

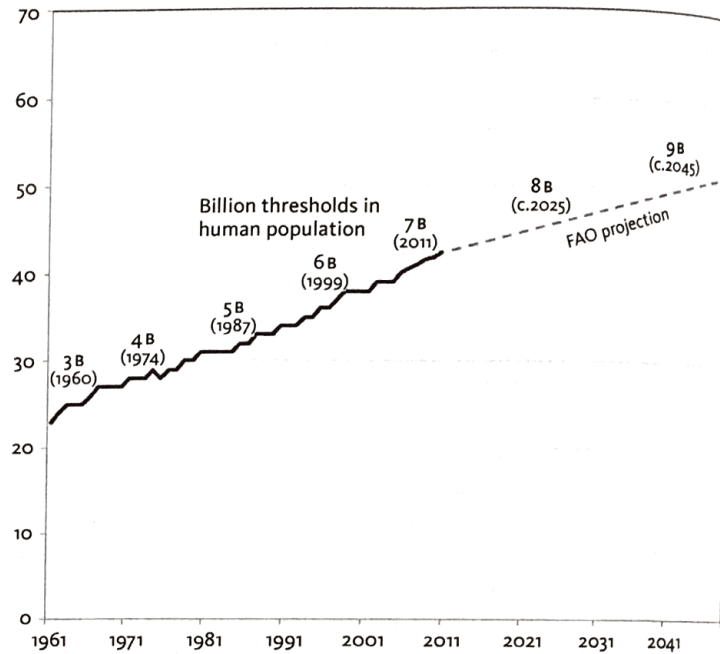
# INTRODUCTION: MEATIFICATION AND WHY IT MATTERS

## The vector of meatification

On a global scale, human diets are in the midst of a great transformation, which is wrapped up in the radical narrowing of agricultural production. One of the most fundamental aspects of this is the rising consumption of animal flesh and derivatives, principally from pigs, poultry, and cattle. The average person today eats almost twice as much meat as did the average person only two generations ago, along with many more eggs, in a world with more than twice as many people now as then. In 1961, just over three billion people ate an average of 23 kg of meat and 5 kg of eggs a year. By 2011, 7 billion people ate 43 kg of meat and 10 kg of eggs a year. This translates to a *quadrupling* of world meat production in a mere half-century, from 71 to 297 million tonnes, and an even greater rise in world egg production, from 15 to 69 million tonnes. World milk production more than doubled, roughly in line with human population growth, with the average person consuming 104 kg in 2010.<sup>1</sup>

Industrial livestock production is the driving force behind the rapid growth in meat and egg consumption, in what are variously referred to as Intensive or Industrial Livestock Operations (ILOs), Concentrated Animal Feeding Operations (CAFOs), or factory farms and feedlots. This transformation permeates everyday life in a way that is both intimate, in the bodily encounter with food, and overwhelmingly unconscious. Rapid growth is expected to continue in the coming decades. By 2050, the Food and Agriculture Organization (FAO) of the United Nations projects that global meat production will rise to 52 kg per person in a world with 9.3 billion people, which amounts to 484 million tonnes (see Figure 0.1). Put another way, if the current course continues, there will be about one third more people and two-thirds more meat produced in four decades than there is today.<sup>2</sup>

This broad picture contains huge disparities. Although increasing per capita meat consumption is occurring almost everywhere, people in rich countries consume vastly more meat than do most people in



0.1 Global per capita meat consumption (kg/person) (sources: FAOSTATS 2013 and UNFPA 2011)

the global South. To take one simple example, between 2001 and 2010, an average American consumed roughly eight times more meat than someone in Africa and over twenty times more meat than someone in South Asia.<sup>3</sup> At the same time, global-scale inequalities tend to be mirrored in class disparities within poor countries, while the biggest consumption increases are occurring in the world's fastest-growing economies – and the upper and middle classes within them – with China and Brazil in the vanguard. China, for instance, now produces and consumes roughly half of the world's total pig meat.<sup>4</sup>

