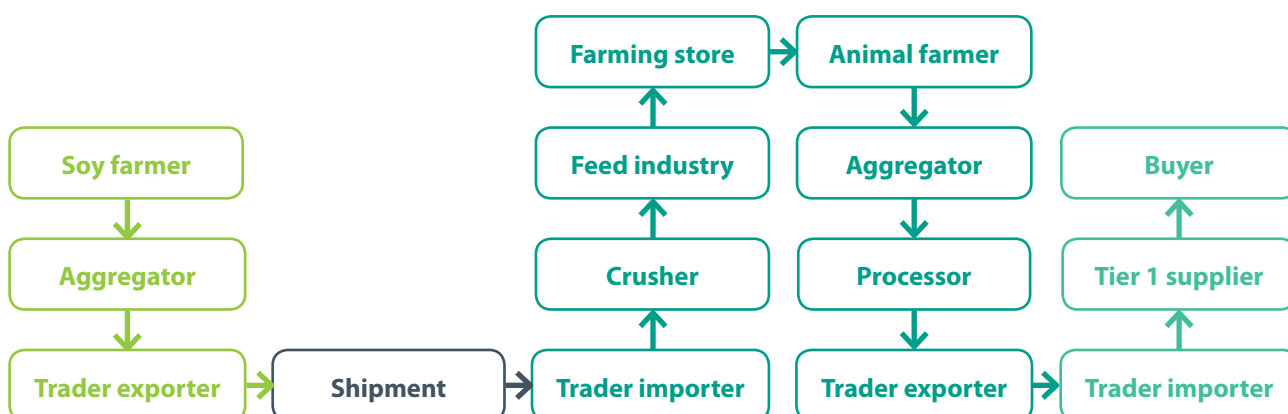
Figure 7: Examples of a short and long animal protein supply chain with embedded soy

There are other combinations of supply chain structures between the lesser and the most integrated examples, and the recommendation is that downstream companies separate their suppliers into these different categories. The aim is to initially engage suppliers closer to production, with the goal of collecting data on the feed composition and production system. One example of supplier classification is presented in 3Keel's 2018 Retail Soy Initiative report[20] where retailers' suppliers were classified in three different categories: producer, packer and manufacturer. The conclusion of this report was that the bulk of their members' soy footprint was from suppliers that were either producers, who have control over the feed, or packers that had direct contact with producers, therefore, closer to the feed procurement process[20].

Box 2 presents a case study on how McDonald's is calculating their soy footprint. This case study was prepared by McDonald's, Agrotools and Proforest, building on their joint work to develop the Soy calculator.

## Case study: McDonald's work to estimate the Soy Footprint of chicken in their products

2

Authors:

What is the Soy Calculator?

McDonald's and franchisees operate restaurants in more than 100 countries around the world. They work closely with supplier partners who produce and supply chicken for menus across the globe. To meet McDonald's Commitment on Forests, McDonald's needed to understand their complex global supply chain and ensure that the soy footprint calculation reflects the reality of the production of chicken around the world in McDonald's supply chain. To create such a tool, McDonald's engaged in a multi-year strategy with supplier partners including Tyson Foods and Cargill, franchisees and external partners to develop a soy calculator. The detailed methodology of the soy calculator is available on a technical note[21].

The calculator provides an estimate of McDonald's soy footprint (in hectares and volume of soy) in priority countries Brazil, Argentina and Paraguay[22] by combining different parameters related to the animal production systems in those countries. The chicken raw material volumes are gathered and analysed in relation to the type and cut of meat, feed conversion rates etc. from suppliers' production systems.

