Our approach to deforestation and conversion risks for embedded soy

Methodology for estimating soy footprint and assessing deforestation and conversion risk

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1. Introduction

Nestlé sources soy from suppliers in different countries in two main forms:

- Direct soy (soybean oil, soybean meal and their derivatives)
- Embedded soy (as part of animal protein ingredients like meat, dairy, and eggs)

To advance on the Consumer Goods Forum's (CGF) Forest Positive soy roadmap in a complex supply chain like embedded soy, we developed a methodology to estimate our embedded soy footprint and our exposure to high-risk origins. The result of this work is enabling us to assess and address deforestation and conversion risks in the following ways:

- Purchase of regional certification credits in high-risk regions to signal Nestlé's support for sustainable soy production in priority origins.
- Establishment of traceability to country of origin and subnational jurisdiction where possible.
- Investing into landscape initiatives in the Brazilian regions most at-risk for deforestation and conversion in order to find local solutions to help halt conversion.
- Engaging our strategic direct animal protein ingredient suppliers to fine-tune the assessment of our exposure to risk and agree on an action plan so that the embedded soy we source can be assessed as deforestation and conversion-free (DCF).

2. Scope of the footprint calculation

Soy may be embedded in numerous products and by-products we buy. We used the Consumer Goods Forum's Soy Ladder Framework to identify which products were most material to Nestlé. Based on this methodology, the following were included in the scope of this footprint calculation: meat (including by-products), egg and dairy ingredients. The risk exercise was developed considering deforestation and conversion of natural habitats.

3. Methodology to calculate the footprint

i. Extract, clean, adjust and convert volumes purchased to fresh equivalent tons

Data on volumes of meat, eggs and dairy ingredients sourced in 2020 was cleaned, volume units were aligned on metric tons, and product category adjusted based on material specification. Additionally, water content factor was used to convert sourced volumes to fresh equivalent tons, based on the type of processing method used for different products.

ii. Estimate feed intake

Different Feed Conversion Ratios (FCR) were used according to each product's category to measure the animal's efficiency to convert feed mass into the desired product. In the case of beef, because

production systems vary significantly across the globe, with implications on soy footprint, FCRs were regionalized.

Category	FCR - Global Average
Poultry[1]	2
Pork[2]	3,15
Dairy[4]	0,7
Eggs[2]	2,3
Veal[7]	1,59
Rabbit[9]	3
Mix [10]	3,15
Lamb[8]	1,59
Fish[11]	1
Game[12]	0
Kangaroo[13]	0

Beef	FCR
Global average[2]	1,59
Brazil[3]	0,332
US/Canada[5]	1,906
Australia[6]	2,52
Europe[8]	0

iii. Estimate soybean intake through feed

The FCRs obtained above were crossed with soy content in feed, with data obtained from available literature, considering different products and geographic regions. Again, as production systems are different in the Americas and other regions, regionalized soy content factors were used.

[1] Source: Greenhouse gas emissions from pig and chicken supply chains – A global life cycle assessment (fao.org)
[2] Calculated based on the average of FCRs in Brazil, US/Canada and Australia/New Zealand
[3] Sources: https://canalrural.uol.com.br/noticias/confinamento-requer-atencao-alimentacao-manejo-27470/ http://www.abiec.com.br/controle/uploads/arquivos/sumario2019portugues.pdf https://www.canalrural.com.br/programas/informacao/rural-noticias/confinamento-intensivo-tem-ganho-de-ate-2-quilos-por-dia-em-bovinos/ https://www.pubvet.com.br/uploads/b46736937f46f28b2eec5a62254b8c56.pdf Tropical Beef: Is There an Axiomatic Basis to Define the Concept? (nih.gov)
[4] Source: Human appropriation of land for food: The role of diet - ScienceDirect
[5] Sources: https://www.aphis.usda.gov/animal_health/emergency_management/downloads/documents_manuals/beef_feedlot.pdf , XLS - A009B Average Carcass Weights for Federal Slaughter of Cattle - Agricultural Industry Market Information System (AIMIS) , Red meat conversion factors - agriculture.canada.ca , Current situation and future trends for beef production in the United States of America — A review (nih.gov)
[6] Sources: mla-agribenchmark-feedlot-results-report-jan-2019.pdf, https://futurebeef.com.au/knowledge-centre/beef-cattle-feedlots-feed-consumption-and-liveweight-gain/
[7] Same as beef
[8] As most of the beef in Europe comes from dairy cattle, it was assumed that beef is a by-product of the dairy production. Sources: https://literatur.thuenen.de/digbib_extern/dn053284.pdf and wp75.pdf (au.dk)
[9] Rabbit Tracks: Feeds and Feeding - MSU Extension and Possibilities to reduce the feed conversion in rabbit production (asic-wrsa.it)
[10] For mix of products, highest FCR was used (pork)
[11] As fish volume was negligible for Nestlé, a FCR of 1 was adopted
[12] As game are mostly wild animals, not fed with soy feed, a FCR of 0 was adopted
[13] Kangaroos are not farmed, therefore, a FCR of 0 was adopted

