

Peak Meat Production Strains Land and Water Resources

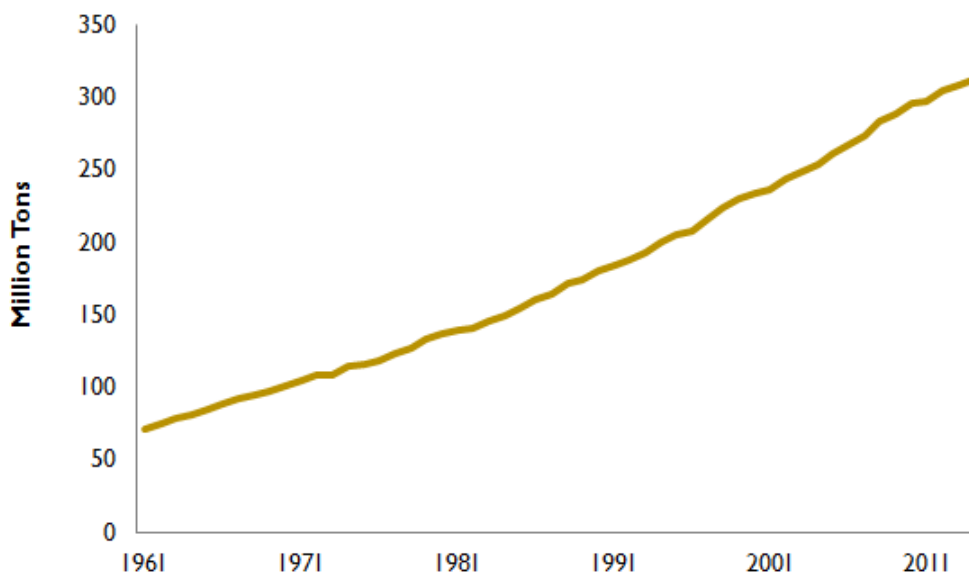
Michael Renner | August 26, 2014

Global meat production rose to an estimated 308.5 million tons in 2013, an increase of 1.4 percent over 2012.¹ The United Nations Food and Agriculture Organization (FAO) forecasts additional growth of 1.1 percent in 2014 to 311.8 million tons.² Production is thus reaching new peaks, despite drought conditions in Australia and New Zealand and disease outbreaks in the United States and Eastern Europe.³ However, the annual rate of growth has slowed from 2.6 percent in 2010.⁴

Since 1961, the first year with comparable FAO data, production has expanded more than fourfold, responding to growing purchasing power, urbanization, and changing diets.⁵ (See Figure 1.) Looking back much further, meat production has grown 25-fold since 1800, outpacing human population growth by a factor of 3.6.⁶

Asia's 131.5 million tons accounted for close to 43 percent of world output in 2013.⁷ Europe was second, with 58.5 million tons, followed by North America (47.2 million tons) and South America (39.9 million tons).⁸ Africa was a distant fifth, at 16.5 million tons, slightly above the combined production of Central America and Oceania.⁹

Figure 1. | **World Meat Production, 1961-2014**



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Source: FAO, FAOSTAT

Among individual countries, China was without equal, producing 85.5 million tons in 2013—close to 28 percent of the world total.¹⁰ (See Figure 2.) European Union (EU) members (44.9 million tons), the United States (42.8 million tons), and Brazil (25.3 million tons) follow, and together with China they accounted for two thirds of global output.¹¹ No other country came close, although Russia, India, Mexico, Argentina, Canada, and Australia stood out among the remaining producers.¹²

