Soy Barometer 2014

A research report for the Dutch Soy Coalition

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Introduction

The Dutch Soy Coalition is a cooperation of a number of non-governmental organziations in the Netherlands: Both ENDS (secretariat), IUCN-NL, Milieudefensie (Friends of the Earth Netherlands), OxfamNovib, Natuur & Milieu (the Netherlands Society for Nature and Environment), Solidaridad, WWF-Netherlands, and (since 2013) Wetlands International. The involved civil society organisations in the Netherlands combined their expertise to address global problems regarding the large scale production of commodities and to support and complement the work of their partner organisations in soy producing countries.

The Dutch Soy Coalition encourages all relevant stakeholders in the soy chain – from producers to consumers – to take concrete steps in order to reduce the negative effects on people and environment due to the massive increase in soy production. The Dutch Soy Coalition has developed a strategy where the three ´Rs´ are the key to change: *Responsible soy production*, *Replacement* and *Reduction*.

Responsible production is about improving the way in which soy is grown, reducing the negative effects for people and environment. The concerns of civil society organisations about the consequences of the rapidly growing soy production have already resulted in a number of initiatives to make the production of soy more responsible.

Replacement is referring to possible alternatives to soy in animal feed, the most important use of soy. Local, protein-rich crops – such as peas, beans, lupine and alfalfa (lucerne) – are being researched for their nutrient content and effects on the environment in comparison to soy. Soy grown in Europe is also being proposed as part of the solutions and the use of meat-and-bone meal in animal feed is being considered, which is no longer possible since 2003 due to an EU-regulation.

Reduction is mostly about decreasing the consumption of animal protein (meat, dairy, eggs, fish) in the Netherlands and Europe. This would help to reduce the consumption of soy for feed, which in turn would reduce the problems in the production areas. This is a very important element in the mix of solutions as it is hard to produce sustainably and attain good governance of land use while there is so much pressure on resources.

In this publication the emphasis is on a more *Responsible production* and *Replacement*. The research has been conducted on behalf of the Dutch Soy Coalition to serve as a basis for the publication of the 'Soy Barometer 2014'.

Chapter 1 gives an overview of terms and definitions used in the publication. It explains the data sources and the limitations that are connected to these figures. Chapter 2 looks at the global production and trade in soy as well as the consequences for the environment and livelihoods. The soy market and processing of soy in the Netherlands is the focus of Chapter 3. Based on the production of livestock and food, conclusions can be drawn on how much soy is consumed in the Netherlands and how much is being exported to other destinations. Chapter 4 describes the different sustainability standards which have been introduced in order to improve the production of soy and reduce the impact on the environment and livelihoods. 0 summarizes the results of the research for Dutch companies processing certified soy. Finally, Chapter 6, written by Natuur & Milieu and Milieudefensie, covers the possibilities of replacing soy as a protein source in animal feed. The conclusions from this research project are summarised in Chapter 7.

Chapter 1 Methodology

1.1 Scope

This publication provides a brief overview of how much soy is purchased and processed by the feed and food industry annually into food in the Netherlands, and what share of it can be referred to as ‘certified’ under an accredited standard. It is an update and follow-up to the Soy Barometer 2012 (published in September 2012), and the Soy Barometer 2009 (published in December 2009). It allows a check on how far industry, authorities and civil society organisations are succeeding in their aim to make the global soy production more responsible. In addition, suggestions for the replacement of soy as well as information on companies which are already pursuing this aim have been researched.

1.2 Definitions

The following terms and definitions are used in the report:

- Throughout the report, soy is used as a general term for soybeans and the products resulting from their processing, namely soybean meal and soybean oil.

- Soybeans are processed into two main products – soybean meal and soybean oil. This process is referred to as ‘crushing’. The crush ratio refers to the weight ratio between meal and oil resulting from the processing of the beans. Depending on whether the hulls are included in the resulting meal (44% protein meal) or kept separate (48% protein meal (‘hi-pro’)) different protein contents are achieved. The protein content of soymeal also varies depending on the geographical origin as oil yields are influenced by growing conditions. For example, Argentinian soymeal has a lower protein percentage than meal originating from its top competitors, Brazil and the United States. This fall in protein content is believed to be irreversible, caused by the focus of Argentinian producers on one single crop variety and a lack of crop rotation.[1]

  Generally the crushing ratio varies between 73% - when high-protein meal (de-hulled) is produced - and 80% for low-protein meal.[2] In this report, the crushing figures of key producing countries over a period of three years are used to calculate an average crushing ratio, resulting in 78.5% meal and 18.5% oil (see Appendix 2 for a detailed explanation).

- All volumes are given in metric tonnes (1,000kg), abbreviated as mt in tables.

- Europe is referring to the geographical definition of Europe, thus also including European countries outside of the European Union. This refers, for example, to Switzerland, Bosnia-Herzegovina, Russia, Ukraine or Norway.

- European Union (EU) is referring to the current 28 member states of the European Union (EU-28). In cases where tables also include data from 2009, before the accession of Croatia, the data for this country were added to the EU-27 data for that year. For earlier years the data reported for the countries forming the EU at that time were used.

- In soy trade, a differentiation is made between calendar years and market years. Often data for soy production and trade is reported in market years, which are referring to the period from the beginning of a new harvest, usually the 12-months period from beginning of October to end of September of the following year.

- 'Certified' soy is referring to a range of certification standards most relevant on the Dutch market in 2013 (EcoSocial, ISCC, non-GM soy, Organic soy, ProTerra, Roundtable on Responsible Soy (RTRS). While they all aim to make production of soy more 'responsible', there are considerable differences in the environmental, social and governance criteria applied by these different standards. An inclusion in the analysis is not intended as, nor does it constitute an endorsement of a standard as responsible by the authors or the members of the Soy Coalition.

- Figures for the import or processing of certified soy do not always imply the physical presence of certified soy in the product. Some certification standards do not require full traceability of the certified product throughout the supply chain but provide negotiable certificates irrespective of a physical delivery (see section 4.3).

1.3 Data used in this study

1.3.1 Soy on the Dutch market

This study aims to map the whole soy market including trade streams and production of relevant products directly or indirectly containing soy. This approach is chosen in order to be able to make a statement on the overall traded, processed and consumed soy in the Netherlands.

Important parts of this study thus rely on trade statistics, both in terms of trade between EU member states and third countries (extra-EU trade) as well as trade among EU member states (intra-EU trade). Statistical data on the development of the global soy harvest, prices of soy traded on the international market and key supply streams were collected from sources like the U.S. Department of Agriculture (USDA), oilseed market research publications and statistical authorities in the European Union.

The provision of consistent and reliable trade statistics remains a widely discussed issue as their accuracy is influenced by various factors, including the coverage of data collection and methods to adjust non-collected data, measurement units and differences in categorization systems, data revisions and confidentiality. However, the reliance on customs procedures entails to a high quality and good coverage of data on trade with non-EU countries.[3]

Due to the EU Customs Union, intra-EU trade cannot be documented via customs documents but is based on the so-called Intrastat-system. For Intrastat-reporting, member states apply thresholds of annual values in EU-trade for both arrivals and dispatches to reduce the workload for small- and medium-sized providers of statistical information. These thresholds are set in such a way so as to collect data relating to at least 97% of all dispatches and at least 95% of all arrivals of intra-EU trade operators.[a] The gap caused by the exemption threshold must be compensated with adjustments, which in most countries is done based on VAT-collection data.[4] While this avoids significant gaps, it carries a certain risk of error, as conversion from value-based data to volume-based data is influenced by various factors.

a In 2013, the thresholds implemented by the Netherlands stood at a maximum value of €900,000 for, respectively, overall imports and exports, by a company during one calendar year.

For the purpose of this study, the leading sources for trade statistics have been consulted in order to match figures and identify significant discrepancies.[a] For the analysis of the soy streams entering and leaving the Netherlands, the analysis predominantly relies on data gathered and digested by an international agricultural statistical information provider.[5] Data provided in these publications not only rely on statistical information, but also include expert analysis double-checking and correcting statistical data, taking into account, for example, information on domestically processed volumes.

The Soy Barometer is aiming to map the whole soy chain for food production, not only considering animal feed but also other products into which soy is being processed. Also it is being considered as important that the Netherlands takes responsibility not only for the soy which is consumed domestically, but also for the soy which is entering the country in its role as a key transporting hub, but is subsequently re-exported. This is happening directly without further processing, but also indirectly after processing into animal feed and use in the production of meat, eggs and dairy. Not enough detailed and reliable data can be drawn from industry disclosure on soy processing and consumption.

The data used in this report has to be considered as the best available to bring the distribution and consumption of soy in the Netherlands in picture. The problem of intransparent commodity markets cannot be solved by this research.

1.3.2 Soy processed in animal feed and food products

Data on the standard composition of animal feeds was obtained from LEI Wageningen UR (LEI), a social-economic research institute connected to the University of Wageningen in the Netherlands. These are based on a survey conducted in May/June 2014 among a selection of key Dutch animal feed producers in regard to their average use of soy and soy products in compound feeds in the three-year period from 2011 to 2013.

For data on Dutch production of key products directly or indirectly containing soy – meat, dairy, eggs, margarine and others – previous editions of the Soy Barometer relied on detailed data provided by the so-called Product Boards. These Product Boards have been abolished though as of the beginning of 2014, with the consequence that the level of detailed data available is reduced. Only for poultry and dairy production these detailed data were still published for 2013. For other livestock sectors, data for the year 2012 had to be used as a basis of the analysis. These figures have been corrected based on preliminary reports on changes in the volumes resulting from slaughtering in 2013 and data reported by the Dutch Statistical Office (CBS), assuming that consumption in the Netherlands remained stable in comparison to the previous year.[6]

1.3.3 Certified soy streams

The relevant certification bodies generally do not publish detailed figures on volumes of certified soy imported into specific countries, in this case the Netherlands. Obtaining information on actual amounts of certified soy used in the Netherlands is thus dependent on the willingness of companies to share such information.

Various companies and industry associations have been contacted and asked for input. However, not all stakeholders were willing to participate or provide details on amounts and uses of certified soy imported and processed during 2013. The conclusions drawn in this study are thus influenced by the fact that no full overview is available.

a CBS Netherlands, European Statistical Office (EuroStat), USDA Foreign Agriculture Service, ISTA Mielke.

Chapter 2 The world of the soybean

2.1 Soy is everywhere

Soy is an annual plant that produces an edible bean with a high content of protein (over 40%) and fat (18%). Soy is grown in temperate, subtropical and tropical climates: (the midwestern) United States, South America (especially South-Central Brazil, Argentina and Paraguay), Asia (especially Central India and North-East China) and to a limited but increasing extent in Europe (especially Ukraine, Russia and Italy). In the (sub)tropics it is possible to harvest soy twice per year. Soy is used as one of the crops in rotation schemes, both by large-scale industrial farmers and small-scale family farming.

A pack of soybeans is rarely found in the supermarket shelf, but soy is directly and indirectly used in many processed food products. The most recognizable foods are products like soy milk, soy sprouts and tofu and fermented soy products such as soy sauce (ketjap), miso and tempeh. However, only about 6% of the world production of soybeans is directly used in such food products, and then predominantly in Asia. A small share of the beans is used in animal feed prior to extracting the oil ('full-fat soybeans'), but the largest part of the soybean harvest is in fact 'crushed', resulting in soybean meal and soybean oil as the main products.

Soybean meal is a highly nutritious ingredient in animal feed. The fact that worldwide more and more meat, dairy and eggs are consumed is the main reason why the global demand for soy has been showing a strong upward trend in recent decades. In the half century from 1962 to 2012, global meat production quadrupled, from 70 million tonnes to 300 million tonnes.[7] In order to quickly raise the suppliers of those products - chickens, pigs and cattle – soybean meal (also called oilcake) is used in animal feed as a valuable protein source.[8]

The soybean oil resulting from the crushing ends up in food products, cosmetics, detergents, industrial products and for a small share in animal feed. Soybean oil is typically used as cooking oil and in products such as mayonnaise, margarine, sauces, soups and dressings, but also bakery products, ready-made meals, cereal products, savoury snacks, cookies, candy, ice cream and other desserts. Further, particularly in the United States, more and more soybean oil is used to produce biodiesel supported by government policies setting biofuel goals.[9]

A valuable by-product from the crushing process is soy lecithin. It is an effective emulsifying agent in food products such as chocolate, cookies, peanut butter and coffee creamer, but also in cosmetics, textiles, paints, coatings and waxes.[10]

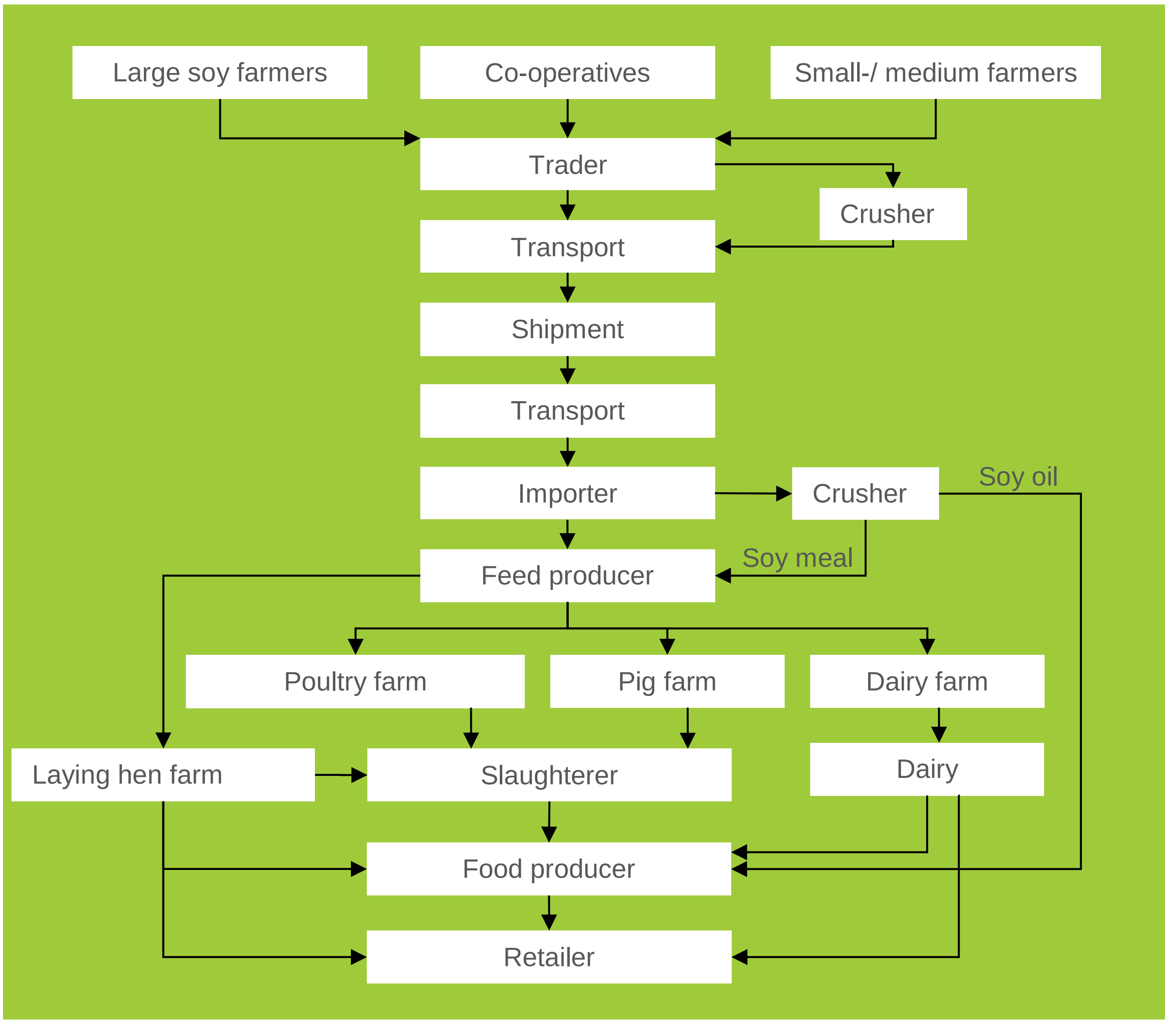
2.2 The soy chain

The international soy chain starts with the cultivation of soybeans. There are large differences in the size of the farms that grow soybeans. The average 'modern' farm in Argentina and Brazil works 1,000 hectares, but there are also large operators farming more than 100,000 hectares.[11] At the same time there are many hundreds of thousands of small farmers in South American, Asian and African countries, which grow soy on plots of less than 1 to 50 hectares in crop rotation. The market price for soybeans at a given time is one motivation for whether or not to plant soy.[12]

The trading and processing of soy is globally dominated by four multinational companies, the so-called *ABCD traders*: Archer Daniel Midlands (ADM), Bunge, Cargill and Louis Dreyfus. These companies are involved in cultivation, trade, processing (crushing), transportation and sale of soy products (see section 3.1.1). In recent years also Japanese trading companies like Marubeni, Mitsui and Itochu increased their soy market shares, especially for imports to China and other Asian destinations.[13]
The feed industry buys soymeal usually through trading offices of these and other large traders. The soymeal is processed and mixed with other ingredients in compound feeds, in a ratio that is specific to the different livestock species. The feed is fed by farmers to their pigs, cattle and chickens for the production of meat, dairy and eggs. Also part of this chain are slaughterhouses, dairies and other users which pose specific (quality) requirements for the products and thereby also have influence on the specifications of the feed.

A part of the meat, dairy and eggs finds its way to the consumer without much processing. Another part is further processed by the food industry. In this industry multinationals such as Unilever, Danone, Procter & Gamble, Kraft and Nestle play a major role. All these different end products of the soy chain are sold to consumers through retail businesses, supermarkets and butchers. Figure 1 presents a simplified overview of the most important parts of the soy chain for feed and food, leaving aside industrial and fuel uses of the soy products.

Figure 1 Overview of the soy chain



The global soy market is highly volatile, being influenced by the global economic situation, harvest predictions and actual volumes harvested depending on weather conditions, the economic situation of China as the most important importer, as well as policy developments, for example in relation to biofuel regulations.[14]

2.3 Soybean cultivation

2.3.1 Global soybean harvest

The global soybean harvest reached a volume of 276 million tonnes in 2013. Compared to the season 2007 (the starting point of the Soy Barometer 2009) with 216 million tonnes this is an increase by about 28%. The global harvested area grew by 17% (from 95 million to 111 million hectares).[15] This development also indicates a significant increase in productivity during this period of time.

Looking at the development over a longer period of time, Table 1 shows that the global soybean harvest grew by 140% in the last 20 years, based on FAO data for the years 1993 until 2013. This development is partly due to an increase in the global harvesting area for soy – up to approximately 111 million hectare in 2013 – and partly due to an increase in the yield per hectare. Across all countries, the growth in productivity has slowed down in recent years. However, large discrepancies in the yield per hectare can be observed in different countries, varying in the most recent market year from less than 1 tonne per hectare in India to 2.9 tonnes per hectare in Brazil.[16]

Table 1 Soy harvest in selected production countries and globally (1993-2013)

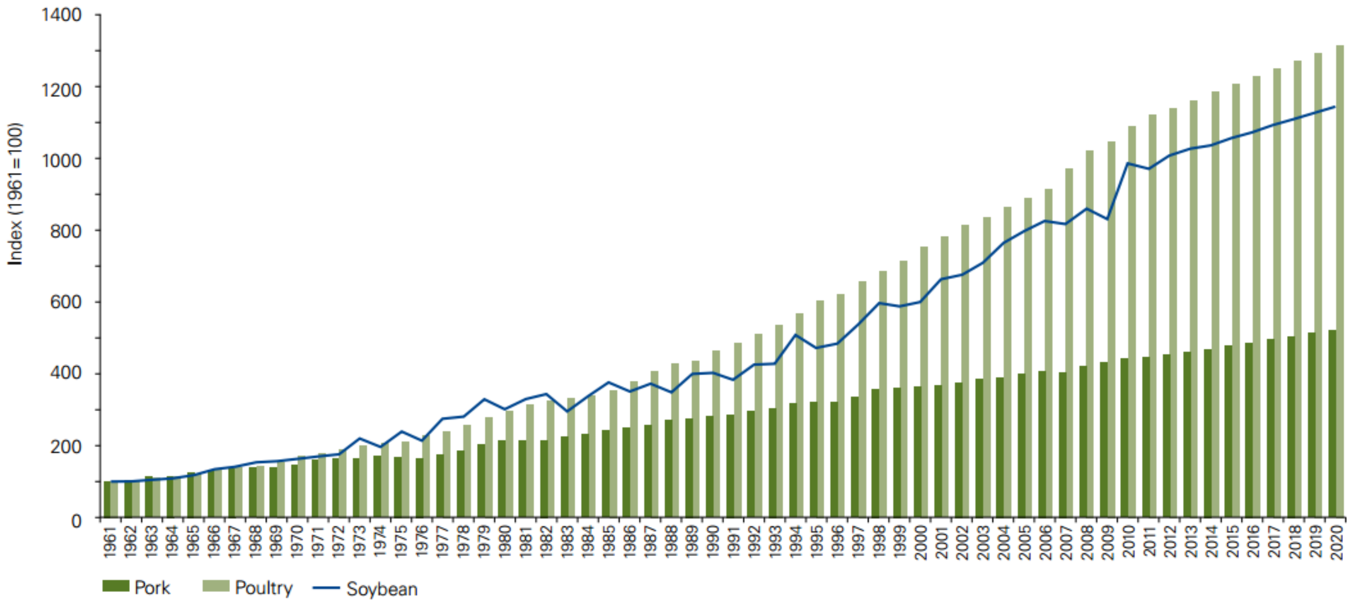
	1993		1998		2003		2008		2013	
Producing country	**1,000 mt**	**1,000 ha**	**1,000 mt**	**1,000 ha**	**1,000 mt**	**1,000 ha**	**1,000 mt**	**1,000 ha**	**1,000 mt**	**1,000 ha**
Canada	1,851	720	2,737	980	2,273	1,049	3,336	1,195	5,198	1,820
U.S.	50,886	23,191	74,599	28,507	66,781	29,330	80,749	30,223	89,483	30,703
Argentina	11,045	5,116	18,732	6,954	34,819	12,420	46,238	16,387	49,306	19,419
Bolivia	491	214	1,120	589	1,586	684	1,260	786	2,347	1,238
Brazil	22,591	10,635	31,307	13,304	51,919	18,525	59,833	21,246	81,700	27,865
Paraguay	1,794	635	2,856	1,086	4,205	1,474	6,312	2,464	9,086	3,080
China	15,323	9,459	15,153	8,501	15,393	9,313	15,542	9,127	12,500	6,600
India	4,745	4,371	7,143	6,493	7,819	6,555	9,905	9,511	11,948	12,200
Russia	497	625	297	377	393	399	746	712	1,636	1,203
Ukraine	61	70	36	31	232	190	813	538	2,774	1,351
EU-28	1,046	435	1,921	710	973	473	763	271	1,070	417
Sub-Saharan Africa	483	796	869	904	1,032	1,061	1,426	1,272	2,222	1,788
Other countries	4,334	3,233	3,366	2,547	3,226	2,168	4,350	2,735	7,134	3,586
Total	**115,148**	**59,499**	**160,136**	**70,983**	**190,652**	**83,640**	**231,272**	**96,468**	**276,406**	**111,270**

Source: FAO Statistics Division (FAOStat), "Production", *Website FAOStat* (faostat.fao.org), viewed in August.

The rapid global increase in soy production over the last ten years is mostly due to the area expansion in South America. In Brazil, large soy cultivation areas have been added in Mato Grosso, Goiás en Mato Grosso do Sul. In Argentina, the most important areas for soy production are the central provinces of Buenos Aires, Córdoba and Santa Fé. However, in recent years also the soy cultivation area in the North and Northwest of Argentina increased rapidly.[17] As explained in section 2.5, vulnerable and valuable habitats are faced with negative environmental and social consequences from soy cultivation.

As Figure 2 illustrates, the expansion of soybean cultivation can be clearly linked to the parallel increase in global meat consumption, particularly poultry and pork. Due to the continuously increasing global meat consumption predicted also for the coming years, it can be expected that also the production of soybeans will further grow to provide the required proteins.

