

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 2008 was over 222 million tonnes, making it the world's fourth agricultural commodity after wheat, rice and maize. The largest producers are the USA (33%), Brazil (27%) and Argentina (21 %). 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 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. Our aim is to reduce the negative social and environmental impacts associated with the production, processing and consumption of soy. We are pursuing of this goal in three ways: we are campaigning to reduce the high levels of meat and dairy consumption in the Netherlands, which is the root cause of the problems; we promote more responsible production of soy; and we ask the livestock sector to replace part of the soy in animal feed with alternative feed crops.

This is one of three fact sheets we have prepared to explain why we are pursuing these three goals and provide information on the 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.

Table 1 shows European per capita consumption of various animal products. Figures for Dutch consumption vary but are similar: on average Dutch people consume 182 eggs, 20.5 kilos of cheese and 62 liters of milk each year. Dutch meat consumption was 84.8 kilos per capita in 2007.² Table 1 also illustrates the amounts of soybeans needed and the acreages required to produce these animal products.³ The European consumption of these animal products requires about 9.5 million hectares of land. That is more than twice the surface area of the Netherlands (4.1 million hectares).

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).

² Based on carcass weight; actual consumption of meat is 39.2 kg per year (PVE, 2008).

³ The amount of soybeans needed was calculated by assuming that 1,000 tonnes of soy meal is equivalent to 771 tonnes of soybeans. The acreage needed to grow these soybeans was estimated by using an average soybean yield of 2.61 per hectare.

Table 1: European consumption of relevant livestock products (2006/2007) and the soybean meal, soybeans and acreage needed to produce the consumed products.

Livestock product	European consumption per capita	Soy meal per unit	Soy meal needed (1,000 tonnes)	Soybean equivalent (1,000 tonnes)	Acreage (hectares)
Beef & veal	17.6 kg	232 grams / kg	2,020	1,557	595,519
Pork	41.8 kg	648 grams / kg	13,416	10,341	3,956,061
Poultry meat	21.5 kg	967 grams / kg	10,294	7,934	3,035,314
Milk	78.8 liter	21 grams / liter	806	621	237,642
Eggs	266 eggs	32 grams / eggs	4,212	3,247	1,242,109
Cheese	16.3 kg	189 grams / kg	1,500	1,156	442,402
Total			32,248	24,856	9,509,047

Source: van Gelder et al., 2008

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 substitute (see the fact sheet *Replacing soy in animal feed*); another way is to reduce the consumption of animal products. Besides lowering the demand for soy, reducing the consumption of animal proteins has several additional advantages. First, because the production of animal proteins requires two to six times 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. Second, reducing animal protein intake also has certain health effects. Meat can be part of a healthy diet, but 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. Third, reducing the consumption of animal products can significantly reduce the production of greenhouse gases. If everybody cut back their consumption of animal products to 70 grams a day, this would reduce the costs of meeting global climate change goals by 50%. The final argument for reducing meat consumption is that the production of meat is associated with many animal welfare issues.

Current options for reducing animal protein consumption:

1. Reduce consumption
2. Eat meat substitutes based on non-animal proteins
3. Mix animal and non-animal proteins
4. Eat insect proteins
5. Eat fish

1. Reduce consumption

An average 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. Eat meat substitutes 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 substitutes 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 substitutes are soy proteins or wheat glutes. "Quorn" is one of the most well-known fungi-based meat substitutes. The fibers are made to resemble meat by pressing, folding and rolling them.

3. Mix animal and non-animal proteins

A new development is the growing popularity of so-called hybrid meat products. Vegetable proteins – especially from soy, wheat and lupines – can be added to processed meat products like snacks, sausages, minced meat and hamburgers. In the past, this was usually done in very small quantities, but now it is technically possible to add higher volumes. A Dutch example is

"Fit&Good", containing 50% beef, 25% vegetables, and 25% "Meatless", a vegetable protein made from wheat and lupines. The advantage of this strategy is that the positive aspects of meat (juicy, good taste and structure) are combined with the advantages of eating less meat. Another advantage is that people who eat vegetarian diets often replace meat with cheese, which also has a lot of negative environmental and health effects.

4. Eat insect proteins

Insects are also a source of protein for human food. 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.

5. Eat fish

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

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 almost as high as that of beef. 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.

CO₂ equivalents and land use

Consuming less meat not only reduces the need for soy. Blonk et al. (2008) showed that the environmental effects of a shift from animal to vegetable proteins leads to important reductions in land conversion and CO₂ emissions. The researchers estimated that if the total Dutch population switched to full vegetable consumption, a 6 megatonnes reduction in CO₂ equivalents is possible. If everyone stopped eating meat, dairy and eggs for one day a week, this could save up to 1.1 megatonnes.

If the Dutch population became fully vegetarian, the area needed to produce food for Dutch consumption would be reduced by 12,500 square kilometers (in comparison, the surface area of the Netherlands is just over 4 million hectares, or 41.000 square kilometers). Shifting from beef to chicken meat would reduce the total area needed by 11,000 square kilometers. Consuming the amount of protein-rich products advised in the Dutch guidelines for good nutrition ("Richtlijnen voor Goede Voeding") of the Netherlands Nutrition centre would save 6,000 square kilometers (people generally consume more proteins than needed).

Important to note here is that Blonk et al. (2008) did not take the effects of deforestation (for the production of soy) into account. The actual numbers are therefore likely to be higher.

Source: Blonk et al., 2008

Available meat substitutes

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

Table 2: Available meat substitutes.

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

Current state of affairs

Over the years the range of meat substitutes has grown, as has the market for these products. Some recent developments are discussed below.

Consumers

In the Netherlands, the turnover of meat substitutes⁴ has grown from €27 million in 2001 to €60 million in 2007. This shows that consumers are taking a more positive attitude towards these products. However, positioning meat substitutes in the market is difficult. The concept of a meat substitute is itself problematic as it presumes that meat needs to be replaced, 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.

Consumer attitude

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

Research and development

There are various initiatives to create new and better substitutes. Research shows that the average Dutch consumer (not vegetarians) wants meat substitutes to resemble meat, both in taste and use (function within the meal, way of cooking). It is especially important to imitate the characteristic fiber-like structure and tenderness of meat.

Other research focuses on growing meat by using stem cells to develop into meat tissue. Algae are another subject of research as their potential as a source of feed, vitamins and energy is still unknown. The possibility of using insect cells as alternative source of protein, rather than the insects themselves, is also being studied.

These studies are all being done by universities and other research institutes. Although the private sector is also working on the development of meat substitutes, it is still difficult to develop new processes to produce meat substitutes that are more in line with the wishes of the consumer.

⁴ That is, meat substitutes like vegetarian burgers, not other sources of proteins like nuts or dairy.

Multinationals like Cargill and ADM are known to be working on mixing meat and vegetable proteins.

Policy development

The Dutch Minister for Agriculture, Nature and Food Quality, Gerda Verburg, stated that she does not want to influence people's eating patterns as a way of meeting the climate goals. Nor does she feel that influencing meat consumption is her responsibility. However, she does want to ensure that consumers have an informed choice. Her goal is that in 2011 consumers are aware of the impacts of their consumption behavior and can buy responsibly. This will be made possible by labeling, international agreements, education and support for market developments for innovative, sustainable products. The critical citizen will have to behave as a critical consumer.

Considerations

The expanding range of meat substitute 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 CO₂ equivalents and land use (see box). Eating chicken meat is generally more environmentally sustainable than eating beef because land use and CO₂ equivalents are lower, 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. The overall environmental impact of a vegetarian diet is roughly 1.5–2 times less harmful.

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).

