

February 2008



**Friends of
the Earth**

Briefing

Hoofprints

Livestock and its environmental impacts

Most of us have heard of the term environmental footprint – used to describe the impact that we all as individuals have on the planet. But recently the environmental footprint of the livestock sector has also come under scrutiny for its contribution to escalating environmental degradation. This ‘hoofprint’ has some of the largest impacts on almost every environmental problem - including climate change, biodiversity loss, overuse of natural resources and environmental pollution.¹

Growing population and changing diets means that global livestock production is predicted to double by 2050, predominantly through industrial production systems.² This presents serious problems for a planet already struggling to cope with current levels of consumption. But at the same time, the livestock sector is a key part of economies across the world and provides livelihoods for about 1 billion of the world's poor.³

This briefing sets out the background for Friends of the Earth's new campaign on the impacts of the Livestock sector. It brings together the key environmental and social issues arising from production and consumption of livestock products - which includes meat and dairy. Although the impacts have been divided into distinct areas, many of the underlying drivers for these problems are closely interconnected. What is clear is that we require a rethink of livestock farming systems if we are to ensure a sustainable and equitable future for food and farming.

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Livestock and Biodiversity loss

Definitions

An ecosystem is the complete community of living organisms in an area, plus all the nonliving materials in the area. So a forest ecosystem would include all the plants, animals, microorganisms, rocks, rivers and soils etc. in the forest.

Biodiversity is the combination of the variety of species and the diversity of the ecosystems present on our planet.

Ecosystem services are all the services that nature provides such as such as soils, carbon cycles, water and air.

Land use change is a change in the management of land by humans and includes land clearing, conversion of forests to agriculture, burning to clear land and bush fires

A thriving planet is rich in biodiversity because only then can it provide the ecosystem services necessary to support us. But the current loss of biodiversity is causing an unprecedented threat to the benefits we currently enjoy from the natural world including provision of clean water and regulation of natural events such as flooding. This is especially true for those who directly depend on natural resources for their livelihoods – such as forest communities and fisherfolk. Three quarters of the billion poorest and most vulnerable people in the world live in rural areas in developing countries and depend on agriculture, forestry and fishing for their livelihoods⁴.

Biodiversity is not evenly distributed across the globe. For example, tropical forests cover approximately 8% of land surface but contain 50% of global biodiversity.⁵ But these high biodiverse areas are also where most of the growth in livestock and feed production for export to Europe and the UK is occurring.

Threats to Biodiversity from Livestock

According to the Millennium Ecosystem Assessment, a global academic study of the state of the world's natural systems, changes in biodiversity due to human activities have been quicker in the past 50 years than at any time in human history.

Studies also confirm that the factors that are causing the loss of biodiversity, and consequently ecosystem services, are either being maintained or are increasing in strength.⁶ So what are these factors?

The most important direct causes of biodiversity loss are changes to habitats (largely caused by land-use change), climate change, overexploitation, pollution and the invasion of habitats by foreign species. For all land-based ecosystems land use change has been the biggest factor in biodiversity loss for the past 50 years.⁷

Livestock production contributes significantly to every one of these factors but it has the biggest impact on land use change.

Livestock production affects land use change in two key ways; through the clearing of forests for cattle ranching and through the conversion of vast amounts of land to agriculture to cultivate soya and cereals for animal feed. Already a third of the world's cultivable land is used to grow cereal and soya to feed livestock⁸, and 7% is used for actual grazing⁹ – figures that are constantly growing.

Particularly at risk are the world's biodiversity 'hotspots', where 75% of all threatened species and 90% of all life on earth live, like the Amazon forests and rich grasslands or 'Cerrado' in South America¹⁰. It is estimated that every year over 2 million hectares of both ecosystems are lost to ranching and crop cultivation.¹¹

Cattle ranching has historically been a leading cause of deforestation in South America and continues to have a large impact especially in the Amazon.¹² However the recent high demand and value of soya for animal feed and for fuel (as biodiesel)ⁱ, along with the many social and environmental issues related to its production have made soya an increasingly key threat to ecosystems in South America.