Figure 2 Development of global soybean and meat production, 1961-2020 (Index 1961=100)

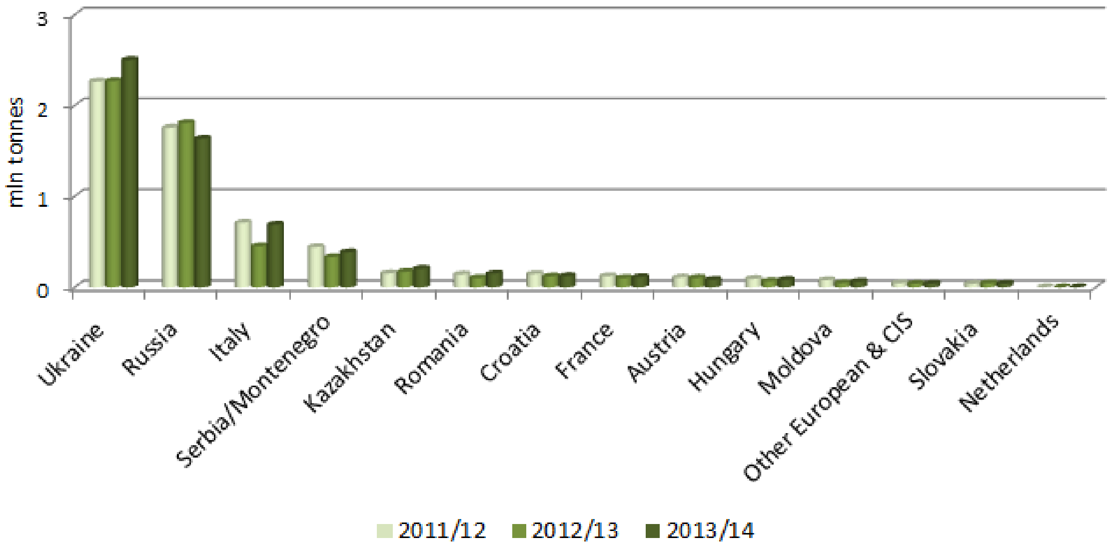


Source: FAOSTAT/FAPRI, In: KPMG International, "A roadmap to responsible soy", *KPMG International*, May 2013.

2.3.2 European soybean harvest

Soybean cultivation in Europe and the CIS (former Soviet Republics) is so far not playing a significant role on a global scale, however, acreage and production have steadily increased in recent years, with output rising from 3.6 million tonnes in market year 2009/10 to 6.1 million tonnes in 2013/14 (see Figure 3). Key producers within this region are the Ukraine and Russia, producing respectively 2.5 and 1.6 million tonnes in 2013/14, thus together accounting for about 68% of the total production in the region. This is followed by Italy with 0.7 million tonnes and Serbia/Montenegro with 0.4 million tonnes. The total production in Europe and the CIS is expected to account for 2.1% of global soybean production in market year 2013/14.[18] A large share of the European harvest is used in food production. For example, about half of the Austrian soy production, which reached 100,000 tonnes in 2013, is used in foodstuffs.[19] Production in Ukraine and Russia, on the other hand, is predominantly destined for feed production.[20]

Figure 3 Soybean production in Europe and the CIS, 2011/12-2013/14



Note: (partly) based on estimates/preliminary data;
Sources: ISTA Mielke, "Oil World Annual 2014". *ISTA Mielke*, Hamburg, May 2014; Heselmanns, M., "Soja – Opmars van peulvrucht in de polder", *NRC Handelsblad*, 25 October 2013; Bron, J.C., "Agrifirm: 100 hectare soja in Nederland", *Website Boerderij*, 22 April 2014 (www.boerderij.nl/Akkerbouw/Nieuws/2014/4/Agrifirm-100-hectare-soja-in-Nederland-1507406W/); Agrifirm, "Noordwest-Europese soja", *Website Agrifirm*, 13 November 2013 (www.agrifirm.com/agrifirm-group/duurzaamheid/csr-artikelen/articletype/articleview/articleid/87/noordwest-europese-soja).

In comparison with other major agricultural regions of the world, Europe is characterised by a relatively low share of leguminous plants in cropping systems (see also Chapter 6). Instead, a large share of the land is devoted to cereal production.[21] In contrary to cereals, leguminous plants like beans, peas or lupines yield proteins. In order to fulfil its protein needs, especially for animal feed, imports from South and North America are dominating the crop protein supply of the European Union. The more than 40 million tonnes of crop proteins which are imported annually, mainly soybeans and corn gluten feed, account for 80% of the EU's crop protein consumption. The land required to produce these crops equals 10% of the EU's arable land, or 20 million hectares of arable land.[22] The annual EU consumption of 150 million tonnes of soymeal accounts for about 20% of world soymeal production.[23]

Protein crop production in the EU has showed a significant reduction in the past decade. Production of the main dried pulses excluding soybeans decreased by 30%, and soybean production fell by 12%. This deficit in domestic protein crop production goes back to previously established international trade agreements (the General Tariff and Trade Agreement (GATT) and the Blair House Agreement, 1992). These allowed the EU to protect its cereal production and in return allowed duty-free imports of oilseed and protein crops into the EU. At the same time, a restriction was placed on the quantity of by-products made available as a result of the cultivation of oilseeds for non-food purposes on subsidised set aside land. This competitive disadvantage led to a significant fall in protein crop production, accompanied by a loss of practical knowledge in on-farm selection, storage, processing and on-farm use as animal feed of these crops and a lack of further-developed new varieties.[24] However, while the Blair House Agreement remains in place, the limit on the EU production of oilseeds has been abolished in 2008.[25]

Besides the negative social and environmental impacts of the large-scale production of soy for export markets especially in South America as described below (section 2.5), this development also carries risks for the European livestock sector, as price volatility on international markets has substantially increased.[26]

In reaction to the protein dependency of the EU, the European Commission has established a Protein Focus Group, which has been tasked to analyse the demand for protein crops in Europe, considering the specific requirements for the feed sector, strategies to increase competitiveness of protein cultivation in Europe, the potential of relevant protein-rich crops and forage, the value of protein crops in the crop rotation and strategies to increase productivity and protein content of soybean, pulses, alfalfa and clover, and other oilseeds.[27]

Due to its nutritional value and especially protein digestibility, soybean meal is very valuable for the livestock sector. Research by Wageningen University in the Netherlands came to the conclusion that, within the category of oilseeds, European produced soybean meal seems to be the most promising alternative for soybean meal originating from South America.[28]

In an effort to unlock the local potential to increase crop protein supplies through soy, several initiatives have been started in order to promote the expansion of soybean cultivation in EU member states. This is not only an attempt to ease the protein dependency of European countries, but in addition ensures supplies of non-genetically modified (non-GM) soy. Several examples of such initiatives in different EU countries exist:

- In the *Netherlands*, the University of Wageningen is cooperating with the agricultural cooperative Agrifirm on developing a strategy for creating a north-western European soy cultivation area in which adapted, high-yield varieties will form the basis for expanding cultivation in the EU.[29] Soy cultivation in the Netherlands was first tested in 2013, with eleven farmers sowing about 26 hectares. First results from this trial were promising, with an average productivity of 2.7 tonnes per hectare, a similar level to what is achieved in major producing countries.[30] In the current growing season (2014), the number of farmers has increased to 32, cultivating soy on more than 100 hectares in the Netherlands. Among the buyers of the soy are Mona Naturprodukte, an Austrian soy milk producer, and Belgian animal feed producer Danis. The companies are paying a premium for non-genetically modified soybeans.[31] While cost of production is comparatively high due to its small scale and further research is needed into species adapted to local conditions, the results show potential for European soy production for domestic consumption.

- In the Danube region, the association 'Donau Soja' (Danube Soy) aims to systematically support and increase the cultivation of high-quality soy for food and feed. For the whole Danube region, including areas of Southern Germany and a number of middle European countries, it is being estimated that about 1.8 million hectares of land suitable for soy cultivation are lying fallow.[32] The production potential for *Austria* alone is estimated at around 4 million tonnes annually.[33]

- *Romania*, an EU member state with favorable climate conditions for growing soybeans and with the largest potential area for soy in the EU, used to grow more than 500,000 hectares of soy in the 1980s but production has been stagnant around 150,000 tonnes since 2010. However, the Ministry of Agriculture sees strong opportunities for Romania as an ideal location for growing, processing and marketing (organic) soy. Danube Soya has an office in Bucharest in order to help developing this potential.[34]

- According to the 'National Protein Programme' in *Hungary*, potential in soybean production is up to 300,000 tonnes on 100,000 hectares (now 41,000 hectares) and sees good options in organic production.[35]

- Also the *German* government has agreed on a protein crop strategy in 2012, aiming to strengthen local production of leguminous plants, especially soy. This includes a national network of more than 100 organic and conventional farms participating in research and trials with soybean cultivation. In addition, three exemplary value chains for sustainable and conventional soybean feed and food are developed.[36] In June 2014, the German government agreed to provide support of €3 million for the cultivation of protein crops during this fiscal period.[37]

- *France* has much larger potential and good resources, but soy has experienced difficulty competing with other crops due to a lack of investment and regulatory support. About one quarter of soy grown in France is organic and they plan to increase their production by 300% before 2020.[38]

Also in other European countries soy production has been increased in recent years:

- For the *Ukraine*, it is expected that soybean production will increase to an estimated 4 million tonnes by 2017, up by about 60% from 2013. Interest in cultivating soy has seen a rapid increase over the last decade, with the number of engaged farmers increasing from 2,300 in 2003 to 7,700 in 2013.[39]

- Soybean production in *Russia* reached about 1.6 million tonnes in 2013. Higher production is still expected for the coming years due to larger cultivation areas in the Far East and in the Central Federal District as well as higher yields. The increased supply is a reaction to the growing domestic livestock industry as well as increasing Chinese demand and the gradual removal of export duties due to Russia's accession to the WTO.[40]

- Vojvodina in *Serbia* is one of the most successful soy growing regions in Europe, and Serbia is the only country within Europe with a soy surplus. Serbia bans the import of GM soy and GM feed into the country. Danube Soy sees the success in the combination of a supportive regulatory environment, strong seed production and research, strong processors and well-trained farmers.[41]

2.4 Soy trade

About two-thirds of the global soybean harvest - an estimated 276 million tonnes in 2013 - is traded internationally. In 2013, 104 million tonnes have been exported directly as soybeans. After crushing in the country of origin or the importing country, also almost 60 million tonnes of soymeal and 10 million tonnes of soyoil are exported.[42]

As can be taken from Table 20, the leading soy producing countries are generally also the most important exporters, with the exception of China. There are, however, notable differences in the kind of soy products which are exported: the United States, Brazil and Paraguay export comparatively more beans, while Argentina and India perform most of the crushing of the beans domestically and thus export comparatively more meal and oil. Argentina is an example of a country which supports domestic value generation through the introduction of differential export taxes for the oilseeds value chain, imposing 35% on soybeans but only 32% on the crushing by-products soyoil and soymeal, aiming to keep more value generation in the country.[43]

Also some of the countries importing soybeans subsequently export part of the soymeal and – oil resulting from the crushing process. EU member states are predominantly engaged in intra-EU export and to a much smaller extend to third countries. In 2013, the most important third countries for soyoil exports from the EU were Algeria, Morocco and South Africa, and Turkey, Russia and Switzerland for soymeal.[44]

Table 2 Leading soy exporting countries (2013)

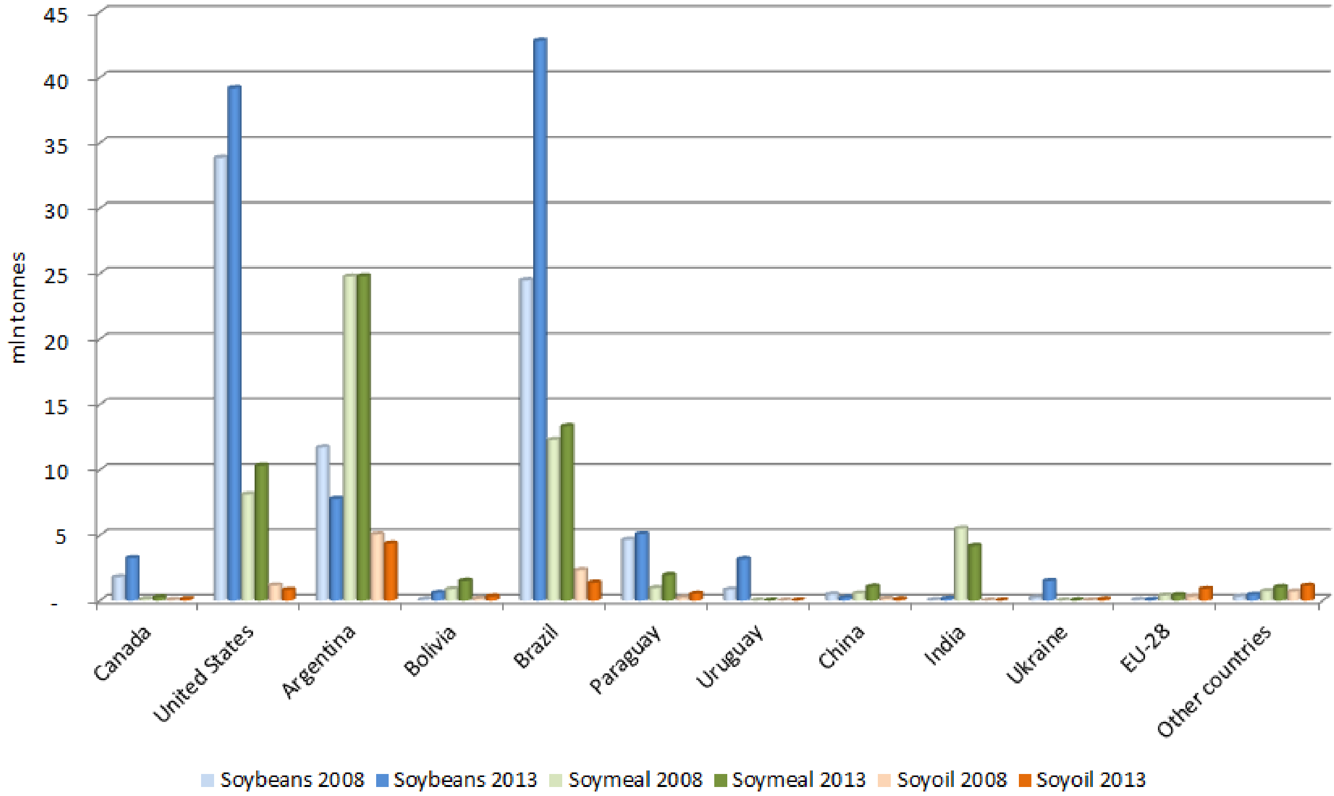
Country	Export (1,000 tonnes)			
	Soybeans	Soymeal	Soyoil	Total
Canada	3,256	237	104	3,597
United States	39,176	10,309	816	50,301
Argentina*	7,777	24,801	4,361	36,938
Bolivia	583	1,506	302	2,391
Brazil	42,796	13,334	1,363	57,492
Paraguay	5,082	1,945	515	7,542
Uruguay*	3,176	-	-	3,176
China	209	1,070	90	1,369
India*	140	4,176	-	4,316
Ukraine	1,493	22	82	1,596
EU-28	51	415	884	1,350
Other countries	440	1,039	1,133	2,612
Total	**104,177**	**58,853**	**9,649**	**172,680**

* (partly) based on estimates/preliminary data;
Note: excluding intra-EU trade;
Source: ISTA Mielke, "Oil World Annual 2014". *ISTA Mielke*, Hamburg, May 2014.

Figure 4 illustrates the dominance of three countries in world soy supply – Brazil, Argentina and the United States. While the general volatility of soft commodity markets also leads to a certain level of fluctuation from year to year in the supply of and trade with soybean product, a comparison between 2008 (the first year of the soy barometer) and 2013 (the latest year for which data are available), allows to identify certain trends.

For soybeans, especially exports from Brazil took a rapid increase by 75% during these six years, making it the leading supplier of soybeans to the world market. The United States as the runner-up also showed a 16% increase during this period of time. Argentina on the other hand, while being the third largest soybean producer, focuses on the export of crushing products, making it the number one supplier of soymeal and -oil to the world market. In Europe, the Ukraine is the only supplier of soybeans of some importance, reaching 1.5 million tonnes in 2013, compared to just 200,000 tonnes in 2008.[45]

Figure 4 Development of soy exports from key countries, 2008-2013



Source: ISTA Mielke, "Oil World Annual 2014". *ISTA Mielke*, Hamburg, May 2014; ISTA Mielke, "Oil World Annual 2012". *ISTA Mielke*, Hamburg, May 2012.

The European Union is highly dependent on imports of oilseeds and oilseed products (protein meals and vegetable oils) to meet demand for food, feed and industrial uses. This is especially true for oilseeds with no or limited domestic production, such as soybeans (see section 2.3.2). Some 70% of soybean meal must be imported. Only the production of rapeseed meal is somewhat higher than demand.[46] This makes the European Union the second biggest importer of soy after China (Table 3). The mix of imports from the Southern and Northern hemisphere ensures constant supplies to the EU livestock and poultry industry with soybean products year round.[47]

China overtook the EU as the biggest importer in 2003, especially dominating the global import of soybeans: in 2013, China imported 63.4 million tonnes of soybeans, representing 62% of globally traded soybeans.[48] According to market forecasts, China's soybean imports are expected to hit 69 million tonnes in the 2013/14 market year, a 16% increase over the previous year. The socio-economic development of the country led to a rapid increase in the demand for soymeal (for animal feed) and soyoil (for food use) in recent years. At the same time domestic availability was impacted recently by adverse weather conditions as well as Chinese farmers switching to maize production due to higher market prices, thus leading to smaller domestic soybean supplies in the current marketing year.[49]

The EU is importing large amounts of soymeal for use in animal feed as well as soybeans for crushing into meal and beans. The bulk of the soybean meal imported into the EU originates from Brazil and Argentina. India remains a marginal supplier compared to the South American countries; however, its market share has increased significantly over the last years due to its ability to supply non-GM soy.[50]

Accounting for about one fourth of the EU-imports of soymeal and soybeans, the Netherlands are the largest importer of soy products in the European Union. Other key players are Germany, France and Spain. Especially for the Netherlands, the country's role as a transhipment country has to be kept in mind though, meaning that a considerable part of imports are shipped to third countries, mainly in the EU.[51]

Table 3 Leading soy importing countries (2013)

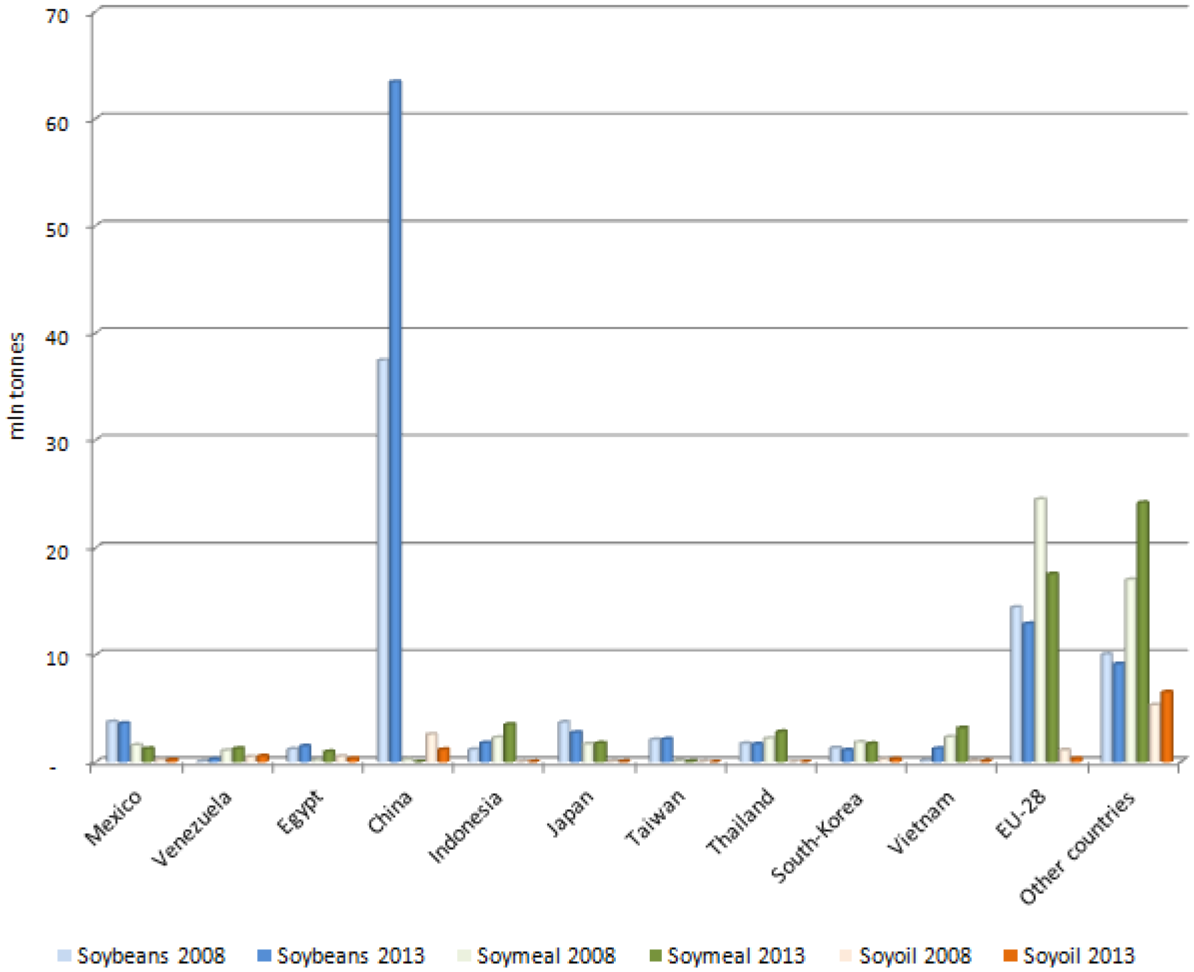
Country	Import (1,000 tonnes)			
	Soybeans	Soymeal	Soyoil	Total
Mexico*	3,613	1,239	197	5,049
Venezuela*	268	1,271	550	2,089
Egypt*	1,484	966	324	2,774
China	63,405	17	1,158	64,579
Indonesia	1,785	3,512	25	5,323
Japan	2,762	1,758	40	4,560
South-Korea	1,116	1,708	287	3,111
Taiwan	2,140	53	-	2,193
Thailand	1,679	2,822	3	4,503
Vietnam*	1,262	3,175	79	4,516
EU-28*, of which:	13,514	17,557	322	31,393
Denmark	7	1,033	23	1,063
France	499	2,211	59	2,769
Germany	3,111	1,525	20	4,657
Italy	1,309	1,506	-	2,815
Netherlands	3,142	4,706	38	7,886
Poland	45	1,336	45	1,426
Spain	3,358	1,352	22	4,731
UK*	639	1,200	20	1,859
Other EU countries	1,411	2,686	120	4,217
Other countries	8,543	24,191	6,522	39,255
Total	**101,570**	**58,268**	**9,506**	**169,344**

* (partly) based on estimates/preliminary data;
Note: excluding intra-EU trade;

Source: ISTA Mielke, "Oil World Annual 2014". *ISTA Mielke*, Hamburg, May 2014; European Statistical Office (Eurostat), "EU Trade", *Eurostat* (epp.eurostat.ec.europa.eu/), viewed in June 2014.

Figure 5 illustrates the key soy importers in 2008 and 2013. It clearly shows the dominant role of China accounting for a large share in soybean imports globally. EU imports of soybeans, -meal and -oil decreased slightly.

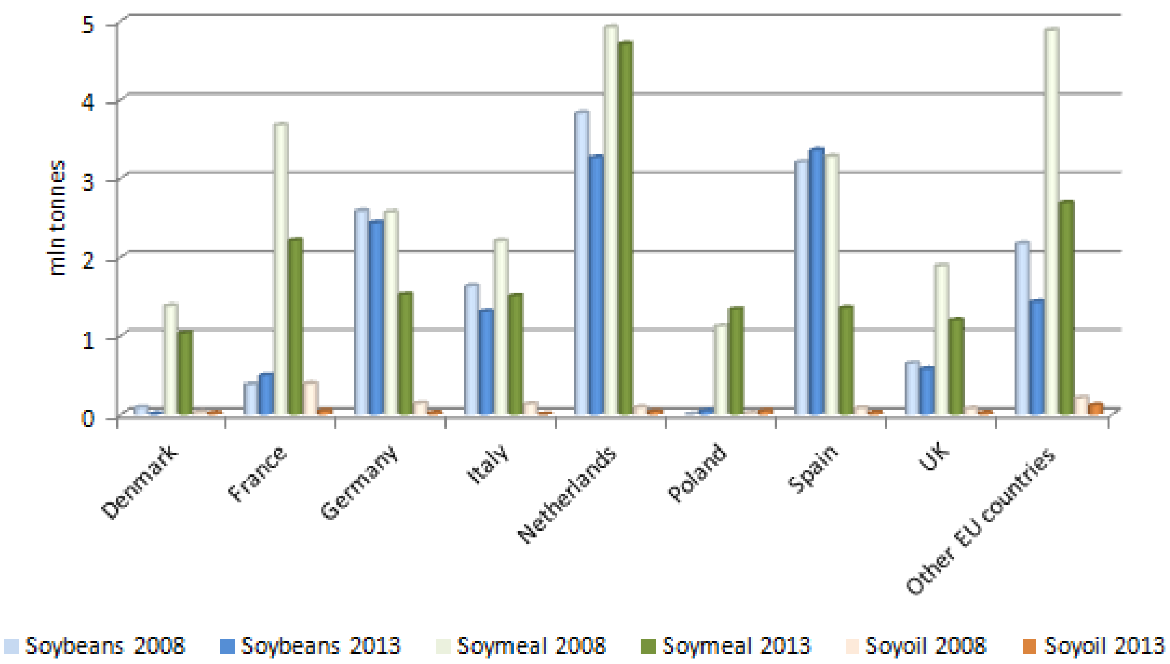
Figure 5 Development of soy imports by key countries, 2008-2013



Source: ISTA Mielke, "Oil World Annual 2014". *ISTA Mielke*, Hamburg, May 2014; European Statistical Office (Eurostat), "EU Trade", Eurostat (epp.eurostat.ec.europa.eu/), viewed in June 2014.

