

Livestock and climate change

Livestock's long shadow

Anyone who wants to help prevent climate change would do better to give up eating meat rather than their car, suggests a recent FAO report. Scientists agree that livestock are a significant source of greenhouse gas emissions, but not all of them endorse the proposed solution – more intensive livestock production.

By **Joris Tielens**

Fossil fuels are the most significant source of greenhouse gas emissions, the recent report of the Intergovernmental Panel on Climate Change (IPCC) stated again. But this conclusion does not take fully into account another important source of greenhouse gases, namely livestock, say researchers at the UN Food and Agriculture Organization (FAO). In a bulky report, *Livestock's Long Shadow: Environmental Issues and Options*, the FAO concludes that livestock contribute substantially to land degradation, air and water pollution, and the loss of biodiversity.

The report follows on from previous assessments of the livestock sector and the environment compiled by the FAO and organizations such as the International Food Policy Research Institute (IFPRI) and the International Livestock Research Institute (ILRI). What is new in this report is its estimate that livestock are responsible for 18% of anthropogenic greenhouse gas emissions, a bigger share than that of the transport sector worldwide.

Chain

The authors of the FAO report arrived at these conclusions by adding together all the greenhouse gases produced throughout the entire livestock commodity chain. The primary greenhouse gas emitted directly by livestock is methane, which is produced during the digestion of food. Another, nitrous oxide, comes from manure, as well as from the artificial fertilizer used in the production of feed crops such as soya and maize. Finally, CO₂ itself is released as a result of land degradation due to overgrazing, deforestation and the conversion of grasslands for cultivation. 📌 Thus most of these greenhouse gases come not directly from livestock themselves, but from the production systems of which they are part.

Western consumers eat most meat and are therefore the main producers of greenhouse gases. As a rule of thumb, as incomes rise, so does the consumption of meat. This is also the driver of what has been called the 'livestock revolution' – the dramatic increase in the worldwide demand for meat. Between now and 2050 this demand is likely to double due to population growth, continued rural–urban migration and, in particular, rising incomes in emerging economies such as China. An exception is India, where religious rules limit the consumption of meat. In Western countries, a small number of concerned consumers are choosing to eat less meat or organic meat, or switching to a vegetarian diet or 'novel protein foods', i.e. meat substitutes based on vegetable proteins, but the effects are only marginal. 📌

The increasing consumption of meat in developing countries has many benefits. Not least, a varied diet is better for human health. Also, in many countries, animals are an integral part of the agricultural systems of small farmers. Crop waste is used as feed for cattle, which are used to plough fields, and their manure is used as fertilizer. For many people, cattle also represent a walking insurance policy, since they can be sold when times are hard.

The consequences of livestock for the environment need to be addressed, but these also need to be weighed against their other important functions, according to Akke van der Zijpp, professor of animal production systems at Wageningen University. 📌 Based on her research into the sustainability of animal production systems in developing countries, van der Zijpp believes that part of the solution lies in encouraging the consumption of meat from other types of animals, particularly non-ruminants such as pigs and poultry because they emit less methane than cattle. Cattle have a low food conversion efficiency: they produce fewer kilograms of meat per kilo of fodder they consume compared with pigs and chickens. In fact, insects produce the most animal protein per unit of food consumed. While insects may be an unorthodox source of food

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Photo: Abbas/Magnum/HH

in the West, they are widely accepted in Africa.

The FAO report has been criticized in a number of respects. For example, it states that land degradation and deforestation make significant contributions to greenhouse gas emissions in that they result in the release of stored CO₂. But research suggests that the resilience (the rate of recovery) of degraded pasture might be greater than expected by the FAO. Further, deforestation cannot be ascribed solely to livestock production. In many countries in South America, trees are being cut down not only to clear land to produce soya for cattle feed, but also for wood for sale, and by land speculators. 🇺🇸

