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Structure of the Global Markets for Meat

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Abstract

Meat trade flows among countries and world regions are determined largely by differences among countries in their resource base, their preferences for meat types and cuts, the extent and character of barriers to trade, and the industry structure. Future growth of meat trade depends on further liberalization of protectionist barriers, eradication of animal diseases, economic development, and population growth. Trade growth is likely to feature greater complexity in trade patterns, with more countries engaging in trade, and with an increased tendency for individual countries to import and export meat cuts and offal from the same animal species.

Keywords: Meat trade, competitiveness, trade policy, sanitary barriers, consumer preferences, industrial structure.

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Summary

Poultry meat, beef, and pork are the three most important meats in world trade. The United States, the European Union, Australia, Canada, Brazil, and Argentina are leading meat exporters, and Russia, Japan, China (including Hong Kong), Mexico, and the United States are leading importers.

Meat trade flows among countries and world regions are determined largely by differences among countries in their resource base, preferences for meat types and cuts, the extent and character of barriers to trade, and the industry structure.

Those parts of the world with low-priced inputs—feed, labor, equipment, etc.—have competitive advantages in meat production. Land for forage and grain production is important for success of livestock operations. Among the keys to competitiveness in meat processing are large and reliable livestock supplies, low labor costs either through low wages or economies of size, and a profitable market outlet for a full range of meat products and byproducts.

Pronounced differences exist in the preferences for meat expressed by cultures around the world. Americans pay more for white poultry meat, but consumers in other countries place a premium on dark meat, and this dual market has been one of the underpinnings of large U.S. poultry exports. Some major markets are willing to pay higher prices for meat offal than others, again leading to large trade flows. The ability to ship sub-primal and retail cuts to retail outlets around the world has created the opportunity to exploit the differences between countries in their preferences for particular cuts of meat from the same animal species.

Trade barriers, both sanitary and protectionist, have strongly influenced meat trade. The distinction between countries free of foot-and-mouth disease (FMD) and those that are not free largely defines world trade in fresh, chilled, or frozen beef and pork. Bovine spongiform encephalopathy (BSE) virtually ended Britain's beef exports in the late 1990s. In the 1990s, gains were made in eradicating FMD in many countries, but recent outbreaks in Taiwan, Britain, and Argentina provide strong reminders of both the difficulty of control and the damage caused by disease.

The evolution of world and regional trade agreements, such as the World Trade Organization, the North American Free Trade Agreement, and MERCOSUR, has lowered protectionist barriers. However, significant protectionist barriers still remain, such as high tariffs and tariff-rate quotas, which prevent or inhibit significant potential trade in meats.

Large multinational firms are prominent in the meat trade. The success in world trade of the largest firms is likely linked to their ability to achieve economies of size, and perhaps of scope. Achieving such economies lets them compete on the basis of price while providing a variety of meat types, at consistent levels of quality, in large units. Large firms are also more likely to have sales offices and plants in many parts of the world. Maintaining operations in diverse production areas and markets also provides a degree of protection against a shortfall in livestock supplies owing to disease quarantines or natural disaster in any one country.

The outlook for future world meat trade appears to be for more growth, given further liberalization of protectionist barriers, animal disease eradication, economic development, and population growth. If some or all of these changes fail to materi-

alize, trade in meats will show less growth. Greater complexity in trade patterns is likely to accompany trade growth, with more countries importing and exporting meat, and with an increase in countries that both import and export meat and offal from the same animal species.

U.S. firms, marshaling the large U.S. resource base for animal production and the capital and labor resources for meatpacking, have fashioned a meat distribution network that sends cuts to domestic and foreign markets that pay the highest price for each cut. Those firms have become preeminent in the world meat markets, and the United States has become the largest meat-exporting country. Underpinning much of the U.S. export success, especially for poultry meat, are important differences among major foreign regions in preferences for meat cuts, combined with the United States' position as one of relatively few nations with disease-free status for the major meats. If countries with different preferences for meat cuts achieve disease-free status, the United States could see greater imports in the future, especially of chicken breasts. Significant protectionist trade barriers still limit U.S. exports in much of the world. If tariffs, tariff-rate quotas, and nontariff barriers are reduced by future agreements, U.S. exports will continue to grow.

Structure of the Global Markets for Meat

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Introduction

Global meat trade is large (over 24 million tons in 2000), high in value (over $43 billion in 2000—about 10 percent of total agricultural trade), and growing rapidly (by about 6 percent per year, 1990-2000). This report reviews the elements of production, marketing, and consumption that determine today's global markets for meat, and highlights general themes so that readers interested in agricultural trade can better understand meat trade and the issues surrounding it.

- Meat trade flows among countries and world regions are determined, in the absence of trade barriers, by differences among countries in their resource base for animal production and meat processing and by differences in their preferences for meat.
- Trade barriers—protectionist and sanitary—do exist, however, acting both to channel the existing trade and to prevent some potential trade.
- Rising consumer demand for meat, aided by trade liberalization and changes in technology (for example, in shipping), has helped meat trade more than triple in the past three decades.
- Large firms appear to have lower costs and increasing returns to investments in meat production, and world trade in meats offers an opportunity for firms to increase the size of their markets to absorb increased production.

While a number of factors can influence meat trade in the near term, especially currency exchange rates and the general macroeconomic, cultural, and political climate, this report focuses chiefly on the factors listed above, whose influence is more long term.

Competitiveness in the Supply Chain

Firms and, to some extent, countries compete to supply meat to consuming markets. Meat firms in an exporting country compete both against domestic rivals and firms in the importing country. Success in this competition results in part from keeping prices low by minimizing supply costs. Producing and distributing meats involves several distinct phases from the farm and processing plant to the retail outlet, and each phase has necessary inputs. If the inputs are available at low cost, the final meat output can be offered at a low cost.

The meat supply chain starts with animal production at the farm level. Animals are next sold or transferred for slaughter and processing. Finally, there is a distribution process that takes the meat products to the final consumers. In the animal production stage, feed inputs are important (such as grass and forage for cattle and sheep, and grain and protein meals for swine, poultry, and fed cattle). Labor and equipment are also important to farm production of livestock (see box, "Cost of Production for Hogs"). At the slaughter and processing stage, labor and equipment are important inputs (Hayenga et al.). Distribution also depends heavily on labor and equipment.

Resources Used in Supplying Meat

Throughout the whole supply chain that brings meat to the consumer, the key inputs are feed, labor, and capital (both equipment and financial capital). The cost of feed inputs to a livestock farmer depends on the price of growing, processing, transporting, and storing the feeds. Feed costs will be lower for farmers close to major feed crop production areas because transportation costs will be lower. It is possible to ship grass-based fodders to cattle in farms around the world, but it is cheaper to let cattle graze directly on pastures, or to harvest forage crops and bring them to cattle that are being raised on the same farm. Feedgrains, such as corn, and oilseed meals, such as soymeal, can also be shipped, with or without being mixed into feed rations. However, the cost of shipping these bulky crops or feed rations can be minimized if swine, poultry, or grain-fed cattle are located near the crop areas.

Cost of Production for Hogs

Recent U.S. data on the cost of producing hogs illustrate the major components of animal production costs. The costs are per hundred pounds of weight gain, for the year 2001.

Component	Cost	Share of total cost
	Dollars	*Percent*
Feed costs	20.36	32.85
Feeder pigs	16.63	26.83
Veterinary/medicine	1.10	1.77
Fuel, lube, electricity	1.32	2.13
Labor costs	8.38	13.52
Marketing	1.05	
Hired labor	2.39	
Opportunity cost of unpaid labor	5.03	
Capital costs	12.22	19.72
Interest on operating capital	.70	
Capital recovery of machinery/equipment	10.74	
Repairs	.78	
Other costs	1.97	3.18
Total	61.98	100.00

Feed costs represent the highest share of total costs. The cost of purchased feeder pigs also includes an embedded feed cost—feed costs were about 31 percent of feeder pig costs in 2001. The second-highest cost category was for interest on operating capital and for depreciation and repair of machinery and equipment. Labor costs were also significant. In the case of U.S. hog production, land costs were insignificant.

Some data are available on feed costs outside the United States. However, it is difficult to compare them with U.S. costs. Currency exchange rates and interest rates vary significantly, and strongly influence comparisons. Foreign data sometimes measure costs on small-scale farms only, which are not typical of meat animal production in those countries. Cost data published in the commercial press sometimes offer little documentation of the sample or the methodology used. Estimates of capital costs, such as the depreciation of equipment, can be made using widely different assumptions. However, like the U.S. hog data above, estimates of foreign costs of production usually indicate that feed costs are the highest cost category for meat animal production.

Source: Economic Research Service, USDA. *http://www.ers.usda.gov/data/costsandreturns/testpick.htm*

Labor costs in the farming, slaughtering, processing, and distribution phases are an important part of the total costs of providing meat to consumers. Labor costs vary depending on the alternative ways that workers can earn money in an economy. An economy with a large nonagricultural sector tends to raise the wage expectations of prospective workers because many jobs are competing with jobs in livestock farming and meat industries. Similarly, if education levels are high and uniform, workers will have skills that will be demanded outside agriculture.

The presence and power of labor unions in farming and farm-related industries like meatpacking can also affect wages.

Capital is a key input in supplying meat. Increasingly, the meat processing and livestock production industries in developed countries have sought to reduce labor costs by replacing labor with machine-based systems. Farms for intensive livestock production require housing, efficient feeding and cleaning systems, environmental controls, and monitoring systems. The industrial nature of meat slaughter, processing, and distribution requires large capital investments. The ability to invest money in buildings and machinery requires access to financial capital, and investors seek to minimize the cost of the financial capital. Well-developed banking systems, insurance systems, and investment funds effectively lower the cost of financing the building and operation of meat processing plants.

Returns to size is an economic term that is applied if an increase in size of an enterprise results in lower costs and increased net returns (the difference between revenues and costs). There appear to be increasing returns to size at several levels of the meat supply

chain. If large farm size can be achieved, then labor, capital, management, and other costs per unit can fall. Studies generally report size advantages gained from spreading capital costs over more animals as well as improved feed efficiency and labor utilization (Duncan et al.; Van Arsdall and Nelson). Given unchanged revenues per unit, lower costs result in increased net returns. If slaughter and processing plants achieve size economies and are well organized, costs per unit of meat will decline markedly (MacDonald et al.). Increasing the size of a firm may also lower distribution costs per unit of output. Meat operations and firms have an incentive to increase in size as long as such increases yield greater returns.

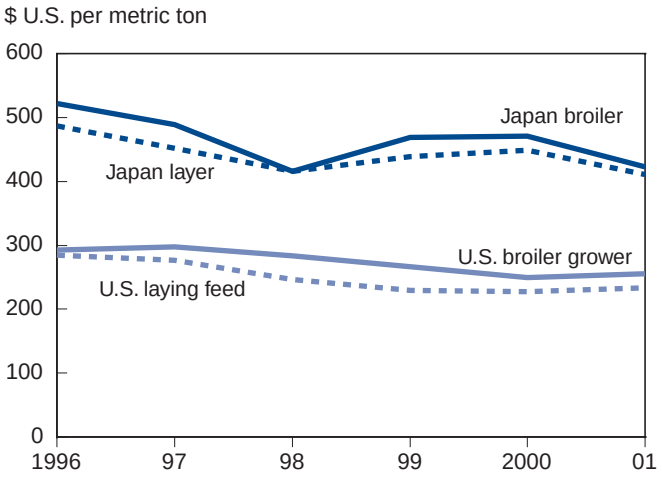
Regional Distribution of Resources for Meat Production

Those parts of the world with low-priced inputs—of feed, labor, equipment, etc.—have competitive advantages in the first phase of meat production, raising animals on farms (see Appendix 1, "Feeding Meat Animals—Where Are the Resources?"). A large land base for agriculture helps livestock farms and ranches expand in size. Grasslands are suited for raising extensive herds of cattle and other ruminants. Large crop areas can support intensive feeding of swine and poultry with low feed transportation costs. Feed costs can be significantly higher if feeds are transported a long distance: concentrated poultry feed costs in Japan are over 60 percent higher than in the United States (fig. 1), partly because of the transportation expenses. Land availability is also important in using the wastes generated by livestock operations. Spreading manure as soil nutrients on fields is the preferred method of disposing of wastes, but fields cannot absorb unlimited amounts of waste. Access to a large, nearby crop or pasture area reduces costs associated with waste disposal. In addition to the size and quality of land resources, population density on the land is increasingly pertinent to livestock operations. Densely populated areas sometimes restrict livestock farming and processing because of concerns about pollution.

Labor costs influence the location of meat production for export. Many developing countries have abundant, low-cost labor. This gives these countries a wage-rate advantage in livestock production and processing. Proximity of low-cost labor to major livestock production favors the development of export-oriented meat production. Brazil, where the production and export of poultry meat have flourished, benefits from the combination of large nearby feed production and relatively low-cost labor. However, other factors, such as animal disease standards, often intervene to prevent exports from developing countries. While wages in developed countries are higher, differences in labor market structure lead to significant differences in wage levels among developed countries (fig. 2).