Figure 6 zooms in on the key importing countries in the European Union (excluding intra-European trade). It illustrates the dominant role of the Netherlands as an entry country for soy imports within the EU, both for soybeans and soymeal. Soyoil imports play a negligible role.

Figure 6 Development of soy imports by key EU-countries, 2008-2013



Source: ISTA Mielke, "Oil World Annual 2014". *ISTA Mielke*, Hamburg, May 2014; European Statistical Office (Eurostat), "EU Trade", *Eurostat* (epp.eurostat.ec.europa.eu/), viewed in June 2014.

Of the Dutch soybean imports, a part is re-exported to other countries (549,000 tonnes), but the largest share (2.4 million tonnes or 76% of the imports in 2013) is being crushed in the Netherlands. The Netherlands is the third largest crusher in the European Union, behind Germany and Spain (3.3 million tonnes each).[52] Subsequently, a large share of the soymeal and soyoil directly imported into the Netherlands or becoming available after crushing soybeans is re-exported to other European countries. See Chapter 3 for further information.

2.5 Consequences of increased soy production

It is to be expected that the global soy production will further increase in the coming years due to a globally growing demand for livestock products and biofuels. This can have important economic advantages for the producing countries: the export of soybeans, soymeal and soyoil is an important source of foreign currencies. However, the rapid expansion of the soybean cultivation area has come with a number of social and environmental consequences.

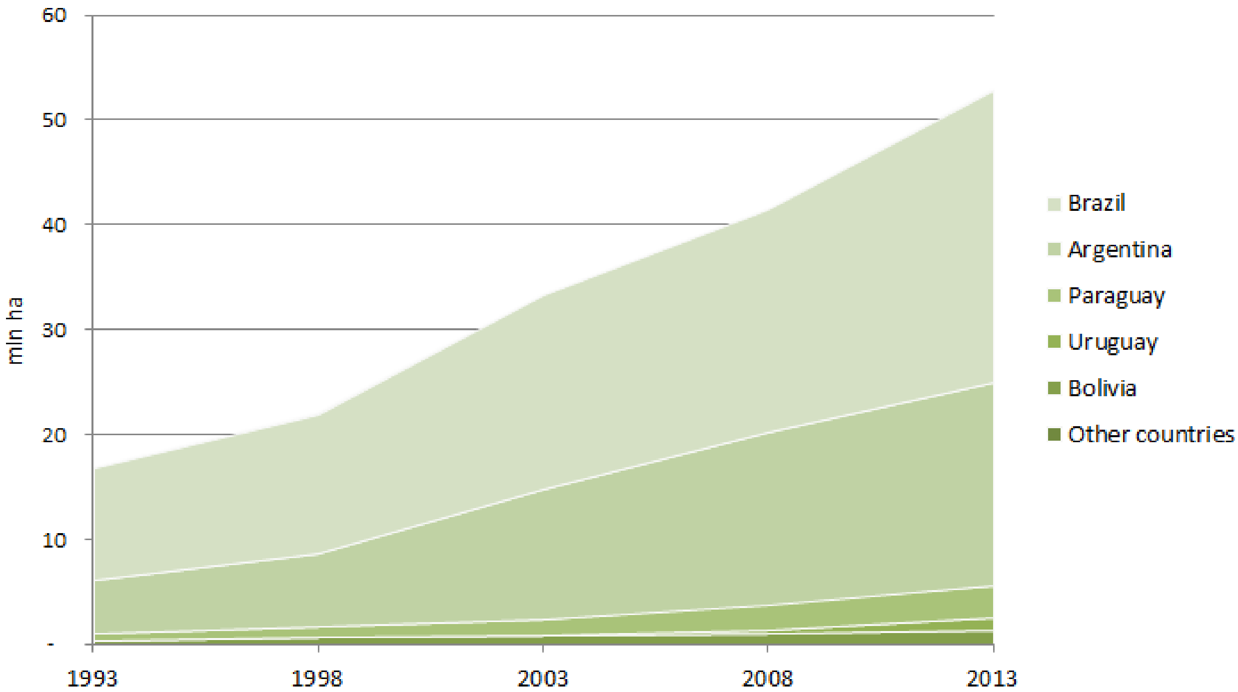
2.5.1 Deforestation and conversion of natural ecosystems

The massively increasing soy production surface in South America and directly connected economic activities as well as the displacement of other food crops are an important driver of deforestation and conversion of natural ecosystems.

Healthy ecosystems such as forests and wetlands provide a wealth of biodiversity and ecosystem services such as clean water, erosion reduction, flood control, crop pollination by animals, healthy soils, pest control, carbon storage, climate stabilization and products such as wood, honey, rubber and fruit. This is especially true for the highly biodiverse ecosystems in the South American Amazon rainforest, the wooded grasslands of the Cerrado and the Gran Chaco woodlands, which are home to many endemic and vulnerable species. Destruction and degradation of these ecosystems contributes to greenhouse gas emissions, further driving climate change. Forest loss accounts for up to 20% of global greenhouse gas emissions. On the local level, the WWF expects the change in the water balance in the Amazon to cause droughts and climate changes in the surrounding areas.[53] As the deciduous and tropical forests in South America are an important source of moisture, removal of the natural vegetation can have a significant impact on precipitation.[54]

Loggers and cattle ranchers were joined by soy producers in recent decades, speeding up destruction and further fragmenting the ecosystems. Soy is often found on deforested lands previously degraded by cattle, pushing pasture lands further into forests, thus indirectly fuelling deforestation.[55] The soybean cultivation area in South America grew from 17 million hectares in 1993 to 53 million hectares in 2013, mainly on land directly or indirectly converted from natural ecosystems. In the five years from 2008 until 2013 alone, the surface used for soybean production in South America grew by 38%.[56]

Figure 7 Development of soybean cultivation area in South America, 1993-2013



Source: FAO Statistics Division (FAOStat), “Production”, *Website FAOStat* (faostat.fao.org), viewed in August.

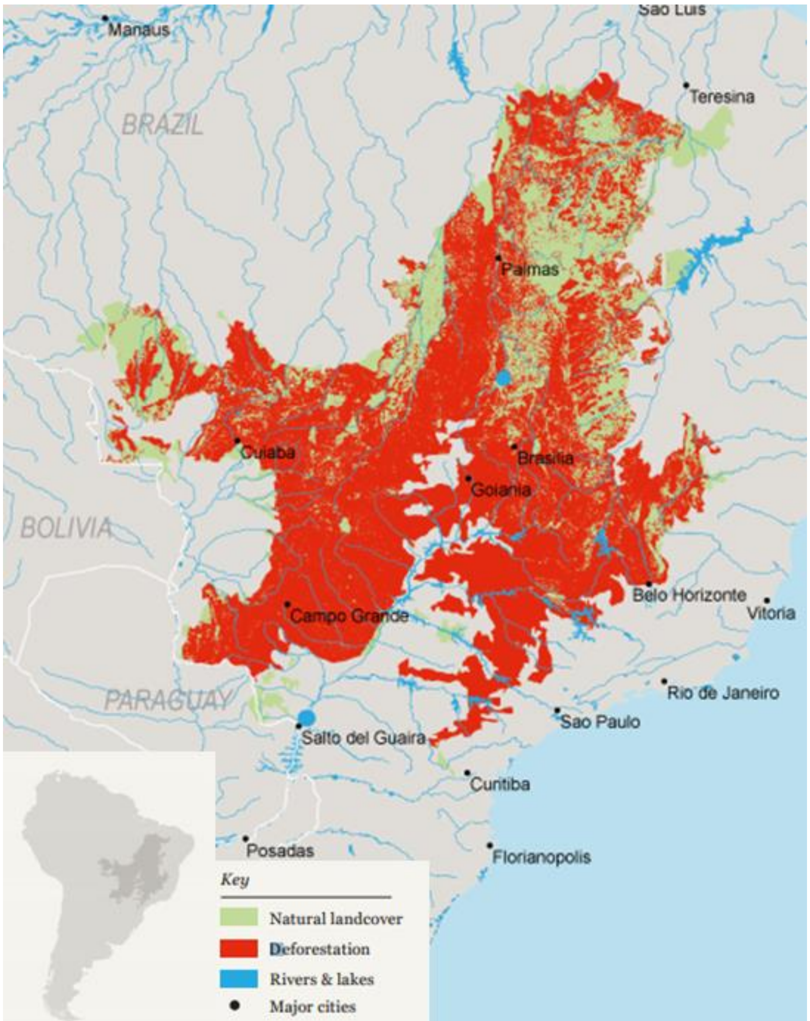
Clearing and converting natural ecosystems pays off for cattle farmers as there is likely going to be a soy farmer wanting to buy the now easier to plant land once the cattle raising operations moved on. In Brazil’s Mato Grosso state, clearing forest to create pasture was found to lead to a five-fold increase in land value, and upgrading the land to soy production doubles the price again.[57]

Recent evidence noticed a process of geographical and sectoral coupling in the soybean and cattle ranching sectors in South America due to ongoing value chain integration. This would mean that the two sectors increasingly share driving forces and actors. Coupled soy and cattle production frontiers instead of competing drivers in land use dynamics would also need to be considered in land use and conservation policies.[58]

Some examples of valuable ecosystems in the main soy production areas in South and North America directly or indirectly affected by the expanding soy cultivation are given below.

- **Cerrado savannas and Gran Chaco dry woodlands**
  While concerns over the massive impact of soy cultivation on the Amazon resulted in agreements aiming to limit soy-related deforestation in the Amazon Biome (see below), deforestation has in recent years also and increasingly taken place in areas surrounding the Amazon: in the Atlantic forests of Brazil, northern Argentina and Paraguay and the highly diverse savannah woodlands in the region: the Cerrado of Brazil (Figure 8) and the Gran Chaco forests of Argentina, Bolivia and Paraguay. These woodlands form the second biggest ecosystem on the American continent after the Amazon. While multiple factors have been driving forest loss, including agriculture, ranching, forestry, tree plantations and infrastructure development, the expansion of the soy cultivation area is often a key underlying cause.[59]

Figure 8 Deforestation in the Cerrado



Source: Brazil Ministry of Environment (Ministério do Meio Ambiente, MMA), In: WWF International, "The Growth of Soy: Impacts and Solutions", *WWF International,* Gland, 2014.

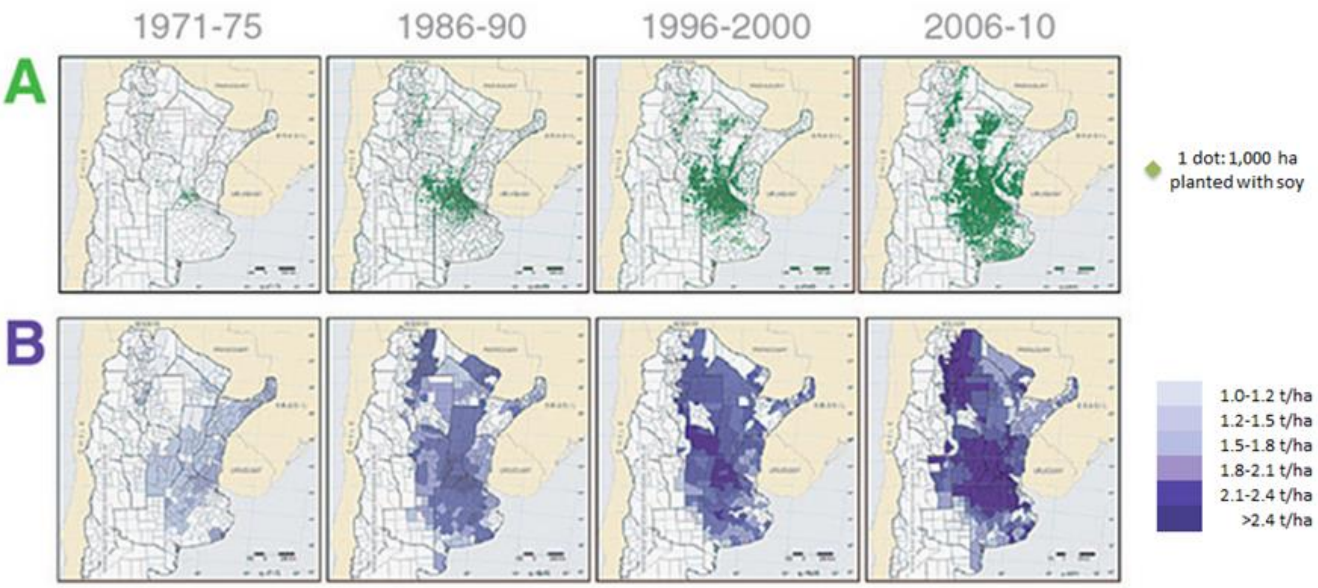
The Cerrado provides home to about 5% of the world's biodiversity and plays an important role as a source of water. However, new techniques allowed farming to expand rapidly in the last decades, with cash crops like soy, maize, cotton and sugar cane now being grown on vast areas. Soy is nowadays covering about 7% of the Cerrado biome. If conversion was to continue at 2004 rates, it is feared that this natural ecosystem could disappear within the next three decades.[60]

In the total Gran Chaco Americano, deforestation totalled 560,684 hectares or an average of 768 hectares per day during 2010 and 2011. In 2012, almost twice as much was deforested with 539,233 hectares, an average of 1,473 hectares per day.[61] 2013 showed a small decline to a total of 502,308 hectares deforested area in the Gran Chaco. Paraguay accounted for the largest amount with 236,869 hectares, followed by Argentina with 222,475 hectares, and Bolivia with 42,963 hectares.[62]

In Argentina, deforestation for agriculture, and then especially soy production, has seen a massive increase in the past two decades, fueled by growing global demand as well as the introduction of genetically modified soy under no-tillage system making cultivation in drier areas more viable.[63]

Forest loss in the Argentinian Chaco is estimated at 1.5-2.5% per year. Deforestation is concentrated mainly in the Northern provinces of Santiago del Estero, Salta and Chaco. Between 1998 and 2002, 618,500 hectares were lost here, about 79% of the total reported for Argentina, increasing to 1,057,600 hectares or 89% of the total deforestation in Argentina in the years from 2002 to 2006.[64] Figure 9 illustrates the rapid spread of soybean cultivation in Argentina during the last decades. Besides the growing cultivation area, especially in the central, north and north-western provinces, a strong increase in productivity can be observed during the same period of time.[65]

Figure 9 Expansion of soybean cultivation in Argentina, 1971-2010



Source: Viglizzo, E.F., "El Noroeste Argentino, ¿una encrucijada ambiental?", *Instituto Nacional de Tecnología Agropecuaria (INTA)/ Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET)*, 2013.

- **Brazilian Amazon**

  The spread of soy cultivation in the Amazon Biome, especially in Mato Grosso state, was seen as one of the key drivers of the rapidly increasing deforestation in the Amazon until eight years ago. In July 2006, ABIOVE (Brazilian Vegetable Oil Industry Association) and ANEC (Brazilian Grain Exporters Association), and their respective member companies reacted to public pressure, pledging to no longer trade and finance soy originated from deforested areas within the Amazon Biome. This initiative, known as the ‘Soy Moratorium’, seeks to reconcile environmental preservation with the region's economic development, through the responsible and sustainable use of Brazil's natural resources. Besides ABIOVE and ANEC, other participants of the Soy Working Group negotiating the moratorium include the Ministry of the Environment (MMA), Banco do Brasil and civil society organisations (International Conservation, Greenpeace, IPAM, TNC and WWF-Brazil).[66] The Soy Moratorium was renewed several times, for a final year in February 2014.[67]

  The monitoring of the Soy Moratorium during its first five years until 2011 suggested that it was effective, as soybean cultivation was found to only have a small contribution to deforestation in the Amazon Biome during this time (18,410 hectares deforested for soybean cultivation or 0.41% of the total deforestation).[68] However, concerns over the indirect contribution of the soy cultivation to further deforestation remained.

  In 2011, the Amazone Biome had seen the lowest overall deforestation rate since the start of documentation (1988).[69] However, a new deforestation record was reached in August 2012: 522 km^2 or 220% more than in the same month a year earlier (163.8 km^2). Rates were especially high in two of the nine monitored states: Pára en Mato Grosso. For the full year of 2012, an increase in Amazon deforestation by almost one third compared to the previous year to 5,800 km^2 was reported, reversing a decade-long trend of better protection of the rainforest.[70]

  Various factors are seen as direct and indirect drivers of deforestation in the Amazon, including the rising global demand for meat, high prices for soy on the world market, ongoing development of infrastructure projects and the controversial reform of the Brazilian forest code in 2012.[71]

  Currently the members of the Soy Working Group are working on a new agreement to replace the Soy Moratorium. It remains to be seen in how far concerns over soy indirectly fuelling deforestation in the Amazon will be accounted for and what enforcement strategies will be implemented.

  ABIOVE admitted that soybean production and soybean-related deforestation will probably grow from 2015, expecting it to become responsible for 2% of deforestation in the Amazon biome. Expansion is seen as most likely along the BR-163 road that connects Mato Grosso with ports on the Amazon River.[72]

- **Wetlands of South America**
  The drainage of large areas of wetlands for the conversion to agricultural use and especially soybean cultivation can be observed in Argentina, Brazil, Paraguay and Bolivia. In parts of the Argentinian Cordoba province, for example, wetland loss has reached 42% due to drainage. Intensive agricultural use leads to soil erosion and associated sediment deposition in low areas, streams or other water runoff pathways. The loss of ground cover results in loss of biodiversity and changes in water balance. Inadequate and excessive use of agrochemicals carries a high risk of water contamination, affecting water quality, wildlife and fisheries, and ultimately affecting local communities and their sources of income, such as traditional fisheries and beekeeping.[73] The problem of soil erosion and nutrient depletion is of special concern in Argentina, as farmers commonly lease land under short term contracts of only one or two years, providing them with less incentive to maintain soil quality than on own land.[74]

  In Argentina, where nowadays 60% of the cultivated area of the country is accounted for by soybean, the large-scale soybean cultivation was found to lead directly to the disappearance of valuable wetlands and indirectly to their degradation and the loss of connectivity and associated biodiversity. Traditional land use is pushed to other areas, such as wetlands. This can, for example, be observed in the Parana Delta, where soy cultivation led to the displacement of around one million cows from the surrounding Argentina Pampas.[75]

  The Pantanal is an important ecosystem in Brazil, Paraguay and Bolivia. It is the largest fresh water wetland worldwide with a key function in water regulation of the Paraguay and Parana Rivers, not only in Brazil but also downstream; a wide variety of flora and fauna and endangered species can be found in this area. The main threats to the protection of the Pantanal are the expansion of agri-commodities (soy, sugarcane), mining, waterway construction (Hidrovia Paraguay Parana), forest plantations and the construction of a large number of small dams.

  A recent study shows that in the Bacia de Alto Paraguai (BAP), an area of direct influence to the wellbeing of this vulnerable wetland, soy production in the state of Mato Grosso increased by 33% (1.2 million hectares to 1.6 million hectares) and 39% (0.6 million hectares to 0.9 million hectares) in the state of Mato Grosso do Sul between 2002 and 2012. The expansion of soy production is being accompanied by infrastructural developments such as the renewed effort to construct the controversial Paraguay-Paraná waterway to facilitate the export to China and Europe.[a]

  Besides the resulting loss of valuable ecosystem functions, these developments also affect the services that wetlands provide to society, including for example decreased intensity of the effects of flooding on neighbouring ecosystems, the availability of potable water, and the production, retention and fixation of sediment and pollutants, which in turn improves water quality.[76]

- **Northern Great Plains of North America**
  In the United States and Canada, the temperate grasslands of the Northern Great Plains form a highly biodiverse ecoregion which is under threat from various influences, especially the dramatic increase in land surface used for soybean and maize cultivation and the realization of energy and infrastructure projects.

a A study by Sergio Schlesinger is expected to be published by the end of October 2014. The study can be obtained through the Dutch Soy Coalition.

The monitoring of longer-term land cover trends in the U.S. found that rates of grassland conversion to soy and maize were comparable to tropical deforestation rates in the 1980s and 1990s. A further expansion of the cultivation area in the Great Plains would put the remaining fragments of tallgrass prairie at risk.[77]

2.5.2 Resource consumption

Intensive soy cultivation consumes large amounts of resources like water, soil, fuel, fertilizers and pesticides. Through the disappearance of vegetation, erosion and drying out of soils the land loses fertility. This is in turn compensated by applying artificial fertilizers. The expansion of soybean cultivation contributed significantly to the increased global demand for phosphorus fertilizer. Phosphorus is especially needed when growing crops on marginal lands with low fertility. For example, its application significantly enabled the expansion of soy cultivation in the Brazilian Cerrado. However, phosphorus is a finite resource which is of key importance to sustain overall food production and security.[78]

The sheer scale of the monoculture increases the ecological vulnerability, leading to growing problems with pests such as the stem borer and diseases such as soybean rust.[79] The observed significant increase in the application of pesticides goes along with growing negative impacts on ecosystems, water quality and human health and creates new challenges for farmers through the rapid spread of herbicide-resistant 'superweeds' (see section 2.5.4).

2.5.3 Social consequences

The expansion of the soy frontier is more than simply a change of land use: it is a basic transformation involving new technologies (zero-tillage techniques), new power relations (large agribusiness companies taking control), and a shift from labour-intensive to capital-intensive production regimes, and is being accompanied by new dependencies (the reliance on a small number of firms that provide agrochemical packages and patented seeds).

Some examples of the socio-economic problems connected to the large-scale soy cultivation in South America are described below.

- **Unequal distribution of economic benefits**
  Increasing concentration in land ownership and land degradation due to monoculture cultivation carry significant negative consequences for food security, employment and the more diverse family farming as local, varied food production is replaced.[80] While median rural incomes are found to increase due to few stakeholders benefitting, the majority of the rural population is being left behind and faced with increased inequality.[81]

  The local communities are partly dependent on the materials and foods that the forests provide. Deforestation decreases the habitat of the indigenous population and thus the cultural diversity.[82] The growth of soybean production brings the local food supply at risk, as land that was formerly used for growing a mix of maize, rice, oats and beans is now solely used for the cultivation of soy for export markets.[83]

  The Brazilian NGO Repórter Brasil reports increased suicide rates, malnutrition among children and murders of community leaders among the Guarany Kaiowá group in Mato Grosso do Sul due to the soy and sugarcane occupation of their ancestral lands.[84] Eventually the displacement of local communities also leads to a loss of information on the sustainable management of forests.

Incidentally forced labour for the cultivation of soy is reported as workers have to repay alleged ‘advances’. The work carried out is often temporary, under poor working conditions and only concerns the removal of forests and savannahs for the cultivation of new soybean fields.[85] The so-called ‘Slave labour laundry list’ based on information published by the Brazilian government as part of the ‘Pact to Eradicate Slave Labour’ lists a dozen soy farms accused of using slave labour.[86]

Production is mainly in the hands of large companies, while small family businesses have to give way. Due to the heavy mechanization, employment on the large-scale farms is eventually small. On a modern farm, one or two jobs are available to work 400 hectares, while small-scale agriculture on the same area of land provides work for 80 people. Low-skilled workers and small farmers who have sold their land to soy producers move to the city where there are few suitable jobs for them.[87]

While efficient cooperative systems in some areas allow smallholders to compete, soybean cultivation in North and South America is mostly conducted by large farmers and companies, often putting smallholders at a disadvantage.[88]

- **Land concentration and land grabbing**
  New technologies and increased mechanization allow the farming of large areas of land with just one crop. In Argentina, a drastic reduction in the number of farms has been observed in the key soy cultivation areas on the Pampas since the beginning of the soy boom. Rural depopulation goes along with a decrease in the number of farms, while at the same time an increase in farm size and concentration of land holding can be observed. In the Pampas region, the number of farms was found to have plunged by 42% in the two decades from 1988 to 2008. Overall, the largest farms - with 10,000 hectares or more - only accounted for 0.9% of total farms but controlled almost 36% of landholdings in 2009.[89]

  The rapid expansion of the soy frontier increases pressure on the land, leading to speculation; it is also seen as a manifestation of land grabbing.[90] It exacerbated illegal deforestation, land seizure from local communities and land tenure conflicts. Farmers or small communities without title deeds have difficulties to fight for their rights. Government agencies are missing the means, or more frequently show a lack of political will to monitor land use or are involved in giving away public land.[91]

- **Health implications**
  The large-scale use of pesticides and fertilizers involves health risks for the population as the groundwater and surface water is polluted and aerial spraying reaches nearby communities.