A growing proportion of soya animal feed is bound for the EU, partly due to changes in feeding practices following the BSE crisis.¹³ The EU and UK also import a significant quantity of beef from Brazil and Argentina.

While the EU imports large amounts of feed and livestock products, escalating population and changing diets in other countries like China are also driving this.¹⁴

The impact of soya animal feed

Between 2004 and 2005, an estimated 1.2 million hectares of rainforest was cut down to as a result of soya expansion.¹⁵

Direct impacts

Soya cultivation, almost entirely for animal feed, has emerged as a leading threat to biodiversity across the world, especially affecting tropical forests and grasslands. In Latin America, the land devoted to soya crops doubled between 1994 and 2004¹⁶ – in Brazil alone soya is cultivated on an area the size of Great Britain.¹⁷ Together, Brazil and Argentina are expected to surpass the USA to become the leading global soyabean producers by 2010.¹⁸

This has resulted in the devastation of natural vegetation, threatened local livelihoods by displacing hundreds of small farmers and weakened the production of staple food crops in the region.

With global demand for soya – and ultimately meat - rapidly increasing and the limited area available for expansion on existing land, soya plantations are leading the expansion of agriculture into the virgin forests and grasslands in Brazil and other countries.

For example the state of Mato Grosso in Brazil, lies half within the Amazon and half within the Cerrado. This state has become the largest soya producing area of Brazil,

ⁱ For more information on fuels from agricultural commodities or agrofuels please see friends of the Earth briefing at http://www.foe.co.uk/resource/briefings/agrofuels_fuelling_or_fool.pdf

with cultivation doubling from 1996 to 2006. The state now has the highest rate of deforestation and forest fires.¹⁹

Many of the areas identified by Conservation International as being highly under threat, such as the Cerrado in the state of Mato Grosso in Brazil and the Atlantic forests in Paraguay, are home to many species found nowhere else in the world, such as the maned wolf, maned sloth and the giant armadillo.²⁰

These areas of habitat support thousands of species including potentially as yet undiscovered animals and plants. In fact a single Amazonian tree was found to have about the same number of ant species as all of Germany.²¹

Indirect impacts

Soya farms also have an indirect impact on deforestation by taking over land that has already been cleared by logging or cattle ranching. This forces ranchers and smaller farmers ever deeper into the forest to create new pasture and farms²², funded by the huge profits made by selling their land to soya farmers.

For example, satellite imagery has shown how large-scale soya expansion in the southern state of Parana, in Brazil has resulted in the expansion of the agricultural frontier into the Amazon rainforest in the North.²³ This is because government policies and private investments have favoured the expansion of large-scale industrial soyabean farms in Parana. And this trend has forced small-scale farmers, who lose their land, to migrate into the Amazon area, where they clear forest for agriculture or cattle ranching.^{24 25}

Soya monocultures

In Argentina alone, it is estimated that about 200,000 small and medium farmers have been evicted from their lands, to make way for soya monocultures.¹²

The drive for more soya is reinforcing the large, industrial monoculture pattern of farming. Massive capital investment is required for inputs such as pesticides, machinery and genetically modified (GM) seeds, and to be profitable farms must operate on a huge scale and minimise labour costs. This makes it hard for small producers in developing countries to compete, so many have been forced to sell (or in some cases have been driven off) their land to make way for the high capital, low labour intensive farming required.

This means that the international soya trade is dominated by a few large companies such as Cargill, Bunge and Archer Daniel Midland. They have a huge level of control over agricultural production, from owning farms to selling seeds and fertilizers, which small farmers simply cannot compete with. This allows them to dictate prices of crops and how they are grown, and pass on any costs associated with bad weather or a bad harvest to the farmers.