Figure 1

Poultry feed prices in Japan and the United States



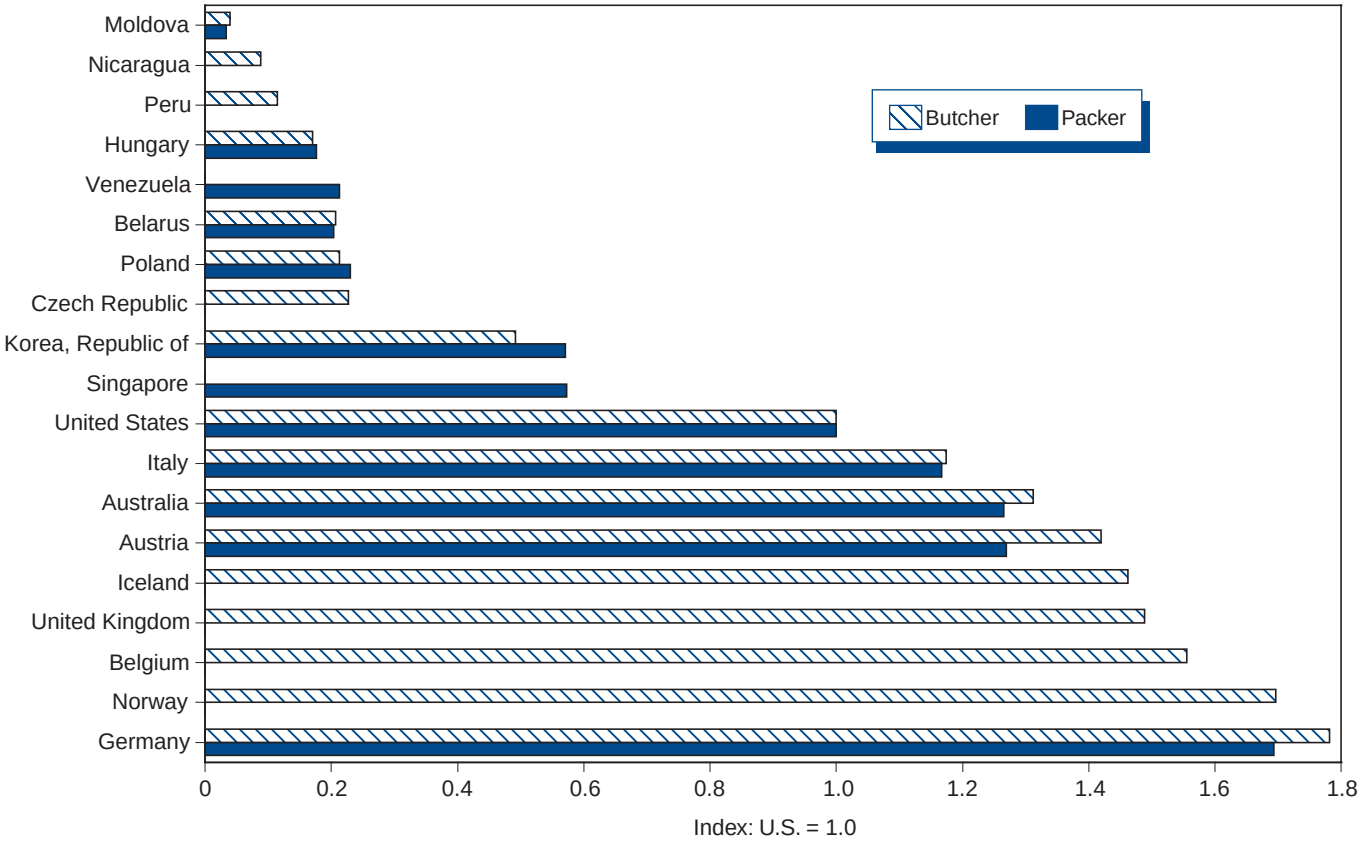
Sources: MAFF (Japan) and NASS/USDA (United States).

Capital costs often vary a great deal among countries. High interest rates, macroeconomic uncertainty, and lack of transparency[1] in developing countries can deter local investment in livestock farming and meat processing; this was the case in 2002 in Argentina. The large scale of slaughter and packing plants necessary to achieve economies of size implies a large initial investment, often beyond the means of small firms and small economies. However, financial capital, in contrast to labor and certainly to land, is internationally mobile. Foreign investment, using low-cost labor available in developing countries, could create globally competitive slaughter and meatpacking plants in those countries by importing meat or animals for further processing. China's poultry industry, which has used frozen U.S. broiler meat as an input for further processing and reexport to Japan, demonstrates this possibility.

[1] See, for example, the risk premiums by country calculated for the Opacity Index in 2001 by PriceWaterhouseCoopers Endowment for the Study of Transparency and Sustainability. *http://www.opacityindex.com/index.html*

Figure 2

Monthly wages for "slaughtering, preparing, preserving," selected countries, 1998



Source: National Bureau of Economic Research, Occupational Wages around the World (OWW) Database *http://www.nber.org/oww*. Accessed April 11, 2002 (index by the authors).

Geographic location works together with the basic resources of feed, labor, and capital to help determine where livestock industries will flourish. Having meat production near large numbers of consumers allows processing operations to realize economies of size and reduce distribution costs. Agreements on trade rules between countries can also expand the size of the market available to a firm, creating a multinational marketplace with common rules.

The simple facts laid out above explain much of the current world meat trade. Currently, the United States and Canada together form the largest meat-exporting region (fig. 3). The United States has abundant grains, meals, grass, and forage, a large domestic market, and access to several large foreign markets. Canada has similar resources, and, although its own population is relatively small, it has access to the large, neighboring U.S. market through the North American Free Trade Agreement (NAFTA) and to more distant international markets as well.

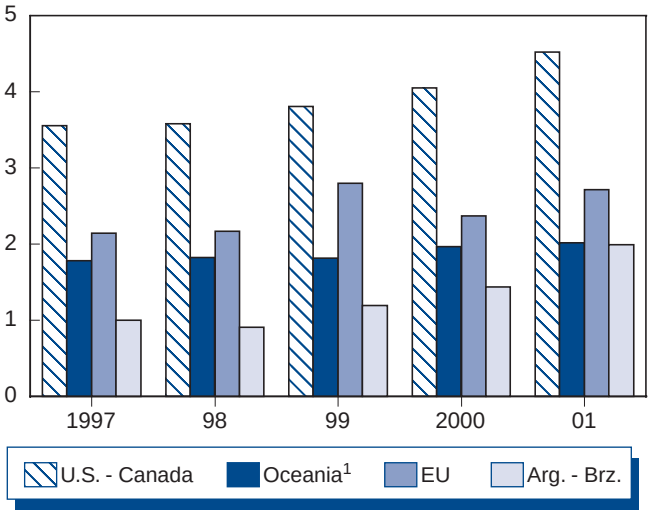
Other major components of the current world meat trade also can be explained as the result of efficient use of abundant resources for animal production and processing (see Leuck for more discussion). The exporting regions of Oceania (Australia and New Zealand) and South America (Brazil and Argentina) use abundant land resources for animal production and export beef (Oceania and South America), sheepmeat (Oceania), and poultry meat (Brazil). Brazil, in addition to a large, productive crop agriculture and large pasture areas, also benefits from relatively low-cost labor and a large domestic market.

East Asia—defined as Japan, South Korea, and Taiwan—is usually the world's largest meat-importing region (fig. 4). The region is densely populated, with mountains and forests that limit the land available for agriculture, so that large-scale feed production is relatively expensive. Furthermore, the region has relatively high labor costs. East Asian livestock producers must pay to import feeds, and locating large-scale farms and processing plants is sometimes difficult because of

Figure 3

Total meat exports by region (intraregional trade excluded)

Million tons



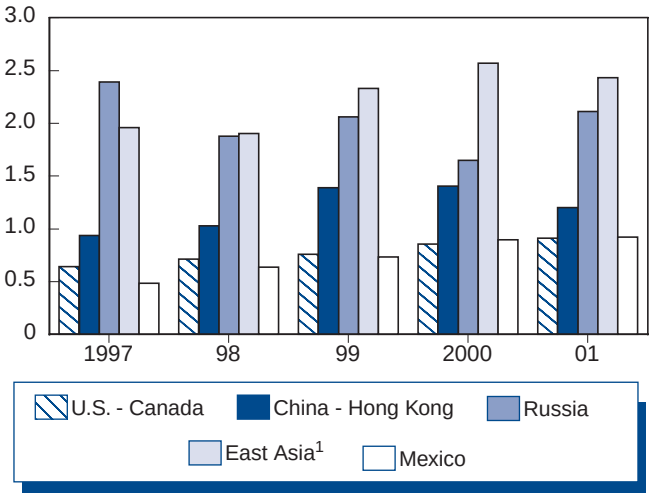
[1]Oceania is Australia and New Zealand.

Sources: Volume data are from official trade data, and are on a product-weight basis, representing mostly boneless products.

Figure 4

Total meat imports by region (intraregional trade excluded)

Million tons



[1]East Asia is Japan, South Korea, and Taiwan, with trade within the region subtracted out.

Sources: Data for China-Hong Kong are the sum of China's imports, less those from Hong Kong, and Hong Kong's imports, less those from China. Data for Russia are from official trade data and the USDA PS&D database (converted to a boneless basis for beef, pork, and sheepmeat by multiplying by 0.7). Volume data for United States-Canada, China-Hong Kong, and East Asia are from official trade data, and are on a product-weight basis, representing mostly boneless products.

pollution concerns and land costs. Although East Asia's meat producers benefit from proximity to a large domestic and regional market, the region as a whole has become a major meat-importing zone.

Differing Preferences for Meats

Some aspects of the meat trade are not explained solely by differences in the resource base or the ability of a supply chain to keep animal product prices low through the use of low-cost inputs. Differences among countries in preferences for meat are important in explaining some major trade flows. Some examples follow.

U.S. Poultry Meat Trade

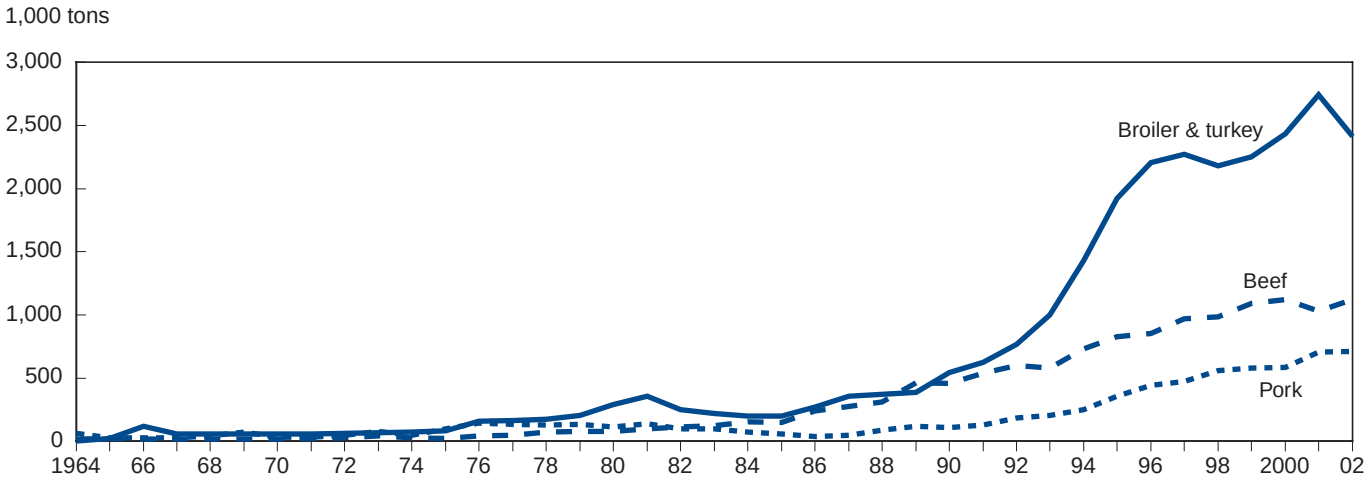
The largest meat export flow from the United States, in volume, is poultry meat (fig. 5). Poultry production requires less feed per kilogram of meat produced than does pork or grain-fed beef.[2] If a country's meat production is based in part on imported feeds, then less feed needs to be imported to produce broiler meat than to produce an equal amount of pork or grain-fed beef. On the basis of this feed conversion advantage, poultry meat should be more likely to be produced in a feed-deficit country than pork or beef, and should be less likely to be imported. Yet poultry meat trade has grown faster than trade in beef or pork since 1990, and now exceeds both beef and pork in volume traded. A principal reason for the large U.S. poultry exports is that U.S. firms export those parts of the chicken that have a low value in the United States but a higher value elsewhere (while selling parts in the United States that are more highly valued by U.S. consumers).

U.S. trade with China provides an example of trade based on differences in tastes. China has its own feed resources, and low labor costs for processing (Tuan et al.). Resource availability favors poultry meat production in China. However, in 2001, the United States sent

[2] Feed conversion varies around the world, but ratios are uniformly lower for broilers than for swine. Ensminger et al. estimate feed conversion rates of 2.1 pounds of feed for 1 pound of broiler meat; 4 pounds of feed for 1 pound of pork (feeding from birth to market weight); and 9 pounds of feed for 1 pound of beef (for a yearling finishing period in a feedlot). Feed conversion ratios for Japan used in the ERS baseline model are approximately 2 kg of feed/kg of broiler output, 3.6 kg of feed/kg of pork output, and 5 kg of feed/kg of beef output (not including grass-based fodder).

Figure 5

U.S. meat exports, 1964-2002



Source: USDA Production, Supply, and Distribution database, 11/21/02.

$370 million in poultry meat and offal to China (including Hong Kong). Beef exports were $52 million, pork $25 million, and red meat offal (variety meats) $59 million (USDA, FAS(a)). Looking at the relative resource bases of the two countries, it is odd that U.S. meat exports to China are dominated by poultry meat. Part of the answer is revealed by examining the major poultry product flows. The United States exported $135 million worth of poultry paws (feet less the spurs), $70 million worth of poultry wings, $86 million worth of chicken legs, and $41 million in poultry offal to China/Hong Kong in 2001, in addition to $38 million worth of unspecified other frozen cuts (USDA, ERS, DARTS database, using data from the U.S. Bureau of the Census). Chicken paws, rarely used as a food in the United States, are desirable in China, and China's demand for frozen wings and poultry offal is strong enough to bid these products away from U.S. consumers.

Red Meat Trade

Taiwan's pork exports to Japan offer another example of the effect of preference variations. In part, the exports occurred because Taiwan had lower labor costs than Japan and was close to Japan, reducing transportation costs relative to other supplying countries. However, the trade also flourished because Taiwan's consumers placed the highest value on offal, rather than the muscle meat of swine. Japan received the muscle meat and the offal stayed in Taiwan (Huang). The large U.S. export trade in meat offal follows a similar logic, but with a different set of preferences. Edible byproducts of cattle and swine slaughter, such as tongues, livers, intestines, and hearts, are accorded a higher value in markets outside the United States than inside the United States, and net U.S. exports of offal exceed $500 million each year. In 2001, the United States exported 682,000 tons of cattle and swine variety meat or edible offal, worth $953 million, to Japan, Mexico, Korea, China, and other countries. U.S. imports of offal were 63,000 tons, worth $108 million (USDA, FAS(a)).