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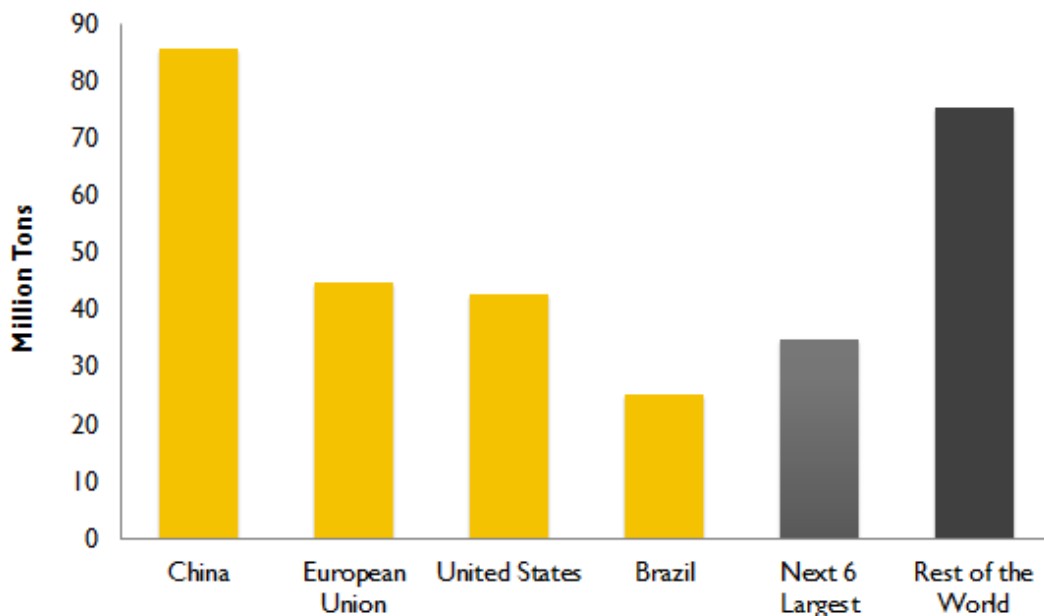
of total world meat production

But in an age of globalization, it is not enough to look at statistics through a national lens. The 10 largest meat companies, measured by their 2011–13 sales, are headquartered in just six countries: JBS (Brazil), Tyson Food (United States), Cargill (United States), BRF (Brazil), Vion (Netherlands), Nippon Meat Packers (Japan), Smithfield Foods (United States, but acquired by China’s Shuanghui International Holdings in 2013), Marfrig (Brazil), Danish Crown AmbA (Denmark), and Hormel Foods (United States).¹³

The share of meat that is traded rose from less than 4 percent of total production in 1961 to 10 percent in 2013.¹⁴ The two most important exporters in 2013 were the United States (7.6 million tons) and Brazil (6.4 million tons), together representing 45 percent of global trade.¹⁵ Other important sellers were the EU (4 million tons), Australia (2 million tons), China (1.9 million tons), India (1.8 million tons), and Canada (1.7 million tons).¹⁶

Importers were less concentrated. China (4.4 million tons), Japan (3.1 million tons), and Russia (2.4 million tons) were the largest buyers and together accounted for one third of global imports.¹⁷ They were followed by Mexico, the United States, Vietnam, the EU, and Saudi Arabia, which in all accounted for another 24 percent of all imported meat in 2013.¹⁸