When the lens moves from volume increases to individual animals consumed, the pace of growth becomes even more staggering. In a mere half-century, from 1961 to 2010, the global population of slaughtered animals leapt from roughly 8 to 64 billion, which will double again to 120 billion by 2050 if current rates of growth continue. The stunning rise in the number of individual animals slaughtered reflects the

absolute growth in the volume of meat production and consumption, the quickening turnover time for livestock in industrial systems, and the increasing shift towards poultry birds, which have smaller bodies and are more efficient – or better, *less inefficient* – at converting feed to food than larger animals. The FAO projects that poultry consumption will increase by 2.3 times between 2010 and 2050, in comparison to an increase of between 1.4 and 1.8 times with other livestock.<sup>5</sup>

This general trajectory has been termed the 'livestock revolution' in one frequently cited report.<sup>6</sup> It is also often described in terms of a 'nutritional transition' towards improved diets, with the rising consumption of animal protein portrayed as a more or less inevitable aspiration, part of humans' omnivorous nature, that gets materialized as individuals and societies become wealthier and there are increasing quantities of meat in the marketplace. This imagery might seem plain enough, as per capita meat consumption has clearly marched in step with rising affluence, but it is not nearly as simple as this. The framing of massive inequalities in consumption through the lens of a universal nutritional transition harkens to development theories about the transition to modernity, in which societies of high mass consumption such as the USA are presented as the summit that can be reached and should be aspired to by all countries.<sup>7</sup> Such transitional narratives have a naturalizing effect, because if different parts of the world are seen to be located at different stages along the same course, with all moving towards an improved condition, it can serve to legitimize the course itself and make large inequalities seem less troubling.

Layered onto this is an insistence by prominent actors that further yield enhancement is the key to solving present and future world food problems, which is sometimes described in terms of closing global 'yield gaps,' especially in poor 'under-yielding' countries. Yield-centric narratives are also linked to an insistence that world food production must double by mid-century if it is to meet future demand.<sup>8</sup> But the scale of chronic hunger (nearly one billion people) and malnourishment today, and expected population growth (more than two billion), still do not come close to adding up to a doubling scenario, which must also be understood to contain an uncritical expectation that meat consumption will continue climbing rapidly. These assumptions – there *will* be more meat consumed, total food production *must* double – are influential starting points for contemporary debates about agricultural futures. They are also extremely dubious and dangerous ones.

Rather than a nutritional transition, I prefer to mark the increasing and highly uneven global consumption of meat with more evocative terminology: as the 'meatification' of diets.<sup>9</sup> First, this seeks to call attention to the pace and scale of change. For most of the 10,000-year history of agriculture, meat, eggs, and dairy were consumed periodically and in relatively small volumes, and it was not until the industrialization of livestock production that they began to shift from the periphery to the center of human diets on a world scale. Secondly, the notion of meatification seeks to dispel the imagery of a course that is natural, inevitable, or benign. Great volumes of industrial grains and oilseeds are being inefficiently cycled through soaring populations of concentrated animals, with much usable nutrition lost in the metabolic processes of animals before getting converted to meat, eggs, and dairy. The ensuing production is then highly skewed toward wealthier consumers when, as indicated, one in seven people on earth are hungry or malnourished and many more in varying states of food insecurity. Globally, livestock consume around one third of all grains and a much larger share of all oilseeds, and flows of crops through livestock are much higher in industrialized countries than in poor ones. The aim of this book is to provide a new way of understanding the momentousness of this trajectory, its multidimensional impacts, and the urgency of confronting it.

### Rising attention

This aim should not imply that this book is stepping into a vacuum. On the contrary, there has been a great deal of important work examining the nature and impacts of industrial livestock. Three of the key foundations were Ruth Harrison's pioneering assessment of the early stages of industrializing livestock, Frances Moore Lappé's seminal argument about the global injustice of cycling rising volumes of grain through livestock in a world of widespread hunger, and Peter Singer's moral-philosophical case against speciesism, which included a searing indictment of the treatment of animals in factory farms.<sup>10</sup> These were followed by a number of other pivotal contributions that helped establish the major lines of critical analysis on industrial livestock,<sup>11</sup> which can be broadly seen to focus on:

- human health (e.g. chronic diseases, food safety risks);
- environmental impacts (e.g. climate change, water use and pollution, biodiversity loss);

- the decline of family farms, rural life, and small towns;
- hazardous, insecure, and poorly paid labour; and,
- the suffering of farm animals.