U.S. beef industry products are not distributed evenly across all markets. The United States Meat Export Federation analyzed data on U.S. exports of beef in 2000 and concluded that the three top export parts were the short plate, the liver, and the short rib (United States Meat Export Federation).[3] The study estimated that exports took 68 percent of the total U.S. short plate production and 57 percent of short rib production. The leading market, Japan, was focused on the short plate and short rib. Together, these two cuts comprised about 50 percent of Japan's beef imports from the United States. Over 50 percent of Korea's imports from the United States were the short rib and the chuck roll. Other cuts, however, are exported much less. The tenderloin, strip loin, and sirloin butt, for example, account for a very small portion of exports. This indicates that it is hard to bid these cuts away from U.S. consumers, who place a relatively high value on them.

[3] The study obtained data on exports by cut for about half of U.S. beef export volume.

The fact that importing countries prefer certain cuts from cattle carcasses may provide an advantage to countries with large domestic markets. The United States and Australia are the chief countries competing to supply Japan and Korea. While the large U.S. market can absorb a great deal of beef, Australia's meat industry could encounter difficulty in disposing of the remaining cuts (especially from grain-fed animals) if it exports only a subset of them to its Asian trade partners.[4] The aggregate value of the carcass could be depressed by the low prices that might have to be offered in order to induce consumption of non-exported cuts by Australia's relatively small population.

Trade in Cuts

Two main points emerge from these examples. First, meat trade mainly is in cuts or parts, not in the form of live animals or carcasses. The slaughter of a meat animal automatically generates a full set of muscle meat cuts, as well as trimmings, offal, and other byproducts. The value of a carcass is the composite value of the cuts and other products taken from it, and the derived value of a meat animal is the composite value of the carcass and byproducts from the animal, less processing and transaction costs.

According to the Food and Agriculture Organization (FAO), the aggregate value of live animal trade in 2001 was $8.5 billion, while the aggregate value of trade in meat was over $43 billion (FAO).[5] In the meat trade, boneless cuts, rather than carcasses or bone-in cuts, dominate. In 2001, only 4 percent of Australia's meat exports were in whole- or half-carcass form, and only 2 percent were cuts with bones left in. In the same year, only 2 percent of Japan's meat-related imports were bone-in cuts, and only a fraction of 1 percent were whole-, half-, or quarter-carcasses. U.S. carcass meat exports accounted for 4-6 percent of total U.S. meat export value in 1995-2001.[6] These data from the largest meat exporting and importing nations indicate the degree to which trade customers purchase quite narrowly defined meat cuts, separated from the other meat cuts and byproducts (such as bones).

Second, there are differences in preferences for various cuts among countries. The importance in trade of competitive advantage in animal production, processing, and distribution—of a lower cost supply chain—is very great, and is determined by the resource base. But meat trade is complicated by the existence of differentiated demand. Trade in cuts rather than animals or carcasses allows differing preferences to be met and total demand increased.

Differences in preferences partly explain the phenomenon of countries exchanging meat from the same species with each other. This intra-industry trade can be counterintuitive if analysis is based only on supply-side data. Consider a country with a comparative advantage in producing meat: an abundant resource base and relative prices that encourage use of resources in meat production, rather than for other enterprises. Another country has higher costs for producing meat, because of a poorer resource base, but still has some meat production. If we consider just the supply chain, the country with resource advantages will export meat to the other country. But, if the two countries have different tastes, two-way trade (called intra-industry trade) becomes possible. If people in the resource-poor country avoid buying a cut that the resource-rich country finds desirable, that cut may be exported from the resource-poor country to the resource-rich country. The composite value of the meat animal will then rise in the resource-poor country, and fall in the resource-rich country.

Consumer preference differences extend beyond demand for particular meat cuts. Increasingly, consumers in some markets focus on production-oriented process traits related to animal welfare (e.g., the use of hormones and antibiotics, or the presence of genetically modified ingredients in feed rations). Sometimes, these preferences are the basis for regulatory barriers to trade (discussed in the following section), but they have also resulted in differentiation of retail meat products according to the production process followed in the supply chain. The market niches for meat from free-range chickens and for organically produced meat are examples.

Barriers to Meat Trade

While global trade in meat has grown strongly in recent decades, many meat producing and consuming countries are still not linked by trade. In some cases, no trade occurs because neither supply nor demand factors

[4] Australia sells a great deal of hamburger beef, but virtually no table cuts, to the United States, its other leading export destination.

[5] FAOSTAT, the UN FAO database. Trade among the European Union countries was not netted out.

[6] Official trade data from the countries.

make trade profitable, but in other cases there is no trade because countries have erected import barriers (and in a few cases, export barriers).

Sanitary Standards

Sanitary standards are extremely important determinants of meat trade. The distinction between countries judged free of foot-and-mouth disease (FMD), and those judged not free, largely defines world trade in fresh, chilled, or frozen beef and pork. For most of the last 50 years, the FMD-free zone consisted chiefly of the United States, Canada, Australia, New Zealand, Japan, South Korea, Taiwan, and Denmark. Most trade in uncooked beef and pork occurred among these areas—ignoring trade within the European Union (EU). The importance of this factor was evident as Argentina's beef export opportunities expanded when it gained FMD-free status in 1999 but then contracted in 2000 when FMD recurred. Taiwan's large pork export trade vanished in March 1997 when an outbreak of FMD was discovered. Hog cholera and African swine fever barriers also define pork trade.

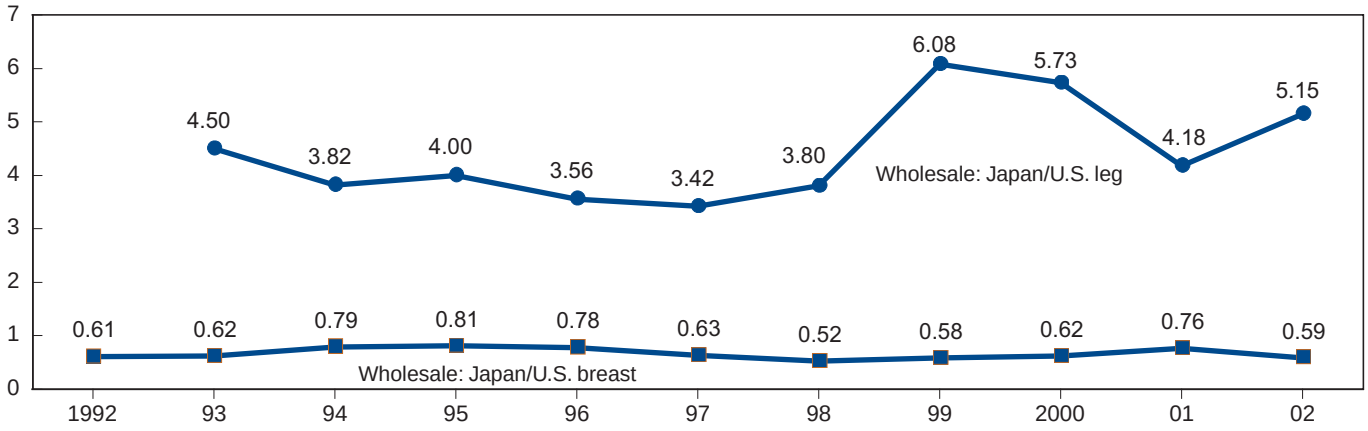
The U.S. poultry sector also offers an example of the importance of sanitary rules in trade. U.S. consumers have an affinity for chicken breasts (white meat). Dark meat is preferred by many consumers in the rest of the world, and the breast is accorded a lower value, particularly in parts of Asia. Japan is a well-documented example (fig. 6). The market price of chicken breasts is consistently lower in Japan than in the United States. This is despite the fact that Japan's broiler industry faces higher costs than the U.S. industry: virtually all feed is shipped across the Pacific, incurring transportation costs, and serious environmental problems (aggravated by Japan's dense population) make expanding plant size difficult. But sluggish demand for breasts means that they are sold at a low price. The situation may be similar in other Asian countries, such as China. Despite this, the United States imports very few chicken breasts. One reason is that chicken meat does not have a long shelf life unless it is frozen, and frozen meat is not preferred in the United States. However, another reason is that producers in most of the world, including China, Mexico, and Japan, cannot export chicken meat to the United States because of the danger of infecting U.S. flocks with Exotic Newcastle disease (see table 1).[7]

Although they can forestall significant potential meat trade flows, sanitary standards are effective in preventing the spread of serious diseases that can devastate animal production. The potential cost of a

[7] Two Mexican States, Sonora and Sinaloa, are permitted to export fresh poultry meat or other poultry products to the United States under specific conditions.

Figure 6

Ratio of Japan / U.S. broiler part prices



Note: Japan data on a fiscal year basis (Apr.-Mar.); U.S. data on a calendar-year basis.

Sources: For Japan, Agriculture and Livestock Industries Corporation, data for boneless cuts; for the United States, ERS Animal Products Branch database, data for boneless, skinless breasts and bone-in legs (bone-in converted to boneless by dividing by .76).

disease outbreak in the United States, for example, could be large for diseases like FMD, Exotic Newcastle, and African swine fever. The risk of infection is always a factor in all countries. Even countries where a disease is endemic often enforce sanitary rules for meat imports, in order to prevent a possible vector for the entry of the disease while the country is working to eradicate it internally. Major steps were taken in the 1990s to eradicate diseases in important areas, especially FMD in parts of South America, Mexico, and Europe. When disease-free status is attained, new channels for meat trade can open up, based on advantages in supply and/or differences in preferences for meat cuts. However, permanent disease eradication has proven to be difficult, and FMD outbreaks in 2000 and 2001 badly hurt the export trade in fresh, chilled, and frozen red meat from several countries that had been recognized as FMD-free in the 1990s (e.g., Argentina, Uruguay, Britain).

The danger of transmitting diseases to humans has also led to segmentation of the meat trade based on sanitary rules. Bovine spongiform encephalopathy (BSE, also called mad cow disease) virtually ended Britain's beef exports in the late 1990s and has since barred beef exports from much of Europe to other parts of the world. Avian influenza led to a suspension of poultry exports from China and Hong Kong to Japan in 2001, and a swine virus closed down exports of pork from Malaysia in 1999. In these cases, the primary fear was that the viruses had an ability to infect humans. Strict controls on plants that process meat for export are also related primarily to concerns about human health. Major importing countries sometimes inspect and certify plants in exporting countries, and allow meat imports only from certified plants.

The risk of a disease outbreak is shared by all the producers in a nation (or disease-free region of a nation). One case of a disease on one farm can shut down the exports of an entire country (e.g., Canada in May 2003). The impact of such a loss in trade can be serious for the producing country.[8] Meat that would otherwise go out of the country must suddenly be consumed in the country, and declines in meat prices are necessary to stimulate the additional consumption needed. Government efforts to control diseases can lower the risk, both by disease eradication within a country's borders and by measures to prevent infection passing across the borders, (e.g., through meat from a foreign infected area). Since disease controls entail costs, governments and private firms assess both the costs and benefits of disease control before beginning a program.

For firms that distribute meat internationally or import meat, a disease outbreak can be devastating, since exports may be impossible for one or more years. An option for meat-trading firms is to cope with risk by sourcing meat from more than one country. An outbreak that closes one supply source may leave another source untouched, and a trading firm can continue to supply its customers. Risk may be further reduced if supply countries are in regions that are distant from each other, so that spread of disease is less likely.

Protectionist Barriers

Other barriers to trade are erected by governments in the form of tariffs, tariff-rate quotas, and nontariff barriers. Like sanitary standards, they inhibit trade. But, while sanitary standards protect against the spread of disease and can be overcome through sanitary improvements in exporting countries, high tariffs[9] and other nonsanitary barriers are designed to discourage imported meat from competing with domestic products. Thus, they are referred to as protectionist barriers.

The evolution of the General Agreement on Tariffs and Trade (GATT) and its successor, the World Trade Organization (WTO), since World War II has in general seen a lowering of protectionist barriers. Only minor tariffs now affect pork and poultry meat imports into the United States. Canada's pork market is relatively unprotected. Australia has abandoned nonsanitary barriers. Japan's barriers have been substantially lowered for all meats (Dyck), and South Korea has given up its meat quotas. The Uruguay Round (1995) of the GATT replaced a number of trade bans with tariff-rate quotas and lowered tariffs in a number of developing countries. The admission of China and Taiwan to the WTO includes provisions opening their meat markets to significant potential imports (see Appendix 2, "Meat Trade Barriers in Major Countries"). Trade within regional zones has increased as partners to trade agree-

[8] See Abdalla et al. and Cao et al. for investigations of the costs and benefits of animal disease control in Australia, and Perry et al. for a study on the implications of FMD control efforts in southern Africa.

[9] Tariffs also have the function of raising revenue for a government. Low tariff levels may primarily represent this function, and not be designed to protect domestic producers.

Table 1—USDA-recognized animal health status of countries/areas regarding specific livestock or poultry diseases

Country/area	Countries/areas affected (A) with African Swine Fever	Countries/areas affected with Bovine Spongiform Encephalopathy (A)	Countries/areas that are considered to have a substantial risk (R) associated with BSE	Countries/ areas free of Classical Swine Fever (F)*	Countries/ areas free of Exotic Newcastle Disease (F)	Countries/ areas free of Foot-and-Mouth Disease and Rinderpest (F)**
Africa-all countries on the continent (see also Rep. of South Africa)	A					
Albania			R			
Andorra			R			
Australia				F	F	F
Austria		A		*		**
Bahama Islands						**
Barbados						F
Belgium		A		*		**
Belize						F
Bermuda						F
Bosnia-Herzegovina			R			
Brazil	A					
Bulgaria			R			
Canada		A		F	F	F
Channel Islands						**
Chile					F	**
Costa Rica					F	F
Croatia			R			
Cuba	A					
Czech Republic		A				**
Denmark		A		F		**
Dominican Republic						F
El Salvador						F
Estonia						**
Federal Republic of Yugoslavia			R			
Fiji				F	F	F
Finland		A		F	F	**
Former Yugoslav Republic of Macedonia			R			
France		A			F	**
Germany		A				**
Germany (except for a list of specific areas, see APHIS website)				*		
Greece		A		*	F	**(rinderpest)
Greenland						F
Guatemala						F
Haiti	A					F
Honduras						F
Hungary			R			**
Iceland				F	F	F
Ireland, Republic of		A		F	F	**
Israel		A				
Italy (except for Emilia-Romagna, Piemonte, and Sardinia)		A		*		**
Emilia-Romagna and Piemonte		A				**
Sardinia	A	A				**
Jamaica						F
Japan		A				**
Liechtenstein		A				
Luxembourg		A			F	**
Malta	A					

See notes at end of table.

