



Swedish Society for Nature Conservation

# Fact sheet Environmental Week

Food for a better climate



# INTRODUCTION

Nearly one-third of the climate impact produced by Swedish households comes from food, and the majority of this is caused by meat consumption. Globally, live-stock cultivation accounts for 18 percent of greenhouse gas emissions. This is more than all transportation combined.

The production of meat affects the climate in many ways, both negative and positive. This is why it is important to take into account all of the environmental aspects of meat production, not only those related to the amount of greenhouse gas emissions. We must look ahead and consider the ways nature will be able to cope with a changing climate and how agricultural lands are best used under new conditions, such as reduced access to cheap fossil fuels.

Raising livestock requires more energy than cultivating grains, vegetables or fruits. Livestock feed also consists of large proportions of grains and legumes such as soy, which has a significant negative environmental impact and is a waste of resources. Rather than raising livestock on grass or waste products, 50 percent of all grains and legumes grown in Sweden and a full 70 percent of cultivated land are dedicated to livestock feed. In addition to this, 25 percent of the land used to grow feed for Swedish livestock is located abroad. Artificial fertilizers and chemical pesticides, which reduce the number of wild plant and animal species, are used in nearly all cases. This means that biological diversity is decreased and nature becomes more vulnerable.

Livestock manure plays an important role in sustainable agriculture by circulating nutrients and by providing soil with a desirable structure. The addition of energy-intensive artificial fertilizers, which are produced using fossil fuels, contributes to significant environmental impact and is unsustainable in the long run.

Production of organic meat reduces the distribution of chemicals and offers better living conditions for plants and animals. The area in and surrounding an organic farm contains approximately 30 percent more plants, birds and insects than an equivalent area in a conventional farm. A high degree of biological diversity makes nature less vulnerable and better equipped for changes in the climate. A large proportion of livestock feed in an organic farm consists of grass, while manure is carefully preserved for use in the fields. On a global scale, organic farming may be a prerequisite for increased crop yields and a more sustainable agriculture.

In Sweden, we eat too much meat. Nonetheless, meat consumption is on the rise. The average Swede currently purchases some 80 kilos of meat per year, a 40 percent increase over the past 20 years. It is a trend that is neither nutritionally nor environmentally sustainable. The UN Food and Agriculture Organization (FAO) has concluded that as prosperity rises, so too does average meat consumption. The organization predicts that global meat production will double from an annual average of 229 million tons in 1999 and 2001, to 465 million tons by the year 2050.

In order to contribute to a better environment, we will have to eat more vegeta-

rian meals. Every time a vegetarian dish is substituted for a meat dish, that meal's climate impact is reduced by more than half. Chickpeas, for example, result in only 5-10 percent of the greenhouse gas emissions produced by an equivalent amount of meat. By eating less meat, and by carefully choosing which meats to buy, we can reduce our food's environmental impact while improving nature's ability to withstand changes in the climate.

- Eating less meat is better for both the climate and the environment.
- Choose organic meat and/or grass-fed Swedish meats.
- Eat less chicken and pork, and choose eco-labeled meat products.

## GLOSSARY

**Biological diversity:** The variation of living plants and animals. The term includes diversity both within and between species, as well as the diversity of ecosystems. Biological diversity is often referred to on three levels: genetic variation, the diversity of species and the diversity of ecosystems.

**Ecosystem services:** Resources produced by nature that are essential to life. Examples of services supplied by ecosystems include the ocean's ability to produce fish, natural air and water purification, pollination of plants by insects, natural resistance to pests, the ability to mitigate the effects of natural disasters and the ability of forests to store the greenhouse gas carbon dioxide.

**Agrochemicals:** External products used in agriculture, such as chemical pesticides, artificial fertilizers and fossil energy.

**Carbon dioxide equivalents (CDE or CO<sub>2</sub>e):** A measurement accounting for the differing effects of various greenhouse gases (see below). In order to be able to compare these gases and their impact on the environment, their effects are converted into so-called carbon dioxide equivalents. These calculations are most often based on the gases' impact on the global climate over a period of 100 years, with carbon dioxide representing the base value of 1. Methane, for example, is approximately 21 times stronger in its effect on the environment, whereas the effects of nitrous oxide are some 310 times stronger.