  According to the Brazilian Association of Collective Health (ABRASCO), the use of pesticides increased by 42% in the period from 2002 to 2011 (from 599.5 to 852.8 million liters), and that of fertilizers by 37% (from 4.9 to 6.7 million tonnes). Also the use of pesticides per hectare has gone up in that period, with the leading soy producing states also consuming the largest shares.[92] Various foods in Brazil exceed the authorised maximum of pesticide residues. A study in Mato Grosso found increased levels of pesticides in breast milk.[93]

Also in Argentina, the increase in the large-scale cultivation of soybeans went along with a steep increase in agrochemical use (see section 2.5.4).[94] Dozens of cases were documented where pesticides are applied in ways unanticipated by regulatory science or specifically banned by existing law. The spray is found to drift into schools and homes and contaminates water sources. Health experts have warned that uncontrolled pesticide applications could be the cause of growing health problems in the agricultural areas of the country, pointing to two- to four-fold increases in cancer rates in comparison to the national average and significantly increased rates of birth defects.[95]

2.5.4 Genetically modified soy

The first genetically modified (GM) soy was planted in the United States in 1996. Since that time the area of GM soy (namely Monsanto's so-called RoundupReady soy which is resistant to the herbicide glyphosate, such as the company's own Roundup) has increased to an estimated 84.5 million hectares in eleven countries worldwide in 2013. In the major soy producing countries, the United States, Argentina and Brazil, the majority of the soy crop is today genetically modified, reaching 93% in the United States and 99% in Argentina.[96] Officially, Brazil has only started cultivating GM soy in 2005. Since then its share has increased rapidly, with estimations of the share in 2013 ranging between 75% and 85% of the total soy acreage.[97] Other countries cultivating GM soy on a smaller scale include Canada, Bolivia, Chile, Costa Rica, Mexico, Paraguay, Uruguay and South Africa.[98]

The introduction of GM soy and other GM crops has led to heated debates between supporters and opponents. Agribusiness claims that these crops allow more efficient farm operations, produce higher yields and reduce pesticide use. Civil society organisations and other opponents on the other hand doubt these benefits or see them connected to problematic trade-offs. For example, the use of herbicide-resistant GM crops made farm work more efficient as mechanical cultivation and spot spraying are no longer required. However, the new cultivation system has driven the consolidation of monoculture farming at larger scale.[99] GM accelerated deforestation as it facilitated expansion into areas previously not suitable for agriculture, for example in Northern Argentina.[100] Also, there is an increased dependency of farmers on seed and chemical supplies from a small number of companies.[101] A few large companies hold a monopoly position in this market, providing both the seeds modified to be resistant to a particular pesticide as well as the pesticide in question.

There are concerns about a number of potential unintended health and environmental impacts of GM crops, like negative effects on beneficial insects, weed tolerance, new allergens and toxins.[102] Another major concern is the spread of harmful traits to weeds and non-GM crops.[103] However, this risk is comparatively small for soybeans as they are self-pollinating.[104]

The increased use of agro-chemicals that accompanied the widespread adoption of herbicide-tolerant GM-crops is already reality. Herbicide-resistant seeds like GM soybeans allow farmers to widely spray fields with pesticides to kill any weeds that might compete with the crops, in the case of soybeans this is glyphosate. Even though the seeds are more expensive, farmers were enthusiastic as the system saved time, made weed control easier and the so-called no-till technique not requiring the plowing of fields was praised to reduce soil erosion. However, after a temporary reduction, the planting of GM soy was found to noticeably increase overall pesticide use and thus increase costs for farmers. It also prompted the return to the use of the original and more toxic chemicals such as 2,4-D as so-called 'superweeds' developed. For the U.S. alone, it was estimated that herbicide-resistant soy increased herbicide use by 167,300 tonnes in the period from 1996 to 2011. 2,4-D-use initially declined after glyphosate was widely adopted on soybean, maize and cotton, but increased since glyphosate-resistant superweeds proliferated, growing by 90% between 2000 and 2012. For the United States alone, it is being estimated that 24 million hectares have been infested by these herbicide-resistant weeds by 2013.[105]

Research in Brazil also raised concerns about soybean seed quality being negatively affected by the application of glyphosate at high rates. In addition, there is the potential that increases in glyphosate rates at certain stages of development can negatively affect yields.[106]

A direct influence of the use of non-GM versus GM soy on social (people) and financial-economic (profit) indicators can hardly be established. This was also found for land right conflicts in Argentina, which are fuelled mainly by the large-scale expansion of farms. However, the conclusions depend in part on the specific situation in various countries.[107] While GM soy facilitated cultivation into areas previously not suitable for agriculture, the general move towards large-scale farming would probably also have occurred with conventional soy varieties.[108]

So far GM soy and other modified crops have neither delivered on solving production challenges or yield constraints faced by poor farmers nor have yields in high-tech farming been found to have increased.[109] This has also been confirmed in a recent review by the U.S. Department of Agriculture, which states that GM seeds have not shown to increase yield potentials of the varieties.[110]

Chapter 3 Soy in the Netherlands

3.1 Import, export and crushing

3.1.1 Trade

The Netherlands is a key intersection in the European soy value chain, playing an important role in both trading and processing of soy. The domestic harvest is still negligible (see section 2.3.2). About one fourth of European soy imports are entering through the ports of Rotterdam and Amsterdam. The Netherlands is importing soybeans predominantly from Brazil and the United States, accounting for 38% and 31%, respectively. Soymeal mostly originates from Brazil (62%) and Argentina (33%). The amount of soyoil imported from non-European countries of origin is insignificant. Within the European Union, Belgium and Germany are the most important suppliers of soy products to the Netherlands. However, also this soy is originally sourced from North and South America.

Table 4 provides an overview of the countries of origin of Dutch soybean, -meal and -oil imports. In addition, the area used to harvest these amounts of soy in the countries of origin is calculated (see Appendix 1 and Appendix 2 for calculation method).

Table 4 Volume of Dutch soy imports and required area (2013) (productivity figures)

Country of origin	Soybeans		Soymeal		Soyoil		Total soy	
	1,000 tonnes	1,000 ha	1,000 tonnes	1,000 ha	1,000 tonnes	1,000 ha	1,000 tonnes	1,000 ha
United States	990	360	0.2	0	-	-	990	360
Canada	380	138	-	-	-	-	380	138
Argentina*	-	-	1,209	331	-	-	1,209	333
Brazil	1,201	437	3,437	947	0	0	4,638	1,384
Paraguay	370	134	-	-	-	-	370	134
Uruguay	187	68	-	-	-	-	187	68
EU-28	42	15	288	79	65	43	394	138
Ukraine	10	4	-	-	-	-	10	4
China	3	1	36	10	-	-	39	11
India	1	0	22	6	-	-	23	7
Other countries	1	0	2	1	37	25	40	26
Total	**3,185**	**1,158**	**4,994**	**1,375**	**102**	**69**	**8,281**	**2,602**

* (partly) estimated;
Note: including intra-EU trade. Calculation of surface based on average productivity in key producing countries.

Source: ISTA Mielke, "Oil World Annual 2014". *ISTA Mielke*, Hamburg, May 2014; European Statistical Office (Eurostat), "EU Trade", *Eurostat* (epp.eurostat.ec.europa.eu/), viewed in June 2014; own calculations.

As can be taken from Table 4, the Netherlands imported a total of about 8.3 million tonnes of soy (beans, meal and oil) in 2013. For the harvest of this soy, an estimated 2.6 million hectares were required. This equals almost 80% of the land surface of the Netherlands. In comparison with 2008 (the basis of the Soy Barometer 2009), the total import of soy and soy products decreased by about 4%. The decrease in surface is more significant with 18%, caused by smaller imports, a higher productivity in the main producing countries, and an adapted methodology to calculate the yield, putting more importance on the specific yields in main countries of origin of Dutch imports.

Notable are the comparatively small imports from the United States, considering the role of the country as the largest soy producer in the world. This can partly be explained with price differences, but also with the fact that the EU has not provided approval for the placing on the market of some GM-soy events which are cultivated in the U.S.[111]
It can also be observed that the Netherlands imports more soymeal than soybeans. This is connected to EU operators increasingly importing soymeal rather than -beans, and the European soy crushing capacity remaining stagnant.[112] Also the use in food products of soyoil resulting from the crushing of GM-soybeans is marginal still due to low consumer acceptance. At the same time especially Argentina has significantly increased crushing capacity and supports the export of soymeal.

The four most important globally operating companies active in trading and processing soy are also known as the so-called ABCD-traders: Archer Daniel Midlands (ADM), Bunge, Cargill and Louis Dreyfus. In the Netherlands, Dutch player Cefetra, Brazilian company Amaggi and Dutch-Chinese Nidera are operating as traders.

- The U.S.-based *Archer Daniels Midland (ADM)* is involved in trading agricultural commodities as well as processing oilseeds, maize, wheat and cocoa and producing food ingredients, animal feed and feed ingredients, and biofuels. ADM is one of the leading soy exporters out of Argentina, Brazil, Paraguay and Bolivia and has more than 270 processing facilities worldwide, among which a soy crushing facility in Rotterdam.[113]

- *André Maggi Group (Amaggi)* focuses on buying and selling grains and related activities like processing, transport, seed propagation, and sale of fertilizers and pesticides. The company has various own soy farms in the Brazilian state of Mato Grosso and operates three soy crushing facilities in the country, two in Mato Grosso and one in Amazonas. It also pertains over 40 storage facilities with a total capacity of 2.5 million tonnes. Internationally, Amaggi is represented with sales offices in Argentina, the Netherlands (Amaggi Europe), Norway and Poland.[114]

- *Bunge* is another U.S. company which is internationally engaged in growing, processing and trading soy, rapeseed, wheat, maize, sunflower and other crops. Bunge is supplying farmers as well as the food industry with products and services and is producing oil and margerine for the consumer market. In Europe, it is one of the leading soybean processors with plants in, among others, Germany, Italy, Spain and Portugal.[115] In the Netherlands the company is present with offices in Rotterdam.

- The privately-owned U.S.-company *Cargill* is the largest trader of agricultural commodities in the world.[116] The company is operating globally in supplying food ingredients and services for farmers, varying from fertilizers, salt and steel products, grains and oilseeds and other crops to risk management and financial solutions. Cargill is one of the leading soy traders and crushers in South America and also a very important processor and trader of soy on the European market. The company owns soy crushing plants in Belgium, France, Italy, the Netherlands (Amsterdam), Spain and the United Kingdom.[117]

- *Cefetra* supplies raw materials to the animal feed industry (90% of its activities), the foodstuffs industry, the crush and starch industry, and the biofuel sector, including biomass in the Netherlands. Since 1 January 2013, Cefetra is owned by German trading and logistics group BayWa.[118] Besides the Netherlands, Cefetra has offices in Hungary, Ireland, Poland and the United Kingdom. Cefetra is a leading supplier of raw materials for the animal feed sector in Northwest and Central Europe and an important player in the Netherlands.[119]

- The French *Louis Dreyfus Group* is one of the leading traders in agricultural commodities globally through its subsidiary Louis Dreyfus Commodities. Louis Dreyfus operates its own shipping fleet with more than 170 vessels. Louis Dreyfus is present in South America with origination, logistics, shipping and processing activities, including ten crushing plants, five in Brazil, three in Argentina and two in Paraguay.[120]

- *Nidera*, based in the Netherlands, is internationally active in the sourcing, trading and marketing of agrarian and bioenergy products and services. Nidera has processing facilities and structures mainly in Argentina and Brazil and port terminals in Argentina, Brazil, Europe and the United States.[121] In February 2014, Nidera and Chinese state-owned COFCO Corporation announced a strategic partnership, with COFCO acquiring a 51%-stake in Nidera.[122]

3.1.2 Crushing and processing

The Netherlands counts two major soy crushing plants: a facility of ADM in Rotterdam and a facility of Cargill in Amsterdam.[123] Of the soybeans imported to the Netherlands in 2013, 2.4 million tonnes (76%) have been crushed in these plants and 549,000 tonnes have been exported directly, predominantly to destinations within the EU. The remaining soybeans are used in food products or animal feed. A large share of the soymeal and soyoil becoming available in the Netherlands (through direct import or the crushing of soybeans) have been exported, totalling 4 million tonnes of soymeal and 491,000 tonnes of soyoil. Most important destinations are Germany and Belgium, followed by the UK, Denmark and France.

Table 5 Dutch soy-exports per destination (2013)

Destination country	Export soyproducts (1,000 mt)			
	Soybeans	Soymeal	Soyoil	Total
Austria	3	161	1	165
Belgium	119	1,064	90	1,272
Denmark	-	233	-	233
France	2	225	13	241
Germany	373	1,746	75	2,193
Hungary	-	82	-	82
Ireland	5	8	23	36
Lithuania	-	47	-	47
Poland	2	126	10	138
United Kingdom	39	494	112	645
Other European countries	3	148	12	163
non-European countries	4	45	154	204
Total	**549**	**4,379**	**491**	**5,419**

Note: including intra-EU trade;
Source: ISTA Mielke, “Oil World Annual 2014”. *ISTA Mielke*, Hamburg, May 2014; European Statistical Office (Eurostat), "EU Trade", *Eurostat* (epp.eurostat.ec.europa.eu/), viewed in June 2014.

In the Netherlands, more than 100 companies are trading in edible oils, fats and oilseeds. Most of them are organised in the *Netherlands Oils, Fats and Oilseeds Trade Association (NOFOTA)*.[124] As most of the companies do not publish detailed business figures it is difficult to determine which ones are the most important players in the Dutch soy trade based on absolute volumes.

3.1.3 Available soy

In total, 8.3 million tonnes of soybeans and -products were imported into the Netherlands in 2013. After crushing part of the beans and exporting of part of the soy-products, 227,000 tonnes of beans, 2.5 million tonnes of soymeal and 125,000 tonnes of oil were available in the Netherlands for further use (see Table 6).

Table 6 Soy available for use in the Netherlands (2013)

Soy products (1,000 tonnes)	Import	Crushing	Result of crushing	Export	Losses & changes in stock	Available for use in the Netherlands
Beans	3,185	2,409	-	549	60	227
Meal	4,994	-	1,879	4,379	12	2,494
Oil	102	-	470	491	-45	125
Total	**8,281**	**2,409**	**2,349**	**5,419**	**28**	**2,846**

Source: ISTA Mielke, "Oil World Annual 2014". *ISTA Mielke*, Hamburg, May 2014; European Statistical Office (Eurostat), "EU Trade", *Eurostat* (epp.eurostat.ec.europa.eu/), viewed in June 2014.

The different sectors involved in the use and processing of soybeans, -meal and -oil in the Netherlands are further described in the following sections.

3.2 Livestock

3.2.1 Overview

The livestock sector is by the far the largest sector dealing with further processing of soy products in the Netherlands. Soymeal, and to a lesser extent, soybeans and soyoil are used as ingredients for animal feed for pigs, chickens (laying hens and broiler chickens), cows (dairy and meat cows) and other animals. The livestock sector distributes the final products to slaughterhouses, dairy factories and egg collectors. The products are partly exported after processing, partly distributed to retailers and the hotel and catering industry, and finally further processed to snacks, instant meals and bakery products.

3.2.2 Livestock feed production

The livestock feed industry in the Netherlands purchases most of the required soymeal for the production of feed from international traders (see sector 3.1.1). In the Netherlands, more than 100 companies are active in the livestock feed industry, of which the majority is producing compound feed. A few companies are privately-owned but most companies are cooperatives and thus owned by their customers. The animal feed industry is the third largest segment of the Dutch agri-food industry, after the dairy industry and the slaughterhouses and the meat-processing industry.[125]

According to the European Feed Manufacturers' Federation (FEFAC), which receives its figures from the national animal feed associations like Nevedi (the Dutch Feed Industry Association, representing 95% of the total feed production for livestock in the Netherlands), the amount of livestock feed produced in the Netherlands reached 13.6 million tonnes in 2013, a decrease by about 2.2% from the 13.9 million tonnes reported in 2012. The production figures are broken down for different types of compound feed.[126]

The agro-economic research centre LEI researched average shares of soybeans, -meal and -oil in different animal feeds for the years 2011 until 2013 based on a survey among key players in the industry.[127] Applying these average shares of soy products in different compound feeds as well as estimates for additional use of soymeal as single feedstuff to the Dutch production volumes of these feeds as reported by FEFAC, this results in an estimated consumption of about 1.7 million tonnes of soy products in the Dutch compound feed industry in 2013, with soymeal accounting for 1.6 million tonnes.

However, trade statistics point to a higher consumption of soy products by the livestock industry. As there are no other relevant industries processing soymeal, it can be assumed that all soymeal available in the Netherlands is processed into livestock feed. In addition to the 2.5 million tonnes of soymeal available in the Netherlands, it is being reported that 85,000 tonnes of soybeans and 26,000 tonnes of soyoil were used in mixed feeds.[128]

One possible explanation for the resulting gap of about 459,000 tonnes of soy products might be that trade statistics, on which the calculations in Table 6 are based, are underestimating Dutch soy exports to other EU-countries. The Netherlands is a key transit location for European soy imports and certain error margins in trade statistics have to be taken into account. An estimate has thus been made for the impact of direct purchases of raw materials from traders through farmers and of intra-EU trade under the threshold (2% of soybean and -meal exports, 99,000 tonnes). In the calculation of the domestically available soy it has been considered that a certain amount of soy is also exported in compound feeds from the Netherlands. According to a LEI estimate, 5% of compound feeds are exported.[129] As no details on the composition of exported compound feeds are available, it has been assumed that the same average content of soy products applies as in Dutch consumption in recent years (12%, 81,000 tonnes).[130]

Another possible explanation could be that solely relying on data provided by players in the animal feed industry - as LEI is doing - carries the risk that the average amounts of soy used in feeds may be somewhat different when looking at the overall market. Also it is difficult to double-check the data provided by companies as these are not publically available or independently verified.

It will not be possible to find a complete explanation for the differences in the resulting amount of soy being consumed in the Netherlands. Taking the position that industry production statistics are less transparent than officially-checked trade statistics, it is unlikely that errors in intra-EU trade statistics are the sole explanation for the gap in the consumption figures for the Netherlands. As there is no other use for soybean meal, the remaining difference cannot be attributed to any other production category.

Other possible explanations are either a higher share of soy-products in animal feed; or an underestimate in the Dutch consumption of soymeal in animal feed and as single feedstuff. In order to synchronize the results from this research with the figures from the LEI on the soy content in various forms of animal feed, the assumption was made for the Soy Barometer that the volume of animal feed consumed is actually higher than is indicated by the FEFAC figures. This would be a plausible explanation why the use of soymeal for compound feed in the Netherlands is higher than suggested by the average soy percentages of LEI in combination with the Dutch animal feed production volume. Therefore a multiplication factor for the animal feed production in the Netherlands is used for the purpose of this analysis.

To calculate the multiplication factor it is assumed that the remaining 753,000 tonnes of soymeal available in the Netherlands is partly processed in livestock feed or as single feedstuffs and partly directly exported. A part of the 165,000 tonnes of soybeans that could not be assigned to any other product group is also assigned to livestock feed. This process results in a multiplication factor of 1.27 for the amount of livestock feed consumed in the Netherlands in 2013, and thus an estimated Dutch feedstock consumption volume in 2013 of 17.3 million tonnes (see Table 7).

The soy content in feed differs between different livestock, depending on the specific needs of the animals. Generally, the soy share is highest in compound feeds for broilers and laying hens. Fluctuations in feed composition between years can, within certain boundaries, be influenced by availability and prices of protein crops like soy and rapeseed. See Table 7 for further information on the soy used in livestock feeds. Hulls used in feed are not being separately considered as their role as a commodity is negligible. In addition to the soy content in compound feeds, the use of soymeal as single feedstuff has been considered. This is mostly relevant for pigs, dairy cows and laying hens.

Table 7 Soy in different livestock feeds in the Netherlands (2013)

Livestock feeds	Livestock feed production (1,000 mt)	Soy content (%)[a]			Soy product in livestock feed (1,000 mt)[b]			
		beans	meal	oil	beans	meal	oil	total
Pigs[c]	6,427	0.2	7.6	0.5	3	565	30	598
Dairy cows	3,605	0.0	9.9	0.2	2	418	8	427
Cattle[d]	1,888	0.0	7.6	0.1	0	144	1	145
Broilers	2,172	2.1	22.2	1.2	46	484	26	556
Laying hens	2,600	0.4	12.9	0.3	10	354	9	373
Other	592	0.0	6.2	0.3	0	37	2	39
Total	**17,285**				**61**	**2,002**	**76**	**2,138**

[a]based on average shares for the years 2011 to 2013; [b]including soymeal as single feedstuff; [c]based on relative soy shares in sow, piglet and fattening pigs feed; [d]including milk replacer and part of reported dairy feed attributable to young calves/old cows; Source: Calculation by Profundo based on: Hoste, R., *LEI,* August 2014; FEFAC, "Industrial compound feed production 1989-2013", *FEFAC*, June 2014.

3.2.3 Poultry meat

The Dutch poultry sector includes turkeys, geese, ducks, guinea fowls and chickens (broiler and laying hens). Broiler chickens are kept for the meat and laying hens for the production of eggs. As can be seen in Table 7, broiler chicken feed contains the highest share of soy out of the entire livestock sector.
The gross production in the poultry sector in the Netherlands reached about 920,000 tonnes in 2013, with an average annual domestic consumption of 22.3 kilo per capita.[131]

3.2.4 Pork meat

More than half of the Dutch meat consumption is accounted for by pork. The livestock feed for pigs contains the second highest percentage of soy. In 2012, the Dutch sector counted 5.9 million pigs and 14.3 million slaughterings. This resulted in a production of 1.33 million tonnes of pork meat plus imports totalling 252,300 tonnes. A total of 897,500 tonnes was exported, resulting in a domestic consumption of 685,900 tonnes or 41 kilo per capita and year.[132] For 2013, a reduction in production by about 1.9% was reported, resulting in a production of 1.3 million tonnes.[133]

3.2.5 Beef and veal meat

The Dutch cattle farms are focused on milk, but also produce high quality meat. In 2012, there were 2.3 million cows older than a year and 908,000 calves. Including significant imports of live calves, a total of 1.4 million calves and 510,000 cows were slaughtered. Considering import and export of beef and veal meat, the total consumption of beef amounted to 277,000 tonnes and the veal consumption was 24,700 tonnes. Per capita consumption reached 16.6 kilo of beef and 1.5 kilo of veal. [134] For 2013, an increase in slaughtered weight by 1.5% was reported, resulting in a production of 363,000 tonnes.[135]

3.2.6 Eggs

The total egg production (considering eggs for consumption as well as eggs used in processed products) in the Netherlands was 10.4 billion, of which the largest share was exported (7.1 billion). The total export of eggs reduced in comparison to previous years due to Germany, the largest distribution area for Dutch eggs, expanding its own production. Net domestic consumption came to 3.3 billion eggs or 198 eggs per capita.[136]

3.2.7 Dairy

Most of the produced milk is distributed from the farms to the dairy industry where it is processed into different dairy products. Besides drinking milk and other fresh milk products, large amounts are processed into butter, cheese, milk powder and other products. The Dutch dairy industry consists of 50 dairy factories of which 25 are part of the FrieslandCampina Cooperation. In 2012, a total of 11.8 million tonnes of milk was available in the Netherlands, considering imports, exports and stocks.[137]

For 2013, an increase in milk production of 4.6% is being reported or an estimated total of 12.4 million tonnes, caused by a number of reasons, with key motivations for keeping milk cows longer before slaughtering being a high milk price and preparation for the abolition of the EU milk quota in 2015. The largest part of this production increase was destined for export, mostly to non-EU countries.[138] The Netherlands exports large volumes of dairy products, with cheese, butter and skimmed milk power being the most important export products. Per capita consumption of milk, including milk processed in various dairy products, reached an estimated 380kg in 2013.

3.2.8 Production, consumption and export

The largest share of the Dutch livestock products are exported abroad. With the export of these products, soy indirectly leaves the country (soy used to produce these products). Table 8 shows the production, net export and consumption of livestock products in the Netherlands in 2013.

Table 8 Production, net export and consumption of livestock products in the Netherlands (2013)

Product group	Production	Net export	Consumption
Cattle and meat (1,000 mt slaughtered weight)			
Cattle & beef	363	61	302
Pigs & pork	1,780	1,094	686
Poultry & -meat	920	543	377
Other cattle & meat	150	100	50
Eggs and egg products (millions)	10,400	7,100	3,300
Dairy products (1,000 mt)			
Consumption milk	548	-76	624
Consumption milk products	783	34	748
Cheese	799	552	248
Butter and butter oil	204	155	49
Condensed milk	388	181	207
Milk powder	196	109	87
Other dairy products*	1,678	-325	2,003

* including whey/whey products, fermented products (yoghurt etc.), lactose/lactose syrup etc.;
Source: Product Boards Livestock, Meat and Eggs (PVE), "Livestock, Meat and Eggs in the Netherlands, Annual Survey 2012", *PVE*, 2013; Product Boards Livestock, Meat and Eggs (PVE), "Verzorgingsbalans Totaal pluimvee 2007-2013", *PVE*, 2014; Product Boards Livestock, Meat and Eggs (PVE), "Verzorgingsbalans Varkens 2007-2012", *PVE*, 2013; Product Boards Livestock, Meat and Eggs (PVE), "Verzorgingsbalans Runderen 2007-2012", *PVE*, 2013; Product Boards Livestock, Meat and Eggs (PVE), "Verzorgingsbalans Kalveren 2007-2012", *PVE*, 2013; Productschap Zuivel, "Zuivel in cijfers 2012", *Productschap Zuivel*, 2014; Centraal Bureau voor de Statistiek (CBS), "Statline goederensoorten naar land: Natuur, Tabak en Voeding", *CBS*, July 2014; Centraal Bureau voor de Statisitiek (CBS), "Melkaanvoer aan en zuivelproductie door zuivelfabrieken", *CBS Statline,* viewed in June 2014; Centraal Bureau voor de Statistiek (CBS), "Vleesproductie; aantal slachtingen en geslacht gewicht per diersoort", *CBS Statline*, viewed in July 2014; own calculations.