Continued--

Table 1—USDA-recognized animal health status of countries/areas regarding specific livestock or poultry diseases--Continued

Country/area	Countries/areas affected (A) with African Swine Fever	Countries/areas affected with Bovine Spongiform Encephalopathy (A)	Countries/areas that are considered to have a substantial risk (R) associated with BSE	Countries/ areas free of Classical Swine Fever (F)*	Countries/ areas free of Exotic Newcastle Disease (F)	Countries/ areas free of Foot-and-Mouth Disease and Rinderpest (F)**
Mexico (except States of Sonora, Sinaloa, and Yucatan)						F
Sonora				@	#	F
Sinaloa					#	F
Yucatan				@		F
Monaco			R			
Netherlands		A		*		**
New Caledonia						**
New Zealand				F	F	F
Nicaragua						F
Norway			R	F		**
Oman		A				
Panama						F
Papua New Guinea						**
Poland		A				**
Portugal		A		*		**
Romania			R			
San Marino			R			
Slovakia/Slovenia		A				
South Africa, Republic of	A					(rinderpest)
Spain		A			F	**
Sweden			R	F	F	**
Switzerland		A			F	**
Territory of St. Pierre and Miquelon						F
Tobago						F
Trinidad						F
Trust Territories of the Pacific Islands				F		F
United Kingdom of Great Britain and Northern Ireland						
Northern Ireland		A		F		**
Scotland, Wales, Isle of Man		A		F	F	**
England (except Essex, Norfolk, Soffolk counties)			A		F	F **
Essex, Norfolk, Suffolk counties		A			F	**
Falkland Islands		A				

A = Countries affected with the disease in the column.

R = Countries that are considered to have a substantial risk associated with BSE due to:
(1) Lack of implementation of an adequate surveillance program, or
(2) Potential for disease exposure/introduction, or
(3) Uncertainty of status because insufficient information is available to conduct a full risk assessment.

F = Countries/areas free of the disease in the column.

@ Countries/areas of countries NOT recognized free of Classical Swine Fever, but permitted to export fresh, chilled, or frozen pork to the United States under specific conditions.

Countries/areas of Countries NOT recognized free of exotic newcastle disease, but permitted to export fresh poultry meat or other poultry products under specific conditions.

* Exports Limited to breeding swine, swine semen and pork and pork products

** Special category regarding rinderpest and FMD because, even though the country/area has been determined by USDA to be free of rinderpest and FMD, one or more of the following conditions occur:
(1) They supplement their national meat supply through the importation of fresh, chilled, or frozen meat of ruminants or swine from countries/areas that are NOT designated in Title 9, CFR, Part 94.1(a) (hereafter known as The Regulations) as free of rinderpest or FMD; or
(2) They have a common land border with countries/areas that are NOT designated in The Regulations as free of rinderpest or FMD; or
(3) They import ruminants or swine from countries/areas that are NOT designated in The Regulations as free of rinderpest or FMD under conditions less restrictive than would be acceptable for importation into the United States.

Note: Disease status changes frequently. Refer to APHIS website for current status. *http://www.aphis.usda.gov/NCIE/country.html*

Source: USDA, APHIS, Veterinary Services National Center for Import-Export Products Program: List of USDA-Recognized Animal Health Status of Countries/Areas Regarding Specific Livestock or Poultry Diseases, accessed July 28, 2003, with data as of June 5, 2003. *http://www.aphis.usda.gov/NCIE/country.html.*

ments have opened their borders within the zones. The EU, North American Free Trade Agreement, and MERCOSUR (a regional trade pact including Brazil, Argentina, and Uruguay) are the leading examples.

However, major protectionist barriers still remain (table 2), and the global mean for meat tariffs remains higher than the means for most other tariffs on agricultural commodities (Gibson et al., pp. 12-13). Within North America, tariff-rate quotas for beef remain in Canada and the United States, and for poultry meat in Canada and Mexico. Japan has a 38-percent tariff on beef imports, and operates the gate price system for pork, an import barrier that raises importers' costs and reduces the transparency of border transactions.[10] Even some major exporting countries have high import barriers. Thailand and Brazil enjoy growing success in the poultry export trade, but protect themselves against poultry imports with tariffs. The United States and Canada, as noted above, maintain beef tariff-rate quotas.

The EU occupies a special position in the world meat trade because of its export volume (see fig. 3), but part of its export performance is related to subsidies and protection, rather than to strengths in its resource base or opportunities to export meat cuts for a higher price in other countries. Some meat exports are subsidized through refunds given to offset the high feed costs caused by the Common Agricultural Policy. The EU limits meat imports with high tariffs and a complex set of quotas (see Appendix 2, "Meat Trade Barriers in Major Countries"). In addition, the EU has introduced sanitary barriers unrelated to the spread of disease among meat animals. Strict regulations on slaughter and processing plants and a decision to ban imports of meat from animals that received hormones in their feed have placed strong restrictions on trade. The net effect of the meat barriers is to limit beef imports to special, country-specific quotas, with small imports outside the quotas. Pork imports are small, and limited to special quotas for Central Europe. Poultry meat imports, unlike pork and beef, substantially exceed quota levels.

[10] The system is based on a gate price, in yen/kilogram. Imports that have a unit value below the gate price are assessed the difference between the gate price and the import unit value as a duty. The system ensures that no shipment of pork enters Japan with an average value below the gate price. Imports valued at prices higher than the gate price are assessed a modest *ad valorem* tariff.

Table 2—Meat tariffs and tariff equivalents for 2004

Country	Beef	Pork	Poultry meat
		Percent	
Argentina	12.5	11.5	11.5
Australia	0	0	0
Brazil	12.5	11.5	11.5
Canada	**26.5**	0	**249**
China	12	12	10
EU[1]	***55-104***	***22-42***	***10-55***
Hong Kong	0	0	0
Indonesia[2]	5	5	5
Japan	38.5	gate price	11.9
Mexico[3]	25	20	**234**
New Zealand	0	8.5	5
Philippines	10	**40**	**40**
South Korea	40	25	20
Taiwan (2005)[1]	*9*	12.5	20
U.S.[1]	**26.5**	0	*10*

Notes: This table presents applied tariffs for selected meat cuts that are expected to prevail in 2004, when all tariff reductions under the Uruguay Round Agreement on Agriculture will have been carried out. If tariff-rate quotas exist, the tariffs or tariff equivalents are those that apply for imports outside the quota. Tariffs are for most-favored-nation trade partners, and ignore regional trade agreements, bilateral reductions, and developing-country preferences. In the case of Taiwan, tariffs are those that will apply in 2005. Shading indicates that a tariff-rate quota will be in place in 2004 and after. Numbers in italics are estimates of tariff equivalents (see below), not actual tariffs. The gate price is a minimum import price enforced by Japan, together with a tariff of 4.3%. For authoritative, updated tariff rates, consult official tariff sources for various countries and territories.

[1] For an explanation of how the tariff equivalent was calculated, (see box, "*Ad Valorem* Tariff Equivalents."
[2] Indonesia has banned imports of poultry meat parts since Sept. 2000.
[3] Applied rates. Tariff given for beef is for frozen meat. Fresh and chilled beef imports face a 20-percent tariff.

Sources: Appendix table 2 for tariff data; the Pacific Exchange Rate database for exchange rates; and official trade data of the United States and Japan for average import prices.

Current Structure of World Meat Trade

International meat trade has a long history, but recent decades have seen fast growth of trade volume and value (fig. 7). Reductions in protectionism are one reason. Associated with the reduced protectionism, either as causal factors or as consequences of liberalized trade, are important changes in diets, distribution technology, and multinational business structures. Understanding the significance of these factors is necessary in order to understand the current structure of world meat trade and its future evolution.

Ad Valorem Tariff Equivalents

For instances in which a tariff is not in percentage, or *ad valorem*, terms, an *ad valorem* equivalent of the tariff is desirable when comparing protection across countries and commodities. In table 2, there are six instances in which the duty applied at the border is not in simple *ad valorem* terms.

In one instance, Japanese pork, calculation of an *ad valorem* equivalent is difficult. The gate price system collects the difference between a minimum import price and the actual unit value of a shipment when the average value of the shipment is below the minimum import price. In practice, shipments are usually balanced with cuts of different values to come into Japan with an average value exactly the same as the minimum import price, and calculation of the *ad valorem* equivalent of the various cuts requires a great deal of detailed information.

In the other five cases, an *ad valorem* equivalent is calculated by comparing specific tariffs (in euros/kg, yen/kg, etc.) with the average import values for the same meat in a major importing country that has *ad valorem* tariffs. The calculation is done for calendar year 2002, and uses 2002 average currency exchange rates.

For European Union (EU) beef, the import duty is the sum of a percentage and a specific tariff. The specific tariff (in euros/ton) varies according to cut and other criteria, and the minimum and maximum tariff equivalents are given. They are derived by comparing the maximum and minimum specific tariffs to the average import value of fresh, chilled, and frozen beef imported by Japan in 2002, using HS codes 0201 and 0202. The *ad valorem* equivalent of the specific tariff is then added to the *ad valorem* component of the EU tariff to obtain an overall *ad valorem* equivalent. Japan has a relatively high tariff on beef (38.5 percent), but is one of the major importing countries and imports a wide variety of cuts and qualities of beef.

For EU pork, the specific tariff (in euros/ton) varies according to cut and other criteria, and the minimum and maximum tariff equivalents are given. They are derived by comparing the maximum and minimum specific tariffs to the U.S. average import price for pork in 2002 (for HS code 0203). The United States has an open trading system for pork and is a major importer.

For EU poultry meat, the specific tariff (in euros/ton) varies according to cut and other criteria, and the minimum and maximum tariff equivalents are given. They are derived by comparing the maximum and minimum specific tariffs to Japan's average import price for poultry meat in 2002 (for HS code 0207). Japan has moderate tariffs and is a major importer.

Taiwan applies a tariff of 10 NT$/kg to beef imports (HS 0201 and 0202). As in the case of EU beef, the tariff equivalent is calculated as a percentage of the Japanese average import price for beef in 2002.

The United States' poultry meat tariff is specific (17.6 cents/kg). The tariff equivalent is calculated as a percent of the Japanese average import price for poultry meat (HS code 0207) in 2002.

For more information on methods and problems in calculating *ad valorem* tariff equivalents, see Gibson et al.

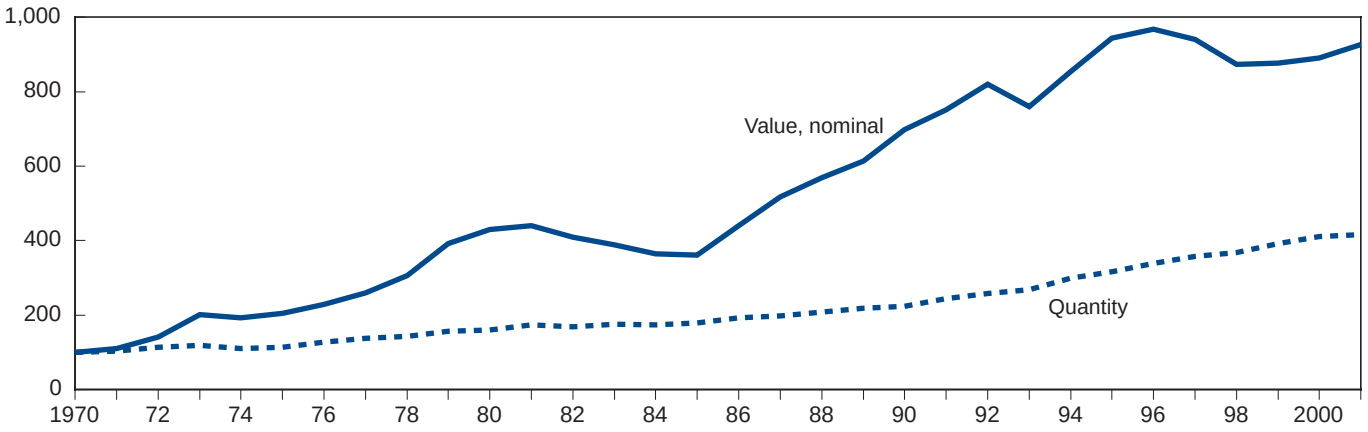
Dietary Changes Associated With Economic Development

Economic development brings with it increased household income and urbanization. With increased incomes, households can purchase more food and higher valued foods, such as meat (Regmi et al.). Urbanization (which can also occur in the absence of economic growth) increases household access to meat sold in shops and brings changes in occupational and household structure that favor consumption of food away from home, including meat. The importance of dietary changes to meat imports is shown by the case of Japan, the world's largest importer of beef and pork, both in value and volume. Japan's import growth reflected the rapid increase in meat consumption that occurred there between 1960 and 1995, when consumption/person increased almost sixfold. Japan's national diet changed during that period, a time of growing affluence, urbanization, and exposure to global trends. Caloric intake increased, and calories from meats replaced calories from rice and other traditional foods. Consumption increased faster than

Figure 7

World meat exports, 1970-2001

Index 1970=100



Source: FAOSTAT, 4/15/03.

production, and imported meat supplied the difference. While meat consumption growth appears to have leveled off in Japan in the late 1990s, meat consumption is currently growing in major parts of the developing world—East, Southeast, and South Asia, the Middle East, Mexico, and South America—as development proceeds (fig. 8). As in the case of Japan, the growth in meat consumption pushes up prices of domestically produced meat, and increases the possibility of a market for imported meat.