Industrial monocultures also have wide ranging environmental impacts such as soil erosion, increased pesticide and fertiliser use, pollution and even cases of human poisoning.²⁶

Genetically modified soya

The increasing use of GM soya is intensifying all the worst aspects of industrial agriculture and tightening the corporate grip on farming.

In South America most GM soya is 'Roundup Ready' or RRSoya, produced by the biotech company Monsanto. It is resistant to the herbicide glyphosate (also produced by Monsanto), Herbicide tolerant soya allows indiscriminate application of herbicide to fields, killing every plant within its range other than the GM variety.²⁷

This has increased agrochemical use in South America. For example, in Argentina where almost all soya is now GM, the use of glyphosate more than tripled between 1999/2000 and 2005/06.

There is also growing evidence that as weeds develop resistance to glyphosate, farmers growing RRsoya are being forced to use greater quantities of glyphosate as well as alternate herbicides. In 2007 a glyphosate resistant variety of Johnson grass, one of the worst weeds in the subtropics was identified in Argentina. Millions of litres of alternative herbicide will be needed to control the weed, at a huge cost to farmers.²⁸

GM monocultures are thought to decrease labour needs by about a third compared to conventional farming, by eliminating the need to carry out weeding by conventional methods for example. This boosts profits but can destroy agricultural communities.

In Europe, GM feed is fed to animals on a large scale. This is because a loophole in EU legislation allows livestock products made from GM fed animals not be labelled as GM. Many consumers are not aware that they are eating meat and dairy products sourced from GM fed animals.

However GM animal feed itself is labelled and therefore retailers and food companies can choose to source non-GM animal feed.²⁹

Where is the demand?

The main demand for soya comes from the high consumption levels of animal products in Europe, and changing diets and a burgeoning population in China. This trend is set to continue.²⁹

The EU is the world's second largest importer of soyabeans.³¹ Within the EU, the UK is the 4th largest consumer of soya. Recent analysis suggests that the UK is potentially responsible for 4% of the soya cultivation in the Cerrado and Amazon Atlantic forests in Brazil.³² But this figure doesn't take into account Soya that we import from other countries, such as the Netherlands, which themselves source from South America. Therefore in reality our impact is probably even higher.

There is so much money to be made from soya that large agribusiness such as Cargill, ADM and Bunge are pouring investment into infrastructure projects like roads through virgin forests and soya crushing plants. This is making it cheaper and easier for farmers to cut down forests themselves, rather than expanding onto previously cleared or cultivated land.³³

The impact of beef production

About two thirds of the deforested land in Latin America has been due to the creation of pasture for cattle ranching.³⁴

Little investment is needed to start raising cattle on cheap land and returns from the land are high for a few years. Therefore overgrazing of pasture land has caused widespread desertification and degraded vast areas of pasture.³⁵

During the 70s and 80s this was attributed to policies which actively promoted the conversion of forests to pasture. Today the situation may be even worse. A 11% annual growth of Brazilian cattle herds caused a surge in deforestation in between 2002 and 2004.³⁶ The cause of expansion has now shifted from domestic demand to the international market - with over a third of Brazil's exports destined for the EU.³⁷ In Latin America as a whole, expansion of pasture land into forest is predicted to cause two thirds of deforestation between 2000 and 2010.³⁸

Today the relationship between land clearing for cattle ranching and soya production is complicated and depends variously on government subsidies, land prices and international commodity prices. But as long as demand for soya and beef, and therefore price keeps increasing, expansion into conservation areas will continue.