The livestock products are mostly exported to Germany, France, the United Kingdom and Belgium. Italy is the largest buyer of veal. Spain and Greece are import countries for dairy products.

Table 9 shows the soy volume used per kilo livestock product. This provides an estimate of the soy indirectly used for these products. It combines both the soy contents from Table 7 and the product volumes from Table 8.

Table 9 Soy content in livestock products in the Netherlands (2013)

Livestock product	Production volume	Milk kg per kg product	Soy product per unit			
			beans	meal	oil	total
	1,000 mt or million eggs	kg	gr/kg or gr/egg	gr/kg or gr/egg	gr/kg or gr/egg	gr/kg or gr/egg
Beef	363		1	395	4	400
Pork	1,780		2	317	17	336
Broilers	920		50	526	28	605
Other meat	150		0	249	11	261
Eggs	10,400		1	34	1	36
Produced and processed milk	12,396		0	34	1	34
Consumption milk		1.0	0	34	1	34
Consumption milk products		0.7	0	23	0	23
Cheese		8.7	1	294	5	301
Butter		1.0	0	34	1	34
Condensed milk		2.1	0	72	1	73
Milk powder		8.3	1	280	5	286
Other dairy		1.0	0	34	1	34

Source: see Table 7 and Table 8, own calculations.

The calculations for meat are for the largest part based on carcass (slaughtering) weight. Meat preparations (sausages etc.) account on average only for 10% of production. The difference between carcass and retail weight is important when calculating the amount of soy necessary for the production of a kilo of meat sold in the shop, as the retail weight required the production of a higher slaughtering weight.[a] The ratio depends on various factors such as the breed and the related meat percentage or the age of the animal.

Average coefficients that can be applied to convert the carcass weight into retail weight are 0.65 for beef, 0.68 for pig meat and 0.75 for poultry meat cuts (for whole broilers a coefficient of 1 can be applied).[139] The consumption of 1kg of meat thus requires the amount of soy used for the production (carcass weight) of 1.54 kilo of beef or veal, 1.47 kilo of pork or 1.33 kilo of poultry.

[a] Carcass weight refers to the weight of an animal after being partially butchered, that is after bleeding and removal of intestines, organs, skin, head and inedible parts of tail and legs. Still included are the bones and other body structure. In poultry, skin, stomach, liver, heart and neck are counted in the slaughtered weight. The carcass weight is thus lower than the life weight, but higher than the retail weight, as trimming and deboning leads to a further weight reduction.

3.3 Food industry

3.3.1 Overview

Besides the livestock feed sector, the food industry also uses soy for a variety of products. Soy is both directly and indirectly processed in food, eventually present in more than 60% of all products in the retail stores.[140] Soyoil is used in margarines and cooking oils. The food industry makes indirectly use of soy products including soy oil, protein and lecithin in processed food such as snacks, ready-to-eat meals, soups and bakery products. Many composite products contain soy through baking and (deep) frying fats but also through the use of meat, dairy and eggs derived from livestock which in turn was fed on soy-containing feedstuff. An assumption has to be made for the total amount of soy used in food products as the product line is so diverse.

3.3.2 Soybean products

An estimated 3,000 tonnes of soybeans were directly processed in food products (mainly soy milk) in 2012.[141] It can be assumed that this amount remained on a comparable level in 2013. Other products that have soy as an ingredient are imported from abroad. It is difficult to map the soy streams from all the individual products and companies. The combined volume of products is, however, still insignificant compared to other sectors and was therefore not further researched.

3.3.3 Soyoil products

Soyoil is widely used as edible oil and commonly referred to as vegetable oil. Soyoil is used by the food industry in a variety of food products including salad dressings, sandwich spreads, margarine, bread, mayonnaise, non-dairy coffee creamers and snack foods. The high smoke point of soybean oil allows it to be used as frying oil. Total direct consumption of soyoil was 55,000 tonnes in 2013.[142]

- **Margarine and baking and frying fats**
  In previous years, industry figures showed 6.6% of soybean oil used in margarine, baking and frying fats. In 2013, around 492,000 tonnes of margarine, baking and frying fats and similar products were produced in the Netherlands, which thus required about 32,000 tonnes of soybean oil.[143]

  The margarine, baking and frying fats consumed in the Netherlands are for the largest part produced in the Netherlands. Little is imported (83,000 ton) and a comparatively large share is exported (417,000 tonnes in 2013). Table 10 shows the total consumption of soy via margarine and baking and frying fats (based on a 6.6% soyoil content) in 2013.

Table 10 Production, export, consumption of margarine, baking and frying fats (2013)

Production (1,000 mt)	Import	Production	Export	Consumption
Margarine	32	230	162	100
Other oils and fats	52	262	255	59
Total	**83**	**492**	**417**	**158**
Required soyoil	**6**	**32**	**28**	**10**

Source: Centraal Bureau voor de Statistiek (CBS), "StatLine", *CBS*, July 2014; Product MVO, "Statistisch jaarboek 2012", Product Board MVO*,* Rijswijk, 2013; own calculations.

- **Other food products**
  Besides margarine and baking and frying fats, soybean oil was also processed in other food products.[144] Based on a total reported food use of 55,000 tonnes in 2013, this results in 23,000 tonnes used as an ingredient for convenience food. It is very hard to distinguish in what products the soy ends up and how much of the processed food is exported or consumed domestically. For the purpose of this analysis it is estimated that half of the foodstuffs are exported, which results in 11,500 tonnes of soyoil consumed as a food ingredient in the Netherlands.

3.4 Technical products and energy products

In 2013, around 11,000 tonnes of soyoil was consumed for technical uses (soap etc.) in the Netherlands.[145] As the soy that is processed in the Netherlands in technical products is so small, it was not included in the research on the use of certified soy. Soy has also been used in energy applications (biodiesel). However, according to the Dutch Emission Authority (NEa), only a negligible volume of soyoil was used in 2013, accounting for 0.1% of single-counting biofuels, which in turn accounted for about 16% of overall biofuels in the Netherlands.[146]

3.5 Retail

Most livestock products and foodstuffs containing soy reach the consumers via retailers. The large supermarket chains operating in the Netherlands are playing an important role in the soy chain as considerable shares of both meat and dairy are sold under their own-brands and generally more than 60% of all processed products in the supermarkets contain soy.[147]

Overall, 59% of meat consumed in the Netherlands is brought to the consumer market via supermarkets. The catering and restaurant sector accounts for another 35%. Butchers and other channels sell 4% and 2%, respectively. For meat preparations, for example sausages, the share that is being sold via the supermarket is with 81% even higher. Also consumption eggs (89%) and dairy products are for the largest part sold via supermarkets.[148]

This important role in the sale of livestock products consequently gives the retailers also a critical role in the overall soy chain.

3.6 Conclusions

The Netherlands is the second largest exporter of agricultural products in the world.[149] The processing of soy into various livestock products is playing an important role in achieving this position. Of the 8.3 million tonnes of soy imported to the Netherlands, a large share is directly or indirectly exported. The export consists of both direct transit as well as the export of processed products containing soy. For livestock products, soybeans are crushed and the resulting soymeal is processed into feed which is used to produce meat, dairy and eggs. For other food products soybeans and -oil are used. Soyoil is also used in the production of technical products.

The domestically available soy for processing cannot fully be appointed to the named product groups. In some cases there is not enough information available, in other cases the available information is not consistent. The soy that remains is therefore divided amongst the different product groups. Table 11 provides an overview of the statistics, corrections and final figures for the product groups further used in this report.

Table 11 Available soy and the remainder appointed to product groups (2013)

Soy product (1,000 mt)	Processed in NL	Original figures product groups			Corrections (estimates)				Final figures product groups		
		Feed	Food	Technical	Feed export	Unregistered exports	Remainder	Assigned to	Feed	Food	Technical
Soybeans	227	48	3	-		11	165		130	85	-
Soymeal	2,494	1,572	-	-	81	88	753	Feed (50%) & direct export (50%)	1,949	-	-
Soyoil	125	59	55	11	-	-	-		59	55	11
Total	**2,848**	**1,680**	**58**	**11**	**81**	**99**	**918**		**2,138**	**140**	**11**

The soybeans and soymeal allocated to the livestock feed sector are considered in the soy content of livestock products. It is assumed that the soybeans allocated to food products are fully consumed in the Netherlands.

3.6.1 Soy net-export

With the information on export and consumption from the above paragraphs we can assume how much soy is exported abroad; both directly as soybeans, -meal and -oil and indirectly in livestock products and other products containing soy (Table 12).

Around 7.2 million tonnes of soy were directly or indirectly exported by the Netherlands. The remaining 1.0 million tonnes of soy was consumed in the Netherlands in 2013.

Table 12 Soy transit through the Netherlands (2013)

Import soy-products	Volume (1,000 mt)	Export soy products	Net-export product (1,000 mt or million pieces)	Volume (1,000 mt) beans	meal	oil	total
Soybeans	3,185	Direct export		631	4,756	491	5,878
Soymeal	4,994	Indirect export					
Soyoil	102						
		Cattle and meat					*746*
		Beef & veal	61	0	24	0	25
		Porkmeat	1,094	2	347	18	368
		Poultrymeat	543	27	285	15	328
		Other livestock & meat	100	0	25	1	26
		Eggs and egg products	7,100	7	242	6	*255*
		Dairy products					*203*
		Consumption milk	-76	-0	-3	-0	-3
		Consumption milk products	34	0	1	0	1
		Cheese	552	1	162	3	166
		Butter and butter oil	155	0	5	0	5
		Condensed milk	181	0	13	0	13
		Milk powder	109	0	30	1	31
		Other dairy	-325	-0	-11	-0	-11
		Other products					*124*
		Food from soybeans		85		-	85
		Margarine, baking and frying fats				22	22
		Other food products				11	11
		Technical products				6	6
		Energy products				-	-
Total import	**8,281**	**Total export***					**7,206**
		Losses					28
		Soy-import - Soy-export - Losses = Soy consumption in the Netherlands					**1047**

*differences between sum & individual figures due to rounding.

3.6.2 Soy consumption

Table 13 presents an overview on the estimated amount of soy needed for the Dutch consumption of livestock products and other food products, and an indication on the amount of agricultural land needed to produce the soy for the Dutch consumption.

Appendix 1 and Appendix 2 contain more detailed explanations for the calculation of the average yield per hectare and the conversion to soybean equivalent.

Table 13 Consumption soy in the Netherlands and the required land (2013)

Product (group)	Consumption (1,000 mt or million eggs)	Soy volume (1,000 mt)				Soybean equivalent (1,000 mt)	Land (1,000 hectares)
		beans	meal	oil	total		
Cattle and Meat					*592*	*480*	*174*
Beef & veal	302	0	119	1	121	93	34
Porkmeat	686	1	218	12	230	187	68
Poultrymeat	377	19	198	11	228	189	69
Other meat	50	0	12	1	13	10	4
Eggs and egg products	3,300	3	112	3	*118*	*93*	*34*
Dairy products					*224*	*175*	*63*
Consumption milk	624	0	21	0	21	17	6
Consumption milk-products	748	0	17	0	18	14	5
Cheese	248	0	73	1	75	58	21
Butter	49	0	2	0	2	1	0
Condensed milk	207	0	15	0	15	12	4
Milk powder	87	0	24	0	25	19	7
Other dairy	2,003	0	67	1	69	54	20
Other products					*113*	*136*	*56*
Food from soybeans		85			85	85	35
Margarine, bake- and frying fats				10	10	19	8
Other food products				11	11	21	9
Technical products				6	6	10	4
Energy products					-	-	-
Total consumption*		**110**	**880**	**58**	**1,047**	**883**	**327**

*differences between sum & individual figures due to rounding.

For the Dutch consumption of livestock feed, food and other products in total 1.0 tonnes of soy products were required. This is equivalent to 883,000 tonnes of soybeans and required 327,000 hectares of farm land.

3.6.3 Soy transit

Of the total soy imported (8.3 million tonnes), around 13% is used for Dutch consumption in the form of livestock feed, food and other products. The largest volume is directly exported without any further processing (71%). 16% is exported after processing of the soy in livestock feed products, food and technical products. Table 14 gives an overview of the soy export as a percentage of the import.

Table 14 Soy (re)export from the Netherlands (2013)

Flow	Volume (1,000 mt)	Percentage of total import (%)
Export without processing	5,878	71.0%
Export after processing to feed and other products	1,327	16.0%
Consumption in the Netherlands	1,047	12.6%
Losses and stock differences	28	0.3%
Total import	**8,281**	**100%**

Dutch companies (and Dutch subsidiaries of foreign companies) make significant profits from the soy transit through the country as well as the processing of livestock feed and other products for the domestic and foreign market. This makes them jointly responsible for the impacts caused by the production, processing, transport and consumption of soy, to take action to mitigate these impacts and to be transparent about their involvement and engagement.

The next chapter describes different initiatives from companies, governments and civil society organisations to increase the availability of certified soy.

Chapter 4 Certification standards and initiatives for soy

4.1 Introduction

The following chapter describes some of the standards and initiatives for soy which have been introduced with the intention to stimulate more responsibly produced soy and which play a role on the Dutch market. These are considered in the further calculation of the share of certified soy that is imported, processed and consumed in the Netherlands. The social and environmental sustainability criteria and the standards' governance (including the level of assurance) are the most important measures to compare the standards.

4.2 Sustainability criteria

Section 2.5 described the far-reaching effects of soy production on the environment and local communities. To reduce and prevent these effects, sustainability criteria for the production of soy have been developed by various groups of stakeholders. These are mostly initiatives initiated by commercial enterprises like retailers, manufacturers and processors, or multi-stakeholder 'roundtable' initiatives involving producers, industry and civil society as main actors.[150]

Several reports have been published in recent years to compare the sustainability criteria applied by different standards. This includes, among others, a report written by CREM and commissioned by the Dutch Soy Coalition in 2011, an overview of benchmark studies published by IUCN NL/Ecosystem Alliance in 2013 and a report by the Swedish Institute for Food and Biotechnology in 2013.[151] The reports do not compare the same standards and initiatives and apply different criteria for the comparison. It is also important to note that standards are subject to changes.

A range of criteria can be used to describe the scope of the standards which play a role on the Dutch market. Key criteria include:

- **Environmental issues**
  - Legal compliance: compliance to national and/or international laws and conventions;
  - Good agricultural practices: limited use of pesticides, crop rotation and tillage;
  - Nature conservation/biodiversity: waste & pollution control, protection and restoration of natural areas, maintaining buffer zones and implementing biodiversity plans;
  - Deforestation: no soy production in primary vegetation/native forests and High Conservation Value Areas (HCVA), use of Cut-Off dates (the date after which primary vegetation may not have been converted into farm land);
  - Reduction of greenhouse gas emissions: monitor and reduce greenhouse gas emissions;
  - No genetic modification: prohibit the use of GM.

- **Social issues**
  - Land rights: legal acquisition, proof of ownership;
  - Documented community consultation: require documented evidence of a communication system or plan to improve the relationship with local communities;
  - Social and environmental impact assessment ;
  - Complaint/conflict resolution mechanism;
  - Fair compensation for communities;
  - Free, prior and informed consent (FPIC) from traditional communities in case of land use;
  - Competition with food; relevant for local food security;

- Smallholders: adjusted (less demanding) requirements and assistance in compliance through training, capacity building, group certification and incentives;
- Labour rights: wages, freedom of association, equal opportunities, no discrimination and the absence of child and forced labour;
- Occupational Health and Safety (OHS): health and safety policy, accident and emergency procedures, availability of medical aid and monitoring;
- Gender: reasonable maternity leave, implementation of programs to support working women, programme of activities and medical support for pregnant women.[152]

4.3 Governance

Important characteristics of the way the standards are implemented are the actual certification systems and to what extent stakeholders are involved in the development and the governance of the standards. Stakeholder involvement may for example be organised by means of a multi-stakeholder board. Broad stakeholder input to setting standards can also be ensured through public consultation processes complemented with balanced and transparent decision-making processes. Part of good governance is to ensure implementation of agreements and to provide adequate information on the developments of the standard (transparency) and the role of stakeholders.

The following questions are important:

- *Stakeholder involvement*: are the criteria established through consultation with and involvement in decision-making of various stakeholders (multi-stakeholder initiative), and how is the organisation governed?
- *Level of assurance*: how is the application of the adopted criteria secured (verification and certification) and is the certification traceable throughout the supply chain back to the origin?

The characteristics for these two topics can be described as follows:

- **Stakeholder involvement**
  These criteria mainly look at the extent to which stakeholders were involved in the development of a standard and represented in the board of the organisation. The biggest stumbling block here is transparency. The following topics are of interest:

  - *Multi-stakeholder initiative*: developed through a transparent process with multiple stakeholders that fully reflect the views of all interested parties, also according to the guidelines of ISEAL Code of Good Practice for Setting Social and Environmental Standards.
  - *Good governance*: organisation governed by a representative and transparent governance system, list of members (if any) publically available.

- **Level of assurance**
  For a good certification system, the verification of the applied criteria through an independent accredited certification body is imperative.

  The main criteria impacting the level of assurance of a voluntary standard include:
  - The rules of the audit system, including among others the detailed audit procedures, sampling requirements, verification procedures and sanctions for non-compliance;
  - The managing system, including the level of transparency and stakeholder involvement, accessibility of information and implementation of complaints procedures;
  - Accreditation, membership or recognition by official organisations or government bodies;

- The rules for the affiliation and for the acceptance of other (sometimes weaker) voluntary standards.[153]

Subsequently, it is of importance in how far the certified product can be traced throughout the supply chain to its origin. For this a so-called ‘Chain of Custody Certification’ with an associated control system is required. There are basically four types of systems, ranging from a high degree of transparency and traceability on the one end (with a labelled end product which is recognizable to consumers) to a claim that the producer is compensated for the extra effort on the other end. These are:

- *Identity Preserved (IP)*: the certified product is physically separated from other products originating from other sources. The identity of the producer can be traced throughout the entire chain and maximum transparency is provided.
- *Segregation*: the certified product is kept physically separate from other products that are not certified, but certified products coming from other sources can be mixed. The identity of the producer is known throughout the whole chain.
- *Mass Balance*: certified and non-certified products can be mixed at any point in the chain, as long as the volume of the certified product remains the same. This approach focuses on supporting production according to certain criteria.
- *Certificate Trading (or Book & Claim)*: this administrative system provides negotiable certificates of a certified product irrespective of a physical delivery of the product and thus neglects requirements for traceability through the chain. Certificate trading focuses on compensating producers for adapting their business conduct without immediately incurring costs for chain certification. Certificates are thus not linked to physical product flows.

The standards discussed in the next section make use of one or more of these systems, depending on the demands of processors, retailers and consumers.

4.4 Certification Standards

There is no shortage of certification initiatives for soy; however, this does not necessarily mean that high-quality criteria are always applied. While all standards ultimately have the objective to make soy production more sustainable, the strictness of the applied criteria, the rigour and credibility of controlling and assurance of compliance with the standards, and the level of traceability differ.[154]

This section briefly describes the different quality standards for the certification of soy which are included in the Soy Barometer 2013 based on their relevance in the Dutch food production chain. The following standards are described in alphabetical order: EcoSocial, Non-GM, Organic, ProTerra and RTRS, and for its relevance at European level and for biofuels, ISCC (International Sustainability and Carbon Certification).

Certification of non-GM soy does not require compliance with most of the social or environmental sustainability criteria named above. It does, however, comply with the non-GM criteria and is thus considered in the further analysis of certified soy on the Dutch market.

On the other hand, the RTRS- and ISCC-certification schemes do not make the exclusion of GM-soy mandatory but only have voluntary non-GM options. They do, however, address various social and environmental concerns.

Whenever possible, available information on the countries of origin and an estimate of the global volume of certified soy are provided. However, quantitative information on the international level, let alone for the Netherlands, is not readily available. A summary of the sustainability criteria applied by the different standards is provided in section 4.4.8.

4.4.1 EcoSocial

EcoSocial is a fair trade standard which is exclusively applicable to products and processes certified as organic, including soy. It was developed in 2004 by the Instituto Biodinâmico (IBD), a Brazilian organisation for rural development.

EcoSocial requires Organic certification (see section 4.4.4) and full traceability and excludes the use of GM soy. In addition to organic criteria, it integrates economic, social and environmental criteria in a single certification standard. It is based on standards and recommendations established by organisations such as the International Labour Organization (ILO), International Federation of Organic Agriculture Movements (IFOAM), Fairtrade Labeling Organizations International (FLO) and the Social Accountability in Sustainable Agriculture Project (SASA). Additional principles taken into consideration include international cooperation agreements related to social and environmental management, such as Agenda 21, Global Pact Program, Millennium Development Goals, Earth Charter and Human Rights Declaration, as well as standards like SA8000, ISO 14000 and BS 8800.[155]

The EcoSocial certification applies to companies, properties, and producer groups that envision a process of human, social and environmental development on a local level stimulated by commercial relationships that are based on the principles of fair trade. The standard is a consumer label and mainly used in Latin America and Europe.[156]

The EcoSocial standard had 16 soy producers certified in Brazil and nine other countries in 2013. Volumes produced are relatively small; no information about certified volumes is available.[157]

Dutch importers of EcoSocial-certified soy include DO-IT Dutch Organic International Trade and GFI Greenfood International. Also Provamel, the organic brand of Alpro soy products for human consumption, which is also marketed in the Netherlands, obtained EcoSocial certification for its organic soybeans.[158] The Dutch organic poultry sector achieved 30% certification in 2013 and is aiming for poultry feed to be 60% EcoSocial-certified in 2014 and 100% in 2015 (see section 4.5.2).[159]

4.4.2 ISCC

ISCC (International Sustainability and Carbon Certification) is a now independent international certification system. It was initially financially supported by the German Federal Ministry of Food, Agriculture and Consumer Protection until 2012. In July 2011, the European Commission recognized ISCC as one of the first certification schemes to demonstrate compliance with the EU Renewable Energy Directive’s (RED) requirements.[160]

The standard certifies all kinds of biomass based on sustainability standards, encompassing environmental, social and economic as well as compulsory greenhouse gas emissions criteria. However, ISCC does not exclude GM soy.[a] Segregation is not mandatory; products are traced via mass balance or optional physical segregation. Certifications are not volume-dependent but are granted to certain units in the supply chain (farms/plantations, first gathering points,

a ISCC Plus, which extends the standard to food and feed products, includes optional non-GM criteria.

traders/warehouses, conversion units). Once a unit is certified it can produce or supply as much certified biomass/biofuels as chosen as long as the certificate is valid (one year).[161]

ISCC aims to protect high conservation value areas (HCVAs) and land with high carbon stock. Land converted from peat land in January 2008 or thereafter is excluded from conversion.[162]

Worldwide, more than 4,800 certificates have been issued to date, but no numbers are published by ISCC regarding total volumes of biofuels produced under the standard. However, estimates for double certification with other standards are high. This is also caused by the fact that ISCC recognizes all other RED-approved systems, including RTRS but also less-demanding and more weakly controlled ones such as 2BsVs (see section 4.4.6).[163]

The certificate database lists nine current certificate holders for soybean inputs in the Netherlands, including three held by ADM in Rotterdam for its oil mill and refinery and two each held by Cargill and Biopetrol Rotterdam.[164] In 2013, all of the soyoil used in biodiesel on the Dutch market was ISCC-certified. However, soyoil only accounted for a minor share of the feedstock used for biodiesel production.[165]

4.4.3 Non-GM

CERT-ID, headquartered in the U.S., was one of the pioneers in non-GM certification, with a programme launched in 1999. Offices are located in the United States, Brazil and the United Kingdom. CERT ID provides third party non-GM certification for various grains and food types, including large volumes of non-GM soy from Brazil exported to the European Union and soy lecithin produced in India.[166]

The CERT-ID Non-GMO standard assures a GM-content below the quantification limit of 0.1% (‘Hard IP’). The CERT-ID EU standard assures 0.9% maximum accidental or technically unavoidable GMO contamination.[167] Besides the non-GM requirement, the certification does not require additional social or environmental criteria. Certification is provided via independent verification.

