

Strategies for reducing the negative impacts of soy production***Reducing soy consumption*****Introduction**

Soy is a raw material for the manufacture of a range of animal feed, food and industrial products. It meets a large proportion of the global market for vegetable oil and protein-rich oil meals, on which the world's intensive animal husbandry industry depends. Global production in 2009 was about 212 million tonnes, making it the world's fifth agricultural commodity after sugar cane, maize, rice and wheat. The largest producers are the USA (38%), Brazil (27%) and Argentina (15%). Soy production has risen sharply over the past decade. As the global demand for meat and dairy products continues to increase, in turn pushing up demand for animal feed, the yearly market for soy is expected to rise to 300 million tonnes within 15 years.

The expansion of soy cultivation has occurred almost exclusively in South America. Although soy production has generated substantial revenue for producers, traders and national economies, it is also causing severe environmental and social impacts. These include deforestation, erosion and soil degradation, land conflicts and human rights violations, slavery, reduced employment opportunities, food insecurity, and health problems and pollution caused by the use of pesticides.¹

The Netherlands is the second largest importer of soy in the world. In view of the country's importance in the market for soy, various Dutch civil society organizations have joined forces in the Dutch Soy Coalition (DSC) to support and complement the work of their partners in soy producing countries. The DSC aims to reduce the negative social and environmental impacts associated with the production, processing and consumption of soy. The DSC is pursuing this goal in three ways: by campaigning to reduce the high levels of meat and dairy consumption in the Netherlands, which is the root cause of the problems; by promoting more responsible production of soy; and by asking the livestock sector to replace part of the soy in animal feed with alternative feed crops.

This is one of three fact sheets prepared by the DSC to explain why the coalition is pursuing these goals and to provide information on important initiatives and activities. The fact sheets are: *Responsible soy production*, *Reducing consumption*, and *Replacing soy in animal feed*.

Why should we reduce animal protein consumption?

The global consumption of meat increased from about 26 kilos per person in 1970 to 37 kilos in 2000 and is expected to rise to 52 kilos in 2050. The increasing demand for meat and other animal products is driving up demand for soybeans and soybean meal for animal feed.

In the Netherlands, meat and dairy consumption has been increasing steadily since the 1950s. In 2009, Dutch meat consumption was 43.3 kilos per capita (an increase of 2% compared to 2007 and 50% compared to 1950). Pork meat is consumed most (21 kg), followed by chicken (11.3 kg) and beef (10 kg). On average Dutch people consume 184 eggs, 20 kilos of cheese and 60 liters of milk each year. These figures resemble European consumption data.

The total annual consumption of soy products that is needed to feed these animals averages 1.8 million tonnes. The consumption of soy products varies between different types of meat, from 100 grams per kg of veal to almost 600 grams per kilo for poultry. 11 grams of soy are used per kg of raw milk, while for the production of eggs the figure is 300 grams per kg. The total area of cultivated land required to produce this quantity of soy is approximately 700,000 ha. This resembles about 20% of the entire surface area of the Netherlands or 1.4 million football fields. To make more responsible production of soy possible, demand will inevitably have to be reduced. One way to achieve this is by replacing soy in animal feed with a replacement (see the fact sheet *Replacing soy in animal feed*); another way is to reduce the consumption of animal products.

Sustainable food has become more urgent than ever. Experts predict serious consequences for nature, environment and food security if the consumption of animal proteins is not turning into a more sustainable plant-based diet. This will have important effects:

¹ For a detailed explanation of these impacts see 'Soy Big Business, Big Responsibility – Addressing the social and environmental impact of the soy value chain' (DSC, 2008).

- Because the production of animal proteins requires two to six times² as many vegetable proteins, replacing animal proteins in human consumption with vegetable proteins leads to less demand for arable land, more sustainable land use and a decrease in biodiversity loss.
- Reducing the consumption of animal products can significantly reduce the production of greenhouse gasses.
- In Europe and other developed countries people generally eat more than necessary, which leads to overweight and a greater risk of cardiovascular diseases and cancer. Reducing animal protein intake can contribute to a healthier diet.
- The production of meat is associated with many animal welfare issues, which can be averted if there is less demand for meat.