The summarised soy footprint is used to estimate the area (in hectares) for the soy production in high risk origins (Brazil, Argentina and Paraguay), and the RTRS equivalent premium (US$) that is to be purchased by McDonald's chicken suppliers to initially compensate for it. In the long run, McDonald's plan is to engage all suppliers and eradicate conversion of native vegetation from all their supply chains.
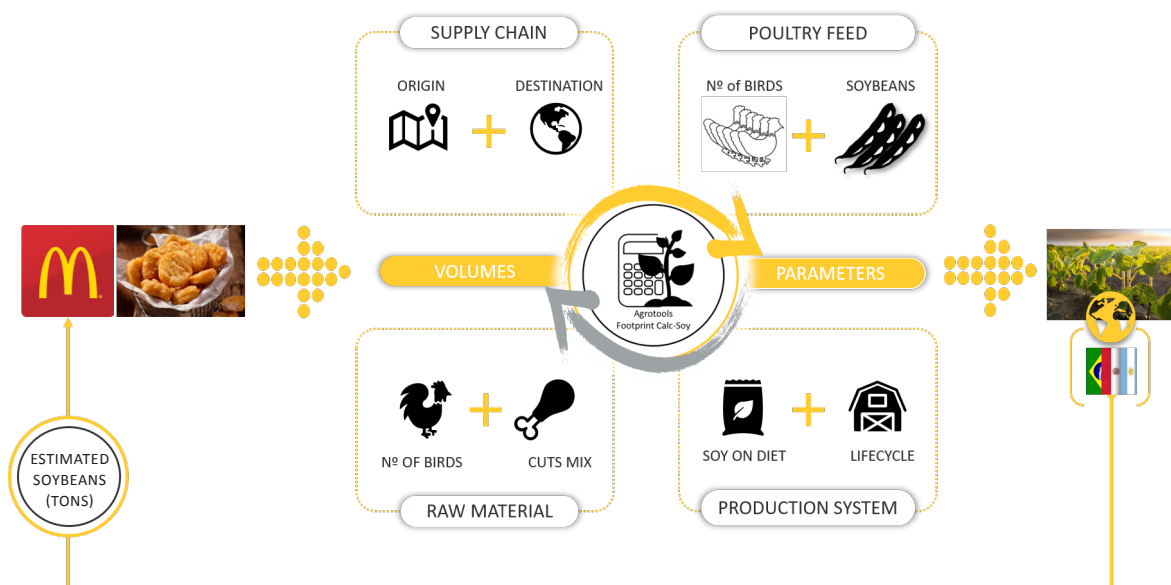
Soybean origin and destination markets

McDonald's Commitment on Forests considers different targets for different markets; therefore, the destination markets is important information in the Soy Calculator. Information on the country of soy origin is also gathered, when available, as the policy is focused on high deforestation risk origins. When reporting the total volume of chicken raw material supplied to McDonald's, each supplier indicates the respective percentages of soy produced in Brazil, Argentina or Paraguay (considered to be 'high risk'), embedded in the feed consumed by the animals, or from other origins considered 'low risk'. When soy origin is unknown, a conservative approach is taken, and origin is considered as of 'high risk' until data is available to demonstrate otherwise.

What information goes in the Soy Calculator?

McDonald's sources chicken raw material from suppliers in the form of different types of meat cuts, which are classified in two categories:

I. **White meat:** includes breast skinless & boneless; breast fillets; breast tenders.

II. **Dark meat:** includes wing joints; wing drumettes (stick); wing flat middle; leg meat skinless & boneless; thigh yield skinless & boneless and thighs.

All suppliers report their volumes under these two categories and need to input information related to their operations of chicken production. In case the supplier does not have infomation on chicken production then there are a set of default parameters in the calculator that can be used and are based in information of the prevalent productive systems in different regions. The main steps of the calculator are presented below.

Calculation steps of the Agrotools McD Soy Calc

Calculator steps	Details
Production System	To reach a certain slaughter weight, the animal goes through different development stages, which require daily consumption of feed (in grams) with varying nutritional composition. The following parameters are considered: life cycle (days), feed conversion rate[23] and carcass yield.
Production System	The main soy ingredients in poultry feed are soybean meal and soy oil and their amounts vary according to the producer and their production system. Based on the percentage of these ingredients in the animal feed and the amount consumed during the lifespan until slaughter, the amount of soybeans in grains (in kilograms) necessary to produce a single chicken is estimated. It is also possible to estimate the approximate area (in hectares) necessary to produce soybeans that feed a single chicken.
Raw Material	The proportion and weight of the different types of chicken cuts are used in the calculation of the carcass yield based on the live weight of the slaughtered animal.
	In this stage, the information on the different meat cuts directly influences the calculation of the total chicken produced and total soybeans used in the feed.
Poultry Feed	The volume of chicken supplied (in tonnes) is divided into different types of cuts each representing a different percentage (%) of the total chicken's weight.
	The calculator will initially estimate separately how many animals are needed to produce the amount of white and dark meat supplied. A single animal produces both white and dark meat and the calculator will choose the largest number (i.e., the most conservative) of birds needed to define the volume of chicken produced.
	This number feeds into the calculations to estimate the volume of soy consumed by these birds.