Technology of Distribution

Meat has a short usable shelf-life, unless it is preserved. However, for many purposes, fresh meat is preferred in markets around the world. Frozen meat has uses in the restaurant and food processing businesses, but households in most developed countries generally prefer to buy fresh meat, unless the meat is prepared for easy serving. Chilled meat, which is kept at quite low temperatures but never frozen, is a close substitute for fresh meat and has a longer shelf-life. Opportunities to ship chilled meat increased in the 1990s. With current technology, beef and pork can both be shipped long distances (e.g., across the Pacific) in chilled rather than frozen form. Because of its shorter shelf-life, poultry meat can only be shipped in chilled form for relatively short distances.[11]

Japan has been at the center of much of the transition from trade in frozen meat to trade in chilled meat. Taiwan's shipments of chilled pork to Japan began in the 1970s. In the 1980s, Australian exports of chilled beef to Japan opened a major new flow of beef to Japan, followed quickly by chilled shipments from the United States of both beef and pork.[12] Even for poultry meat, which has the shortest shelf-life, a significant trade in chilled meat opened up in the late 1990s from China to Japan. New technology (especially controlled-atmosphere refrigerated containers, vacuum packing, and improved microbial control) has lengthened the time in which meat can be kept marketable and encouraged transoceanic trade in chilled meat by ship.

Japan is also pioneering the import of prepared (ready to heat and serve) meat entrees, instead of meat cuts for cooking or further processing. These prepared products are being sourced in China, Thailand, Brazil, and the United States. Such product additions to the meat trade potentially increase the complexity of trade patterns, because they increase the possibilities for shifting processing operations to countries where labor is relatively abundant from countries where processing labor is expensive.[13] Frozen poultry meat, for example, has been shipped from the United States to China, where it is cut up and used in meat preparations sent to Japan.

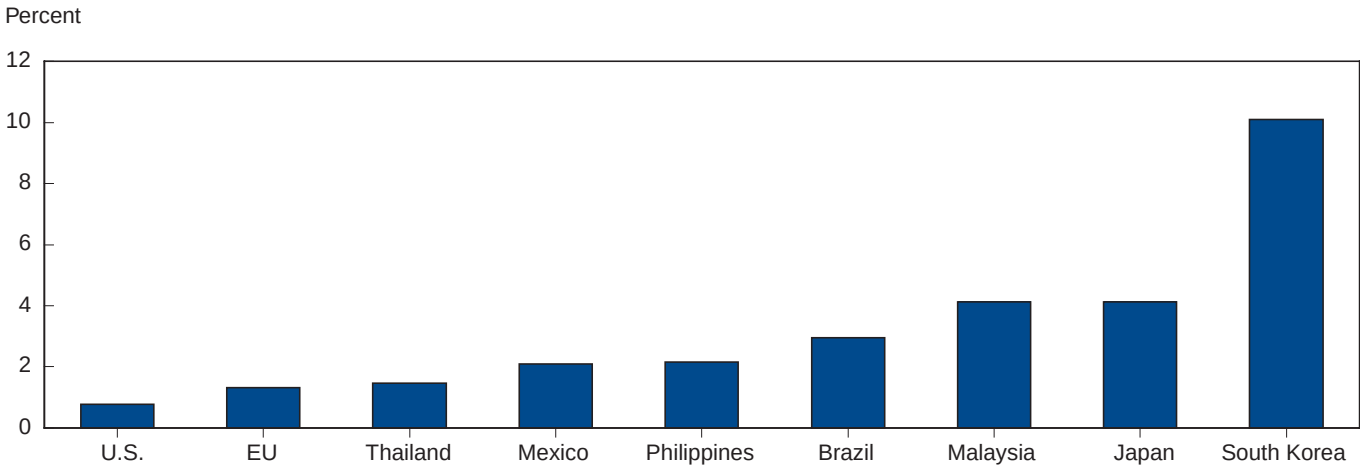
[11] Thus, the opportunities for chilled trade that exist for beef and pork exceed those for poultry meat.

[12] South Korea's imports of chilled beef and pork have also grown since the end of its meat import quotas.

[13] It also opens up the possibility of exporting cooked (or thermo-processed) meat from countries otherwise unable to export because of their disease status.

Figure 8

Average annual change in meat consumption per person, 1964-1999



Source: FAOSTAT.

Multinational Business Structures

Hundreds of firms of all sizes engage in world meat trade, but a few very large firms are clear market leaders. These firms tend to be important meat firms in their home countries, and to sell and/or produce meat in more than one foreign country. Of the 10 firms with the largest meat sales, seven are headquartered in the United States, and one each in Switzerland, Japan, and Denmark (table 3). Firm-level trade data are not available, but the high share of meat production by the U.S. and Danish firms in their home countries indicates that their share of meat exports must also be high.

A larger, international market may enable increases in plant and firm size that lead to economies of size. As a firm sells to a larger market, its costs per unit of meat fall because it can expand its size of operation. Seen from another perspective, large firms can deliver larger orders of meat of consistent quality, more often, and at lower cost than smaller firms, and thus are successful in competing for export markets. Their size also allows them to establish sales offices in foreign markets. Exports act as an extension of the market into which a firm sells meat. By expanding the potential consumer market, exports can justify the construction of larger slaughter/processing plants and/or the more intensive use of such plants allowed by adding shifts to plant operation. The success to date of the largest firms in world trade is likely linked to their ability to achieve economies of size that let them compete on the basis of price while providing meat of a variety of types, in large units, at consistent levels of quality. Firms may also realize economies of scope (for example, realizing cost savings by providing centralized management, sales force, or research to several operations). In general, large firms dominate first the meat markets of countries with large populations, then reach out to foreign markets to attain better prices for cuts and byproducts than can be realized in their home markets.

Examples of the success of large firms in global meat markets include Denmark's Danish Crown, the ninth-largest meat company. Danish Crown produces most of its meat in Denmark, but, with a population of about 5 million, the Danish domestic market absorbs only a fraction of the firm's output. The rest is shipped, in cuts, throughout much of Europe and to North America and East Asia. The ability to trade has allowed Danish Crown to increase the size and number of its meat plants (and Danish hog farms to increase herd size). Like Danish Crown, the Brazilian meat firms Sadia and Perdigao are major meat exporters. These firms have grown large selling poultry and pork to the populous domestic market, and have become major poultry exporters to Japan, the Middle East, Europe, and other parts of South America.

Firms can also take advantage of differences in meat cut preferences. Shipping a cut to a foreign market where it commands a higher price can increase a firm's net returns. Transportation and distribution costs may be lower for larger quantities and more frequent shipments. Thus, large firms which can reliably and consistently produce large quantities of cuts (or byproducts) may have a competitive edge over smaller firms in supplying such cuts.

Table 3—Fifty largest international meat and poultry firms, ranked by sales [1]

Rank	Firm	Country	Sales (mil $)	Year ended	Comments
1	**Tyson Foods, Inc.**	**U.S.**	**24,000**	**Sept. 2001**	**Sales increase reflects acquisition of IBP, Inc., Dakota Dunes, S.D.**
2	**ConAgra Foods**	**U.S.**	**13,894**	**May 2001**	**Sales decrease represents sale of the firm's fresh beef and pork operations to Swift and Co.**
3	**Excel Corp.**	**U.S.**	**12,000**	**May 2002**	**Beef, pork and turkey processor**
4	Nestle SA	Switzerland	10,150	Dec. 2001	Company has total sales of $56 billion—the $10.1 billion figure represents sales for the firm's prepared dishes division
5	**Swift and Co.**	**U.S.**	**8,000**	**May 2001**	**Represents acquisition of ConAgra's fresh meat operations**
6	Nippon Meat Packers	Japan	7,853	March 2002	Japan's largest fresh meat manufacturer
7	**Smithfield Foods, Inc.**	**U.S.**	**7,400**	**April 2002**	**Sales increase reflects acquisition of Packerland Packing and Moyer Packing**
8	**Farmland Refrigerated**	**U.S.**	**4,754**	**N.A.**	**Company is currently reorganizing under Chapter 11 protection**
9	Danish Crown	Denmark	4,534	Sept. 2001	Denmark's largest meat company
10	**Sara Lee Packaged Meats**	**U.S.**	**4,166**	**June 2001**	**Diversified processed meats manufacturer**
11	**Hormel Foods Corp.**	**U.S.**	**4,124**	**Oct. 2001**	**Diversified processed meats manufacturer**
12	Itoham	Japan	3,883	March 2002	Red meat manufacturer
13	**Oscar Mayer and Pizza**	**U.S.**	**3,653**	**Dec. 2001**	**Diversified processed meats manufacturer**
14	**Perdue Farms, Inc.**	**U.S.**	**2,700**	**March 2001**	**Family-owned poultry processor**
15	Nutreco Holding NV	The Netherlands	2,506	Dec. 2001	Total company sales were $3.74 billion. However, only 67 percent of total sales represent meat and poultry interests
16	Prima Meat Packers	Japan	2,297	March 2002	Fresh meat manufacturer
17	Dumeco B.V.	The Netherlands	2,254	Dec. 2001	Red meat slaughterer and processor
18	**Pilgrim's Pride Corp.**	**U.S.**	**2,215**	**Sept. 2001**	**Poultry processor with strong foothold in the U.S. and Mexico**
19	Uniq PLC	United Kingdom	2,136	March 2002	Convenience food manufacturer
20	**OSI Group**	**U.S.**	**2,100**	**N.A.**	**Sales figure is an estimate. The company is a meat manufacturer with global interests**
21	Maple Leaf Meats Group	Canada	2,015	Dec. 2001	Canada's largest meat company
22	**Golden State Foods**	**U.S.**	**2,000**	**Dec. 2001**	**Diversified processed meat and liquid products manufacturer**
23	**Keystone Foods L.L.C.**	**U.S.**	**2,000**	**N.A.**	**Beef and chicken supplier to McDonald's**
24	A. Moksel AG	Germany	1,846	Dec. 2001	German meat processor

See notes at end of table.

Continued--

Table 3—Fifty largest international meat and poultry firms, ranked by sales--Continued [1]

Rank	Firm	Country	Sales (mil $)	Year ended	Comments
25	Marudai Food Co. Ltd.	Japan	1,838	March 2002	Fresh and processed meats manufacturer
26	**Gold Kist, Inc.**	**U.S.**	**1,811**	**June 2001**	**Poultry processor**
27	CG Nordfleisch AG	Germany	1,742	Dec. 2001	German meat processor
28	Starzen Co. Ltd.	Japan	1,727	March 2002	Meat processor with significant wholesale operations in Japan
29	Veronesi Group	Italy	1,487	Dec. 2001	Sales figure includes Agricola Italiana Alimentare poultry and Montorsi pork operations
30	Campofrio Alimentacion SA	Spain	1,475	Dec. 2001	Spanish processed meat manufacturer
31	Doux SNC	France	1,333	Dec. 2001	France's largest poultry processor
32	Glanbia PLC	Ireland	1,332	Dec. 2001	Total company sales were $2.562 billion. Fifty-two percent come from the food processing sector
33	Grampian Country Foods	Scotland	1,327	May 2001	Scottish agri-business firm
34	Westfleisch	Germany	1,208	Dec. 2001	Estimate. CG Nordfleisch and Westfleisch will merge Jan. 2003
35	**Foster Poultry Farms**	**U.S.**	**1,200**	**Dec. 2001**	**The largest poultry processor in the Western U.S.**
36	Charoen Pokphand	Thailand	1,196	Dec. 2001	Sales figure reflects 68 percent of the company's business in meat and poultry processing
37	Sadia Alimentos SA	Brazil	1,160	Dec. 2001	Brazil's largest meat company
38	Cremonini SPA	Italy	1,138	Dec. 2001	Sales figure includes the company's beef, processed meats and distribution business, which total approximately 87 percent of sales
39	LDC Societe Anonyme	France	1,022	Feb. 2001	Poultry processor and convenience food manufacturer
40	**Wayne Farms/Dutch**	**U.S.**	**880**	**March 2001**	**Poultry processor**
41	Irish Food Processors Ltd.	Ireland	879	March 2002	Cooperative of Irish beef processors
42	Swedish Meats	Sweden	870	Dec. 2001	Sweden's largest meat processor
43	Yonekyu Corp.	Japan	855	Feb. 2002	Meat processor manufacturing ham, sausages, and other meat products
44	**House of Raeford Farms**	**U.S.**	**850**	**April 2001**	**Chicken and turkey processor**
45	Olymel, Ltd.	Canada	845	Oct. 2001	Canadian pork and poultry processor
46	**Rosen's Diversified**	**U.S.**	**800**	**Sept. 2001**	**Beef slaughterer and processor**
47	Perdigao SA	Brazil	783	Dec. 2001	Holding company with interests in vertically integrated meat and poultry operations
48	**Seaboard Corp.**	**U.S.**	**772**	**Dec. 2001**	**Pork processor**
49	**Colorado Boxed Beef**	**U.S.**	**740**	**March 2001**	**Full-service meat and poultry processor**
50	**Greater Omaha Packing Co.**	**U.S.**	**725**	**Nov. 2001**	**Nebraska beef packer**

[1] IBP, Inc., Dakota Dunes, SD, was acquired by Tyson Foods, Inc., Springdale, AK, and Packerland Packing, Green Bay, WI, was acquired by Smithfield Foods, Inc., Smithfield, VA. The consolidation will continue next year when CG Nordfleisch and Westfleisch merge in early January 2003.

Source: Reproduced with permission from *www.MEATPOULTRY.com*, March 25, 2003. <*http://www.meatpoultry.com/resourcecenter/*<*archive_article.asp?ArticleID=58620*>

Note: U.S. firms are in bold.

Eight of the 10 largest firms export meat from their home market (the exception are the Japanese and Swiss firms). By reducing costs in the supply chain, through exploiting economies of size, and by satisfying differentiated international demand for cuts and byproducts, these firms are evidently able to increase net returns from processing animals.