The growing significance of these problems is reflected in the proliferation of both scholarly and more popularly oriented literature.

There has also been increasing attention to the trajectory of livestock production within key UN organizations, most notably the landmark FAO report *Livestock's Long Shadow*.<sup>12</sup> The essential message of this report – the 'long shadow' – was that livestock production commands extensive amounts of land, water, and resources and entails a heavy pollution load, which loom over most major environmental problems, including making one of the greatest contributions to climate change of any economic sector. The contribution of livestock to climate change was further underlined when the chairman of the Intergovernmental Panel on Climate Change (IPCC) stated that reducing meat consumption could have a significant role in cutting greenhouse gas (GHG) emissions.<sup>13</sup>

Concerns about industrial livestock are beginning to penetrate mainstream environmental thought and activism, a reflection of which can be seen in a selection of headlines in popular green magazines and the corporate news media. A recent spate of critical documentary films is another significant part of the rising attention to the negative impacts of industrial livestock, as are compelling visual-informational resources on the internet (Box 0.1).

Yet while awareness of the impacts of industrial livestock production is surely growing, it should not be exaggerated. When the environmental impacts of industrial livestock are discussed, too often responses are framed in limited ways, centered mainly on individual ethics but without connection to other struggles. Such emphases can serve to diminish the interconnectedness of problems and the magnitude of the whole, and divert attention away from the system of production. But the far bigger matter remains the continuing unconsciousness with which immense volumes of pork, ham, bacon, pepperoni, hotdogs, sausages, hamburgers, steak, beef, ribs, shawarma, souvlaki, kofta, chicken balls, nuggets, wings, breasts, eggs, milk, cheese, and miscellaneous flesh, derivatives, and by-products are consumed. The clearest indication of the limits of awareness and concern lies in the fact that meatification on a world scale shows

**Box o.1 Rising attention: selected examples from media, film, and the internet**

Popular 'green' magazines:

- 'Meat: the slavery of our time.' *E Magazine* (July/August 2008)
- 'Meat: now, it's not personal! But like it or not, meat-eating is becoming a problem for everyone on the planet.' *World-Watch Magazine* (July/August 2004)
- 'Meat factories: hellish hog plants, lakes of sewage, and lifeless waterways.' *Sierra* (January/February 1999)

Corporate news media:

- 'Save the planet: stop eating meat.' *Maclean's* (30 March 2010)
- 'Gut check: here's the meat of the problem.' *Washington Post* (29 July 2009)
- 'The cow is a climate bomb.' *Der Spiegel* (27 August 2008)
- 'Rethinking the meat guzzler.' *New York Times* (27 January 2008)
- 'Pollution on the hoof.' *Los Angeles Times* (15 October 2007)

Documentaries with a major focus on industrial livestock production:

- Forks over Knives* (2011)
- Death on a Factory Farm* (2009)
- Peaceable Kingdom: The Journey Home* (2009)
- Pig Business* (2009)
- Earthlings* (2005)

no signs of slowing while, as emphasized, the expectation that there will be continuing growth is a major part of calls for the doubling of world food production. The FAO, an agency that simultaneously influences dominant narratives about world agriculture and is an important barometer of them, exemplifies this momentum: though it reports on the 'long shadow' cast by livestock and warns that approaching a doubling of production would 'place a considerable

- The Emotional World of Farm Animals* (2004)
- A Cow at My Table* (1998)

Documentaries focusing on industrial agriculture, containing substantial critiques of some aspect of industrial livestock production:

- Farmageddon: The Unseen War on American Family Farms* (2010)
- Food Inc.* (2009)
- King Corn* (2007)
- Our Daily Bread* (2005)

Internet animations and other resources:

- Animal Visuals ([www.animalvisuals.org](http://www.animalvisuals.org))
- The Meatrix ([www.themeatrix.com](http://www.themeatrix.com))
- Mad Sausage ([www.madsausage.com](http://www.madsausage.com))
- Farm to Fridge ([www.meatvideo.com](http://www.meatvideo.com))
- CAFO ([www.cafotothebook.org](http://www.cafotothebook.org))
- Meat ([www.meat.org](http://www.meat.org))
- HumaneMyth ([www.humanemyth.org](http://www.humanemyth.org))
- United Poultry Concerns ([www.upc-online.org](http://www.upc-online.org))
- The True Cost of Food ([www.truecostoffood.org](http://www.truecostoffood.org))
- Compassion in World Farming ([www.ciwf.org.uk](http://www.ciwf.org.uk))
- A Cage is a Cage: The Human Farming Association ([www.hfa.org](http://www.hfa.org))
- Food and Water Watch ([www.factoryfarmmap.org](http://www.factoryfarmmap.org))
- Physicians Committee for Responsible Medicine ([www.pcrm.org](http://www.pcrm.org))
- Academy of Nutrition and Dietetics ([www.eatright.org](http://www.eatright.org))

burden on already strained natural resources,'<sup>14</sup> it gives little indication that this course can or should be challenged in a major way, instead focusing much more on things like improved management, regulations, and monitoring, and more technological innovation, from facility design to enhancing the ratio at which feed is converted into flesh, eggs, and dairy.

## The industrial grain-oilseed-livestock complex and the ecological hoofprint

To appreciate the vector of meatification, the strength of its momentum, and the impacts of industrial livestock production, they need to be set within the dynamics of the *industrial grain-oilseed-livestock complex*. The industrial grain-oilseed-livestock complex is the dominant system of agriculture across the temperate world, and is spreading to significant parts of the tropics. Its landscapes can be likened to islands of concentrated livestock within seas of grain and oilseed monocultures, with soaring populations of a few livestock species reared in high densities, disarticulated from the surrounding fields. These islands of concentrated livestock and seas of monocultures are then rearticulated by heavy flows of crops such as corn/maize, barley, sorghum, soybeans, and rapeseed/canola cycling through animals. This disarticulation and rearticulation is mediated by an array of technologies, inputs, and large corporations, and marked by the loss of large volumes of usable nutrition.

Revolutionary increases in yield and output per farmer have been fundamental to this system, which underpins world food security and has reconfigured diets in very uneven ways. On one hand, productivity increases have stoked the lopsided meatification of diets discussed earlier; on the other, they have sown a severe dependence upon cheap grain imports in many poor countries. This has also simultaneously placed intense competitive pressures on small farm livelihoods, from the world's agro-industrial heartlands to impoverished, highly agrarian, and food import-dependent regions.<sup>15</sup> But high productivity and low prices belie deep instabilities, or what I have described as a series of *chronic biophysical contradictions*.<sup>16</sup> This implies that the biological and physical foundations of agriculture are being rapidly undermined by industrial productivity, which is in turn overridden in ways that hinge on the unsustainable use of non-renewable resources, particularly fossil energy, and generate tremendous emissions and wastes. It also means that the logic of efficiency which determines the price of cheap food – and has had an important role in shaping patterns of world food security – amounts to a giant illusion. However, this illusion is now starting to crack amid intensifying and converging problems of biodiversity loss, soil degradation, diminishing freshwater availability, declines in key non-renewable resources, and climate change. In other words, chronic biophysical contradictions are now accelerating. As

this occurs, previously cheap industrial foods are bound to become more expensive, with the greatest vulnerability centered in the world's Low Income Food Import Dependent Countries (LIFDCs). Further, many LIFDCs are located in the semi-arid tropics, where climate change is projected to affect agriculture first and worst.

Today, much critical attention given to global food imbalances is focused on the stark disparities associated with the industrial agrofuel boom and the new land grabs. Industrial agrofuels are demanding rising shares of agricultural land and crop production, with dubious energetic budgets (i.e. there is limited energy returned relative to the energy invested in production), and there is an obvious regressivity to the growing competition between people with cars and people struggling to secure enough food. Agrofuels also factor in the land grabbing unfolding across the South, especially in Africa, in which varying combinations of transnational corporations, finance capital, sovereign wealth funds, and state investment agencies are conspiring with local elites and corrupt governments to grab large tracts of land for both productive and speculative uses.<sup>17</sup> Yet as important as the agrofuel boom is, it should not detract from the inequity and ecological impacts of industrial livestock production, which constitutes an older, bigger, and similarly regressive pull on world grain and oilseed harvests.