**Concentrated feed:** Feed consisting of grains and/or legumes such as wheat, barley, soy and peas. In some cases, concentrated feed may contain industrially manufactured proteins in order to accelerate the growth of livestock, as well as additional vitamins and minerals.

**Life Cycle Analysis (LCA):** Life Cycle Analysis is a method of calculating a product's total effect on a single factor, such as its climate impact or water usage. A Life Cycle Analysis is based on a complete study of a product, from cradle to grave, or from raw material extraction and production processes to a consumer's

use and disposal of the product. All transports and energy consumption are thus accounted for. The method has its drawbacks, however, in that it fails to account for effects that are less quantifiable, such as chemical hazards, impact on biological diversity and radiation.

**Greenhouse gases:** A term including all gases that affect the climate. Emission statistics account for carbon dioxide, nitrous oxide, methane and fluorinated gases.

- Carbon dioxide (CO<sub>2</sub>), which is produced by the burning of fossil fuels, is the predominant greenhouse gas. Although carbon dioxide is also released during the burning and decomposition of biomass, this is not counted as additional carbon emissions. The raising of livestock accounts for a full 9 percent of the total carbon emissions caused by human activity, mainly due to the effects of deforestation and land usage. This is largely because of the large quantities of carbon that are released when tropical forests are converted into grazing lands or croplands used for the cultivation of livestock feed for export, the effects of which are most evident in South America. The use of fossil fuels is also a significant factor, for example in transports and energy-intensive processing and storage – all of which account for an increasing proportion of global carbon emissions.
- Nitrous oxide is produced primarily by agricultural, waste management and industrial processes. It is also the strongest of the three predominant greenhouse gases produced by the raising of livestock. One kilo of nitrous oxide is equivalent to 296 kilos of carbon dioxide, and is emitted mainly by soil and fertilizers. The higher the soil's nitrogen content, the more nitrous oxide that is released. Livestock cultivation accounts for 65 percent of the total global nitrous oxide emissions caused by human activity.
- Methane is produced primarily by agriculture and waste disposal. Livestock cultivation, which accounts for the large majority of the agricultural sector's methane emissions, is responsible for an estimated 40 percent or more of the total methane emissions caused by human activity. These emissions are mainly caused by the digestive processes of ruminants. One kilo of methane emissions is equivalent to 21 kilos of CO<sub>2</sub>e.
- Fluorinated gases (HFC, PFC and SF<sub>6</sub>) are produced only through industrial processes.

# FOOD'S ENVIRONMENTAL IMPACT

Food plays a major role in our lives, far beyond the simple nourishment provided by the meals on our plates. It is often the center of social activities full of joy and traditions. In addition to this valuable resource, agriculture also provides benefits such as biological diversity and richly cultivated landscapes.

The current methods of food production are, however, far from sustainable. Most of the problems caused by today's agricultural systems began with the advent of cheap and widely accessible fossil energy, which also hastened the pace of agricultural specialization. It is precisely this type of specialization that has resulted in certain regions in Sweden where grains are cultivated, and others where meat is produced. Farming itself is most often specialized in specific types of crops. These divisions, along with the expanding size of farms, have led directly to increased dependence on artificial fertilizers and chemical pesticides, the effects of which include eutrophication and decreased biological diversity. In the future, a more diversified agriculture including regions with a proper balance between livestock and plant cultivation should be strived for.

The food currently consumed in Sweden is largely dependent on imports. Only 11 percent of the resources needed to produce our food are both local and renewable, while the remaining 89 percent are imported from abroad – the transportation of which often requires heavy consumption of fossil energy. One-third of all land used to produce food for the average Swede is located abroad. In order to produce the current quantities of Swedish milk and meat products, imported soy and palm meal flour are now used for livestock feed while domestic feed is produced using artificial fertilizers, the raw materials of which are extracted and produced abroad. On top of this, we consume increasing quantities of imported food.