The certifier estimated that approximately 20-25% of the Brazilian soybean production was free from genetic modification in 2012. China and India’s production is 100% non-GM. In 2013, CERT-ID certified an estimated 5.9 million tonnes of Brazilian soybeans as non-GM, an increase by about 36% from the previous year.[168]

The Brazilian Instituto Biodinâmico (IBD) also created a non-GM certification program, but the certified soy is mainly sold on local and regional markets.[169]

For both certification schemes no official data on the volume of non-GM soy imported to the Netherlands in 2013 are available. It is therefore unknown what part of the imported soy originate from GM seeds. GM and non-GM produce are not distinguished at customs during import. However, since April 2004, European law obligates producers of livestock feed and other food products to include GM-information on product labels when these contain or are derived from more than 0.9% GM crops, organisms or ingredients.[170] It can be assumed that non-GM soy is mainly used for (direct) food processing while GM soy is ending up in animal feed. GM-ingredients are a concern among consumers and therefore not widely accepted in Europe. Many producers of A-brands decided against using GM-ingredients in their food products. Meat, dairy and egg products originating from animals fed on GM soy and maize do not need to be labelled.

Despite the lack of labelling for livestock products derived from GM soy, many producers in EU countries had voluntarily committed to GM-free poultry production in recent years, mostly due to pressure from retailers. Some of these companies recently announced to withdraw from their commitments to non-GM feed, pointing out a lack of sufficient non-GM supplies. British retailers and the Danish Poultry Meat Association withdrew their commitments in 2013. McDonald's Europe stated in April 2014 that it withdrew from a voluntary commitment given in 2001 and allowed GM poultry feed in Europe again, similar to the German Poultry Association (ZDG) two months earlier.[171] However, important ZDG-members like Plukon and Deutsche Frühstücksei never followed the move of their association and kept their GM-free commitment.[172]

Reasons given by the food companies are problems with contamination and limited supplies of non-GM soy from Brazil. However, certifier CERT-ID and other market experts expressly disagree, pointing to the newly-introduced containerised exports of non-GM soy from Brazil instead of bulk shipments, which simplify the assurance of non-GM due to strictly segregated supply chains, and ample supply of non-GM production. Main reason rather seems to be the intention to save on production costs as certified non-GM soy is about 20% more expensive than conventional soy (see section 4.4.7).[173]

Leading German retailers, like Rewe, Edeka and Kaufland, who were displeased by the ZDG's move, put pressure on the industry to return to the sector-commitment for GM-free production by January 2015. In August 2014, it was announced that a working group had been established within the quality assurance initiative for animal welfare to achieve GM-free feed in the whole German livestock sector, including pork and beef.[174] A survey published in the same month found that 24 out of 27 German egg producers only use GM-free feed.[175] GM-free feed often refers to ProTerra-certified soy (see section 4.4.5), as is the case, for example, for fresh poultry products supplied to German supermarket chains by Plukon.[176]

4.4.4 Organic

Organic soybean cultivators rely on the strict regulations for organic farming, which includes a comprehensive approach to Good Agricultural Practices (GAP). The International Federation of Organic Agriculture Movements (IFOAM) has developed a list of all standards officially endorsed as organic by the international organic movement, defining what is organic and what is not. IFOAM was one of the founding members of the ISEAL Alliance, the global membership association for sustainability standards.[177]

Organic farmers do not use chemical pesticides, fertilizers or GM organisms. Alternative methods and crop rotation are used to reduce diseases. The cultivation of local crops, soil fertility control and efficient irrigation are important criteria. Farming areas on land that has been obtained by clearing of HCVAs in the preceding five years are excluded from certification. For the soy to be certified as organic the origins have to be fully traceable and based on non-GM production.[178]

Divergent from other standards, organic certification often has to comply with national or, in the case of the EU, regional legislation. EU-legislation on organic production defines a range of environmental and animal welfare criteria.[179] Accredited third-party auditors conduct scheme audits.

A total area of more than 640,000 hectares was used for growing organic oilseeds (soy, rapeseed, linseed, sunflower seed) in 2012, representing 0.3% of the world's total harvested oilseed area. Soy accounts for the largest area with a total of 274,042 hectares (43%). Assuming an average yield of 2.75 tonnes per hectare (see annex 1), this resulted in about 750,000 tonnes of organic soy produced globally in 2012.[180] For 2011, a production of certified organic soybeans of 600,000 tonnes was reported.

Seven countries account for 90% of the certified organic soy production: China (58%), the United States (15%), Canada (4%), India (3%), Austria (3%), Argentina (3%) and Italy (3%). Depending on market dynamics and demand, organic soy production could see an increase over the next two to three years as Brazil reportedly has additional hectares under conversion to organic soybeans. Organic accounted for 12% of the total standard-compliant production of soy in 2012.[181]

Organic soybeans are used in the production of food products like soymilk or meat replacers. EU regulations require farmers since January 2012 to provide 100% organic feed to their cattle in order to market their products as organic or to use the EU logo, abolishing optional exceptions (up to 5% of ingredients, including soy) which were in place until then.[182] Presumably this had an effect on the demand for Organic certified soy.

4.4.5 ProTerra

The ProTerra Standard for Social Responsibility and Environmental Sustainability ('ProTerra') builds on the 'Basel Criteria' (BC) for responsible soy. The BC were jointly developed in 2004 by the retailer COOP-Switzerland and the Swiss WWF for more responsible soy production worldwide at all production scales. Aspects addressed by the BC included compliance with applicable legislation, technical management and production, environmental management, social management, continuous improvement, and traceability.[183]

ProTerra was further developed by the Brazilian branch of CERT-ID, drawing on widely accepted existing criteria and standards, including SA8000, the Universal Declaration of Human Rights, the Convention on the Rights of the Child, ILO Conventions and Recommendations, the UN Norms with Regard to Human Rights, and the GlobalGAP Standard.[184] Since 2012, ProTerra is established as an independent foundation based in the Netherlands.[185]

It aims, in particular, to:
- contribute to a fast global up-scaling of good agricultural practices;
- link a more sustainable production with consumer demand;
- contribute to the creation of a favourable environment for more sustainably produced agricultural commodities and derived goods;
- contribute to improved food security.[186]

ProTerra excludes GM from its complete supply chain. It is the first certification scheme in the agricultural commodities sector to respond to the market demand for both non-GM soy and improved sustainability criteria.[187] It applies a maximum GM-contamination of 0.1% and requires strict segregation from potential sources of contamination, full traceability and testing for non-GM at critical control points.[188].

ProTerra includes requirements for continual improvement. Core certification criteria refer among others to compliance with applicable laws and with ILO labour conventions and assessment of impacts of operations on biodiversity and ecosystems. It forbids any traditional land use disruption. With 1994 ProTerra has set an earlier general cut-off date for conversion of HCVAs than other standards; land that has been cleared up to 2004 is accepted if compensatory environmental measures have been taken. This is referring to areas of native vegetation and other high conservation value areas, particularly primary forests.[189]

The standard requires compliance with 80% of its 145 criteria for the first audit. This equals all (48) core criteria and 70% (68) of the other criteria. The remaining criteria must be met during the following year.[190]

A revised ProTerra standard focusing on better agricultural practices and enabling farmers to improve their social responsibility and environmental sustainability is currently open for public consultation and input.[191]

Producers certified under the ProTerra standard include, among others, two IMCOPA crushing plants in Brazil sourcing from 142 audited farms, three crushing plants of CARAMURU Alimentos sourcing from 308 audited farms, two crushing plants of AMAGGI sourcing from 170 audited farms, and food producer Alpro from Belgium.[192]

In 2013, 4.1 million tonnes of Brazilian soy was audited under the criteria of ProTerra. Compared to 2012, the volume increased by about 20% and almost reached the 2011-level again (4.2 million tonnes). Volumes certified in 2012 were smaller, largely due to the heavy droughts in Brazil and the late confirmation of EU-buyers. Not all ProTerra-certified soy is sold as ProTerra compliant due to insufficient demand.[193] A larger volume of ProTerra soy is expected in 2014 as a robust seed certification programme is deployed by the Brazilian association of non-GM grain producers and processors (ABRANGE). There are also reports of growers reverting to conventional production due to non-GM soy delivering better yield and better resistance to adverse weather.[194] Increased demand could thus apparently be fulfilled. ProTerra accounted for 69% of the total standard-compliant production in 2012.[195]

No detailed figures on ProTerra volumes imported to the Dutch market are available. Animal feed producer ForFarmers states that 8.4% of its soy was ProTerra-certified in 2013.[196] In addition 43,000 kilos of ProTerra certified soy are consumed by the purchase initiatives of the Dutch zoos (see section 4.5.5). It is likely that part of the non-GM soy used in food products is also ProTerra certified (see section 4.4.3). Compared to the German or Swiss markets, demand for ProTerra-certified soy in the Netherlands is smaller. The Dutch feed and livestock industry is focusing on RTRS soy.

4.4.6 RTRS

The Roundtable on Responsible Soy Association (RTRS) is an international multi-stakeholder initiative that was established in 2006 to promote sustainable soy production, processing, trade and use through the development, implementation and verification of a global standard.

RTRS states, in particular, its aim to:

- facilitate a global dialogue on soy that is economically viable, socially equitable and environmentally sound;
- reach consensus among key stakeholders and players linked to the soy industry;
- act as forum to develop and promote a sustainability standard for the production, processing, trade and use of soy;
- act as an internationally recognized forum for monitoring the sustainability of global soy production; and
- organise international conferences on responsible soy production and involve new operators and NGOs.[197]

The RTRS criteria are in line with ILO conventions and are generic with national interpretations. RTRS is applicable to all scales and types of production worldwide, thus including certification of genetically modified (GM), conventional as well as organic soy. RTRS provides certification for mass balance, book & claim or optional RTRS segregated system. For the optional non-GM line a 0.9% threshold is applied.

Cultivation on high conservation value areas (HCVA) cleared after May 2009 is excluded from certification. Expansion into natural forests is prohibited if no RTRS-approved HCV-map exists. This is part of a mapping project for Brazil aiming to reduce the impact of soy expansion into crucial areas for the conservation of biodiversity. Cultivation on traditional land is allowed under the condition that compensation, subjected to free, prior, informed and documented consent is given.[198]

RTRS describes itself as an improvement model with performance criteria. Based on a system of monitoring, producers are expected to commit to a process of continual improvement.[199] RTRS requires for the first audit a compliance of 62% of its 98 criteria, meaning that all core criteria (51) and 20% (6.6) of the short-term criteria have to be fulfilled. All criteria have to be fulfilled by producers 3 years after the first audit.[200]

The RTRS-standard is currently mainly implemented in Argentina and Brazil. In 2013, 1.16 million tonnes of soy produced on 494,000 hectares were certified under the RTRS criteria; equivalent to 0.4% of the global soy production. This was an increase by about 14% from the previous year. The soy was produced in Brazil (70.3%), Argentina (19.5%), India (5.8%), Paraguay (3.6%) and the United States (0.9%).[201] In 2013, more than 730,000 RTRS-credits have been sold, an increase by about 30% from the previous year.[202] RTRS accounted for 19% of the total standard-compliant production in 2012.[203]

The Dutch feed and food companies are focusing on RTRS-certification of their soy imports. The companies represented by Stichting Ketentransitie purchased 341,880 tonnes of RTRS-certified soy in 2012 and 417,116 tonnes in 2013.[204]

Ahold, Jumbo and Superunie, the three largest retailers in the Netherlands with market shares of 33.8%, 20.6% and 28.8%, respectively, are members of the RTRS. Ahold, Schuitema (C1000, now part of Jumbo Group), Jumbo Group, Lidl and Superunie announced their intent to begin the transition towards certified soy, namely RTRS, in 2011 as part of the Stichting Ketentransitie (see section 4.5.1).[205] Together these retailers had a market share of more than 90% in 2013.[206]
According to information published by Stichting Ketentransitie, the share of RTRS soy in animal feed in the Netherlands reached 18% in 2012 and 23% in 2013.[207] However, based on calculations for the study at hand, this share stood at 20% (417,116 tonnes out of 2,085,000 tonnes).

Specific initiatives for poultry and pork production with RTRS-soy exist in the Netherlands, for example 'Milieukeur' pork meat (from July 2014) or 'Hollandse Kip' sold at Albert Heijn, but no specific projects to increase purchase of RTRS-soy for eggs have been initiated yet.[208]

4.4.7 Production and Pricing

Total global soy production reached 276 million tonnes in 2013. According to research by the State of Sustainability Initiatives (SSI), in total 2% of global production was certified in 2012 (5 million tonnes) of which about two thirds were not sold as such.[209] In 2013, soy production certified under the two most important schemes, ProTerra and RTRS, reached an estimated 5.3 million tonnes.

Actual premiums for soy certified under one of the schemes are dependent on a large number of factors, including the time of purchase and customer-supplier relationship and the available volume of certified production, and thus can fluctuate considerably. Premiums for standard-compliant soybeans have been estimated to range from 0.3% (US$1.5) for RTRS-certified soybeans to over 80% for organic soybeans based on the market price for a tonne of conventional soybeans. These are considerably influenced by the level of segregation and traceability throughout the soy supply chain and the acceptance or exclusion of GM-soy.

With the relative difficulty in procurement of non-GM seed and the costs and time associated with conversion to compliant production for certain standards, it is likely that premiums for non-GM and Organic standards will remain above 25% for the foreseeable future.

It remains to be seen what will happen to RTRS-premiums as production and demand are expected to ramp up in the coming years. It is anticipated that the price premium will fluctuate around 0.3% to 0.9% (US$1.5-US$4/tonne). For RTRS-soymeal, the premium paid was around US$2-US$4 per tonne in 2013. Premiums for ProTerra-certified soybeans are estimated at 20-25% (US$100 per tonne), with high-end estimates at US$150. On average about 95% of the premiums for ProTerra results from the non-GM status, while the additional 5% is for the ProTerra standard itself (about US$5-7). High-end estimates of premiums for non-GM soy are around US$140 per tonne reached in 2013/14, however, they showed a decrease in the first months of 2014. In previous years premiums fluctuated around US$50.[210] Organic soybean premiums are anywhere between 59-89% (US$300 on average).[211]

Based on these premiums and considering the calculated amount of soy used per kg of product, it can be estimated how much the price of a product would increase when using certified soy.[a] This results, for example, in the following estimates for additional costs (in € cents):

- For a box of 10 eggs, the additional costs range from an estimated 0.1 cent for RTRS soy to 3 cent for non-GM soy and 4 cent for ProTerra soy. The use of certified Organic soy causes extra costs of about 8 cent.
- For a whole broiler chicken weighing 1.2 kilo, the additional costs range from an estimated 0.2 cents for RTRS soy to 7 cent for non-GM and 8 cent for ProTerra. This is in line with the estimates of the ‘German Industry Association Food without Genetic Engineering’ (VLOG), which estimated additional costs of 8 cent for a GM-free fed broiler chicken.[212] Organic certification raises the soy costs by up to 16 cent.
- Considering the difference between slaughtered weight and retail weight of meat sold in the supermarket, the additional costs for 1 kilo of pork meat range between 0.14 cent for RTRS, 5 cent for ProTerra and 11 cent for Organic soy certification.
- For 1 kilo of beef, the price difference results in about 0.18 cent for RTRS, 7 cent for ProTerra and 14 cent for Organic soy.
- For 1 liter milk, the estimated price difference lies between 0.01 cent for RTRS, 0.4 cent for ProTerra and 0.8 cent for Organic.
- The additional costs for 1 kilo of cheese range from below 0.1 cent for RTRS soy to 3 cent for ProTerra and 7 cent for Organic soy.

4.4.8 Conclusions

Since the publication of the first edition of the Soy Barometer (2009), the Fairtrade standard is no longer considered separately in the Soy Barometer as the certified volumes are small on a global scale and irrelevant on the Dutch market. ISCC has been included due to its growing relevance on the biofuel market. It was not playing an important role on the Dutch market in 2013 though.

Global soybean and -meal certification is dominated by ProTerra, followed by RTRS. Soyoil certification for biofuel production is dominated by multi-crop labels like ISCC and ‘Biomass, Biofuels, Sustainability voluntary scheme’ (2BSvs). 2BSvs was developed by a consortium of French biofuel companies and associations. Compared to other voluntary standards, 2BSvs falls into the lowest quality segment.[213] It is not as widely recognized as other standards and therefore not further included in this report.

[a] Not considering potential additional costs charged by feed producers for logistics or administration.

ProTerra and RTRS are by far the most widely applied certification standards with relevance for soy. The two standards show on many levels similarities in the applied criteria, for example for legal compliance, labour conditions, community relations, good agricultural practices, waste and pollution management or requirements of continuous improvement.[214] However, when looking at the details and comparing the environmental, social and governance criteria there are also significant dissimilarities between ProTerra and RTRS, with both standards showing strengths and weaknesses as pointed out in comparative studies; this includes for example the approaches to:[215]

- *Land use rights*: ProTerra forbids any traditional land use disruption. RTRS allows disruption under the condition that compensation, subject to free, prior, informed consent, is given.
- *HCVAs*: RTRS has a May 2009 cut-off date for clearing of natural habitats. Expansion into natural forests is prohibited if no RTRS-approved HCV-map exists. However, the definition of 'native habitat' is unclear.
  ProTerra has an earlier general cut-off date in 1994; land that has been cleared up to 2004 is only accepted if compensatory environmental measures have been taken. This is referring to areas of native vegetation and other HCVAs, particularly primary forests, however, the definitions of these ecosystems is unclear.
- *GM-seeds*: ProTerra categorically excludes GM, applying a 0.1% threshold. RTRS accepts GM, besides all other production types; the optional RTRS non-GM line applies a 0.9% threshold.
- *Transparency:* Both standards adhere to the ISEAL guidelines for standard setting; RTRS is an affiliate member. None of the two has full ISEAL-accreditation. RTRS has stronger requirements on public records and announcements, making audit report summaries and data on certified entities publically available. ProTerra so far only publishes a list of certified economic operators. On the other hand ProTerra provides full traceability and segregation throughout the supply chain, while RTRS mostly works with mass balance and certificate trading.

Considering the similarities in their missions and visions to achieve a more responsible soy production, the ProTerra Foundation and RTRS signed a 'Memorandum of Understanding' in October 2014 in order to help the food and feed industries meet global demand for soy certified against sustainability criteria. While no full harmonisation of the two standards is pursued, the two organisations aim to increase the share of certified soy from the current 2% by reducing audit costs, training farmers and increasing transparency.[216]

The scope of this research does not allow for a detailed analysis and evaluation of the different standards. Table 18 presents a summarised overview of a selection of key sustainability criteria as outlined in section 4.2 and 4.3, and their implementation by the selected standards. The table draws primarily on the the ITC 'Standards Map' database maintained by the International Trade Center (ITC), a joint initiative by the World Trade Organization and the United Nations.[217] For standards not covered by the ITC (EcoSocial and Non-GM) additional sources have been consulted as mentioned in the table.

It is important to note that this overview does not claim comprehensiveness as it presents a very condensed summary and that standards are changing continually. In order to conduct a detailed comparison of standards on specific environmental and social issues and their level of assurance, reference should be made to the detailed criteria of the individual certification programmes and the option to compare standards on the website of the ITC as well as benchmark studies mentioned above.

In addition to the formulated criteria, it applies for all certification standards that the rigour in the actual implementation and control on the ground is of crucial importance. As is pointed out in benchmark studies, these issues are difficult to cover appropriately by desktop research.

Table 15 Overview of key criteria and inclusion in different standards

Criteria	IBD EcoSocial	ISCC	Non-GM	Organic (IFOAM)	ProTerra	RTRS
Environmental criteria						
Compliance with legislation	National legislation (Brazil).	Based on requirements set in EU Renewable Energy Directive (2009/28/EC) Local and national legislation.	(Inter)national legislation.	Not identified.	(Inter)national legislation & conventions.	National legislation & international conventions.
Good Agricultural Practices	According to organic standards;	Conservation of soil, water & air; Prevention of erosion; Preservation of organic matter, improvement or maintenance of soil structure; IPM; Only pesticides which are registered in country of use; if no registry, reference to FAO International Code of Conduct on the Distribution and Use of Pesticides; Restriction on burning.	-	Conserve & improve soil fertility & quality, water quality; Responsible water use; Crop rotation, local crops; Substances used must be of biological or mineral origin; Positive list of permitted non-chemical-synthetic substances; Use of organic fertilizer; Efficient irrigation; No burning of land.	Soil & crop management system that monitors soil quality, builds soil, enhances fertility, manages pests & diseases, minimizes erosion; Crop rotation; IPM; Avoid or reduce use of toxic pesticides; Exclusion of pesticides listed in WHO class 1a&b, Rotterdam & Stockholm Convention; Efficient irrigation; No open fires	Soil fertility control; Nutrient management; Erosion control; IPM; Documentation of agrochemical use; Exclusion of pesticides listed in Rotterdam Convention & Stockholm Convention; Prevent drift of agrochemicals; Efficient irrigation; No open fires.
Nature-conservation	Increase biodiversity, recovery areas.	No production on land with high biodiversity value or high carbon stock and not from peat land.	-	Maintain and/or establish on-farm wildlife refuge habitats to maintain & enhance biodiversity quality.	Social & environmental impact assessment developing, documenting and implementing plan to maintain / maximize biodiversity within & surrounding operations; Maintain or restore areas of natural vegetation around bodies of water & on steep slopes / hills, other sensitive parts of ecosystems.	On-farm biodiversity is maintained & safeguarded through preservation of native vegetation; Natural vegetation areas around springs / along natural watercourses are maintained or re-established.

Criteria	IBD EcoSocial	ISCC	Non-GM	Organic (IFOAM)	ProTerra	RTRS
Conversion of HCVAs (cut-off date)	According to legislation	Conversion only allowed after authority approval; HCVAs shall be protected; No production on land with high biodiversity value, highly biodiverse grassland, land with high carbon stock; No production on land that was peatland in Jan. 2008 or thereafter;	-	Cut-off date 5 years before certification.	Cut-off date for conversion is 2004; For land-use change between 1994 and 2004 environmental compensation measures are mandatory.	Cut-off date for conversion is May 2009;
Reduction GHG emissions	Mapping of emission; Plan for GHG-emission reduction.	Produced bioliquids and biofuels must grant GHG emissions savings of at least 35%.	-	-	Monitor and reduce GHG emissions; Reduction over time in energy use required.	Efforts are made to reduce GHG emissions and increase sequestration; Increase in fossil fuel use with justification is allowed.
Exclusion of GM-soy	Yes	No (optional segregated supply chain for ISCC-plus).	Yes	Yes	Yes	Not obligatory; Optional non-GM supply chain.
Social criteria						
Local communities Involvement	Improve communication with local communities.	Improve communication local communities.	-	-	Improve communication local communities.	Improve communication local communities
Land rights	Legal purchase, proof of ownership; Respecting customary rights.	Legal purchase, proof of ownership; Respecting customary rights.	-	Legal purchase, proof of ownership; Respect rights of indigenous people, no use or exploitation of land which is in dispute regarding legal or customary rights.	No disruption of traditional land use; Documented evidence that land use does not impair legal or customary rights of other users, including indigenous communities.	Conflicts with traditional land use to be avoided or resolved; Disruption of traditional land use allowed if affected communities are compensated subject to free, prior, informed and documented consent.
Participatory social &	Public consultation	Participatory social impact	-	-	SEIA to develop and	Assessment of on & off

Criteria	IBD EcoSocial	ISCC	Non-GM	Organic (IFOAM)	ProTerra	RTRS
environmental impact assessment (SEIA)	where initial assessment demonstrates potential for high social and/or environmental regional impact; Encouraging participatory management.	assessment; Report is publicly available in appropriate language to surrounding communities.			implement a plan to maintain and maximize biodiversity, evaluate social impact, within & surrounding operations; To be updated annually.	site social & environmental impacts or large or high risk new infrastructure;
Small farmers	Adjusted criteria; Assistance; Group certification.	-	-	Group certification.	Adjusted criteria; Assistance.	Adjusted criteria; Assistance; Group certification.
Labour laws	Livable wage; Freedom of union association & collective bargaining; Equal remuneration; Compatible wages for seasonal workers; No child or forced labour; Incorporation of UN Global Compact principles on labor laws and human rights.	Livable wage; Freedom of union association & collective bargaining; No child or forced labour; Compliance with ILO conventions.	-	Besides legislation: compliance with ILO conventions & UN Charter for Rights of Children; Livable wage; Freedom of union association & collective bargaining for employees & contractors; Equal remuneration; No child or forced labour.	Livable wage, meeting or exceeding minimum wages or wages for equivalent job; Freedom of union association & collective bargaining for workers & share-croppers; Equal remuneration; No child or forced labour.	Livable wage; Freedom of union association & collective bargaining for workers & share-croppers; Equal remuneration; No child or forced labour, also for third parties.
Health & safety employees	Health and safety policies, accident procedures Available medical care; Access to potable water food, housing.	Health and safety policies; Safe working conditions through training & education; Accident procedure; Available medical care; Access to potable water, food, housing.	-	Health & safety policies; Access to potable water, food, housing for employees & family.	Health and safety policies, accident procedures; Access to first aid / medical assistance in case of accidents or emergency on worksite; Social security plan; Access to potable water, food, housing.	Health and safety policies, accident procedures; Access to first aid / medical assistance in case of accidents or illness. Access to potable water, food, housing.
Grievance mechanisms	-	Complaint procedure for farm employees & surrounding communities.	-	-	Timely & effective system to receive, investigate, respond to complaints for workers, local	-

Criteria	IBD EcoSocial	ISCC	Non-GM	Organic (IFOAM)	ProTerra	RTRS
					communities, traditional land users.	
Gender	Equal opportunity & treatment; Support for pregnant & nursing women.	Equal opportunity & treatment.	-	Equal opportunity & treatment; Written terms and conditions specifying maternity/paternity leave.	Equal opportunity & treatment; Maternity leave at least according to national legislation, without discrimination; In locations without specific regulations, reasonable maternity leave to be established.	Equal opportunities & treatment; Maternity leave according to national legislation, without discrimination.
Governance criteria & Assurance						
Long-term sustainability management plan	Continuous improvement of socio-environmental quality in the projects.	Implementation of good management practices.	-	-	Written plan for programme of continuous improvement in order to achieve full compliance with all aspects of the standard; Specified timeline & yearly targets; Personnel management plan; To be implemented within 1 year.	Continuous improvement; Review process to identify social, environmental, agricultural aspects on/off farm where improvement is desirable; Review of monitoring results, action plans to ensure improvement in those aspects; To be implemented within 1 year.
Multi-stakeholder (MS) initiative	No information	Important decision taken by Association; Stakeholders can become member of association or contribute through technical committees appointed by the Board ; ISEAL affiliate.	-	Developed through MS-process; Full MS-engagement including farmers, NGOs, traders, im-/exporters, certification bodies etc.; In line with ISEAL procedures, full ISEAL member	Initially developed by certification body; Further development & revision with public consultation of stakeholders & individuals; Adhering to ISEAL guidelines.	Developed through MS-process; MS-engagement including local producers (organisations), industry, finance, civil society; In line with ISEAL procedures, ISEAL affiliate.