Climate change and livestock production

About a third of global man made green house gas (GHG) emissions come from agriculture and land use change – with over half of this (18% in total) coming directly from the production of livestock and feeds. These emissions are predicted to increase rapidly until 2050, unless efforts are made to curb the livestock sector's impact.^{39 40}

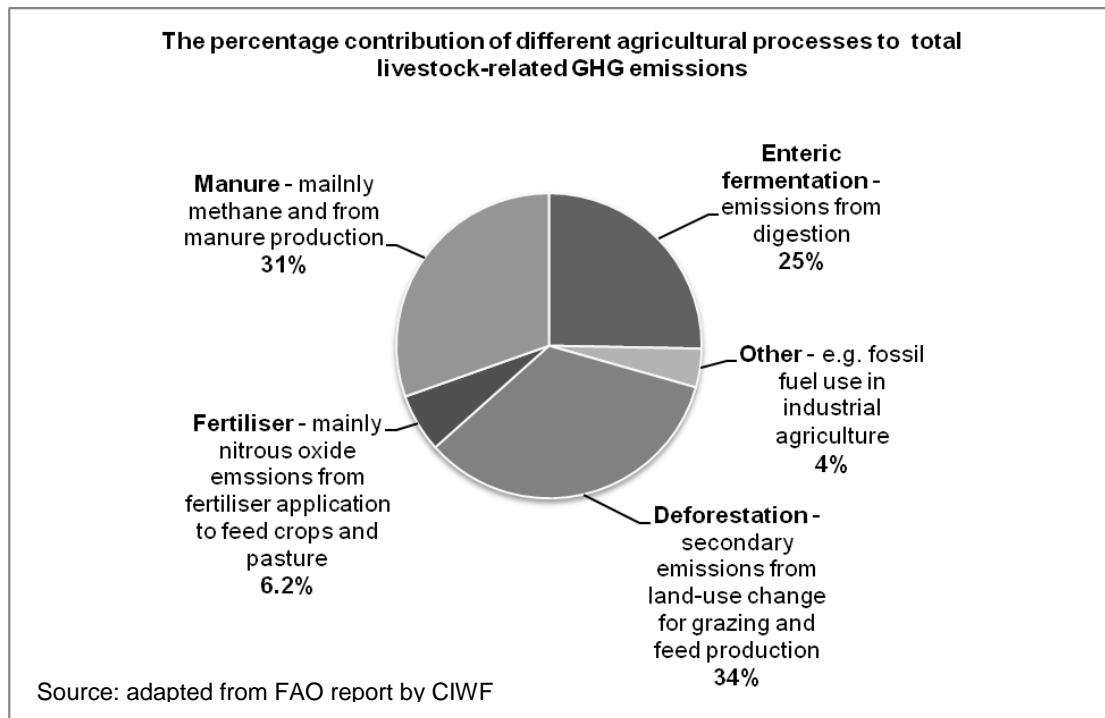
In the UK, livestock accounts for approximately 8% of UK greenhouse gas emissions.⁴¹ In the EU, about 13.5% of emissions are related to the consumption of livestock products.⁴²

The emissions from livestock production come from a variety of sources as illustrated in the chart overleaf. Reducing methane and nitrous oxide emissions can reduce climate change rapidly, as one unit of each of these gases has a bigger impact on climate change than CO².

The process of forest clearance itself is responsible for massive GHG emissions. Deforestation also contributes to the build up of greenhouse gases by destroying valuable carbon sinks, since trees play a big role in absorbing carbon dioxide from the atmosphere. Whilst the Amazon once absorbed excess carbon dioxide in the atmosphere, burning and decaying vegetation from deforestation means that it is now a massive source of emissions – three quarters of Brazil's total.⁴³ This has made Greenhouse has emissions from Brazil higher than that of many industrialised nations.⁴⁴

For more information on the climate impacts of livestock please see Friends of the Earth's briefing Food and climate change at:

http://www.foe.co.uk/resource/briefings/food_climate_change.pdf



Other environmental impacts of livestock production

Water & manure

The livestock sector plays a significant role in water depletion, accounting for over 8% of global water use, predominantly for feed crops.⁴⁵ Water is also used in other stages of livestock such as drinking and in slaughterhouses. Most of this water returns to the environment in waste water or manure, bringing with it pollutants such as high levels of nutrients, drug residues, microbial carriers of disease and heavy metals.