Soy Calculator Report

The report, generated after running the calculator, provides the estimated volume of soy required to produce the chicken raw material purchased by McDonald's chicken suppliers. The estimate soy volume that originated from high risk origins will be covered with approved soy certification schemes or compensated via RTRS regional credits by McDonald's chicken suppliers.

This analysis provides improved visibility of the McDonald's global soy footprint embedded in poultry feed. The tool's output is not based on estimates or academic reports – but instead on real supply chain data gathered across McDonald's global business. The Soy Calculator is a practical and valuable tool that helps McDonald's to implement its Commitment on Forests.

"Cargill's support of McDonald's on the development of the poultry soy calculator exemplifies how partnering across the supply chain leads to the advancement of shared sustainability goals," said Hugo Jansen, Sustainability Director, Cargill. *"We are committed to helping our customers with responsible innovative solutions, like this one, that are aligned to our sustainable soy action plan."*

Step 4. Using the soy footprint to make decisions

The soy footprint estimation can be used by downstream companies to inform their next steps, regardless of whether the simple or the comprehensive calculations were undertaken. Some examples on how to connect the results from the soy footprint exercise to next steps, with references to Soy Toolkit documents for more details are presented next.

Type of action: Assess and Plan the implementation

The results of the soy footprint calculation indicate the main products and origins a company will need to prioritize to reduce their exposure to deforestation risk and other environmental and social risks and have a greater impact. The soy footprint results can inform the definition of implementation strategies and the development of an implementation plan. For more information on how to plan the implementation, please check **Soy Toolkit Briefing Note 1**.

Type of action: Soy Traceability

With the amount of soybeans calculated and an overall idea of the origin, for instance Brazil and Argentina, a company can prioritise their traceability efforts, e.g., focusing on tracing the soy back to the state or municipality in these high risk origins to have a better understanding on the risks associated with that volume of soy. For more information on how to conduct a soy traceability exercise please check **Soy Toolkit Briefing Note 2.A**.

Type of action: Risk Analysis

To calculate their soy footprint, the company will likely conduct a 'light touch' risk analysis based on the information available. It is important to highlight that when choosing to focus on products that are made with soy from Brazil, for instance, the company zoomed in on a high risk origin. The purpose of a deeper risk analysis is to understand the risk of deforestation/conversion of the city/province within Brazil where soy that goes into their products is grown. For more information on how this risk analysis is conducted and what other information is needed to conduct one, please check **Soy Toolkit Briefing Note 2.B**.

Type of action: Supplier Engagement

The result of the soy footprint calculation, along with other criteria, can be used to prioritise engagement with suppliers—e.g. focus can be on suppliers of products with the greatest soy footprint or on suppliers that are more vertically integrated, addressing both risk and leverage. For more information on the different avenues to engage suppliers, please check **Soy Toolkit Briefing Note 03.A**.

Type of action: Supporting at-scale Initiatives

The soy footprint can inform financial contribution to landscape initiatives working to address the main sustainability challenges in soy production. To select an initiative to support, companies with higher visibility of soy origins in their supply chain can focus on their high risk origins and companies with low visibility can support initiatives focused on high risk areas even if it is not clear whether these areas are in their supply chain. Once identified, companies can use the footprint to calculate their financial contribution, see BOX 3. For more information on how to engage at-scale initiatives, please check **Soy Toolkit Discussion Paper 03.B**.