Category	Americas (%)	Other regions (%)
Poultry	28[14]	25.6[15]
Beef	10[16]	3[16]
Pork	18.8[15]	10.1[16]
Dairy	17.8[17]	14.2[16]
Eggs	13.5[18]	15.1[16]
Veal	13.9[17]	3[16]
Rabbit	13.5[10]	6.2[16]

iv. Allocate soybean equivalent volume using economic allocation factor

Different Economic Allocation Factors (EAF) were used for each product category based on literature available on the topic. The EAF takes into consideration the fact that there are multiple uses for soybeans and any use will have associated co-products that will be applied in other sectors to fairly represent how soybean demand is not always driven by one particular output.[19]

Category	Meat	By-products
Beef[20]	1,48	0,07
Poultry[21]	1,48	0,1
Pork[21]	1,21	0,06
Fish[21]	1,48	0,1
Lamb[21]	1,48	0,07
Veal[21]	1,48	0,07
Dairy[21]	0,46	0,46

v. Map potential soy origins to country and biome

For this analysis, it was assumed that Nestlé suppliers have the same importing profile as the country in which they are located.

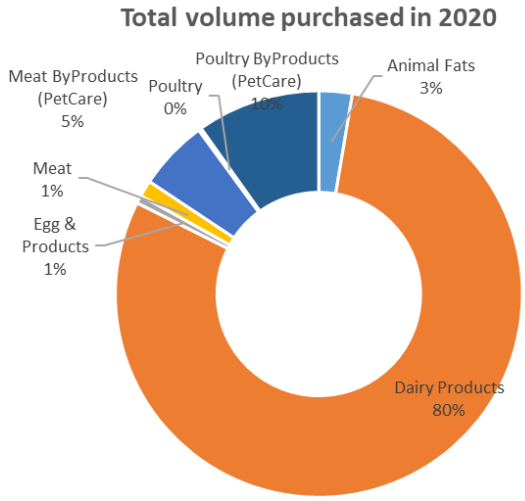
vi. Assess deforestation and conversion risks at country and biome level using trade data, such as TRASE.

Taking this into consideration, data on soybean production, consumption, and imports[22] was used to calculate risk exposure to the priority countries for embedded soy (Brazil, Argentina, and