Industrial livestock production creates vast quantities of excess manure commonly discharged into the environment or stored in vast lagoons, from which they leach into water bodies and groundwater, threatening the quality of the soil, water, air, biodiversity and public health.⁴⁶

Pesticides and fertilisers

Globally, the use of nitrogen fertiliser increased by about one third between 1980 and 2000. This growth has slowed in industrialised countries but is rising in the developing world.⁴⁰

Chemical fertilizers and pesticides are used in feed production to increase yields. Both contribute to widespread water and soil pollution from runoff into freshwater sources and soil. Pesticides also contaminate air quality and have severe effects on biodiversity and ecosystems through their damage on other organisms in the habitat. They can also have serious effects on human health.

Livestock production and people

'Soya is like a big whirlwind that consumes the mountain, the land and our history. It leaves us chewing on nothing but air and bitterness.' - Wichi woman from Embarcacion, Argentina

Threats to food sovereignty

The expansion of industrial scale soya farms has devastated livelihoods and has caused widespread displacement of small farmers in Latin America. This has destroyed diverse farming systems, reduced the number of family farms and threatened the production of food staples, thus reducing food security and food sovereignty.⁴⁸ In Argentina, rice cultivation has dropped by 44%, which has triggered a 130% rise in rice prices.⁴⁹ For more information on food sovereignty please see our leaflet at:

http://www.foe.co.uk/resource/briefing_notes/food_sovereignty.pdf

Land grabbing and rural violence

The profitability of soya production combined with unclear land rights in some Latin American countries has led to land disputes, and consequently land grabbing and violence.⁵⁰ In Paraguay, small-scale peasant farmers and Indigenous communities have had violent struggles to protect their lands from the increasing threat of soya plantations. Paraguay has among the most unequal land distributions in Latin America, with about 80% of the land controlled by 1% of the population. As much as half of the land conflict in Paraguay is attributable to soya expansion and since the beginning of the soya boom, the industry has evicted 100,000 small family farmers from their homes.⁵¹

Labourers on remote ranches and farms have also become trapped by debts incurred with their employers. There is also strong evidence of widespread slave labour being used to clear forests and on soya farms. Between 2003 and 2004, the Brazilian Government reported nearly 8,700 slaves in the two soya and beef producing states of Mato Grosso and Para.⁵²

Pesticides and health risks:

Soya expansion has also brought grave health risks to communities from pesticides in the food chain, and aerial spraying of pesticides. In 2003, there were two cases of deaths from aerial pesticide poisoning, leading to the arrest of two soya producers in Paraguay. Still, pesticide spraying has continued to be the cause of death, congenital birth defects and illness, leading to increased conflicts when communities have demonstrated against crop- spraying techniques.⁵³

Diet and Health risks

The latest World cancer Research Fund published paper recommends individuals should eat no more than around 70g of red meat per day and very little, if any processed meat.⁵⁴

Over consumption of livestock products has been linked to negative health effects including obesity and cancer. In 1998 the Department of Health reported that lower consumption of red and processed meat could reduce risk of cancer. This was echoed by a recent World Cancer research fund paper. The high-income world is

eating far above any recommended levels of meat - on average we eat about 200 to 250 g per person per day.

Intensive livestock farming has resulted in serious animal health and welfare issues, and has also been linked to the spread of animal diseases including some diseases that are transferable from animals to humans (zoonotic diseases).

It would seem that with regard to livestock products there is a direct link between the health of humans, animals and that of our environment.

Conclusions

The livestock sector, while being a key player in many agricultural economies, is also a major source of stress on the planet's ecosystems and natural resources. Given its importance, it is unacceptable that the sector has been largely left out of any Governmental attention or policy analysis on environmental protection thus far.

The pattern of growth of the sector is equally alarming. Large multinational agribusinesses are dominating agriculture in both developed and developing countries. The results of this are already being felt in terms of intensification and expansion of production, and increasing consumption. It is essential that the EU and UK play a leading role in tackling these issues.