Criteria	IBD EcoSocial	ISCC	Non-GM	Organic (IFOAM)	ProTerra	RTRS
Management/ Board	Management Commission, IBD Board with several members of departments of IBD.	ISCC Association: General assembly composed of all members elects Board composed of different stakeholder groups; Board designates Executive Board.	Unknown	IFOAM World Board representing all continents & various stakeholder groups.	Foundation with Governance Board composed of different stakeholder groups; Certification & Standard Committee with representatives of all stages of agricultural value chain.	Board with 15 members in three groups (NGO's, producers, trade & industry).
Certification & traceability	Segregation & traceability.	Mass balance or optional segregation.	Segregation & traceability.	Segregation & traceability.	Segregation & traceability.	Mass balance, book & claim or optional segregation.
Verification	Internal IBD or approved local certification body. Exclusively applied to products & processes certified organic.	Third-party audit & self-assessment; Annual audits; 1-year validity of certificate.	Third-party audit.	Third-party audit; Annual audits, surprise audits; 1-year validity of certificate.	Third-party audit; Annual audits; 1-year certificate validity for industrial operations, 2-years validity for farms;	Third-party audit; Annual audits, surprise audits; 5-year validity of certificate;
Transparency	Data on certified companies & products publically available.	Audit report summaries & data on certified entities publically available.	Not centralized public data.	No centralised public data	Data on certified economic operators publically available.	Audit report summaries & data on certified entities publically available.
Quality label	Yes	Yes	Depending on national legislation & certification	Yes	Yes	Yes
Volume worldwide in 2013 (tonnes)	Unknown	Unknown	> 5.4 million	0.8 million	4.1 million	1.2 million

Source: International Trade Center (ITC), "Standards Map", *Website ITC* (www.standardsmap.org/), viewed in August 2014; CREM, "In search of responsible soy. Key characteristics and comparison of voluntary soy standards", *CREM*, November 2011; CERT-ID, "EU Regulatory Compliance Non-GMO Certification Standard", *CERT-ID,* version 5, August 2008; Potts, J. et al., "The State of Sustainability Initiatives Review 2014", *International Institute for Sustainable Development (IISD) and International Institute for Environment and Development (IIED) on behalf of State of Sustainability Initiatives (SSI)*, March 2014; IBD Certification, "EcoSocial Certification: Program for fair Relationships in Trading Socially and Environmentally Certified Products", *IBD Certification*, 2014; ProTerra Foundation, "Who we are", *Website ProTerra Foundation* (www.proterrafoundation.org/index.php/who-we-are), viewed in August 2014; IBD Certifications, "Clients and certified products", *Website IBD Certifications* (ibd.com.br/en/ProdutosClientesAprovados.aspx), viewed in August 2014; ProTerra Foundation, "Economic operators certified under the ProTerra Standard", *Website ProTerra Foundation* (www.proterrafoundation.org/index.php/economic-operators-certified-under-the-proterra-standard), viewed in August 2014; RTRS, "Certified producers audit reports", *Website RTRS* (www.responsiblesoy.org/informes-publicos-de-auditorias/?lang=en), viewed in August 2014; ISCC, "Gültige Zertifikate", *Website ISCC* (www.iscc-system.org/zertifikate-inhaber/gueltige-zertifikate/), viewed in August 2014.

4.5 Soy initiatives

Several initiatives to stimulate the production of more responsible soy have emerged and progressed in the Netherlands in recent years. This includes programmes for the joint purchase of sustainable soy and/or support of local producers and agreements to reduce deforestation in the Amazon, some of which are also described in the following section.

4.5.1 Stichting Ketentransitie Verantwoorde Soja

The 'Stichting Initiatief Duurzame Soja' (IDS) was temporarily established in 2008 to speed up the process of introducing RTRS to the Dutch market. Founding members included Nevedi, FrieslandCampina, Vion, Gebr. Van Beek Groep and Storteboom Groep. Later Ahold joined the group. They agreed to jointly purchase soy that is not produced in illegally deforested areas in Latin America, aiming to yearly purchase an increasing amount of certified soy and to reach 100% certified soy by 2015. The participating companies wanted to set an example to soy producers in Latin America by only accepting RTRS-certified soy. The first 100,000 tonnes of RTRS-certified soy (mass balance) was purchased in 2011.[218]

In December 2011, the main actors in the Dutch soy supply chain, including the feed industry, dairy and meat industry, farmers, food businesses and retailers, jointly committed to aim for purchasing RTRS-soy, or soy production under comparable standards, representing 100% of the soy required for the Dutch production of animal products by 2015. The 'Stichting Ketenstransitie' (Dutch Foundation for Chain Transition Responsible Soy) was established in order to facilitate the objective to jointly finance the chain transition phase from 2012 to 2014 with co-funding from IDH. It coordinates the purchase of certified soy for the livestock feed and food production sector. The main goal remained to achieve 100% of the purchased soy to be certified by 2015. The aim was to increase from purchasing 500,000 tonnes of RTRS-soy in 2012 to 1 million tonnes in 2013, 1.5 million anticipated for 2014 and 1.8 million tonnes in 2015.[219] However, these goals were not reached. Purchases reported for 2013 totalled 417,116 tonnes of RTRS-soy.[220] These are certified under so-called area mass balance[g], book & claim and mass balance.[221] An additional 128,134 tonnes were sourced from production that claimed to be 'in transition to RTRS', without a time bound plan.[222]

The Stichting Ketentransitie works together with all links in the soy value chain. WWF Netherlands (WNF), Natuur & Milieu and Solidaridad support the commitment of December 2011 and have an advisory role in the board of the Foundation. The following organisations are participating: Dutch Feed Industry Association (Nevedi), Sustainable Trade Initiative (IDH), Dutch Dairy Organisation (NZO) (initiated the initiative 'The Sustainable Dairy Chain' ('Duurzame Zuivelketen') which includes the conversion to RTRS-soy), Central Organisation for the Meat Sector (COV), the Organisation of Food Retailers (CBL), the Organisation of the Oils and Fats Industry (MVO), the Product Board for Poultry and Eggs (PVE), and the association of Dutch retailers (CBL) .[223]

g Area mass balance is a term that the Dutch feed industry has introduced. It is not a recognized (RTRS) model. It is an intermediate form, where the crusher or trader claims to have bought credits in a specific area, while mass balance is following it from the producer.

4.5.2 Solidair met Soja

'Solidair met Soja' has been set up in January 2013 by several partners from the organic egg value chain in the Netherlands. The aim is to contribute to the improvement of social circumstances of employees in South America and Asia and to prevent deforestation in soy producing countries. Partners are Green Food International, Van Gorp Biologische Voeders, Coop de Eendracht, the Biological Poultry Association, Stichting merkartikel Bio+, Gebroeders van Beek, Solidaridad and Bionext (chain organisation for sustainable, organic farming and food). The goal is to supply the Dutch organic poultry sector with EcoSocial-certified soy, achieving 30% certified organic soy in 2013. The goal is to reach 60% in 2014 and 100% by the end of 2015.[224]

4.5.3 Farmer Support Programme

The 'Farmer Support Programme' (FSP) is the successor of the four-year SOYPSI programme initiated by Solidaridad. The 'Soy Producer Support Initiative' (SOYPSI) was formed by Solidaridad, WWF Netherlands (WNF) and RTRS running from 2009 until 2012. The overall goal of SOYPSI was to add value to the soy supply chain by supporting small scale farmers and farmworkers in the soy sector and to prepare them for certification. The pilot project targeted 8,000 farmers and 25,000 farmworkers employed by larger farmers in Argentina, Bolivia, Brazil, Paraguay, and India.[225] The programme was supported by FrieslandCampina, CONO Kaasmakers, Interchicken, Arla Foods Nederland and Vereniging van Keurslagers as part of their ambition to increase the sustainability of their value chain.

Succeeding and upscaling the SOYPSI programme, FSP is focusing on soy, sugarcane, palmoil, cotton and livestock. Under the FSP, programmes are executed in South America (Bolivia, Paraguay), Africa (Mozambique, Malawi) and Asia (China, India) in 2013.

The estimated amounts of produce in the Netherlands in 2013 were at least 9,800 tonnes of dairy and 2,500 tonnes of pork, including products by CONO (for India), FrieslandCampina (for India and Brazil), Keurslagers (for Brazil) and ARLA (for Brazil). Outside the Netherlands, UK-retailer Marks & Spencer (for Paraguay) and Ruchi Soya (India) are participating.[226]

4.5.4 Soy Fast Track Fund

The 'Soy Fast Track Fund' was set up by the Sustainable Trade Initiative (IDH), a Dutch foundation convening public-private partnerships, aiming to leverage investments of producers, processors and/or buyers to increase volumes of RTRS-certified soy in the coming years. Solidaridad is acting as the secretariat and manager of the fund.

Private investments, like extra buying costs or investments in good agricultural practice training are matched to a maximum of 50%. The match-funding by the fund is expected to leverage € 24.5 million of investments. In cooperation with international and local banks and local producer organisations it is aimed to enhance preferential access to (better) finance and agricultural services for farmers producing legally compliant and certified soy.[227]

According to Solidaridad, the Fast Track Fund supported an increase in RTRS-certified volume produced by newly certified farmers in South America by 270,000 tonnes by 2013. 1.9 million tonnes are almost ready for certification.[228]

4.5.5 Purchase Initiative Zoos

The 15 members of the Dutch Zoo Federation started an initiative to provide zoo animals with a sustainable diet. In agreements made with soy importers and animal feed manufacturers only ProTerra-certified soy is accepted. This initiative was implemented in November 2010. Since then around 43,000 kilos of ProTerra certified soy is yearly purchased for the zoo animals.[229]

4.5.6 Initivatives in other European countries

Also in other European countries a range of initiatives aiming to make the production of soy more responsible have been started over the years. Some examples are given in the following.

- The *Danube Soy* programme has been established to promote and propagate the cultivation, processing and marketing of GM-free, origin-controlled quality soy from the Danube Region. The aim is to develop and guarantee a GM-free protein supply in Europe.[230] It includes feed and food companies, farming organisations and retailers. It has established a label that provides certification of local, non-GM production.[231]

- *Soy Network Switzerland* is a joint initative of 14 major Swiss agriculture, food and retail companies. In 2013, the network jointly imported 200,000 tonnes of soy certified under ProTerra, Bio Suisse (organic) or Donau Soja standards. This equalled an 80%-share of overall Swiss imports.[232] The 2014 target of 90% GM-free certified soy used in Switzerland is almost reached.[233] The Soy Network Switzerland has also signed the Brussels Declaration (see below).

- The *Swedish Soy Dialogue* is a voluntary initiative involving 27 food and feed companies and organisations from the entire Swedish food chain. In 2014, at least 60% of the soy that is used and/or sold by the companies in the network must be responsibly produced and 100% in 2015. This is referring to soy certified under RTRS' or Proterra's principles and criteria.[234] This commitment covers the national production of meat, eggs and dairy, but also soy in animal products imported by retailers, food service companies and consumer goods manufacturers. While it only covers domestic use of soy, some of the companies in the Dialogue have also made commitments to certified soy for global operations, such as dairy producer Arla Foods and the Finish mother company of processed-food producer, HKScan.[235]
  Arla Foods announced in February 2014 that starting this year, it will buy RTRS-credits to cover 100% of the soy Arla farmers in Denmark, Sweden, UK, Germany, Belgium and Luxembourg use in feedstuff for their dairy cows. The farmers supplying the company consume an estimated 480,000 tonnes of soy in cow feed per year.[236] In the Netherlands, Arla is part of the Stichting Ketentransitie.

- The *Brussels Soy Declaration* was initiated by a coalition of leading European retailers and launched in May 2013. The signatories include Colruyt Group from Belgium, the German Animal Feed Association (DVT), German retailers Edeka, Kaiser's Tengelmann, Kaufland Group, Lidl, Netto, Rewe Group and tegut, the Swiss Soy Network, Portugues retailer Sonae and Spar Austria Group. The retailers pledge their support for continuing and expanding non-GM soy production in Brazil. Seeing animal feed as the main route by which GM-soy enters the food chain, the participants of this unique joint effort aim to increase support for Brazil as by far the most important producer of GM-free soybeans.[237] No Dutch retailer is among the list of signatories.

- The *Retailers' Soy Group* – a group of ten European RTRS-retailer members including Dutch Ahold, Swiss Migros and British retailers Asda, Marks & Spencer, Sainsbury's, Tesco, The Co-operative and Waitrose – is sharing their minimum requirements for 'responsible' soy. The Retailers' Soy Group aims to signal to the market their requirements to ensure that soy produced as feed for its meat, poultry and soy foodstuffs are RTRS- or ProTerra certified.[238]

- German retailers *Edeka* and *Rewe* are aiming to gradually convert the production of their own-brand products to domestically produced feed or certified 'responsible' and non-GM soy. To achieve this goal, Edeka is cooperating with the WWF in order to ensure ProTerra or RTRS+GM-free certification for the imported crop protein required for its products. Rewe is also a founding member of Danube Soya.[239]

- The two main feed company associations in France, SNIA and Coop de France Nutrition Animale (representing 80% of the feed companies) have created the *Sustainable Procurement for Animal Feed* platform.The platform is focused on identifying responsible sources of animal feed. However, so far procurement of certified soy has not been a priority for the initiative.[240]

Chapter 5 Certified soy in the Netherlands

5.1 Introduction

This chapter combines Chapter 3 (total processed soy in the Netherlands) and Chapter 4 (certification standards for soy). The central question is: what is the share of (physically or virtually) imported and processed certified soy (according to the discussed standards and initiatives) processed, consumed in and exported from the Netherlands?

Information from importers, animal feed industry, companies in the dairy and livestock sector and other players in the soy chain is combined to estimate the volume of certified soy in the Netherlands. The information has been collected via a structured questionnaire, conversations, media reports and other sources. No claims to comprehensiveness are made. Not all relevant stakeholders could be contacted and not all of the players which have been asked for input were willing or able to provide the required information. Some assumptions had to be made on the distribution of soy between different sectors as well as domestic and foreign markets.

5.2 Import

The companies that provided information on the (physical or virtual) import of certified soy to the Netherlands in 2013 accounted for 1.02 million tonnes of soy products certified under different standards. This is around 12% of the total soy imported during that year (8.3 million tonnes). Table 16 gives an overview of the reported import of certified soy broken down by standard and soy product. This does not mean though that all this soy is processed or consumed in the Netherlands; considerable shares of soybeans, -meal and –oil are transhipped to other (EU-)countries, either immediately without further processing or after the crushing of beans.

Table 16 Import of certified soy (2013)

Product	Standards and initiatives (mt)						
	EcoSocial	Non-GM	Organic	ProTerra	RTRS*	FSP*	Total
Soybeans	-	-	5,779	338,000	17,102	-	**360,881**
Soymeal	2,200	10,000	8,800	208,500	355,747	12,500	**597,747**
Soyoil	-	11,967	231	-	44,268	-	**56,465**
Total	**2,200**	**21,967**	**14,810**	**546,500**	**417,116**	**12,500**	**1,015,093**

* incl. purchase of credits, no/partial physical delivery.

5.3 Livestock industry

5.3.1 Animal feed

Animal feed is the most important use of soy. Stichting Ketentransitie accounted for 417,116 tonnes of RTRS-certified soy on the Dutch market in 2013. As about 96% of the livestock feed sector is represented by Nevedi and consequently part of Stichting Ketentransitie, this figure represents most of the domestic livestock feed sector. Several companies purchase also soy certified under standards other than RTRS, in addition to the certified soy that they are offsetting via Nevedi. This soy is destined for non-GM and organic products, and includes ProTerra-, non-GM-, Organic- and EcoSocial-certified soy.

According to 2013 data, the standards most applied for soy imports destined for animal feed were ProTerra and RTRS. RTRS-soy is accounted for by Stichting Ketentransitie. ProTerra soy is, for example, processed in animal feed by producer ForFarmers; the company reports in its 2013 Annual Report that of all the soy it used in its Dutch facilities, besides 27% which were accounted for by RTRS credits via Stichting Ketentransitie, 8.4% was ProTerra-certified and 1.6% certified Organic soy.[241] Several companies imported smaller amounts of Organic- and EcoSocial-certified soy, which is for example processed in eggs under the 'Solidair met Soja' project (see section 4.5.2).

Cefetra ('Cefetra Responsible Soya' (CRS)) and Cargill have their own programmes for soy farmed under own criteria.[242] According to these companies the criteria are based upon RTRS, but the soy is not certified as such; however, as the RTRS-requirements are only partly fulfilled these volumes are not considered in the volume of certified soy. 128,000 tonnes of soy-products were imported under CRS in 2013.[243]

5.3.2 Meat and eggs

It is not known how much soy is used for which livestock, going beyond general assumptions based on the overall shares of soy in feed for different animal feeds. As some data was available specifically for dairy, this sector has been split out. The average export shares for meat and eggs have been applied in order to estimate how much of the soy processed in the products is eventually consumed in the Netherlands.

The feed that organic livestock producers use for their poultry, pigs and cows contains Organic- or EcoSocial-certified soy. According to information obtained from the feed producers, 422 tonnes of Organic- or EcoSocial soybeans, 11,519 tonnes of soymeal and 493 tonnes of soyoil were processed in organic feed in the Netherlands in 2013 (12,434 tonnes in total).

Due to the limited information available it is not known how the volume of organic soy is distributed through the chain of different kinds of meat, dairy and eggs. Based on market signs that it is predominantly processed in organic eggs and meat, the volume has been applied to these product groups and not to dairy.

Feed producers also handle non-GM, ProTerra, RTRS and FSP for their production. There is quite a significant difference in market demand between the Netherlands and Germany, with consumer interest in non-GM being stronger in Germany; a considerable share of the ProTerra and non-GM soy imported to the Netherlands is eventually destined for the German market.[244]

5.3.3 Dairy

For the dairy market, an estimated 137,000 tonnes of soy was certified under the programmes of RTRS and FSP in 2013. The average dairy export shares have been applied in order to estimate how much of this was destined for consumption in the Netherlands and how much went into export.

5.3.4 Summary certified soy in animal feed

Table 17 provides an overview of the standards for certified soy in animal feed as reported by animal feed producers as well as importers and companies processing animal products in the Netherlands. Some of the animal feed as well as a considerable share of the resulting livestock products (meat, eggs, dairy) are not destined for the Dutch market but exported to and consumed in other (EU)countries.

Table 17 Estimates for certified soy processed in animal feed and livestock products (2013)

Product	Standards and initiatives (mt)						
	EcoSocial	Non-GM	Organic	ProTerra	RTRS*	FSP*	Total
Soybeans	-	-	422	48,720	17,102	-	**66,244**
Soymeal	6,200	10,000	8,800	60,465	355,747	12,500	**453,712**
Soyoil	-	3,455	493	1,015	16,268	-	**21,231**
Totaal	**6,200**	**13,455**	**9,715**	**110,200**	**389,116**	**12,500**	**541,187**

* incl. purchase of credits, no/partial physical delivery

According to the information at hand it can thus be concluded that animal feed companies in the Netherlands processed an estimated 541,187 tonnes of soy which was certified according to the criteria of one of the six schemes in 2013; this represented about 26% of the 2.1 million tonnes of soy processed in animal feed (see Table 7).

5.4 Other products

Besides importers and animal feed companies, also a number of food producers have been contacted. With the help of the information that they have provided and using information taken from the media and other reports, estimates can be made for the amount of certified soy used in the production chain. However, as the available data is not detailed enough, no breakdown into products made from soybeans and products containing soyoil can be made.

As presently GM-labelled products are still playing a minor role on the Dutch retail market, it can be assumed that most soyoil sold as vegetable oil and used in the production of food products is still non-GM. Based on the information gathered in section 3.3 this presents an estimated 3,000 tonnes of soybeans and 55,000 tonnes of soyoil, most of which is likely certified under non-GM, ProTerra, Ecosocial or Organic standards.

Importers of organic soy reported that 5,279 tonnes of soybeans were brought into the country under the criteria of EcoSocial and Organic agriculture. This soy was destined for direct use in various food products. However, the largest share of these products was eventually destined for export markets in Belgium, Germany and other European countries.

According to information provided by importers, besides 231 tonnes of Organic-certified soyoil also at least 8,512 tonnes of non-GM and 28,000 tonnes of RTRS-soyoil have been imported for processing in other foodstuffs. These products are partly destined for the Dutch market. However, it is not known how much can be assigned to which specific product.

Table 18 Certified soy processed in other foodstuffs (2013)

Product	Standards and initiatives (mt)						
	EcoSocial	Non-GM	Organic	ProTerra	RTRS*	FSP*	Total
Soybeans	-	-	5,279	-	-	-	**5,279**
Soymeal	-	-		-	-	-	**-**
Soymeal	-	8,512	231	-	28,000	-	**36,743**
Totaal	**-**	**8,512**	**5,510**	**-**	**28,000**	**-**	**42,022**

* incl. purchase of credits, no/partial physical delivery

According to the information at hand it can thus be concluded that food producers processed an estimated 42,022 tonnes of soy which was certified according to the criteria of one of the six schemes in 2013; this represented about 19% of the soy processed in food products.

5.4.1 Technical applications

There is little information available on the use of certified soy for the production of products like soap and lubricants. Within this research no priority has been given to his specific group as the total amount of soy processed in these products is relatively small.

Biodiesel needs to comply with European and Dutch legislation for sustainability. Producers of biodiesel can import soy that is certified under RTRS, ISSC and Green Gold Label. Netherlands Emissions Authority (NEa) reported the amount of soy in biodiesel in 2012 as zero.[245] In 2013, a minor share of single-counting biodiesel was based on ISCC-certified soy. It accounted for less than 0.05% of the energy content of the biofuels.[246]

5.5 Conclusions

The distribution of the certified soy across different product groups is summarised in 0. The table includes information on the percentages of certified soy in each segment, splitting the volumes into estimates for certified soy in Dutch consumption and certified soy processed in products for export.

Certified soy or credits are purchased by various companies selling products on the Dutch retail market (supermarkets, butchers):

- Organic beef, pork, poultry meat and eggs (Organic, EcoSocial);
- Organic soy products, soymilk, tofu and baby food (Organic);
- Rondeeleieren eggs (ProTerra);[247]
- ‘Hollandse kip’ poultry at Albert Heijn supermarkets (RTRS);[248]
- Milk, yoghurt desserts, among others from Campina and Arla (RTRS, FSP);[249]
- Bel Leerdammer kaas (RTRS);[250]
- CONO Beemster Kaas (RTRS, FSP).[251]

Table 19 Use of certified soy in different product groups (2013)

Product group	Soy processed in NL (mt)	Use of certified soy (mt)				
		Processed	Export	Consumption in NL	Share processed (%)	Standards used
Meat & eggs	*1,711,312*	*404,104*	*229,394*	*174,709*	*31.1%*	EcoSocial, Non-GM, Organic, ProTerra, RTRS, FSP
Beef	145,296					Organic, RTRS
Pork	597,866					Organic, RTRS, FSP
Poultry meat	556,154					Organic, RTRS, FSP
Other meat	39,088					
Eggs	372,908					EcoSocial, Organic, ProTerra, RTRS
Dairy products	*426,843*	*137,083*	*54,833*	*82,250*	*32.9%*	RTRS, FSP
Consumption milk	18,877					
Consumption milk-products	18,368					
Cheese	240,312					
Butter	7,033					
Condensed milk	28,442					
Milk powder	55,992					
Other dairy	57,819					
Other products	*236,764*	*42,022*	*25,770*	*14,792*	*18.2%*	non-GM, Organic, RTRS
Food products of soybeans	170,764					non-GM, Organic
Margarine, bake- and frying fats	32,472					non-GM, Organic, RTRS
Other food products	22,528					non-GM, Organic, RTRS
Technical products	11,000					
Energy products	-					ISCC
Total	**2,374,919**	**583,208**	**309,997**	**271,751**	**25.2%**	

5.5.1 Share per certification standard

Based upon the findings described above it can be concluded that at least 1.02 million tonnes out of the total 8.3 million tonnes of imported soy were certified according to one of the schemes included in this report (12%).