All food production affects the climate. Sustainable agriculture aims to minimize its environmental impact, in part by utilizing resources as effectively as possible. In order to accomplish this many factors must be weighed against one another, and the solutions aren't always compatible. These considerations are especially important since, without them, the end result may be ineffective or shortsighted solutions. It is therefore impossible to avoid climate-related issues when discussing the environmental impact of food production, as both concerns are intertwined as part of the larger whole.

## **The Swedish Society for Nature Conservation maintains that sustainable agriculture:**

- fosters and preserves biological diversity and a cultivated landscape rich in natural and cultural value
- produces food products that are free from harmful pollutants
- preserves the soil's productive capacities
- minimizes the contamination of soil, air and water
- effectively contributes to the circulation of plant-based nutrients
- uses only renewable energy resources

- provides ethical, high-quality living conditions for both people and their pets
- demonstrates solidarity with other people around the world
- integrates agriculture with the rest of society
- offers reasonable economic conditions for farmers and ranchers

# ORGANIC AGRICULTURE AND THE CLIMATE

Organic farming generally results in lower levels of greenhouse gas emissions. The production of organic flour and vegetables, for example, causes roughly half the amount of emissions as in a conventional farm. This is because organic farms eliminate the use of artificial fertilizers. The difference is less significant for milk and meat production since organically raised livestock have a longer life expectancy and therefore produce more methane gas.

Life Cycle Analyses also show that the energy consumption of organic farms is considerably lower than with conventional methods: 40 percent lower for meat, and 20 percent lower for milk. This is largely due to reduced reliance on energy-intensive concentrated livestock feed. Organic wheat cultivation, in which artificial fertilizers are eliminated, consumes 37 percent less energy.

Organic farming is also more likely to include perennial crops, the leftover roots of which contribute to carbon-rich mulch. This means that more carbon is stored in the soil than in conventional farming, which in turn reduces atmospheric levels of carbon dioxide.

In general, organic products are more likely than conventional ones to contribute to the environmental quality goals of “a richly cultivated landscape” and “a rich variety of plants and animals,” in part because their diversity of plant species and the elimination of chemical pesticides. Increased biological diversity ensures that nature is better able to cope with and adapt to inevitable changes in the climate.

Organic farms have, on average, 30% more species than conventional farms and the density of individual plants is 50% higher than in conventional farming systems.

Organic products also contribute to a non-toxic environment because no pesticides are used. In conventionally produced foods, traces of chemical pesticides are usually evident. In one EU analysis, toxic residues were found in as much as 46.4 % of the products tested, 4.4 % of which exceeded the permitted limits.

## Organic farming in Ethiopia

The Swedish Society for Nature Conservation’s report, “Organic Ethiopia,” shows

a successful example of how farmers, researchers, local advisors and agricultural experts together can develop a farming system based on local inputs, biological diversity and ecosystem services.

These organic farming systems gave the following positive results:

1. Increased productivity and increased yields
2. Reduced risk of drought, pests and flooding
3. Reduced dependency on fossil fuels
4. Higher groundwater levels
5. Increased soil fertility
6. Restoration of depleted soil
7. Increased income
8. Increased opportunities for women
9. Increased biodiversity and enhanced production of ecosystem services

## MEAT AND THE ENVIRONMENT

Over the past century, Swedish agriculture has undergone a major transformation. Not least among these changes is an increase in specialization, leading in part to a meat industry characterized by negative effects such as eutrophication. Water consumption for livestock production is another major environmental issue, not least in a global context as water is scarce in many countries. Raising livestock requires much more water than growing crops. For example, approximately 1,000 liters of water is needed to grow one kilo of root vegetables or pulses, while producing one kilo of beef can require more than 15,000 liters of water.

Globally, livestock production has a major impact on the environment. It occupies large areas of land, while the development of new pastures and fodder cultivation are two of the most significant contributors to the destruction of rainforests and savannahs. Approximately one third of the world's total land area is used for raising livestock. Much of this land is either non-arable or otherwise unsuitable for purposes other than grazing. Unfortunately, land is not only used to feed the livestock itself, since meat production also claims much of the world's arable land by using it for the cultivation of livestock feed.

The world's total land area consists of 11% arable land, one-third of which is used for growing livestock feed, such as grain, corn and soy. Approximately one-third of the world's total grain production also goes to livestock feed. In Sweden, the corresponding figures are even higher. Here livestock feed is grown on 70% of the arable land, while 50% of all grain is used to feed livestock.

