

level of tariffs and trade barriers (Chase-Dunn, Kawano, and Brewer 2000). This imbalance in power in trade is reinforced by the different levels of market concentration among exporting countries and importing countries. Among the top exporting countries, the top five exporters accounted for 73 percent of beef exports, 86 percent of chicken exports, and 93 percent of pork exports in 2015. By contrast, the top five importers accounted for substantially smaller portions of total world imports: about 52 percent of beef, 46 percent of chicken, and 66 percent of pork. This tends to give exporting nations more leverage in the market (Howard 2016). All of this contributes to unequal exchange between richer and poorer countries.

### Factors behind the Expanding Global Meat Industry

Given the growth in meat consumption and production around the globe, as well as the increased international meat trade, we should take a moment to consider some of the factors that have contributed to this global change in diets. While there are many factors that have played a role in the expanding global meat industry, three are especially notable: an increase in global feed grain production, a global shift toward market-oriented policies and liberalization, and increased corporate concentration. As the following discussion demonstrates, these three factors are interrelated.

First, one important factor contributing to this expansion in the global meat industry has been an increase in the production of feed grains across the globe. World production of corn (maize) and soybeans, in particular, has increased significantly: from 1990 to 2015, corn production doubled from 481 MMT to 967 MMT, and soybean production more than tripled from 104 MMT to 319 MMT (Winders 2017, 3, 11). In 2015, the global production of these feed grains—a combined total of 1,286 MMT—was larger than the production of the two major food grains, wheat and rice, which were 735 MMT and 430 MMT, respectively, for a combined total of 1,165 MMT.<sup>5</sup> And the amount of land devoted to these food grains and feed grains were as follows: 224 million hectares of wheat, 176 million hectares of corn, 158 million hectares of rice, and 120 million hectares of soybeans. This global expansion of feed grain production was fueled partly by national policies that offered support in the form of farm income subsidies and in the expansion of land. Furthermore, advances in agricultural technology helped to fuel this expansion of world food grain production: in 1996,

genetically engineered (GE) corn and soybeans became available. Today, most of the soybeans produced are GE soybeans, and most GE feed grain production occurs in North and South America, with the United States and Brazil being the world's two largest producers and exporters of corn and soybeans. Together these two countries account for about 80 percent of world soybean exports and about 60 percent of world corn exports. This increased feed grains production made possible the expansion of the global meat industry.

Second, a shift in policies toward more liberal and market-oriented policies contributed to the expansion of the global meat industry. The creation of the World Trade Organization (WTO) in 1995 and the spread of bilateral and regional free trade agreements from the 1990s onward were at the heart of liberalization and the expansion of international trade. This is especially true for agriculture, since prior to the WTO formation, countries had largely protected their agricultural sectors from free trade. The numerous regional free trade agreements in the 1990s included the North American Free Trade Agreement (NAFTA), the Free Trade Area of the Americas, the European Economic Area, Mercosur (founded by Argentina, Brazil, Paraguay, and Uruguay), and the Asia-Pacific Economic Cooperation forum. At the same time as these regional trade agreements were forming, the number of bilateral free trade agreements increased dramatically. Regional associations, such as the European Free Trade Association, also made an increasing number of agreements with individual countries. In addition to the spread of free trade agreements, communism fell in Eastern Europe and the Soviet Union, and markets in China expanded. This decline of communism opened markets for feed grains and meat that had previously been extensively regulated or even closed off.<sup>6</sup> Such policies, agreements, and national changes allowed for greater trade both in meat and in feed grains, which contributed to various nations increasing their own meat production. Total meat trade across the globe increased from 10.6 MMT in 1993 to 26.1 MMT in 2013. The expansion of free trade, especially in agriculture, facilitated the global growth of the meat industry.

Third, increased corporate concentration, in large part facilitated by the WTO and other free trade policies, played a role in the expansion of the global meat industry. Corporate concentration—involving companies growing in size and gaining larger shares of markets, generally by acquiring or merging with other companies—occurred in a couple of ways in the

global meat industry. First, the seed industry experienced significant corporate concentration as GE seed production increased. Howard (2009, 2016) demonstrates the tremendous concentration—in the form of mergers and acquisitions—that occurred in the global seed market from 1996 to 2008, with the commercial release of GE seeds. A handful of companies came to dominate this market during this period, particularly DuPont, Monsanto, and Syngenta. These three companies accounted for more than half of the global seed market in 2009. This consolidation centered on the development of GE seeds, as this new technology facilitated increased market concentration. The global meat industry also became more concentrated in terms of meat processors (Heffernan 1998; see also chapter 2). Heffernan (1998, 50) shows high levels of corporate concentration in meat processing in the United States: four firms controlled 55 percent of broiler chicken production, 87 percent of beef slaughter, and 60 percent of pig slaughter. In 2013, the top four pork processors controlled 63 percent of the market (Howard 2016, 83). As Howard (2009, 1270) points out, the reason behind this consolidation is fairly straightforward: “When concentration reaches a certain threshold, the largest firms are able to ensure stable profits by ceasing to compete on the basis of price.” In the case of both GE seeds for feed grains and meat processing, the increased market concentration was accompanied by an expansion in the global reach of the corporations. Thus, GE seeds for feed grains came to be heavily adopted in several countries, especially Argentina, Brazil, Canada, and the United States. Indicative of the growing global reach, the import of GE feed grains occurs more widely today than twenty years ago and has come to include countries in Africa, Asia, Europe, the Middle East, and North and South America.<sup>7</sup> Consequently, as these markets expanded globally, a handful of companies grew in size, market share, and global reach.

While other factors have also contributed to the expansion of the meat industry, these three factors—increased feed grains production, a shift toward more liberal trade policies, and greater corporate concentration in the meat industry—have been particularly important for the growing global reach of the meat industry. Increased corn and soybean production have allowed for the growth and global spread of industrial livestock production that relies on intensive feed methods. This increased feed grain production, of course, has relied upon greater corporate concentration in the global seed industry with the spread of GE feed grains. Since resistance to GE foods