Figure 2. | Meat Production, Leading Countries, 2013



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Source: FAO

People in industrial countries ate

75.9 kg

of meat per capita in 2013

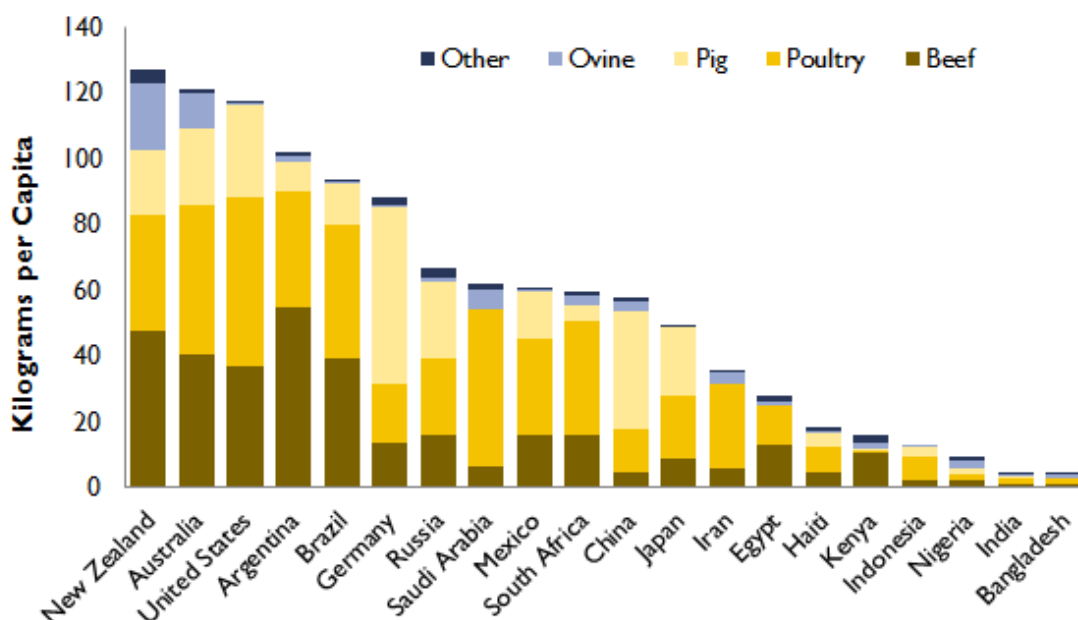
Meat consumption basically follows the same regional pattern as production, with Asia being dominant. On a per capita basis, meat use stood at 42.9 kilograms in 2013 worldwide.¹⁹ Although the disparities have narrowed somewhat, people in industrial countries continue to eat much larger quantities—75.9 kilograms (kg)—than those in developing nations—33.7 kg.²⁰ Meat consumption in Japan is much lower than in many other rich countries, however, and runs close to the world average.²¹ People in New Zealand (126.7 kg per person) and Australia (121.1 kg) ate the most meat in 2011—far more than those at

the bottom of the scale, in Bangladesh and India (just above 4 kg).²² (See Figure 3.) People in China consume almost 14 times as much meat per person as people in India do, and South Africans consume six times more meat than Nigerians.²³

The type of meat eaten varies substantially among different countries. For example, 54 percent of the meat consumed by Argentinians is beef, whereas 74 percent of what Saudis consume is poultry and 61 percent in Germany is pork, while in Nigeria, lamb and mutton (ovine meat) account for 30 percent.²⁴

The growth in meat consumption has not been constrained by rising prices. Following a decline in the 1990s, the FAO meat price index has been on the rise over the past decade, going up 2.4-fold in nominal terms and 1.7-fold after inflation.²⁵ (See Figure 4.) The only exception to this upward trend came in 2008/09, when prices briefly plummeted.²⁶ During the first half of 2014, in particular, prices rose sharply.²⁷