A number of meat firms have become multinational producers, investing in animal production and/or processing in one or more foreign countries. Among the U.S. firms, Swift controls the largest meat firm in Australia, and Cargill, IBP (purchased by Tyson in 2001), and Smithfield are major producers of pork and beef in Canada. Smithfield also produces pork in Mexico, Brazil, and Poland. Pilgrim's Pride (with U.S. ownership) is the second-largest broiler company in Mexico. Tyson and Perdue produce poultry products in China, and Tyson also has large poultry production in Mexico. The Charoen Pokphand companies, originating in Thailand and Hong Kong, are active in meat production throughout much of Asia.

The decision to invest in production in another country or to simply export to that country is influenced by the possibilities for increasing returns to plant size—which could encourage expanding a plant's operation to ship exports out—and possibilities for increasing returns to a firm's scope—which could encourage setting up production or sales in a foreign country in order to get more use out of existing management and marketing efforts (Bredahl). Another reason for multinational operation may be the opportunity to extend technologies or management practices to a country where they are not yet in use, and to capture profits as an early adopter of these methods.

Japan's largest meat firms produce meat both in Japan and in exporting countries (the United States, China, and Australia) for shipment to Japan as well as to other markets. Importing lower cost meat produced in foreign markets allows the Japanese firms to offer competitive prices in Japan while controlling cutting specifications to use those best suited for Japanese consumers.

Summarizing the Current Structure of Meat Trade

Using volume data to summarize national trade flows by meat type, we can create a snapshot of the current structure of the global meat trade. In beef, the largest exporters by volume are Australia, the United States, and, until 2001, the EU (fig. 9). The United States is the largest importer by volume, followed by Japan (fig. 10). The largest pork exporters are the EU, Canada, and the United States (fig. 11). Japan is the largest pork importer, followed by Russia and the United States (fig. 12). In poultry meat, the United States dominates world exports, followed by Brazil, the EU, China, and Thailand (fig. 13). Major importers are Russia, China and Hong Kong, and Japan (fig. 14).

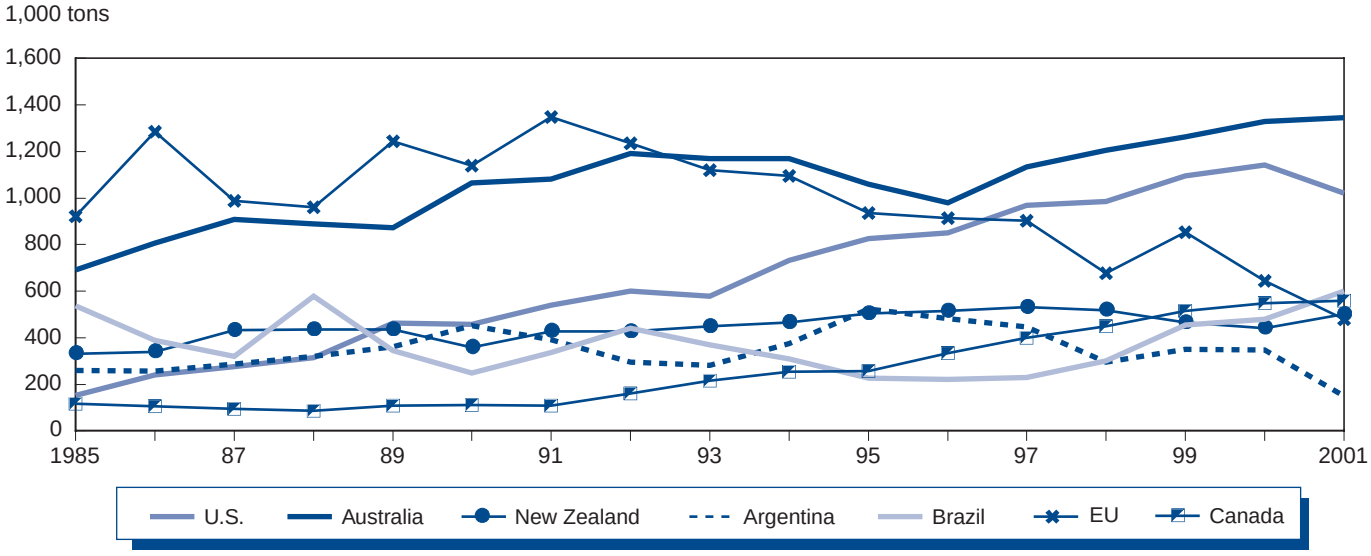
If we define beef, pork, and poultry each as industries, then we observe intra-industry trade within the meat types. The United States is both an importer and exporter of beef and pork; China is both an importer and exporter of poultry. In part, the intra-industry trade reflects large differences within a meat group, such as beef, in production practices and quality. Grain-fed beef production uses high-energy feeds to achieve weight gain, and the meat derived from it is relatively tender because of increased levels of intramuscular fat. In the United States and Japan, grain-fed beef has uses for which grass-fed beef would not be suitable. The United States and Canada import grass-fed beef—combining it with domestic beef to make hamburgers with desirable levels of fat content—while exporting grain-fed beef.

Other intra-industry trade, however, reflects trade in cuts based on differences in demand, such as U.S. imports and exports of pork and offal, China's imports and exports of chicken, imports and exports of pork and offal by Korea and Taiwan. While trade in all three major meats has increased, poultry meat trade has grown the most, and now is the largest meat trade flow by volume. The case of U.S.-China poultry meat trade, already mentioned, is the best illustration of preference differences in demand. China exports legs and a variety of processed chicken meat cuts to Japan, but imports chicken feet, wings, and edible offal. U.S. exports to Mexico and Russia also reflect disparate demand for cuts, particularly in the poultry meat sector. Much of the great outpouring of poultry meat exports from the United States is the reflection of the U.S. affinity for white meat, especially breast meat. Growing more and more broilers for breast meat, U.S. suppliers have turned to foreign markets to sell dark meat, offal, and feet at a higher price than within the United States.

Disease status is reflected in figures 9-14 as well. China's exports of chilled and frozen pork have not grown during a period (1985-2001) when global pork

Figure 9

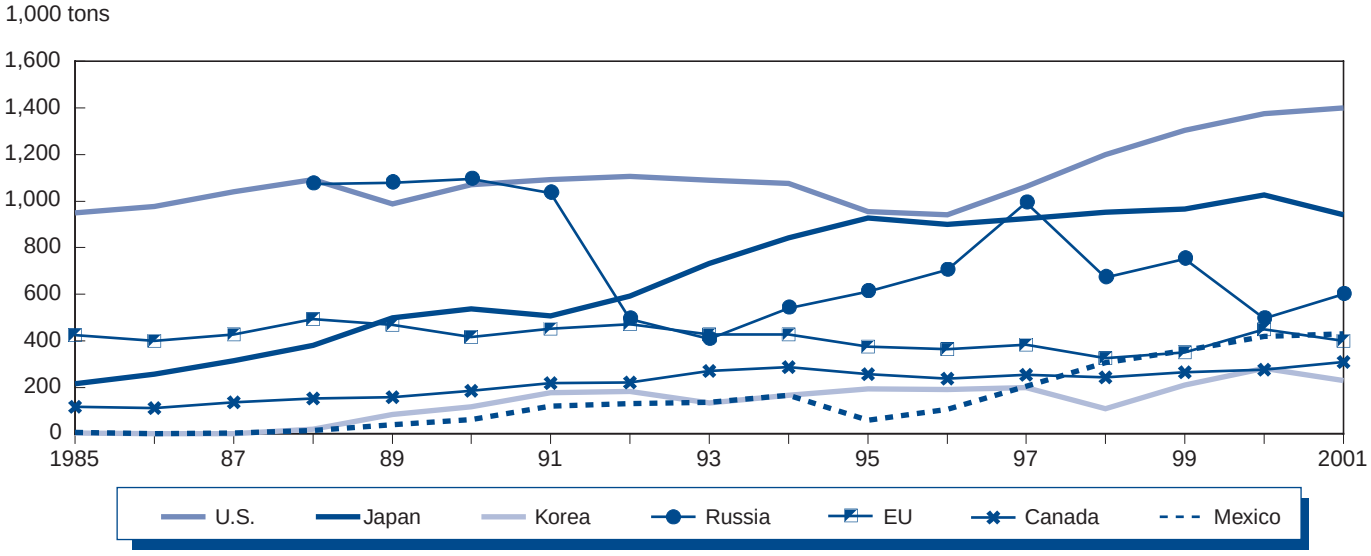
World beef exports



Source: USDA, Production, Supply, and Distribution database.

Figure 10

World beef imports



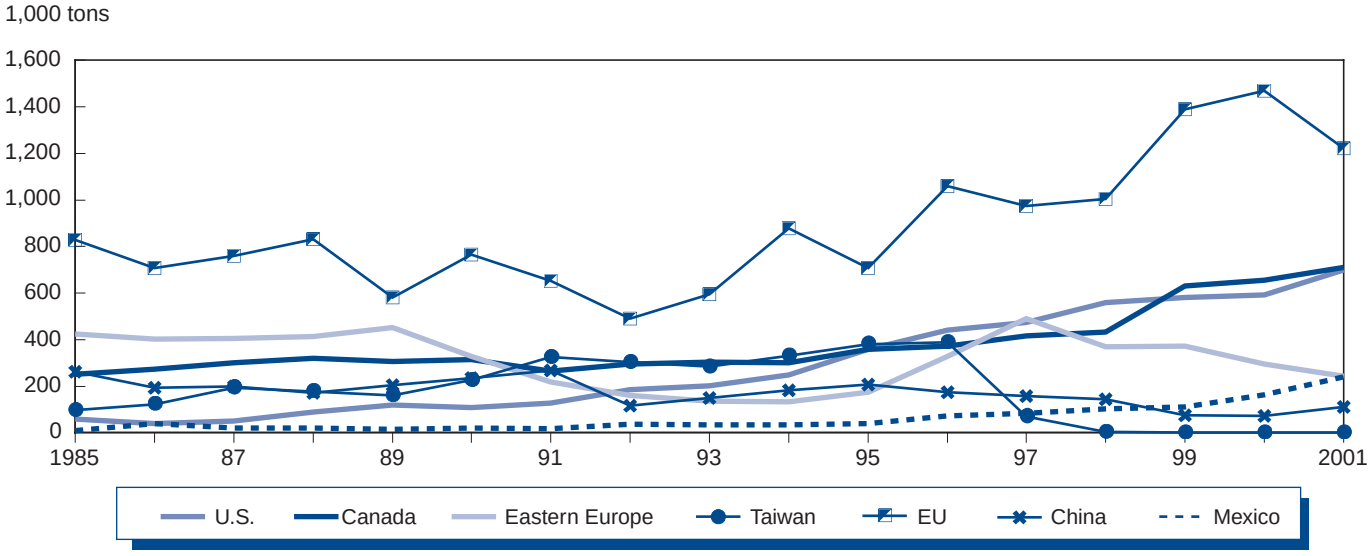
Source: USDA, Production, Supply, and Distribution database.

trade grew, perhaps mainly because China's non FMD-free status inhibits producers from shipping pork to important markets such as Japan (fig. 11). Similarly, Taiwan, at times the world's second-largest pork exporter in the early 1990s, has been virtually shut off from exports because of FMD. Argentina and Brazil have failed to capture much of the growth in world trade in chilled and frozen beef, in part because of recurring FMD problems that blocked trade to major importing countries (fig. 9). The decline in EU beef exports in the late 1990s was due in part to disease problems with BSE and FMD.

Large industrial meat firms are connected to at least some, and perhaps all, of the major meat export flows in figures 9, 11, and 13. This is especially true in the United States, Canada, and Australia for beef; the EU, the United States, Canada, Taiwan, and Brazil for

Figure 11

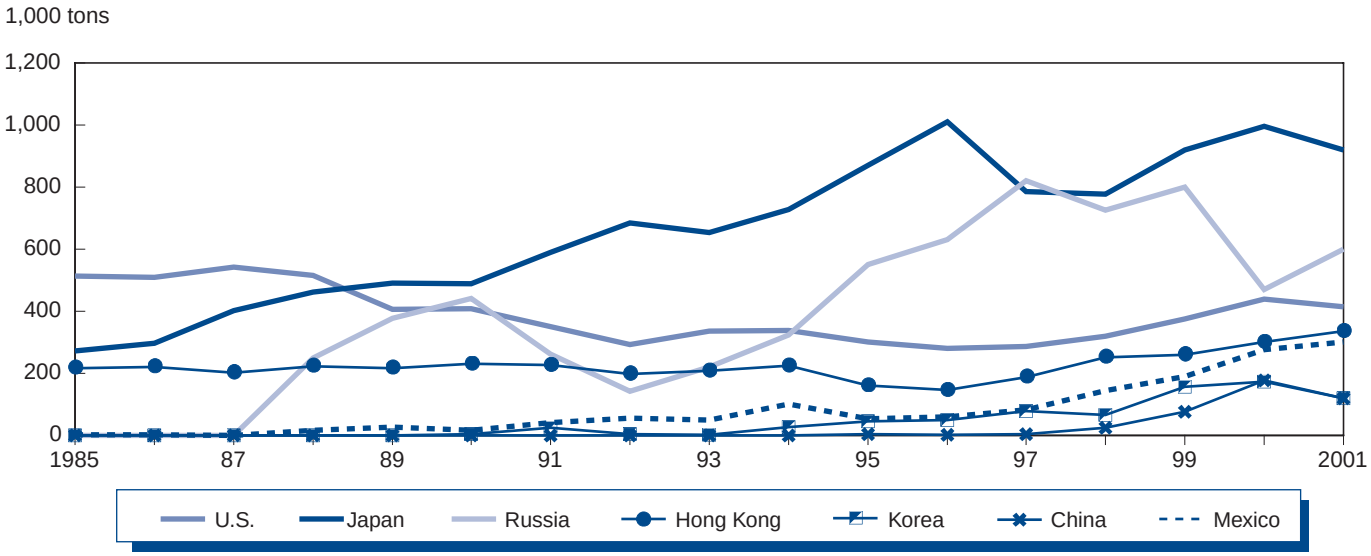
World pork exports



Source: USDA, Production, Supply, and Distribution database.