Friends of the Earth are conducting more detailed research into the opportunities for mitigating our impact on the environmental and social effects of livestock production and consumption. We are working with our groups in affected countries to provide a range of solutions from raising awareness to political change, targeting industry and ideas for personal action. But in the meantime, there are some simple things that can make a difference.

- Eat moderate amounts of livestock products. This has benefits for individual health as well as environmental rewards.
- Look for better quality livestock products. There is a good chance that organic, free range meats and dairy have not been fed on imported or GM animal feed and are more beneficial to the environment.
- Watch out for processed food such as ready meals, sauces etc. which tend to use very low quality meat. Buy fresh produce as much as possible.
- Urge supermarkets and food manufacturers to stop sourcing GM-fed animal products and provide you with clear information on products that come from animals fed GM animal feed. Take action by writing to your supermarket at http://www.foe.co.uk/campaigns/real_food/press_for_change/gm_labelling/index.html
- Shop local. There is a good chance that your local farmers market or butcher will know where his produce has come from. For more on the benefits of local shops and how to promote your local shops go to http://community.foe.co.uk/campaigns/real_food/supermarkets/shop_local/index.html

References

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- ¹ Environmental Impact of Products, EIPRO report, EU Joint Research Centre, May 2006
- ² Steinfeld H et al., *Livestock's Long Shadow: environmental issues and options*. Tables 3.1 & 3.12. Food and Agriculture Organisation of the United Nations. Rome. 2006
- ³ Ibid
- ⁴ Millenium Ecosystem Assessment 2007
- ⁵ MEA special reports 2006 (biodiversity and eco services)
- ⁶ Ibid
- ⁷ Ibid
- ⁸ Global Warning: Climate Change and Farm Animal Welfare, CIWF, 2007
- ⁹ Steinfeld H et al., *Livestock's Long Shadow: environmental issues and options*. Food and Agriculture Organisation of the United Nations. Rome. 2006
- ¹⁰ Conservation International 'Biodiversity Hotspots'
- ¹¹ 'Biofuels driving destruction of Brazilian Cerrado', August 2007, Mongabay.com <http://news.mongabay.com/2007/0821-cerrado.html>, accessed January 2008
- ¹² The Cattle Ranching Chain in the Brazilian Amazon, Amigos da Terra – Amazônia Brasileira, July 2006
- ¹³ The EU imposed a ban on feeding of animal-protein-based ration to all livestock in 2001 in an attempt to reduce the risk of further BSE outbreaks. The resulting shortage of protein has been filled primarily by soy-meal
- ¹⁴ United Soya Republics – the truth about soya production in South America, Grupo de Reflexion Rural, 2007
- ¹⁵ Greenpeace eating up the Amazon, april 2006
- ¹⁶ FAO stat Rome 2006 available at <https://faostat.fao.org/default.aspx>
- ¹⁷ Morais (2005), IBGE (2006)
- ¹⁸ USDA (2001) Major World Crop Areas and Climatic profiles¹⁹ United Soya Republics – the truth about soya production in South America, Grupo de Reflexion Rural, 2007
- ²⁰ Conservation International Biodiversity Hotspots overview <http://www.biodiversityhotspots.org/xp/hotspots/cerrado/Pages/default.aspx>
- ²¹ Ibid
- ²² United Soya Republics – the truth about soya production in South America, Grupo de Reflexion Rural, 2007
- ²³ Skole D, Chometowski W, Salas W, Nobre A, 1994. Physical and Human Dimensions of Deforestation in Amazonia, in *Bioscience* 44 (5), pp314-322.
- ²⁴ Kaimowitz D & Smith J, 2001. Soyabean technology and the loss of natural vegetation in Brazil Bolivia, in Anglesen A and Kaimowitz D (eds), *Agricultural Technologies and Tropical Deforestation*
- ²⁵ Oil Palm, Soyabeans & Critical Habitat loss, WWF, August 2003
- ²⁶ ibid
- ²⁷ 'Who Benefits from GM crops? – the rise in pesticide use', Friends of the Earth International, February 2008
- ²⁸ 'Who Benefits from GM crops? – the rise in pesticide use', Friends of the Earth International, February 2008
- ²⁹ Genetically modified animal feed, Friends of the Earth briefing, May 2006
- ³⁰ USDA, 2003a. USDA Agricultural Baseline Projections to 2012, United States Department of Agriculture, Washington D.C.
- ³¹ DANIEL C. NEPSTAD, CLAUDIA M. STICKLER, AND ORIANA T. ALMEIDA Globalization of the Amazon Soya and Beef Industries: Opportunities for Conservation
- ³² Global Biodiversity Database Protocol Development – Commodity Linkages Report for Joint Nature Conservation Committee, June 2007
- ³³ 'From Rainforest to Chicken Breast - Effects of soyabean cultivation for animal feed on people and nature in the Amazon region – a chain of custody study January 2006, Friends of the Earth Netherlands
- ³⁴ FAO report
- ³⁵ Steinfeld H et al., *Livestock's Long Shadow: environmental issues and options*. Tables 3.1 & 3.12. Food and Agriculture Organisation of the United Nations. Rome. 2006.
- ³⁶ Daniel C. Nepstad, Claudia M. Stickler, AND Oriana T. Almeida Globalization of the Amazon Soya and Beef Industries: Opportunities for Conservation
- ³⁷ Daniel C. Nepstad, Claudia M. Stickler, AND Oriana T. Almeida Globalization of the Amazon Soya and Beef Industries: Opportunities for Conservation