3

Grieg Seafood has committed to contribute approximately 2 US dollars per tonne of Brazilian soy that goes into their fish feed to the Cerrado conservation fund, contributing proportionally to their footprint[24,25].

Step 5. Disclosing and monitoring the soy footprint

When implementing soy sourcing policies, it is important to disclose information on the progress of actions to achieve the commitments made so there is public accountability and transparency in the sector is increased as to what actions are being taken. As companies begin to take action to address deforestation and conversion in their supply chains and understand which products they source that can contribute to deforestation or conversion, soy footprint calculation is gaining traction as a tool that can help with this process. Some companies offer information on their soy footprint in their RTRS member's report, others mention it on their websites, sometimes shedding light on the calculation method used: either using conversion factors, with the support of an independent organisation, or through engaging suppliers (BOX 4).

4

Tesco Tesco discloses its soy footprint on **its website**. It is estimated that its soymeal footprint in 2018 was over 500 thousand tonnes coming mainly (90%) from Brazil, Argentina and Paraguay.

Nando's Nando's **RTRS member report** sheds light on the company's soy footprint: they engage with direct suppliers and were able to calculate their footprint with the information provided. On their website they share that they are buying RTRS credits to compensate for the soy found in chicken feed.

Discussions on Monitoring and reporting are still underway and no definitive solution has been determined. To understand what are some of the discussions taking place in the soy sector about Monitoring, check **Element 5 of the Soy Toolkit**.

Key challenges and potential solutions

Once the soy footprint calculation has become mainstream, the next challenge is to define how the soy footprint (the total volume of soybean needed to feed the animals during their lifetime) should be allocated along the supply chain, both horizontally between companies sourcing different cuts of the same animal and vertically between companies processing and packaging the same products. But calculating their share or portion attributable to their product is a challenge. There are two main approaches companies are exploring in order to calculate attribution and encourage shared responsibility: by revenue and by volume.

Revenue can be used as a proxy for calculating share vertically and horizontally. One example is to differentiate between A-quality (breast, drumstick, thigh and wing) and B-quality (skin and other by-products) meat cuts. If A-quality chicken cuts bring in e.g. 90% of the total revenue, 90% of the embedded soy might be allocated to companies buying those cuts, while only 10% of the embedded soy might be allocated to the companies buying the B-quality cuts. The same approach can be used considering the share of final product price throughout the supply chain. However, it seems sensible not to overcomplicate the approach, as for each of the allocation parameters agreement needs to be sought across the industry.

Volume is a good proxy to calculate footprint share horizontally. The total footprint can be calculated per supplier considering the volume of meat cuts sourced that represent the largest number of animals. The share attributable to the company can consider a proportion of the total soy volume used that is equivalent to the proportion of chicken weight sourced by the company, and this may or may not consider the volume of by-products. For example, if a company sources two types of meat cut that, together, represent 50% of animal live weight. If the volume of one meat cut is equivalent to 1,000 animals and the volume of the other is equivalent to 3,500 animals, the company can assume that the same animal provided for both meat cuts sourced and the company can estimate their footprint as 50% of soybean volume needed to feed 3,500 animals. This assumes that the different meat cuts came from same animal, which may not always be the case. Therefore, it is recommended that once traceability to animal farm progresses, the approach is further developed.

Learn more and help us improve

More information is provided in the references below and at **www.soytoolkit.net**

Please also share with us information that will improve this Discussion Paper (via **soytoolkit@proforest.net**).

Acknowledgments

References

1 Soy Toolkit available at: **www.soytoolkit.net**

2 Soybeans available at **https://www.ucsusa.org/resources/soybeans**

3 Soy: food, feed, and land use change available at https://www.foodsource.org.uk/building-blocks/soy-food-feed-and-land-use-change

4 The UK Soy Story: How retailers' commitments to tackling soy-driven deforestation compare available at **https://www.wwf.org.uk/sites/default/files/2019-10/WWF-UK_Retailers_Soy_Policies_October2019.pdf**

5 Calculation guidelines for the measurement of embedded soy usage in consumer goods businesses from KPMG and CGF, 2016 available at: **https://www.theconsumergoodsforum.com/wp-content/uploads/2017/10/201605-CGF-and-KPMG-Soy-Measurement-Guidance-Final-1.pdf**