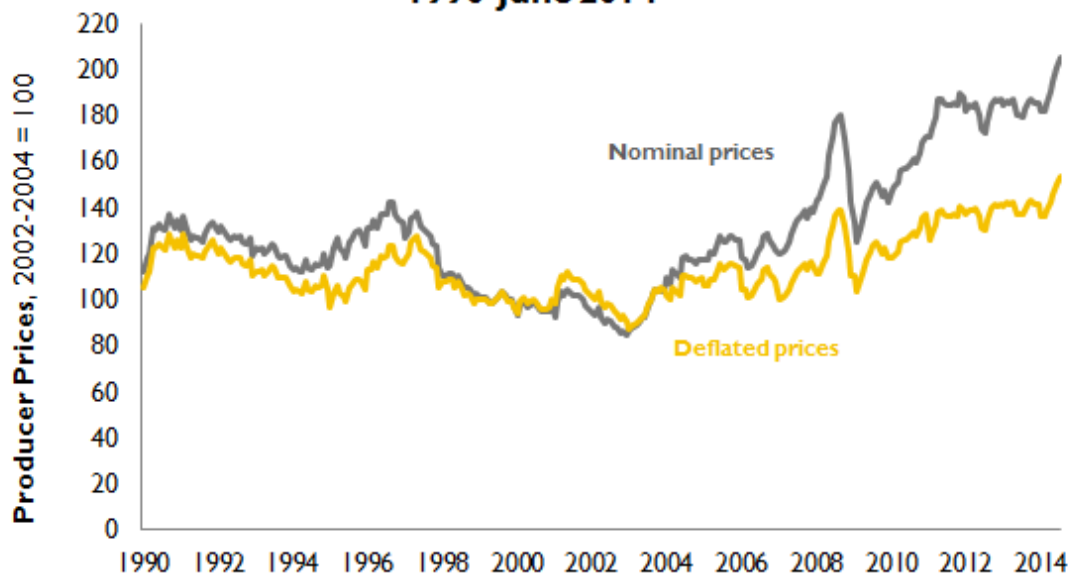
Figure 3. | Per Capita Meat Consumption in Selected Countries, 2011



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Source: FAO

Figure 4. | **FAO Meat Price Index, 1990-June 2014**



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Source: FAO

Pork and poultry accounted for 72 percent of global meat production in 2013.²⁸ At 114.3 million and 107 million tons, respectively, they were far ahead of bovine meat (67.7 million tons) and ovine meat (13.9 million tons).²⁹ Trade, however presents a different picture. Poultry (13.2 million tons) had a 43 percent share, followed by bovine meat (9.1 million tons), pig meat (7.4 million tons), and ovine meat (1 million tons).³⁰

Just a dozen countries are the principal producers, exporters, and importers of each type of meat, with the United States, China, and the EU playing particularly central roles.³¹ China single-handedly accounted for 48 percent of global pig meat production in 2013.³² Just two countries—Australia and New Zealand—were responsible for a stunning 84 percent of the world’s lamb and mutton exports.³³

The steady growth of global meat production and use comes at considerable environmental and health cost. The livestock sector (for meat and dairy) is characterized by industrial methods that use large quantities of water, that mix high-value grains such as corn or soybeans into feed, that cut down forests to expand grazing lands, that confine animals in cramped conditions, that replace organic fertilizers (manure) with synthetic nitrogen, and that administer heavy doses of antibiotics to speed animal growth and reduce the likelihood of disease outbreak.³⁴

In the United States, 13,600 tons of antibiotics were sold for use in livestock operations in 2011—almost four times the 3,500 tons used to treat ill people.³⁵ In Europe, an estimated 8,500 tons were distributed for animal use, but this paled compared with possibly more than 100,000 tons in China.³⁶

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100k tons

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Livestock use large amounts of land. Close to 70 percent

10%

of the planet's agricultural land is used to grow grains to feed livestock

of the planet's agricultural land is used for animal pasture, and another 10 percent is used to grow grains fed to livestock.³⁷ Producing beef is much more resource-intensive than producing pork or chicken, requiring roughly three to five times as much land to generate the same amount of protein.³⁸ Beef uses about three fifths of global farmland but yields less than 5 percent of the world's protein and less than 2 percent of its calories.³⁹

Feeding grain to livestock improves their fertility and growth, but it sets up a de facto competition for food between cattle and people. Worldwide, close to 800 million tons of wheat, rye, oats, and corn are fed to animals annually (more than 40 percent of world production), along with 250 million tons of soybeans and other oilseeds.⁴⁰

Meat production also consumes a lot of water. Agriculture uses about 70 percent of the world's available freshwater, and one third of that—more than 20 percent of all water consumed—is used to grow the grain fed to livestock.⁴¹ Beef is by far the most water-intensive of all meats.⁴² (See Table 1.) The more than 15,000 liters of water used per kilogram is far more than is required by a number of staple foods, such as rice (3,400 liters per kg), eggs (3,300 liters), milk (1,000 liters), or potatoes (255 liters).⁴³