Overlap

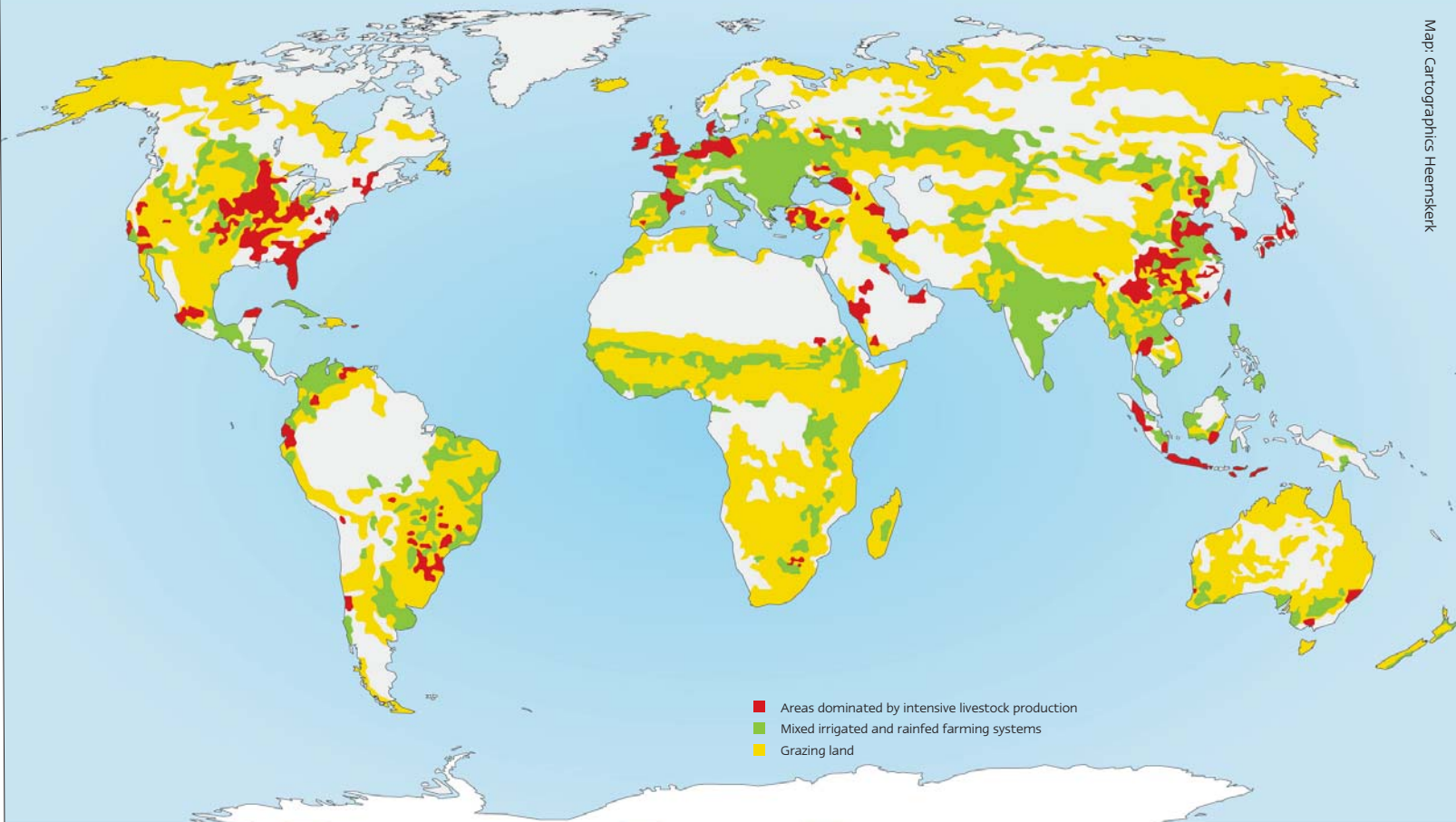
More fundamental criticism comes from Rik Leemans, professor of environmental systems analysis at Wageningen University, whose research focuses on the impacts of changes in land use on greenhouse gas emissions. He contributed to the scientific section of the IPCC report 2007. The report did identify livestock as a significant source of greenhouse gases, but focused on fossil fuels, followed by changes in land use. The reason for this, Leemans believes, is that in any commodity chain analysis, such as that used by the FAO, it is difficult to draw the line between the various sources of greenhouse gas emissions. For example, emissions due to the transport of cattle are included in the livestock sector, but they also belong to the transport sector. The IPCC reports, to which senior scientists from all over the world contribute, apply much stricter scientific standards that do not allow such overlap. All assumptions in the IPCC reports must be substantiated with references, whereas the FAO frequently refers to the 'grey' literature. Leemans concludes that while the FAO report gives a coherent overview of the influence of the livestock sector on climate, it is not appropriate to compare it with other sectors. 🇺🇸 Meat and cattle feed are too cheap, according to the FAO, and that will have to change, for example by reducing or eliminating

agricultural subsidies to Western farmers. The FAO believes that the Clean Development Mechanism of the Kyoto Protocol can help by encouraging projects in which improved 'low-carbon' technologies are part of intensive livestock systems, or focus on the reforestation of degraded land.