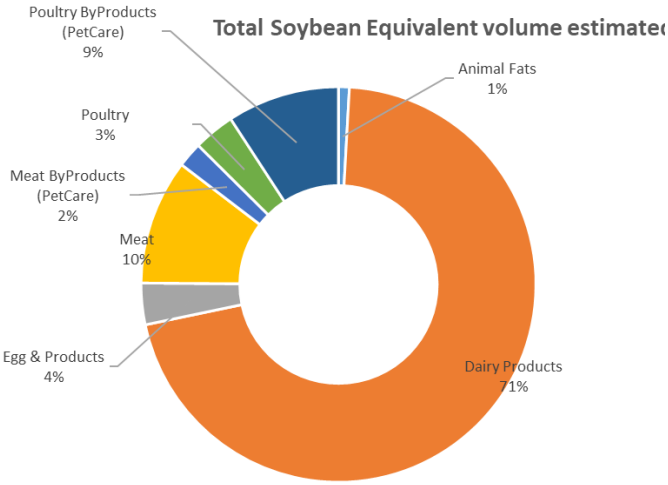
[14] Animal feed formulations | Feed Strategy
[15] https://www.wwf.at/wp-content/uploads/2022/03/WWF-Report-European-Soy-Supply.pdf
[16] Ration Formulations for Growing Cattle (psu.edu)
[17] Soybeans and Soybean Byproducts for Dairy Cattle (psu.edu)
[18] Understanding protein requirements - Poultry World
[19] Source: How much soy is in it? – RTRS (responsiblesoy.org)
[20] Source: PEFCR_PetFood_FinalPEFCRs_2018-05-09.pdf (europa.eu)
[21] Sources: UK milk yield | AHDB
Life Cycle and Lactation Cycle of Dairy Cows - Vet in Training (vetstudentresearch.blogspot.com)
(PDF) Lifetime production of high-yielding dairy cows (researchgate.net)
Growth Charts for Dairy Heifers (psu.edu)
Greenhouse gas emissions from milk production and consumption in the United States: A cradle-to-grave life cycle assessment circa 2008 | Elsevier Enhanced Reader
[22] Source for soybean production, consumption and imports: U.S. Department of Agriculture – USDA and, source for soybean and soy oil global imports as well as specific data on imports from Brazil, Argentina and Paraguay: International Trade Centre – ITC

Paraguay). Subsequently, TRASE data[23] was used to measure exposure to priority biomes (Amazon, Cerrado, and Gran Chaco) within these priority countries[24].

4. Results

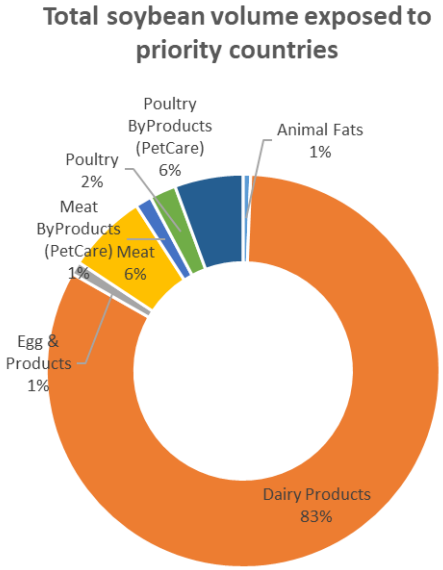


Total volume of meat, eggs and dairy purchased (converted to fresh equivalent): 20,672,367 tonnes



Total soybean equivalent volume estimated: 1,174,408 tonnes

Nestlé's estimated embedded soy footprint is 1.1 million tons of soybean equivalent.



Total soybean equivalent volume exposed to priority country origins: 381,500 tonnes (38%)

[23] TRASE data

[24] Priority biomes: Amazon and Cerrado in Brazil, and Chaco in Argentina and Paraguay as well as all volumes from unknown origins

5. Actions taken to date

- We have purchased 107,817 RTRS credits in priority regions in 2021 (Brazil, Argentina and Paraguay), covering around 28% of our total exposure to risk in embedded soy.
- Further analyses were done on embedded soy and deforestation and conversion risk exposure per country and per ingredient. These analyses inform prioritization of suppliers for engagement (within the 38% of volumes exposed to priority country origins).
- This footprint is being used to inform Nestlé's investments in landscape initiatives as part of Nestlé's Forest Positive strategy.

Going forward

- We are working to further improve the methodology:
    i. Update trade data sources used with more recent data on production, consumption and imports;
    ii. revise factors used (e.g., FCR and EAF) based on more recent literature that is emerging on the topic;
    iii. incorporate to the calculations the estimate of soy volume potentially DCF using European Soy Monitor.
- We aim to update our embedded soy footprint, risk analysis and actions on an annual basis.
- We will engage with suppliers with the highest exposure to deforestation and conversion risk to map their soy supply chain, develop solutions to address deforestation and conversion risks in their business.