Figure 12

World pork imports



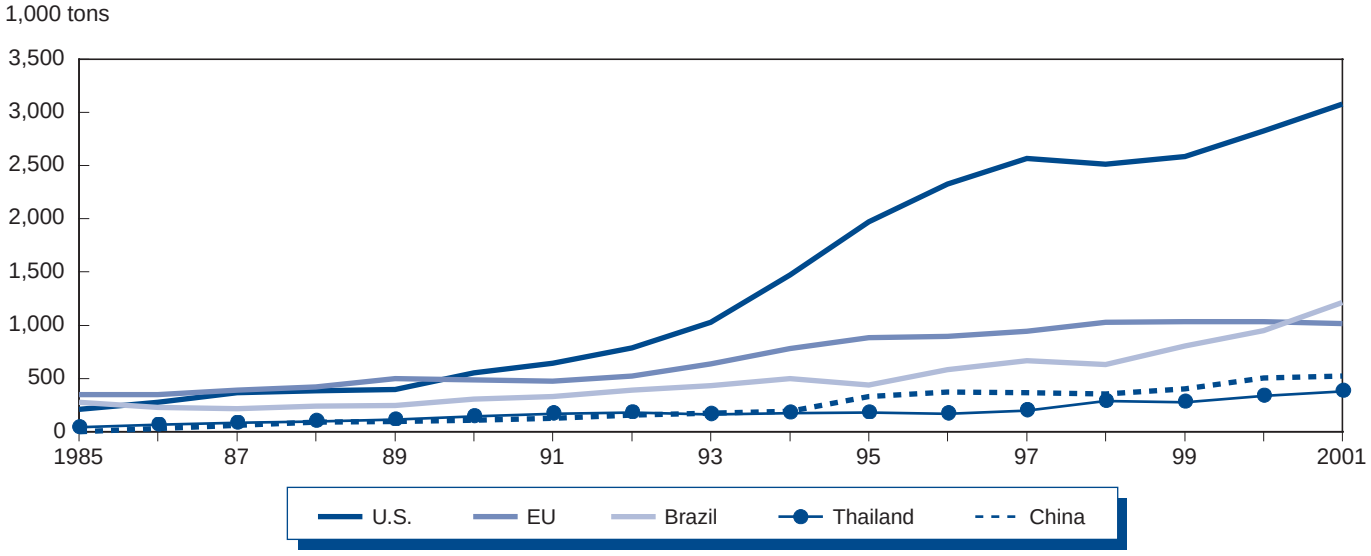
Source: USDA, Production, Supply, and Distribution database.

pork; and the United States, EU, Brazil, and Thailand for poultry meat. A few large firms coordinate most of Japan's meat imports. The association of large firms—maintaining large-scale processing plants—with meat trade is consistent with the idea that economies of size can enhance competitiveness in global meat trade.

The underlying influence of the resource base for meat production is easier to observe after the factors above—intra-industry trade, disease status, and industrial structure—are taken into consideration. In all three meat types, North America, with its grain and oilseed surpluses, plays a leading role in exports. Brazil, where strength in oilseeds and adequate grain and pastureland unite with low labor costs and large-scale firms, is a significant exporter of all three meats, and the second-largest poultry meat exporter. All the leading beef-exporting nations, with the exception of the EU, have

Figure 13

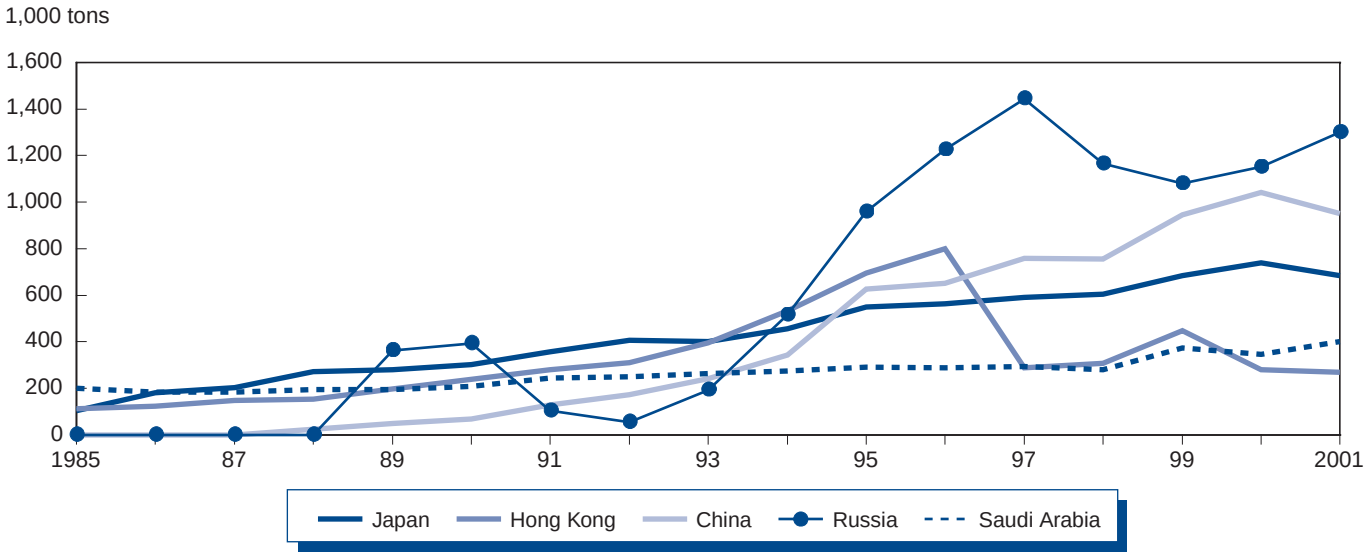
World poultry meat exports



Source: USDA, Production, Supply, and Distribution database.

Figure 14

World poultry meat imports



Source: USDA, Production, Supply, and Distribution database.

large pasture bases, and all, with the exception of New Zealand, have large grain production.

Among the beef-importing countries, resource base appears at first glance not to matter: the United States, Canada, and Russia have good land for pasture and grain production, and the EU produces abundant grain. However, as explained earlier, North American pastureland is used to support a grain-fed cattle industry, and imports consist of grass-fed beef. Russia's economy and agriculture are in transition, and the institutions supporting livestock and meat markets may develop in the future, leading to more beef production in Russia—but this has not happened yet. The EU imports and exports beef with its current, highly protective policies. These policies may mask a resource situation that indicates that Europe could be a net beef-importing region.

In pork and poultry meat, the trade figures show some countries with high grain or oilseed production exporting meat (the United States, Canada, Eastern Europe, the EU, China, Brazil, Thailand) and others with a low production of feedgrain and oilseeds (Japan, Hong Kong, Korea, Saudi Arabia) importing meat. This corresponds well with resources available for meat production. Some anomalies can be explained. Taiwan was a leading pork exporter because of lower labor costs, proximity to Japan, the fact that it was one of the world's few areas free of FMD (until 1997), and preference differences that made exporting cuts to Japan profitable. China's imports of poultry meat are based on preference differences, as noted earlier. Mexico has a deficit in feedgrains (despite considerable grain production) and oilseed meals. Russia, as in the case of beef, seems to have the land resources for greater meat production, but markets have not yet harnessed those resources. Furthermore, Russian imports of poultry meat are often lower priced dark meat from the United States.

Indications of the Future Structure of World Meat Trade

In general, the structure of world meat trade is likely to become more complex in the future. There are several reasons why trade flows could proliferate, which repeat some basic points raised in this report.

- If protectionist barriers to trade (e.g., tariffs) diminish, more countries will be able to trade in meat.
- Economic development, accompanied by rising meat consumption, will increase the markets for meat in some developing countries, and these larger markets will encourage imports.
- The differences in demand for meat cuts are likely to lead to an increasing number of intra-industry trade flows, with countries both importing and exporting.
- Labor costs play a large role in the meat supply chain. Labor costs are lower in developing countries, and meat processing for export in these countries, based on the labor advantage, may grow.
- Increased attention to animal disease control would open export opportunities for more countries, or regions within them.

In general, the reduction of protectionist and disease barriers will lead to more trade flows based on underlying differences in the resources used in meat production. However, demand factors are also important to world meat trade. Higher cost meat-producing countries—such as those with a poor natural resource base or high-cost labor—may continue to be competitive in exporting certain cuts because of differences in demand. For example, overcoming sanitary barriers would allow Mexico to ship chilled chicken breast meat to the United States, or China to ship frozen chicken breast meat to North America, if by exporting breast meat they secured a higher price than in the domestic market. Breast meat prices in the United States and Canada would then fall.

Despite the outlook for overall growth in trade volume and complexity, some trade flows may diminish. Russia, which accounted for 25-30 percent of the broiler meat trade between 1996 and 2002, has decreed new quota limits on imports. In the long run, Russia's increasing efficiency in producing and exporting grain may also strengthen its production of poultry meat and pork, decreasing import demand.[14] Also, if animal disease prevalence increases in the future, trade flows that now exist may disappear, at least temporarily.

The fact that meat production automatically generates many joint products—the set of cuts and byproducts—makes it possible for the slaughter of one animal to generate exports to several countries. The observed differences in preferences for cuts currently help shape the poultry trade, as do differences in demand for edible byproducts (offal) of all the meats. Preference differences across countries may also be important for beef and pork cuts, in addition to offal. To the extent that these differences exist, trade in meats is likely to go not simply west across the Pacific, or north from Oceania, but to move in many other directions, including into North America as well as out of it. U.S. producers will face a more dynamic market with competition varying among cuts and species, new potential import suppliers, and a larger number of export opportunities.

[14] See Bjornlund et al. for a general equilibrium analysis of the prospects for livestock industries in Russia and other East European nations.

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Appendix 1: Feeding Meat Animals—Where Are the Feed Resources?

To answer this question, it is important first to know where feed crops are produced and where pasture resources lie. Second, the extent to which the potential feed ingredients are used for animal feed or for competing uses such as direct human consumption—e.g., as wheat for flour use, corn for tortilla use, or soybeans for tofu—needs to be assessed. This is an issue even for pasture. While pasture cannot be used for human consumption, it is sometimes possible to convert pasture area into cropland, and crops can often be used for direct human consumption.

Feed production requires land. A large area for cropland or for pasture is one indicator of high potential feed production. Several parts of the world have large cropland bases (fig. A-1). In contrast, East Asia (Japan, Korea, and Taiwan) has a small cropland area. Pasture land is abundant in Africa, followed by Oceania, China, the former Soviet Union, South America, and North America (for the purpose of this report, defined as the United States and Canada). Comparatively little pasture is available in East Asia, Southeast Asia, South Asia, and Europe.

Crop area is one determining factor for feed production, but feed production potential across the world's regions also varies according to a region's climate and land quality. Existing institutional and cultural arrangements also affect feed production. One indicator of current feed production potential is the total grain production (fig. A-2).[1] This reflects the amount of land farmed as well as the current yields achieved on that land. North America is by far the largest grain-producing region, followed by China and the European Union.

Where Are Current Deficits and Surpluses In Regional Feed Use?

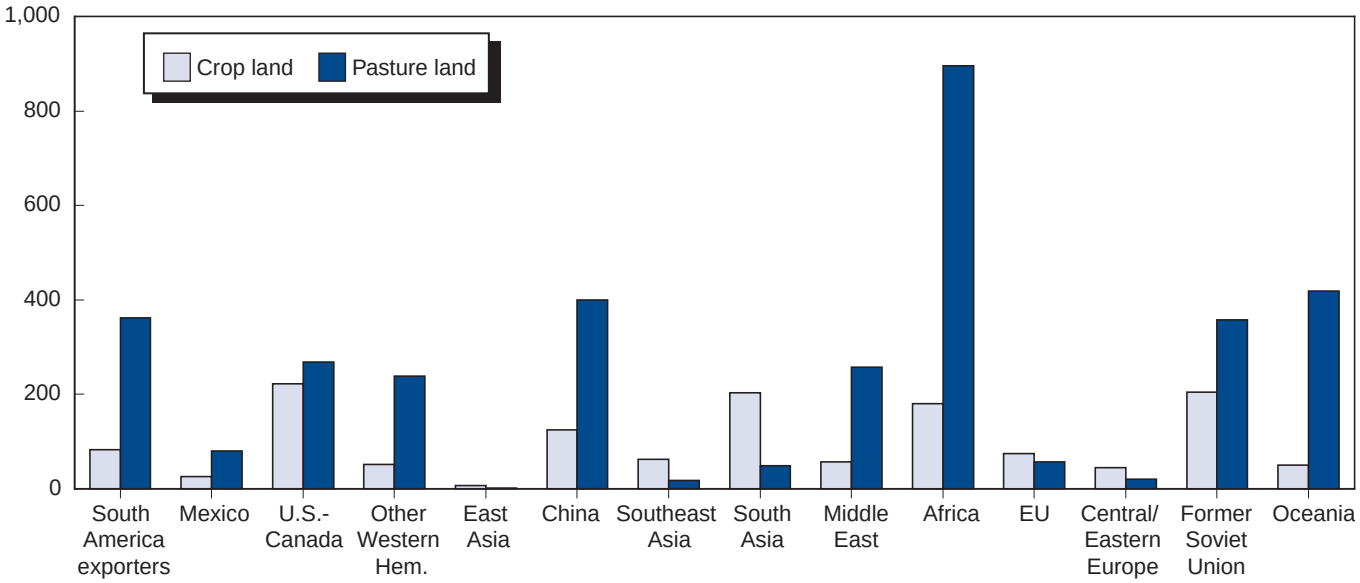
The world's 6 billion people are not distributed in the same way as the world's resources for animal feed production. A region with a large population will need more grain for foodstuffs than a region with fewer people. Production can be divided by population to give an initial, indirect indication of how much grain is available for animal feeds. If grain production per person is high, there is likely to be grain left over after direct

[1] The grain production total excludes rice, which is seldom a major component of animal feeds in modern feed rations. Land used for grain farming can usually also be used to grow oilseeds, and the same conclusions would apply to oilseeds that apply to grain.