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- ³⁸ Steinfeld H et al., Livestock's Long Shadow: environmental issues and options. Tables 3.1 & 3.12. Food and Agriculture Organisation of the United Nations. Rome. 2006.
- ³⁹ Stern Review on the economics of climate change, 2006
- ⁴⁰ Steinfeld H et al., Livestock's Long Shadow: environmental issues and options. Tables 3.1 & 3.12. Food and Agriculture Organisation of the United Nations. Rome. 2006.
- ⁴¹ Meat and Dairy Production & Consumption, Food Climate Research Network working paper November 2007
- ⁴² Environmental Impact of Products, EIPRO report, EU Joint Research Centre, May 2006
- ⁴³ Eating up the Amazon, GP International, April 2006
- ⁴⁴ World Resources Institute Climate Analysis Indicators Tool (CAIT) cait.wri.org
- ⁴⁵ Steinfeld H et al., Livestock's Long Shadow: environmental issues and options. Tables 3.1 & 3.12. Food and Agriculture Organisation of the United Nations. Rome. 2006.
- ⁴⁶ Food and Agriculture Organisation Livestock policy brief 3
- ⁴⁷ Tilman et al 2001, forecasting agriculturally driven global environmental change
- ⁴⁸ Loensen, L., S. Semino and H. Paul, 2005.
- ⁴⁹ Monocrops and Monocultures – the loss of food sovereignty' United Soya Republics – the truth about soya production in South America, Grupo de Reflexion Rural, 2007
- ⁵⁰ Simmons, C. 2004. The political economy of land conflict in the eastern Brazilian Amazon. *Annals of the Association of American Geographers* 94:183–206
- ⁵¹ Soya expansion and the Paramilitarisation of the countryside' United Soya Republics – the truth about soya production in South America, Grupo de Reflexion Rural, 2007
- ⁵² Eating up the Amazon, Greenpeace International, April 2006
- ⁵³ 'Paraguay: Campesino Families Block Fumigation of Soy Fields', http://upsidedownworld.org/main/index2.php?option=com_content&task=view&id=1081&pop=1&page=0&Itemid=1
- ⁵⁴ World Cancer research fund paper