The increasing scale and industrialization of livestock production and the inherent feed conversion inefficiencies have a magnifying effect on the land area, water, energy, and other resources that must be devoted to grain and oilseed monocultures, and to the pollutants and GHG emissions ensuing from them. Added to this are the water, energy, and other inputs going into factory farms and feedlots, and the effluence pouring out of them. This means that the uneven meatification of diets is not only a reflection of global inequality but also a major factor exacerbating it, foremost through climate change.

### Outline and arguments

Chapter 1 sets the context for assessing the environmental problems posed by the growth of industrial livestock production, and for why it is an underappreciated and very important aspect of global inequality. It starts by considering the decline of self-organizing ecosystems, the biodiversity crisis, and climate change, followed by influential narratives given to explain them that fixate on human population growth pressing up against asocial biophysical limits. These narratives continue

to feature prominently in mainstream environmental movements, and are important to consider given how this book calls attention to a different 'population bomb' than the much more familiar one. This discussion also helps to highlight some of the major cross-currents and blind spots that prevail within the messy terrain of environmentalism, before pointing toward the need to center political economy in any understanding of environmental change and degradation – in line with the field of political ecology. A basic implication of this, which guides the approach in later chapters, is that it is important to consider the systemic imperatives which shape how resources get defined and how nature gets organized in the quest for incessant economic growth. Next, the landmark concept of the ecological footprint is marked as a valuable lens through which to frame environmental injustice, and to highlight the unequal responsibility for the impoverishment of the biosphere and for climate change. As a calculation, the ecological footprint seeks to approximate the resource budgets and pollution loads contained in production and consumption and then translate this into a measure of the ecological and atmospheric space needed to sustain them, which then folds into a valuable pedagogical tool. In complex modern societies where human interactions with ecosystems are overwhelmingly mediated through commodities and markets, the footprint can provide a valuable starting point into the nexus of social inequality and environmental problems, which is the connotation I hope to maintain in playing off the footprint metaphor and transposing hooves onto feet (the price of which is the semantic imprecision of using *hoof* to mark a framework that embraces not only ungulate farm mammals like pigs and cattle but also poultry birds, which represent by far the greatest number of animals and the fastest-growing dimension of industrial livestock by volume). Agriculture's ecological footprint is next drawn in broad contours, and from there the hoofprint is introduced as a framework for understanding the nature and impacts of industrial livestock production.

Chapter 2 establishes the big picture of an unequally meaty planet, examining the scale, growth, and inequality of meat consumption and production on a world scale. It starts by reviewing the historic shift of animal flesh and derivatives from the periphery to the center of human diets, and some of the key ideas that have accompanied this transition. A central argument is that narratives about universal nutrition transitions not only *correspond* to linear theories of development,

as suggested earlier; they have been *embedded* in them, from European imperialism to China's current race up the 'animal protein ladder.' In other words, the meatification of diets has been a significant promise of modernization and treated as a visible marker of development. This discussion also briefly considers some of the major health and nutrition debates surrounding this dietary change, from the claims of protein superiority to the proliferation of chronic health problems linked to the Western diet, which helps to understand why it has been so celebrated – but also exaggerated – as a matter of human progress. The chapter concludes by exploring the highly imbalanced growth of world grain, oilseed, and livestock production and the tremendous disparities in food consumption it is entwined with. Here, attention is given to the deep and increasingly precarious dependence on cheap grain imports that exists in many poor countries, where the risks of rising world food prices and market shocks are compounding problems of widespread malnutrition, at the same time as the race to consume more animal protein continues in fast-industrializing countries. Taken together, the uneven meatification of diets and the imbalanced geography of the industrial grain-oilseed-livestock complex provide a basis for appreciating the lopsided burden of the ecological hoofprint, which gets developed in the following chapter.