Table 20 presents an overview of the volumes of soy certified under different standards for which information was retrieved on processing into various products, both for domestic consumption and subsequent export. The covered volumes represent a 57%-share of the total imports of certified soy. Uncertainties regarding the destination of certified soy imports exist for standards other than RTRS; RTRS credits are purchased via Stichting Ketentransitie for processing in the Netherlands. Imports certified for one of the other standards are more likely to be destined for re-export.

The identified volumes are compared to the volumes reported by importers and processors in 2008 and 2011, respectively.

Table 20 Volume certified soy processed in the Netherlands, per certification standard (2008, 2011 and 2013)

Standard or initiative	2013		2011		2008	
	Volume (mt)	**Share in total (%)**	**Volume (mt)**	**Share in total (%)**	**Volume (mt)**	**Share in total (%)**
EcoSocial	6,200	1.1%	6.738	4.0%	500	0.3%
Non-GM	21,967	3.8%	7.706	4.6%	39,225	22.4%
Organic	15,225	2.6%	15.037	9.0%	11,200	6.4%
ProTerra	110,200	18.9%	13.586	8.1%	123,950	70.9%
RTRS	417,116	71.5%	100.000	59.5%	-	0.0%
FSP	12,500	2.1%	24.880	14.8%	-	0.0%
Total	**583,208**	**100.0%**	**167.947**	**100.0%**	**174,875**	**100.0%**

According to these conservative estimations, RTRS was the most commonly used standard in the Netherlands in 2013, accounting for 71.5% of the total certified volume. This is followed by ProTerra with 18.9%. It is likely that the volume of non-GM and ProTerra soy processed in food products is higher than stated in this report. Presumably these two standards are accounting for most products for human consumption with soy as a direct ingredient. The EU-labelling rules state that the presence of GM-ingredients in food products above a threshold of 0.9% has to be mentioned on the label.

Chapter 6 Replacement of soy imports

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6.1 Introduction

This chapter is looking at options for replacing European imports of soy. Replacing soy means that another protein-efficient crop or commodity should be found. Today, the cultivation of protein crops in Europe is enough for only 20-30% of the protein need. The production of animal protein is thus largely dependent on feed imports from outside Europe, particularly protein-rich soy. The 'Commissie van Doorn', which was put in place to make recommendations for a more sustainable livestock production, demanded that by 2020 at least 50 percent of the protein-rich feed should originate from Europe provided that this proves more sustainable than the current situation. As a result of the extensive flow of resources in the Netherlands, intended for intensive livestock farming, there is a lot of attention for the replacement of soybean imports.[252]

The Dutch environmental footprint lies largely abroad. In total, nearly 10 million hectares of agricultural land are needed for Dutch consumption, of which about 85 percent lies beyond national borders. Of this area, the production of meat, dairy and eggs takes up about 2 million hectares (mainly for soybean cultivation). On the other hand, almost half of the Dutch land area is used to produce for agricultural export.[253]

How can we replace soy imports? To feed farmed livestock in Europe, 500 million tons of animal feed is needed on an annual basis. Grain, maize, soybeans and other commodities (65-70 million hectares) provide the necessary ingredients; grassland also covers 65-70 million hectares or about one third of agricultural land in Europe. It is thus estimated that a total of two-thirds of the agricultural land in the EU is used for livestock. Replacing imported soybeans by other crops in the EU therefore has implications for the entire food supply. The 'Netherlands Environmental Assessment Agency' (PBL) is cautious about replacing soybean imports and highlights the efficiency of current cultivation and production.[254]

6.2 Options for replacing soy imports

There are several arguments and reasons for the replacement of soybean imports.

- *Geopolitics*: breaking the dependence of the European livestock sector.
  A sudden collapse of soy imports would cause severe problems for the European economy, especially the livestock and meat sectors.[255] With a protein supply of its own, the EU is responsible and in control of its feed and animal production, including the effects. In 2011, the European Commission published the 'Roadmap to a Resource Efficient Europe' in which the dependence of the EU on imports of raw materials is discussed. The Roadmap highlights the prevention of waste, the reduction and recycling of raw materials, the prolonged use and recycling and green product development.[256] Earlier, the Dutch Parliament adopted a proposal in which the Government is requested to investigate the risks associated with soy imports.[257]

- *Innovation*: promoting research and development of home-grown crops.
  The yields of lupines, peas and European soy are lagging behind the technical possibilities because there was very little attention for the subject during many years. According to an Austrian study, future expansion of soy crops should be taken into account because climate change is making it possible to reach the same yield and income levels as elsewhere in the world. According to a realistic-optimistic scenario 1.8 million hectares of Danube soy could be cultivated assuming a total of 2.4 million hectares in Europe that are suitable for the cultivation of soy; potential annual yields of Danube Soy were estimated at about 4 million tonnes.[258]. Austria is trying to advance the concept of the Danube Soy; the Netherlands and Germany are also investigating the cultivation of their own soy production (see also section 2.3.2).[259]

- *Soil Fertility*: ensuring better crop rotation on European farmland through the use of protein crops and legumes such as peas, lupines and soy.
  These plants capture nitrogen out of the air into the soil. They need less (artificial) fertilizer and also provide future crops with nitrogen. The Scientific Council for Government Policy ('Wetenschappelijke Raad voor het Regeringsbeleid', WRR) in the Netherlands argues that more attention is needed for soil fertility.[260]

- *Better use of already existing by-products*: reduce waste while utilizing existing high quality raw materials for animal feed, such as dry and wet products from the human food chain.[261] For the same reason, carcass meals should reconsidered for use in the animal production chain, estimated at 16 million tonnes per year.[262]

- *New raw materials from the bio-based economy:* using waste streams.
  These could include DDGS (Dried Distillers Grains with Solubles: the leftovers from ethanol production after the fermentation process) from wheat or maize, or the refining of grass (Grassa!); the extracted proteins could be used as an additional ingredient in animal feed.[263]

- *New raw materials from other waste streams*: recovery of feed from insects[264], algae[265] or duckweed.[266]
  These could also serve as ingredients for the production of protein-rich feed, whether or not in combination with secondary goals for improved animal health or the human food production.

In the large-scale replacement of soy imports other leguminosae fall away. Peas and lupins deliver too little revenue. A production level of 3.1 tonnes of soy per hectare in the EU would already be competitive and reduce the footprint of livestock feed.[267] Still other crops should not be completely abandoned: the addition of (one or more) manufactured synthetic amino acids could help to overcome certain nutritional deficiencies of a raw material other than soy. For example, lysine is a synthetic amino acid that is added to sunflowermeal in the diet of pigs to complement the lack of lysine in the raw material of sunflowers. This can create an optimal composition of feed without soy, yet with a slightly higher price.[268].

There are also limits to the use of wet and dry products from the human food chain. In the Netherlands, these products are probably already used to their full potential. A third limitation is that the amount of DDGS as a residue of ethanol production can hardly be influenced. As ethanol production from food crops in the EU is under attack and recently the decision has been made not to raise blending percentages, DDGS-production is not expected to increase.[269]
Also the use of protein from the refinery of grass has its limits. Although in the Dutch situation of intensively fertilized soils and surplusses of grass it is possible to refine grass, this will be limited on a European scale.

The following options for the large-scale replacement of soybean imports remain:

- Soy from the EU: The current production in the EU-28 includes more than 1.2 million tonnes on 469,000 hectares (see Table 1). European soybean production today is estimated at only 4.1 % of consumption.
- The re-use of meat-and-bone-meal in animal feed, estimated at 16 million tonnes in the EU.
- Development of new raw materials in feed, such as algae, duckweed and insects.
- The use of synthetic lysine and other amino acids to compensate certain nutritional deficiencies in soybean substitute crops.

6.3 New possibilities and their effects

The search for sustainable alternatives to soy imports is in full swing. Given the existing production and consumption of animal protein, replacing soybean imports is about the use of known and as yet unknown resources. However, replacing all the imported soybeans with only one alternative commodity is not possible. For the replacement of soy imports, combinations of several of the aforementioned options are necessary. Some considerations include:

- **More European soy in the short-term**

It can be concluded that soy production in the EU and even in the Netherlands can be sustainable and efficient if the revenue level is slightly increased. There is no rule that forbids growing more soy and protein crops. The EU and the Netherlands may even give it some support, for example through innovation efforts. However, from a sustainability point of view the precondition is that competition with food crops, and in particular wheat yields, must be limited. On the other hand there is the chance to produce soy on millions of hectares of fallow land in Eastern Europe. It is estimated that more than 20 million hectares of land lie idle in Russia, Ukraine and Kazakhstan as a result of the breakup of the Soviet Union.[270] Also regional feed streams of protein crops other than soy can help in closing the mineral cycle, but are more expensive in the short-term.

- **Re-use of animal meals**

Use of animal meat–and-bone-meals (MBM) has a low footprint and delivers good protein for the replacement of soy. However, it is difficult to influence the political decision-making for the reuse of MBM as a raw material in feed. It takes years to even reconsider the permission.

- **Algae and insects as major new resources in the medium term**

The feed industry in the Netherlands is already using dozens of by-products and residues from other sectors. For new materials a structural approach is needed through the cultivation of algae, duckweed and insects. These options also help to close the mineral cycle especially if manure (algae, duckweed) or waste streams from the human food chain (insects) are used as substrates.

- **Use of synthetic amino acids**

Combined with other raw materials, the use of synthetic amino acids can be successful, provided that its production is sustainable enough and the footprint of the composite animal feed is more sustainable than the original feed containing imported soy.

Despite these options, the short and the long term self-sufficiency of protein in the EU remains weak due to the dependency on third countries for supplies of phosphate fertilizer and some micronutrients. The only sustained solution is that the mineral cycle of the manure-feed cycle will be fully closed, including the human food chain, a production chain that keeps the minerals in the soil in balance by withdrawing the same amount of minerals for feed production as is applied through fertilizing with manure.

Chapter 7 Conclusions

7.1 Production and trade

Worldwide 276 million tonnes of soy were harvested in 2013, cultivated on a total area of 111 million hectares. The United States, Brazil, Argentina and China are the most important producer countries and, with the exception of China, also the leading exporters. China is an important producer but also the biggest importer of soybeans. The European Union is accounting for about 20% of the global imports of soybeans, -meal and -oil, with the Netherlands as the most important importing country in the European Union.

The European Union is highly dependent on protein crop imports – especially soy and maize gluten - due to a lack of sufficient domestic protein production which can be used for animal feed. Various initiatives have been started in order to increase protein crop production, including a better use of the European soy cultivation potential. Unlocking this potential also enables additional sourcing of responsibly-produced non-GM soy, if sustainability criteria are implemented and indirect effects taken into account.

The Netherlands sources soybeans predominantly from Brazil and the United States. However, most soy is imported in the form of soymeal, especially from Argentina and Brazil. In total, the Netherlands imported 8.3 million tonnes of soy (beans, meal and oil) in 2013. For the harvest of these imports a total surface of 2.6 million hectares was required in the countries of origin – almost 80% of the land surface of the Netherlands.

Of the 8.3 million tonnes of soy and soy products imported by the Netherlands in 2013, 5.4 million tonnes were re-exported. 2.8 million tonnes stayed in the Netherlands for further processing: 227,000 tonnes of soybeans, 2.5 million tonnes of soymeal and 125,000 tonnes of soyoil. Soymeal is processed in livestock feed, while soyoil is used as edible oil, in various food products, cosmetics and technical applications. Soybeans are used in food and feed. The volumes of soybeans and meal processed into these products remain unclear though.

According to industry information on the destination of soy products, namely animal feed for the livestock industry, less soybeans and meal were processed in the Netherlands than were available according to the trade statistics. Even when considering certain error margins in trade statistics, the remaining volumes are too high to just ‘disappear’. For the purpose of mapping the soy streams these products are assigned to the sectors where they are most likely processed. For soymeal it is also assumed that part of it is directly re-exported. These corrected figures were subsequently used to calculate how much soy was processed, consumed and exported in products. Approximately 2.4 million tonnes of soy products were further processed into products in the Netherlands.

Of the total available soy volume, 1.0 million tonnes were used directly or indirectly for products which were consumed in the Netherlands: meat, eggs, milk, cheese and other dairy, margarine and other foodstuffs and small amounts in technical products. For the soy harvest that was required for the production of products consumed in the Netherlands, an area of 327,000 hectares was required. 1.3 million tonnes were used for the production of feed and foodstuffs which were eventually exported and consumed in other countries.

Detailed reporting and data provision by traders and especially feed companies as the key processors of soymeal would help to avoid data insecurities and create a more complete picture of the situation. This should also be in the interest of industry in order to provide more transparency: on the one hand in relation to their actual exposure to raw materials which are connected to various environmental and social problems; and on the other hand on their progress made in increasing the use of certified oilseeds or efforts to use alternative, locally produced protein sources.

7.2 Standards and initiatives

The expansion of the soy frontier is a basic transformation of land use, involving new technologies (zero-tillage techniques), new power relations (large agribusiness companies taking control), a shift from labour-intensive to capital-intensive production regimes, and is accompanied by new dependencies (the reliance on a small number of firms that provide agrochemical packages and patented seeds). The rapid expansion of the soy frontier also puts pressure on the land, leading to speculation.

For the producer countries, the increase in soy production and trade had important economic consequences, creating work and becoming an important source of foreign exchange. However, especially in South America only a small share of the population profited from the rapidly increasing soy production. The rapid growth in extensive monoculture soy cultivation contributed to the destruction of valuable forestlands, savannahs grasslands and wetlands, leading to a loss of biodiversity and greatly impacting on the livelihoods of the local population. The introduction of GM soy in the 1990´s facilitated the expansion of soy production into previously unsuitable areas and led to rising application levels of pesticides. Growing problems with herbicide-resistant superweeds and resulting reversion to even more toxic pesticides are reported from North and South America.

The problems connected to the production of soy have led to the development of various concepts aiming to make the production of soy more responsible. While all standards ultimately have the objective to make soy production more sustainable, the strictness of the applied environmental, social and assurance criteria and the level of traceability differ.

Under five certifiable standards for soy which play a role on the Dutch market (EcoSocial, ISCC, Organic, ProTerra and RTRS), the soy harvest has to meet certain sustainability criteria before the farmer (cooperative) receives a certificate. This is dependent on the results of regular audits by independent third-party certification bodies. In addition to that, the certification of non-genetically modified (non-GM) or organic soy provides clarity on the type of seed and its origin. This is especially important for customers concerned about the effects of GM soy. The Dutch Soy Coalition is of the opinion that non-GM certification alone does not automatically meet other sustainability criteria as no further environmental or social requirements are asked from the producers. This is, however, the case for non-GM soy with additional ProTerra certification applying the ‘Basel Criteria’ or for certified Organic or EcoSocial soy. RTRS- and ISCC-certification schemes on the other hand do not fulfil the non-GM criteria but only offer optional non-GM certification. They do, however, address various social and environmental concerns.

A couple of additional initiatives were set up in the Netherlands in order to stimulate the harvest of more responsible soy. Civil society organisations made agreements with companies to source certified soy and provide relevant advice. The ‘Farmer Support Programme’ (FSP) aims to support farmers in stepping over to producing soy according to the RTRS-criteria. Similarly, the ‘Soy Fast Track Fund’ (SFTF) set up by the Sustainable Trade Initiative (IDH) aims to leverage investments of producers, processors and/or buyers to increase volumes of RTRS-certified soy in the coming years. Companies processing soy can receive financial support in proportion to the volume of soy they process. As the FSP and SFTF are following the RTRS standards, the initiatives have been considered in the calculation of certified soy on the Dutch market.
Several (industry) associations made agreements on the joint purchase of standard-compliant soy, for example ‘Stichting Ketentransitie’ for RTRS, ‘Solidair met Soja’ for EcoSocial or the Dutch zoos for ProTerra soy.

There are different approaches to trace certified soy through the production chain. ‘Segregation’ (the seperation of certified soy) and ‘Identity Preservation’ (traceable back to the producer) provide most transparency and ensure that the certified soy is actually used in the end product. The so-called ‘Mass Balance’ and ‘Book & Claim’ (‘certificate trading’) administration systems have been increasingly used in recent years. These systems focus on increasing certified production on the ground. Costs for certification remain comparatively low here as no physical segregation of the commodity streams is implemented. However, these approaches are less transparent and do not allow making a statement on whether certified produce is actually present in the resulting product.

7.3 Share of certified soy

Via the collection of information from and on oilseed traders, feed and food producers it was aimed to create an overview of products - directly or indirectly – containing certified soy. Traders reported imports of 1.02 million tonnes of certified soy, 12% of the total Dutch soy imports in 2013. ProTerra-certified soy accounted for 54% of these imports, 41% was accounted for by (physical or virtual) RTRS- and FSP-imports; the remainder was made up of Non-GM-, Organic- and EcoSocial-certified soy; no imports of ISCC-certified soy were reported by the companies who replied. A share of these imports was re-exported, either immediately or after crushing.

Based on the gathered information it is estimated that in 2013 at least 583,200 tonnes of certified soy was processed in the Netherlands (25% of 2.4 million tonnes processed). The certified soy which is exported via products in which it is processed totalled an estimated 310,000 tonnes (23% of 1.3 million tonnes). The consumption in the Netherlands of soy certified under one of the certification standards reached an estimated 271,751 tonnes (26% of 1.0 million tonnes). In the Soja Barometer 2012, the share of certified soy was 7% for export and consumption (2.9% for exports and 12% for Dutch consumption). The share of certified soy has thus increased quite considerably during these two years, however, the majority of soy processed and consumed is still not certified.

RTRS-certified soy accounted for the largest share of certified soy in the Netherlands (73.6%, including FSP). This is followed by ProTerra-soy with 18.9%. Organic- and EcoSocial-certified soy accounted for, respectively, 3.8% and 1.1%. Solely non-GM-certified soy had a 2.6%-share.

Dutch players are thus for the largest part focusing on a conversion to RTRS-soy. In some other European countries, for example Germany and Switzerland, retailers and subsequently industry show a much stronger demand for ProTerra-certified soy. Demand for non-GM certification and full traceability for consumer products is weaker on the Dutch market.

It has to be stressed that the results of this research can only give an indication of the share of certified soy at a certain point in time. Also the findings have to be treated as minimum estimates for the amounts of certified soy. It is possible that the real amounts are higher, especially for standards besides RTRS. However, as not all important players were willing to provide details on actual certified volumes the picture will remain incomplete. It is, however, clear that further steps have to be taken to achieve the goals that industry has set for itself and the question remains how ‘responsible’ the certified soy is in reality.
Considering the vast amount of soy produced and consumed worldwide, the share of soy produced under consideration of environmental and social standards still remains marginal. In addition, not even the full volume of this certified soy produced could be sold.

Reduction of soy use through lowering consumption of animal proteins is not a focus of this report, but would certainly also contribute to reducing the negative effects from the production of soy, as well as other footprint issues. As the urgency to replace soy imports from third countries with locally produced protein crops has also been recognized by political decision-makers, this approach could also play a more important role in the near future.

Appendix 1 Yield per hectare

For the calculation of the soy cultivation surface that is necessary for the Dutch imports the figures from Table 21 have been used.

Table 21 Average yield per hectare in the period 2010/11 until 2012/13 in various production countries

Producer country	mt/ha
Canada	2.91
United States	2.81
Argentina*	2.49
Brazil	2.92
Paraguay*	2.30
Uruguay*	2.46
China*	1.79
India	1.03
EU-28	2.66
Ukraine*	1.79
Other countries	1.66
Average productivity (weighted)	**2.75**

* estimates;
Source: ISTA Mielke, "Oil World Annual 2014", *ISTA Mielke,* Hamburg, May 2014; own calculations.

In order to account for the fact that the Netherlands is sourcing more than 90% of its soy from just five countries, the average yields in the different producing countries were weighted according to the share that the country has in soy imports to the Netherlands. This results in an average soy yield of 2.75 tonnes per hectare.

Appendix 2 Calculation of soybean equivalents

The crushing of soybeans results in oil and meal. Both are traded on the world market and world market prices determine the sales for the grower, trader, crusher and other parties further up in the chain. Soymeal cannot be produced without producing oil at the same time and the other way around. As the income from both products are needed for the cultivation of soybeans to be profitable, a part of the surface on which soybeans are grown needs to be assigned to soymeal and a part to soyoil.

As soybeans are annual crops, soybean growers each year take a decision to grow soybeans or another crop. This decision is largely based on the expected financial yield from the soy crop, which is for 61% determined by the sales of soybean meal and for 39% by the expected sales of soybean oil (= sales volume*price). Therefore, we think the price should be included in the calculation of the agricultural land for soybean meal and soybean oil. That leads to the conclusion that the price needs to be considered in the calculation of the agricultural land required for producing soymeal and soyoil.

The alternative is to base this calculation solely on the weight of the products, which would mean that 1 tonne soymeal would equal 1 tonne soybeans and also that 1 tonne soy oil equals 1 tonne soybeans. However, this approach neglects the price differences between the two products. The incentive to produce more soybeans mostly is determined by the financial yield, which argues against a neglect of these price differences. The net value of soy production is thus determined by soymeal as well as soyoil, and by combining them according to their relative share in the weight of soybeans. Soybeans for human consumption, which were found to account for about 6% of the value, are unlikely to have an impact on a production decision. Hulls, which account for less than 1% of the value, can be neglected.

Table 22 Conversion to soybean equivalent, 2010/11-2012/13

Crushing	Soybean production (mln mt)	Soybean products (mln mt)	Crushing ratio	Price (in US$, average 2011-2013)	Value (US$ million)	%	Soybean equivalent (mt/mt)
Soybean production	257.2						
of which crushed	226.3						
Soybeans for food consumption		15.3		561	8,576	6.0%	1
Soybean meal		177.6	78.5%	474	84,121	59.5%	0.757
Soybean oil		41.9	18.5%	1,156	48,393	34.2%	1.849
Soybean hulls*		2.3	1.0%	175	396	0.3%	0.280
Total					**142,942**	**100%**	

* price estimate based on U.S. data for June 2014;
Source: USDA Foreign Agriculture Service, 'Production, supply and distribution online", *Website USDA Foreign Agriculture Service* (apps.fas.usda.gov/psdonline/psdQuery.aspx), viewed in June 2014; Ineternational Monetary Fund, "IMF Primary Commodity Prices", *Website International Monetary Fund* (www.imf.org/external/np/res/commod/index.aspx), viewed in June 2014; Hoste, R., LEI Wageningen UR, and information by Nicolaj, J. (IDH), July 2014.

Table 22 illustrates that in the years 2011-2013, on average 15.3 million tonnes of soybeans were used for human consumption. 226.3 million tonnes were crushed annually worldwide, resulting in 177.6 million tonnes of soymeal and 41.9 million tonnes of soyoil. The crushing ratios are based on data reported by the USDA Agricultural Service for the key countries of origin of Dutch soy imports of soybeans and -meal: Argentina, Brazil, Canada, Paraguay, USA, and other countries. The ratios of these countries are weighted according to their contribution in volume. In addition, 2% losses during the crushing process have been considered. Assuming a division of one-third hi-pro (48% protein meal) and two-third low-pro soybean meal requested by the Dutch feed industry, the crushing of soybeans on average yields 78.5% soymeal and 18.5% soyoil. The remainders are hulls (1%) and waste.[271] Of the resulting oil, about 81% are destined for food consumption, while 18% are accounted for by industrial uses.[272]

As the market prices achieved for meal and oil are quite different, contribution of soybean meal and soybean oil to the total value of the global soybean industry is also different. 177.6 million tonnes of soybean meal has a value of US$ 84 billion and 42 million tonnes of soybean oil has a value of US$ 48 billion. One can therefore assume that the total value of soybeans for 34% is determined by the soyoil and for 59% by the soymeal produced. These results differ somewhat from the figures calculated in the previous editions of the Soy Barometer. This is one the one hand caused by changes in global market prices, and on the other hand due to the fact that it was decided to consider in this update also the contribution of soybeans for human consumption and of hulls to the value distribution of the soy chain.

In order to produce 1,000 tonnes of soymeal, 1,274 tonnes of soybeans are required (=1,000/0.785). Of the total value of this amount, 59.5% is determined by soymeal. We assume thus that of these 1,274 tonnes soybeans, 757 tonnes (59.5%) are exclusively used for the production of soymeal. For conversion purposes, 1,000 tonnes of soymeal are thus equal to 757 tonnes of soybeans.

In order to produce 1,000 tonnes of soyoil, 5,405 tonnes of soybeans (=1,000/0.185) are required. Of the total value of this amount, 34.2% is determined by soyoil. We assume thus that of these 5,263 tonnes of soybeans, 1,849 tonnes (34.2%) are exclusively used for the production of soyoil. For conversion purposes, 1,000 tonnes of soyoil are thus equal to 1,849 tonnes of soybeans.

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