Additional environmental effects of livestock cultivation can include depleted soil properties, eutrophication, the release of toxins and heavy metals from pesticides and chemical fertilizers used for livestock feed cultivation. Research shows, however, that Swedish meat production causes less environmental impact when seen in an international perspective.

# BENEFITS OF GRAZING LIVESTOCK

The environmental effects of livestock cultivation are not only negative. Cattle and sheep can contribute to increased biodiversity if they graze in pastures, also known as natural pastures. By consuming grass, which humans cannot do, grazing livestock also help collect the solar energy that reaches the Earth's surface. When we drink milk or eat meat from these animals, we then absorb this solar energy and receive vital proteins and minerals. Only in the industrialized world have animals taken man's place in the food chain to consume plants that humans themselves could eat, such as grains, peas and soybeans.

In terms of natural resources, it would therefore be wise to utilize pastures on a larger scale in order to preserve biodiversity and ecosystem services while at the same time converting grasses into protein. Pastures bind carbon and, if cared for properly, are also a good source of feed for ruminants.

New estimates also indicate that the climate impact of livestock production based on high utilization of natural pastures must be properly reevaluated. Unplowed natural pastures may in fact serve as effective carbon reserves, since they have the ability to absorb and stably store large amounts of carbon in their soil. This can mean that grazing livestock's negative effects on the climate could be reduced by 20 to 40 percent.

# BIODIVERSITY, ECOSYSTEM SERVICES AND CLIMATE

Biodiversity, a measure of the variety of living plants and animals, is what builds the world's ecosystems. An ecosystem, in turn, consists of all living things and their surrounding environment, within a given natural area. Ecosystems provide us with so-called ecosystem services including plant pollination, water purification, carbon storage and nature's ability to protect us against flooding.

Climate change will lead to higher temperatures, more clouds, more extreme precipitation and less snow, along with an array of other effects. This will affect the distribution of species, for example as southern species spread to Sweden and northerly species have difficulties finding new habitats. 15

During the last century, changes in the climate have already affected plant and animal reproduction, the length of growing seasons, the distribution and size of populations, as well as increased incidence of pests and diseases. Climate change is one of the most significant causes of biodiversity loss and changes in ecosystem services, according to the Millennium Ecosystem Assessment (2005), The European Environmental Agency (2005) and the International Union for Conserva-

tion of Nature IUCN (2005).

Climate change affects biodiversity by introducing some species and eliminating others. Changes in natural ecosystems may also affect the climate by impairing the ability of soil to store carbon. Biodiversity and the climate are therefore intimately connected.

Ecosystems have both buffering and productive capacities, such as the ability to store nutrients and carbon, that will be especially crucial as the climate changes. Biologically diverse environments are therefore important resources for mankind's ability to manage and cope with climate-related crises.

## What are ecosystem services?

Ecosystem services are defined as the resources and processes provided by nature that benefit humankind including, but not limited to:

- food and fresh water
- biomass
- the ozone layer's protection against harmful radiation
- the cultural value of nature

Because many of these services have no apparent market value, they can be quite difficult to protect. More than 60% of the ecosystem services evaluated in the Millennium Ecosystem Assessment (2005), EEA (2005) and IUCN (2005) are currently being destroyed. Agriculture is dependent upon a healthy diversity of microorganisms and soil animals such as predatory insects, bees, earthworms and dung beetles. Since the mid-1800s it has become increasingly common to replace these ecosystem services, primarily with chemical pesticides, mineral fertilizers and the refinement of crops that are not dependent on insect pollination. Organic farming is largely a reaction meant to counteract these developments.

# MEAT'S CLIMATE IMPACT

Livestock cultivation accounts for 18 percent of global greenhouse gas emissions.

In recent years livestock cultivation has risen to the surface of climate debates. In total, the raising of livestock is estimated to be responsible for 18 percent of the global greenhouse gas emissions caused by human activity. This figure includes the entire production chain, not only the raising of livestock, but soil disturbance, feed production, transports and processing, among other factors. It is also a larger proportion of greenhouse gas emissions than that produced by the entire transportation sector. On a global scale, livestock cultivation accounts for some 80 percent of all agricultural greenhouse gas emissions.