6 A framework for the measurement of soy usage in consumer goods businesses by KPMG and CGF, 2015 available at: **https://assets.kpmg/content/dam/kpmg/pdf/2015/10/framework-for-the-measurement-of-soy-usage.pdf**

7 UK Roundtable on Sustainable Soya: Annual progress report, 2019 **https://www.efeca.com/wp-content/uploads/2019/12/UK-RT-on-Sustainable-Soya-APR-2019-final.pdf#page=9&zoom=100,92,97**

8 Soy Calculator from RTRS available at: **http://www.responsiblesoy.org/soy-calculator/?lang=pt**

9 Mapping the soy supply chain in Europe: report prepared by Profundo for WWF on the soy embedded in Europe (EU-28) available at: **https://wwf.panda.org/?247030/Mapping-the-soy-supply-chain-in-Europe**

10 Dutch soy barometer 2014: report prepared by Profundo for the Dutch Soy Coalition which brings, among other things, the soy footprint for the Netherlands, available at: **https://www.bothends.org/uploaded_files/document/Soy_Barometer2014_ENG.pdf**

11 Soy use in Belgium: report prepared by Profundo for WWF Belgium on Belgium soy footprint and consumption available at: **http://www.csa-be.org/IMG/pdf/soy_use_in_belgium_wwf.pdf**

12 Risky Business: WWF study on the impact of UK sourcing of seven commodities including soy available at **https://www.wwf.org.uk/sites/default/files/2017-10/Risky%20Business%20-%20October%202017.pdf**

13 Soy reporting initiative: IDH Sustainable Trade Initiative and KPMG to identify the Soy in Asda, M&S, Sainsbury's and Tesco own-brand supply chains available at **https://www.idhsustainabletrade.com/uploaded/2017/06/Soy-reporting-initiative-Final-IDH-Report-May-2017.pdf**

14 Life Cycle Assessment is a cradle-to-grave or cradle-to-cradle analysis technique to assess environmental impacts associated with all the stages of a product's life, which is from raw material extraction through materials processing, manufacture, distribution, and use. Muralikrishna, I. V.; Manickam, V. Environmental Management: Science and Engineering for Industry, 2017. Available at: **https://www.sciencedirect.com/science/article/pii/B9780128119891000051**

15 For a list of Life Cycle Assessment Databases: **https://nexus.openlca.org/**

16 The Life Cycle Initiative, hosted by UN Environment, is a multistakeholder partnership to enable the global use of credible life cycle knowledge by private and public decision makers. **https://www.lifecycleinitiative.org/**

17 ABIEC http://abiec.com.br/publicacoes/beef-report-2019/

18 https://www.mla.com.au/prices-markets/market-news/cattle-on-feed-numbers-push-new-boundaries/

19 Feed and Livestock in Brazil, China, EU Consume Most Cerrado Soy **https://chainreactionresearch.com/report/feed-and-livestock-in-brazil-china-eu-consume-most-cerrado-soy/**

20 Moving to deforestation free animal feed: 2018 RETAIL SOY INITIATIVE available at **https://www.3keel.com/wp-content/uploads/2019/10/3keel_soy_report_2019.pdf**

21 The technical note on the Soy Calculator methodology will soon be available at: **https://agrotools.com.br/**

22 WWF's Living Forest report classified Brazil, Argentina and Paraguay as priority countries for soy due to the higher risk of deforestation and conversion of native vegetation driven by soy expansion: **https://corporate.mcdonalds.com/corpmcd/scale-for-good/our-planet/conserving-forests.html**

23 Feed conversion rate is the measurement of animal productivity, calculated by dividing the total feed intake by the animal's average weight.

24 Grieg seafood commits funding to new business initiative aiming to halt deforestation in the Cerrado available at: **https://www.griegseafood.no/grieg-seafood-commits-funding-to-new-business-initiative-aiming-to-halt-deforestation-in-the-cerrado/**

25 Cerrado Funding Coalition, available at: **https://www.cerradofundingcoalition.com/**

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