Chapter 3 develops a systematic approach for understanding the industrial grain-oilseed-livestock complex, which is necessary to unravel the scope of its wide-ranging environmental burden. In the process, it aims to demystify the celebrated efficiency of industrial agriculture, which pivots on narrow metrics (tremendous productivity per worker and high yields of plants and animals) while concealing many un- and undervalued costs. The basic approach starts by considering the pressures driving the mechanization, standardization, and biological simplification of agricultural production, and how these generate or exacerbate a range of biophysical instabilities which are then overridden by an assortment of inputs, that in turn entail a range of resource demands. For heuristic purposes, systemic instabilities and overrides are examined at two basic levels: first, focusing on industrial grain and oilseed monocultures, and next at sites of industrial livestock production, which are intertwined through the large volumes of grains and oilseeds flowing inefficiently through animals. This means that the resource budgets and pollution loads associated with industrial livestock production are simultaneously *spatially diffuse* (in magnifying

monoculture production) and *highly concentrated* (at factory farms and feedlots), and these must be added together to arrive at a full sense of the ecological hoofprint. Indeed, a central motivation in using the hoofprint metaphor is to highlight how sites of industrial livestock production dominate landscapes, command resources, and wreak environmental damage far beyond their immediate locations. The islands of concentrated livestock cannot be understood outside the seas of grains and oilseeds.

Chapter 4 starts by adding up the burden of industrial livestock production following the systemic framework developed in Chapter 3: first, focusing on the impacts on land, water, the atmosphere, and public health; and next, considering how the scale and nature of violence in this system represents a revolution in the way humans relate to other species, which then reverberates in especially dangerous and dehumanizing work. When we see the ecological hoofprint as a whole, it helps to make it clear why the continuing meatification of diets and expansion of industrial livestock production bear so heavily on the world's environment and development challenges, and threaten the very biophysical basis of agriculture. Although there is a powerful momentum behind this trajectory, from the corporate complexes directing it to consumer desires and narratives about diet and development, it is far from inevitable. In this spirit, the book concludes with a case for why the deindustrialization of livestock and the demeatification of diets are central to the hope of a more sustainable, just, and humane world, and why these problems cannot be reduced solely to a matter of dietary choice.

## 1 | CONTEXTUALIZING THE HOOFPRIINT: GLOBAL ENVIRONMENTAL CHANGE AND INEQUALITY

### Agriculture and the creeping simplification of ecosystems

For over 99 percent of the last 2 million years, 'our ancestors lived off the land in small, mobile groups.'<sup>1</sup> During this time, all energy was ultimately derived from the sun, converted by photosynthesis along with carbon dioxide (CO<sub>2</sub>), nutrients, and water into usable biochemical forms. Humans harvested only a minuscule part of the total biomass contained in ecosystems through gathering, hunting, and fishing, and did little to impact the structure, self-organization, and process of succession toward climax communities, which are richest in species diversity and almost always have the highest net primary production (NPP) in any given bioregion.<sup>2</sup> Yet as part of nature and evolution, humans have always had some impact on the ecosystems and animal populations around them, and many gatherer-hunter societies were in fact agents of ecological change on a considerable scale. Some intermittently arrested succession through fire, modifying their environments in order to increase the abundance of key prey species, and there is much evidence that hunting pressures were implicated in significant extirpations and even in extinctions of large mammals before the rise of agriculture.<sup>3</sup>

Agriculture arose roughly ten thousand years ago and its expansion was the dominant force of ecological change over most of the Holocene, the relatively warm and stable geological epoch from the end of the last ice age that began around twelve thousand years ago. Agriculture revolutionized how humans obtained biomass and nutrients from the environment, gave rise to new class and gender hierarchies, and established new inter-species relations through the course of domestication. In a biophysical sense, the essence of the agricultural revolution was that humans began to direct photosynthetic activity (and not just appropriate its products) by reorganizing plants, animals, and physical materials within ecosystems and managing their interactions, in order to increase the volume of more proximate and easily accessible nutrition, energy, fibre, and other resources. This also