Table 1. | **Water Requirements of Different Types of Meat**

	Liters / kilogram	Liters / gram of protein
Bovine Meat	15,415	112
Sheep / Goat Meat	8,763	63
Pig Meat	5,988	57
Chicken Meat	4,325	34

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Source: Water Footprint, “Animal Products” at www.waterfootprint.org/?page=files/Animal-products

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Alternative practices could reduce these environmental and health impacts, such as switching feed from grains to grass and other plants, using natural instead of synthetic fertilizers, and ending factory-style livestock operations. But dietary choices also make a big difference. Eating less meat typically means leading a less resource-intensive life. What matters, however, is not only how much meat people eat but also the kind of meat they consume.

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- ¹ U.N. Food and Agriculture Organization (FAO), *Food Outlook*, May 2014, p. 7.
- ² Ibid.
- ³ Ibid., pp. 45–49.
- ⁴ Growth rate in 2010 from Laura Reynolds and Danielle Nierenberg, “Disease and Drought Curb Meat Production and Consumption,” in Worldwatch Institute, *Vital Signs*, Vol. 20 (Washington, DC: Island Press, 2013), p. 49.
- ⁵ FAO, *FAOSTAT Statistical Database*, at faostat.fao.org; FAO, op. cit. note 1.
- ⁶ Calculated from Doug Boucher et al., *Grade A Choice? Solutions for Deforestation-Free Meat* (Cambridge, MA: Union of Concerned Scientists, 2012), p. 2, from U.N. Department of Economic and Social Affairs, *World Population to 2300* (New York: 2004), and from Population Reference Bureau, *2013 World Population Data Sheet* (Washington, DC: 2013).
- ⁷ FAO, op. cit. note 1, p. 111.
- ⁸ Ibid.
- ⁹ Ibid.
- ¹⁰ Ibid.
- ¹¹ Ibid.
- ¹² Ibid.
- ¹³ Heinrich Böll Stiftung (HBS) and Friends of the Earth Europe (FoEE), *Meat Atlas: Facts and Figures About the Animals We Eat* (Berlin and Brussels, 2014), pp. 12–13.
- ¹⁴ Calculated from FAO, op. cit. note 5, and from FAO, op. cit. note 1, p. 7.
- ¹⁵ FAO, op. cit. note 1, p. 111.
- ¹⁶ Ibid.
- ¹⁷ Ibid.
- ¹⁸ Ibid.
- ¹⁹ Ibid., p. 7.
- ²⁰ Ibid.
- ²¹ Ibid.
- ²² FAO, op. cit. note 5.
- ²³ Calculated from *ibid.*
- ²⁴ Calculated from *ibid.*
- ²⁵ FAO, “FAO Food Price Index,” at www.fao.org/worldfoodsituation/foodpricesindex/en.
- ²⁶ Ibid.
- ²⁷ Ibid.
- ²⁸ FAO, op. cit. note 1, p. 7.
- ²⁹ Ibid.
- ³⁰ Ibid.
- ³¹ Ibid., pp. 112–15.
- ³² Calculated from *ibid.*, p. 114.
- ³³ Calculated from *ibid.*, p. 113.
- ³⁴ See, for instance, HBS and FoEE, op. cit. note 13.
- ³⁵ Ibid., p. 26.
- ³⁶ Ibid.
- ³⁷ Boucher et al., op. cit. note 6, p. 2.
- ³⁸ Ibid., p. 7.
- ³⁹ Ibid., p. 1.
- ⁴⁰ HBS and FoEE, op. cit. note 13, p. 31.
- ⁴¹ Ibid., p. 28.
- ⁴² Table 1 from Water Footprint, “Animal Products,” at www.waterfootprint.org/?page=files/Animal-products.
- ⁴³ HBS and FoEE, op. cit. note 13, p. 29.