# CLIMATE IMPACT BY TYPE OF MEAT

Compared with other types of food, meat production causes particularly strong effects on the climate. However, the overall impact differs depending the type of livestock and production methods, along with how and where the animals are raised. And these effects include more than just greenhouse gas emissions which, counted alone, confirm that beef, reindeer and lamb cause the greatest impact, partly due to the release of methane during digestion.

The larger picture is, of course, far more complex. Unlike pigs and chickens, cattle and sheep that are allowed to graze freely in natural pastures not only contribute to the soil's carbon storage, they are also important for biological diversity. Ruminant livestock also convert plants that are inedible to humans into high-quality, edible protein. Today's conventional beef production methods, however, rely largely on feed consisting of grains and imported protein crops. Pigs and chickens are also raised on large quantities of crops that are edible to humans, such as soy. If these same pigs and chickens were instead raised primarily on food waste from households, restaurants and grocery stores, the system would be more sustainable. Still, there are currently no calculations demonstrating to which extent this might be possible, and meat from livestock raised in this manner is currently unavailable to consumers. This is because it is illegal in Sweden to feed food waste to livestock due to the risk of infectious diseases. Industrial food waste, on the other hand, is approved for used in livestock feed.

## EXPORTING ENVIRONMENTAL AND CLIMATE PROBLEMS

**The importation of soy contributes to the destruction of rainforests and savannahs.**

In its current state, meat consumption in Sweden is dependent upon importation of both meat products and feed for domestic livestock. In the 1990s, a full 60 percent of Sweden's imports of food products and materials for food production consisted of materials for livestock feed, according to statistics from the Swedish Department of Agriculture. By thus shifting part its production abroad, the Swedish agricultural system manages to reduce greenhouse gas emissions and eutrophication within the country's own borders. Instead, negative effects on the climate and environment increase elsewhere.

The production of palm oil in Indonesia and soy in South America, products which are imported and added to livestock feed, have particularly serious consequences for the climate, the environment and local populations. Savannas and rainforests, for example, are destroyed in order to make room for soy farms. In Brazil, the expansion of soy farms comes largely at the expense of *cerrados*, or savannas, which are among the most biologically diverse ecosystems on the planet. In the past 35 years, more than half of these grasslands have been destroyed. Rainforests are also cut down to make room for expansive soy farms, which displace small-scale local farmers and encourage them to cultivate lands in new areas, such as the Amazon.

When these forests are destroyed and when grasslands are plowed, large quantities of carbon are released into the atmosphere. According to the FAO, deforestation accounts for approximately one-third of all carbon dioxide emissions produced by livestock cultivation, or a full six percent of our total greenhouse gas emissions.

Soy farms increase nature's vulnerability by replacing a diverse collection of species with a monoculture. This not only reduces nature's ability to adapt to changes in the environment and climate; it also contributes to the heavy usage of artificial fertilizers, often containing high concentrations of the heavy metal cadmium, which ultimately risk ending up in Swedish soil through food and livestock feed imports.

Soy farms also have social consequences, including their negative effects on local employment levels. The large-scale farming systems currently in use require a great deal of capital in order to finance the necessary machinery and agrochemicals. This in turn limits the number of farmers who can engage in farming and the consequence is that many small-scale farmers either move their farms or give up and move to cities to seek paid employment. In many cases, the end result is a drastically changed lifestyle with severely limited economic resources, risk of unemployment and a lack of social security. Many small-scale farmers who once lived off these newly claimed lands have thus been forced to move. Conflicts between landowners and small-scale farmers are not only common; they are often violent as well.

But soy farming is not only a bad thing. Soy is a nitrogen-fixing legume that provides a protein-rich product that can be directly eaten by humans. To the extent that soy is grown in an environmentally friendly manner on lands that have long been used for agriculture, its negative effects on the environment and climate can be reduced. However, the majority of soy farming is generally based on monocultures, where agrochemicals, rather than environmentally adapted farming methods, are the primary solution to most problems.