Greenhouse gas emissions and demand for arable land in different diets

Blonk et al. (2010) show that the environmental effects of a shift from animal to vegetable proteins in Dutch consumption patterns leads to important reductions in greenhouse gas emissions and land conversion.

The researchers estimated environmental effects of six different diets and concluded that reduced meat consumption decreases greenhouse gas emissions and demand for arable land considerably. The amount of reduction depends on the diet and the type of alternative protein source that is chosen. Consuming the amount of protein-rich products advised in the Dutch guidelines for good nutrition ("Richtlijnen voor Goede Voeding" - RGV) of the Netherlands Nutrition Centre reduces 10% of daily greenhouse gas emissions compared to an average diet (based on the most recent food consumption survey of the entire Dutch population). This is due to a reduction of meat consumption and a reduction in consumption of 'extra's' such as snacks. A vegan diet results in the largest reduction of greenhouse gas emissions: 36% compared to the RGV diet. A vegan diet also results in the largest reduction of arable land: 65% compared to an average diet and 40% compared to the RGV diet.

Source: Marinussen et al. (2010).

Options for reducing animal protein consumption

Six different options are considered for reducing animal protein consumption and increasing consumption of alternative protein products.

1. Reduce consumption
2. Hybrid meat products
3. Organic meat
4. Meat replacements based on non-animal proteins
5. Sustainable farmed or captured fish
6. Meat from insects

1. Reduce consumption

On average a Dutch person consumes 80 grams of proteins a day, mostly animal proteins. But people only need 60 grams for a healthy diet. In other words, it is possible to reduce the intake of (animal) proteins by 25%.

2. Hybrid meat products

Hybrid meat products (meat variants in which part of the meat is replaced by plant-based ingredients) could be an important step forward in sustainable production. Not only because of the opportunities for successful marketing and environmental impact, but also because these can produce feasible changes in consumption patterns. By offering hybrid sausages, hamburgers or other common meat products, a connection is made with existing and valued diets. Examples of hybrid meat products are "Fit&Good", containing 50% beef, 25% vegetables, and 25% "Meatless", a vegetable protein made from wheat and lupines.

4. Organic meat

While the environmental impact of organic meat is still under discussion amongst scientists, this option offers opportunities for focusing on production process values (such as fairness, animal welfare or food security).

5. Meat replacements based on non-animal proteins

Meat can be replaced by using alternative sources of protein. Meat contains approximately 20–30% proteins. Alternative sources that also have high protein levels (more than 10%) are seeds and fungi. Many kinds of seeds qualify as replacements for meat and dairy: peas, beans, wheat, soy and nuts. Other possibilities are teff (a grass-like plant from Ethiopia), quinoa and lupine. Seeds can be eaten untreated, but are often treated to increase the protein levels or make them better resemble the structure of meat. The most commonly used replacements are soy proteins or wheat glutes. "Quorn" is one of the most well-known fungi-based meat replacements.

² This is on average and can vary, or even be higher, amongst different types of animal protein.

6. Insect proteins

The domain of insect meat is still experimental in the Netherlands. The advantage of replacing meat with insects is that the protein conversion (the amount of vegetable protein needed to produce one kilo of animal protein) is much lower for insects than for other animals. In recent years, various insect snacks have been marketed in the Netherlands.

7. Sustainable farmed or captured fish

Fish is another important source of animal protein. However, as fish is often produced or captured unsustainably, it is important to make responsible choices when consuming fish products.

Protein quality

When replacing animal proteins it is not only the quantity, but also the quality of the protein that is important. Better quality proteins contain more essential amino acids and are also easier to digest. The best quality proteins for human consumption are those found in eggs and (cow) milk. In general, vegetable proteins do not contain all (or not enough) essential amino acids. Soy is most suitable and wheat least suitable; the quality of soy proteins is comparable to that of meat, milk and eggs. It is possible to increase the protein quality of vegetable products by mixing several sources of proteins; wheat and legumes are a very good combination. The same goes for rice and lentils.

Despite these options for reducing animal protein consumption, totally abandoning animal proteins in the human diet has certain disadvantages. Not only are animal proteins a good source of vitamin B12 and iron, keeping animals for meat consumption also has some specific advantages: animals eat waste from the food industry, certain types of soils and mountainous areas are only suitable for grazing animals, and animals kept for milk or eggs are eventually consumed as well.