According to the FAO, the world's extensive livestock systems – primarily cattle grazing on pasture – currently account for two-thirds of greenhouse gas emissions, while intensive systems are responsible for just one third. The report's most significant solution, therefore, is the intensification of the livestock sector. Through economies of scale and efficiency improvements, businesses would be in a position to invest more in environmentally benign technologies. As an example, the report describes closed ("emission-free") cattle stalls in which the manure is collected and processed to produce methane that can be used as a biofuel. It also suggests that advanced technologies could be used to improve the efficiency of livestock production systems. Genetic engineering, for example, could be used to breed animals that can convert food more efficiently, or the composition of the feed could be altered so that it produces less methane.

The intensification of the livestock sector is already an economic reality in many countries. A large part of the process of animal production is now dominated by large-scale, intensive agri-businesses, not just in Western countries, but increasingly also in China, Brazil and other emerging economies in the South.

Rudy Rabbinge, professor at Wageningen University and chair of the scientific board of the Consultative Group on International Agricultural Research (CGIAR), believes that the FAO report is comprehensive and exhaustive, but perhaps also too gloomy. Even more than the FAO researchers, Rabbinge sees the trend towards the intensification of livestock production as the solution to environmental problems. Developing countries could play leapfrog, and in building their intensive livestock systems make greater use of the knowledge and technology that



Estimated distribution of livestock production systems.
Areas where intensive production systems are already in use are indicated in red.

Source: Adapted from Steinfeld et al. (2006) *Livestock's Long Shadow*, map 13, p.337.

has been built up in recent decades in countries such as the Netherlands. Rabbinge believes that such a strategy could halve the impact of the livestock sector on the environment, and that this would compensate for the doubling of the demand for meat.

Other researchers think that intensification is definitely not the best way forward. Veterinarian Katrien van't Hooft of ETC International in Leusden, the Netherlands, is working in the field of small-scale livestock breeding in developing countries. She fears that intensive livestock production could result in many other, perhaps even greater environmental problems, such as the acidification and overuse of water supplies, and the loss of biodiversity. In countries such as Brazil, large areas are already being deforested to provide land to grow soya for cattle feed. Van't Hooft also notes that small-scale livestock breeders – upon whom millions of people in developing countries depend – cannot compete with intensive farming systems. She is convinced that less large-scale cattle production and more regional production would be much better both for the environment and for the majority of people in developing countries. 📄

Research has shown that small-scale mixed farming systems will remain the dominant form of agriculture in Asia and Africa in the years to come, says Henk Udo, senior researcher within Akke van der Zijpp's group at Wageningen. Udo describes the intensification of livestock production as a single-dimension solution that will be at the expense of the mass of smallholders. Intensification, he believes, is likely to lead not only to many environmental problems, but also to the emergence of much greater social problems due to the exclusion of millions of smallholder farmers.

Pavel Kabat, scientific director of the climate change group at Alterra, part of Wageningen University and Research Centre, also does not share the FAO's view that intensification is the answer to all problems. Intensive livestock production is certainly booming in China, for example, but Kabat does not believe that within the foreseeable future China will have introduced the same environmental technology that is already in place in the Netherlands 📄.

Kabat and many other researchers, whatever their views on the most effective solution to the problem, have concluded it is high time that climate scientists and policy makers took livestock production more seriously and put it high on their agendas for action. ■

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- IPCC (2007) *Climate Change 2007: The Physical Science Basis*, Working Group 1, Intergovernmental Panel on Climate Change. www.ipcc.ch/SPM2feb07.pdf
- H. Steinfeld et al. (2006) *Livestock's Long Shadow: Environmental Issues and Options*. LEAD/FAO. www.virtualcentre.org/en/library

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