# REDUCE YOUR FOOD'S CLIMATE IMPACT

Exactly what you choose to eat is decisive when it comes to your food's impact on the climate. What you eat means more than even the distance your food has traveled. Choosing vegetarian alternatives is therefore the simplest and most important action you can take towards eating in a more climate-friendly way. If you were to become completely vegetarian, you could reduce your food's climate impact by more than half.

## Here's how you can cut your food's climate impact in half

1. Make every other lunch and dinner vegetarian.
2. Don't waste food.
3. Eat organic foods.
4. Eat according to season, and favor heartier vegetables. Avoid lettuce, tomatoes and cucumbers in the wintertime. Choose cabbage, carrots and parsnips instead.

## Eat less meat

Meat production always requires more energy than vegetable cultivation. Meat can result in up to 100 times more carbon emissions than vegetables, beans and lentils.

In order to eat more healthfully, Livsmedelsverket, Sweden's National Food Administration, recommends that the average Swede should reduce his or her meat consumption.

Eating vegetables is also less expensive than eating meat or sausages, particularly

if you choose root vegetables or other hearty vegetables, beans and lentils.

If you eat beef, choose organic or grass-fed Swedish beef. In this way, you can reduce unnecessary transports and energy-intensive concentrated feed. Grazing animals also contribute to an open landscape while preserving biological diversity.

Reduce your consumption of pork and poultry, which provide very few environmental benefits and which also consume the same crops that we humans can eat directly.

## Organic food is better for the climate

Organic flour and vegetables produce about half the volume of greenhouse gases as non-organic alternatives. This is largely due to the fact that organic agriculture takes place without the use of artificial fertilizers, which require a great deal of

energy to produce. Krav-labeled products also follow strict rules for the reduction of climate impact in production.

Another advantage with organic agriculture is that it avoids the use of chemical pesticides. These pesticides kill not only pests – they also kill their natural enemies.

An organic farm is more tolerant toward different varieties of plants and animals, which makes it more possible to manage a changing climate.

## **Eat according to season. Choose heartier vegetables**

Try to follow the Swedish growing seasons for fruit and vegetables. Summertime in Sweden is a perfect time to enjoy Swedish new potatoes, tomatoes, asparagus, cucumbers, lettuce, leeks, berries, rhubarb, snow peas, zucchini and mushrooms. Winter is a better time to eat heartier vegetables such as red and white cabbage or carrots, rather than choosing lettuce, tomatoes and cucumbers purely out of habit.

## **Don't waste food**

The food we waste has large and unnecessary effects on the climate. We throw away 20-30 percent of the food we bring home. Together, Swedish households waste 900,000 tons of food every year.

A four-person family can save up to SEK 7,000 per year simply by refusing to throw away edible food. Some of this waste is due to the fact that we buy too much food, only for it to sit and rot in the refrigerator. More significantly, however, we throw food away completely unnecessarily. Trust your senses. Smell and taste your food.

## **Choose potatoes over rice**

One portion of rice produces twice the amount of greenhouse gas emissions as a portion of potatoes. Nonetheless, Krav-labeled rice is better than normal rice, since it is most often grown in Italy using less water-intensive methods. Other climate-friendly alternatives include whole-grain wheat, pasta and bulgur.

## **Avoid foods transported by air**

- Strawberries, snow peas, haricots verts and asparagus purchased outside of their Swedish growing seasons.
- Delicate tropical fruits such as guava, passion fruit and fresh figs.
- Exotic fresh fish.

## Choose raw ingredients over manufactured and processed foods

As a general rule, the more a food product has been processed, the more emissions it has produced. In every step of food processing is another additive or system of transport that requires energy and results in greenhouse gas emissions. Although it is often difficult to distinguish which of these emissions are caused by processing and which are caused by transportation, rough estimates indicate that the food processing industry accounts for one-fourth of the total emissions produced by our food consumption. Because of the advantages of industrial-scale food production, however, there are some processed food products that can be manufactured more energy efficiently than those we prepare at home. Among the worst alternatives are partially or fully manufactured meals that are finally prepared at home in the oven.

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Edited for translation to English by Sara Nilsson, 2010.  
Abridged version