Available meat replacements

The table below shows a variety of meat replacements available in Dutch supermarkets. The table is not meant to be comprehensive, but serves merely as an example of the available options.

Table 1: Available meat replacements.

Product	Explanation
Meatless	Based on wheat or lupine. Can be consumed directly, or added to hybrid products.
Vegetarian burger	Different varieties, made from various vegetable proteins like soy, wheat protein and wheat starch. They may be enriched with animal proteins like chicken egg protein and milk protein. Examples are Tivall (Albert Heijn), GoodByte (C1000) and Vivera (other Dutch supermarkets).
Valess	Based on skimmed milk.
Tempé	Vegetable protein source made from fermented soy beans.
Tofu	Vegetable protein source made from soy beans.
Soy milk	Used as a milk replacement.
Quorn	Protein source produced by fungi that grow on molasses and ammonia. Often enriched with chicken egg protein to keep the structure intact.

Source: Blonk et al. (2008)

Consumers

In the Netherlands, the turnover of meat replacements³ has grown from €27 million in 2001 to €62 million in 2009. This shows that consumers are taking a more positive attitude towards these products. However, positioning meat replacements in the market is difficult and their market share remains relatively small. The concept of a meat replacement is itself problematic as it presumes that meat needs to be substituted, or that a vegetarian burger is inferior to meat. Another difficulty is that consumers are often unaware of the fact that they influence the way food is produced by what they buy. Every producer therefore has a different strategy to market their products. For example, Campina advertises Valess as an alternative to meat for a more varied diet, Encko markets Fit&Good as a healthier product.

³ That is, meat replacements like vegetarian burgers, not other sources of proteins like nuts or dairy.

Considerations

The expanding range of meat replacement products is making it easier to change to a diet which contains less animal protein. Such a shift will have positive environmental effects. However, choosing between the available alternatives requires careful consideration and a thorough weighing of the options.

The environmental impacts of meat are not related to soy consumption alone, but also, for example, to greenhouse gas emissions and land use. For instance, eating chicken meat is generally more environmentally sustainable than eating beef because land use and climate changes related impacts are smaller, but soy related impacts are (relatively) larger for chickens. The responsible citizen may want to take animal welfare into account as well.

Clearly, what you choose to eat depends on how you look at the issues and what you consider important, and all these considerations do not make it any easier. Nevertheless, it is clear that the burden of a vegetarian diet is usually relatively low compared with a diet with meat.

Consumer behavior

Schuttelaar & Partners questioned 501 consumers about their attitude to the consumption of animal proteins. They found that 80% of consumers are willing to not consume milk, meat and eggs for a day a week if this is environmentally more sustainable. Only 6% are willing to totally stop eating meat. More than half the respondents said they buy sustainably produced milk, meat or eggs (always, often or sometimes). A third of the respondents never buy such products. When buying milk, meat or eggs, people pay particular attention to shelf life (48%), price (36%) and whether or not the product is organic (23%).

Source: LNV Consumentenplatform (2008).

The Dutch Soy Coalition

The Dutch Soy Coalition brings together Dutch civil society organizations working in the fields of nature, environment and development. The coalition was founded in response to alerts by partner organizations in South America about the negative impacts of soy production and expansion. The Netherlands plays a central role in the soy sector as the second largest importer from South America and central distribution point for Western Europe. Therefore, the members of the Coalition see it as their responsibility to raise awareness with consumers and the media, and ask our government and companies to take steps to reduce the negative impacts of soy production and trade. Concrete suggestions of steps to be taken by companies and the government can be found in our publication "Big business, big responsibility: Addressing the social and environmental impact of the soy value chain" and our mission statement, which is available through our website in English, Dutch, Spanish and Portuguese.

The factsheet and case study series has been developed to stress the urgency of the problems and the need to take action. They feature specific cases of social or environmental problems in particular soy producing countries. Should you wish to get in touch with the Dutch Soy Coalition or receive more background information on the issues, please contact the secretariat of the DSC at nsc@bothends.org or refer to our website www.sojacoalitie.nl. An overview of the sources used for this factsheet is available on the DSC website ('[Links and Documents](#)' section).