Figure A-1

Crop and pasture land by region

Million hectares

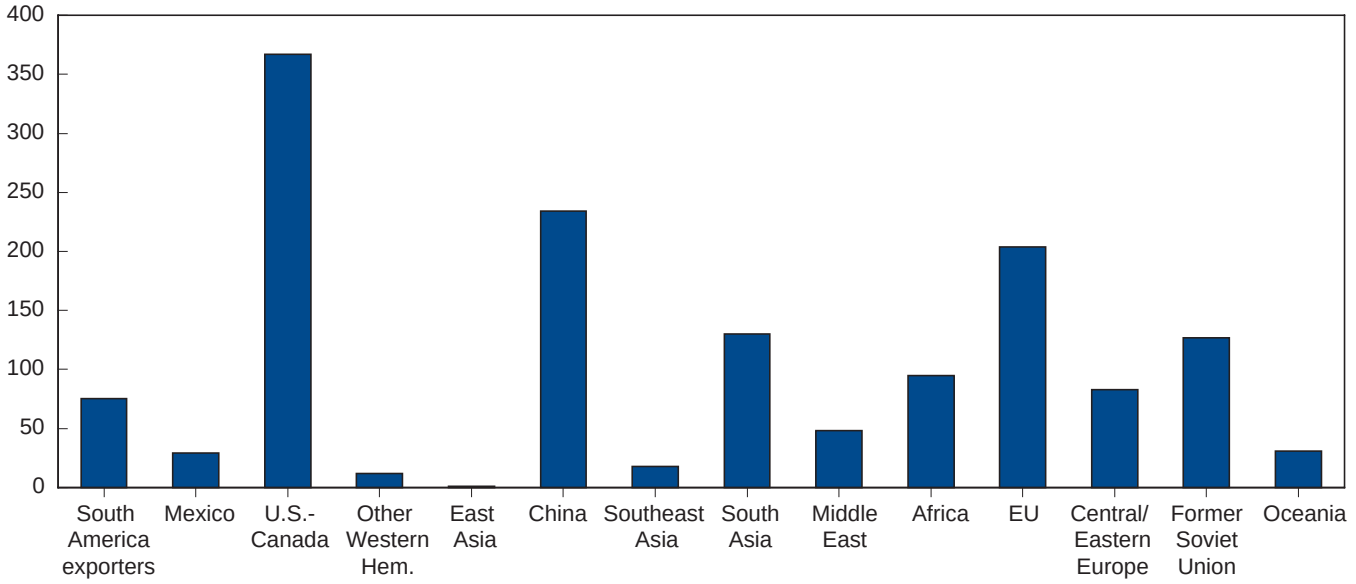


Source: FAOSTAT (data are the average for 1996-2000).

Figure A-2

Grain production, 1998-2002 average[1]

Million tons



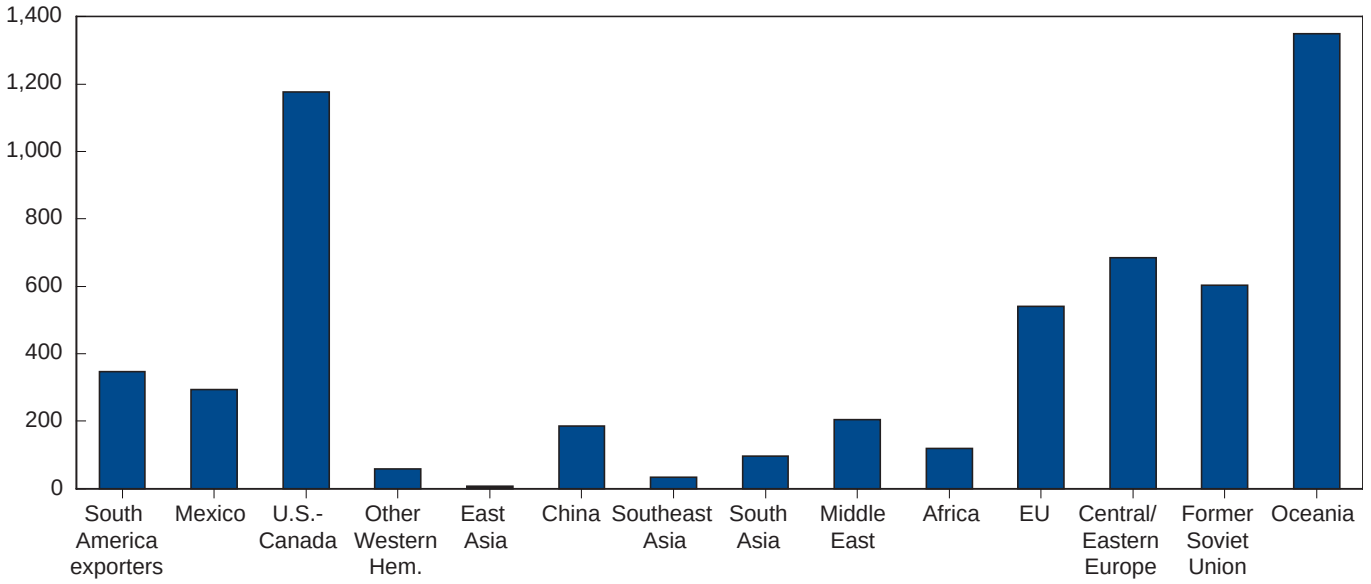
[1] Excludes rice.

Source: USDA Production, Supply, and Distribution database.

Figure A-3

Grain production per person, 1998-2002 average[1]

Kg/per year



[1] Excludes rice.

Source: USDA Production, Supply, and Distribution database.

human consumption is satisfied. Figure A-3 shows that North America and Oceania produce over one ton of grain per person, and Europe produces about half that. These amounts are in excess of human food needs for grain (average cereal supply per person for food use was 156 kg per year, 1998-2000, according to the Food and Agriculture Organization), and indicate substantial grain availability for feed use or export. In contrast, much less grain (excluding rice) is produced per person in East Asia, Southeast Asia, Africa, and China. Even though rice is a principal food grain in these regions (which produce a great deal of rice, satisfying much of their foodgrain needs), wheat-based foods are still important, and the amount of grain produced per person is small relative to other regions.[2]

Data on overall deficits and surpluses in grain use provide another important indicator of regional feed deficits and surpluses. Direct measurement of feed-grain production within a region and of the ultimate use (for direct human consumption or for feed) of grain imports and exports is difficult and requires assumptions that raise the likelihood of error. Overall (with rice netted out), North America had a large surplus of grain (for all uses, on average, 1996-2000, see fig. A-4). Oceania, South America, Europe and the Former Soviet Union also had surpluses. East Asia, Africa, the Middle East, Southeast Asia, and Mexico had substantial deficits.

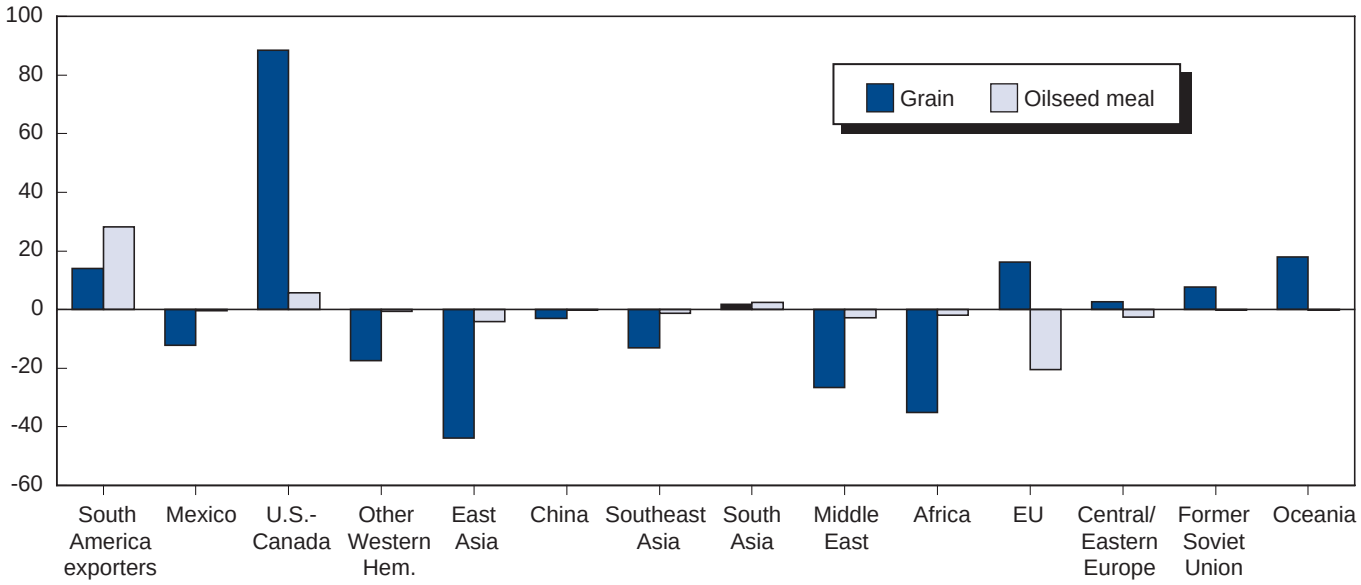
Oilseed meals are a second important ingredient of modern feed rations. Most oilseed meal is used for feed. Oilseeds can be consumed with or without being crushed. Oilseed crushing produces vegetable oil and oilseed meals, while uncrushed oilseeds are also used for a variety of foods. Oilseed meal production less oilseed meal use shows, on a regional basis, which regions currently have more meal than they can use, and which need to import. Figure A-4 shows that South America has a large surplus in oilseed meal. North America and South Asia (India is the only country with an oilseed meal surplus in South Asia) are also in surplus, while the rest of the world consumes more oilseed meal than it produces. Often, oilseed meal is produced by crushing oilseeds that are imported, rather than produced within a region. This is difficult to measure, but if the oilseed meal produced from imported oilseeds were added to direct oilseed meal imports, some of the deficit regions (especially East Asia, which imports virtually all its oilseeds for crushing) would show much greater deficits and North America would show a larger surplus.

[2] Corn, barley, millet, and other grains are also consumed for food in some areas. However, direct food use of these grains has been declining on a per-person basis, and is much less important overall than wheat.

Figure A-4

Grain/meal surpluses and deficits: Production minus consumption, 1998-2002 average[1]

Million tons



[1] Excludes rice.

Source: USDA Production, Supply, and Distribution database.

Where Will Meat Production Increase To Supply Rising Future Demand?

Since feed costs are the largest component of the production cost for meat animals, regions that have abundant, low-cost feed available will have an advantage in animal production. Transport costs for grains and oilseed meals raise feed costs. The regional data show that parts of North and South America have considerable surpluses in grains and oilseed meals, the two largest components of feeds. In the future, this provides a solid, initial advantage for those regions in producing more animals in order to export more meat than they do now. Their current grain and meal exports could be replaced by meat exports. The EU, Oceania, and the former Soviet Union republics have large grain surpluses, but not surpluses of oilseed meals. The meal deficit is particularly large in the EU. Future use of grain to produce animals for meat export would be partially offset by a growing need to import oilseeds for crushing or oilseed meals, which would incorporate a transportation cost. Oceania's grain exports are primarily wheat for food uses. Grain for food use is typically valued higher than feedgrains, so it is unlikely that Australia in the future would replace food-use grain exports with domestic use of the grain for feed. Russia, Ukraine, and Kazakhstan are economies in transition, and the degree to which they could produce more oilseed meal domestically is difficult to gauge. Grain yields and domestic infrastructure for agriculture in those countries have improved in recent years, and grain resources for potential meat exports may grow in the future.

East Asia has the largest deficit in grains of any region, as well as a deficit in oilseed meals. The oilseed meal deficit is actually greater, if the region's near-total dependence on oilseed imports is taken into account. Imported oilseeds include transportation charges, which raise the cost of the meal and oil made from them. Greater meat production in East Asia would require even greater imports of grain and meal, at a cost in terms of transportation. Even maintaining current production is difficult, since higher feed costs burden the region's meat production as it competes against imported meat from North America and Oceania. Africa, the Middle East, Southeast Asia, and Mexico all show significant deficits in non-rice grains as well as smaller deficits in oilseed meals. As in the case of East Asia, these facts indicate that greater meat production would incur transportation costs from importing grains and meals. In terms of domestic resources for intensive animal feeding with grains and meals, these regions do not appear well-positioned to generate meat exports. However, Africa and the Middle East each have a large endowment of pasture land. If that endowment could be made more productive or used more intensively, production of sheep and cattle meat from grass-fed animals might increase.

North and South America appear to be potential sources of greater meat exports, if their current surplus capacity in grains and meals are the only factors to consider. Each region, however, is vast in area. Even within these regions, resources and demand patterns can vary widely, and transport costs for feeds can be important. While for Brazil, Argentina, Paraguay, and Uruguay as a region there is a grain surplus over current consumption, the surplus exists entirely in Argentina, and Brazil had a grain deficit between 1996 and 2000. Growth in animal feeding in Brazil that involved importing grains from Argentina would add transport costs. In the United States, the Midwest has large surpluses of grain and meal, while current large meat-producing areas in the Southeast already depend in part on feedstuffs shipped in from the Midwest or from foreign sources.

Appendix 2: Meat Trade Barriers in Major Countries

Meat-related trade rules in the aftermath of the Uruguay Round Agreement (TRQ=tariff-rate quota)

	Beef	Pork	Poultry meat
Argentina:			
	Meat: Tariff of 12.5%. **Offal:** Tariff of 12.5%.	**Meat:** Tariff of 11.5%. **Offal:** Tariff of 11.5%.	**Meat:** Tariff of 11.5%. **Offal:** Tariff of 11.5%.
Australia:			
	Meat: Zero. **Offal:** Zero.	**Meat:** Zero. **Offal:** Zero.	**Meat:** Zero. **Offal:** Zero.
Brazil:			
	Meat: Tariff of 12.5%. **Offal:** Tariff of 12.5%.	**Meat:** Tariff of 11.5%. **Offal:** Tariff of 11.5%.	**Meat:** Tariff of 11.5%. **Offal:** Tariff of 11.5%.
Canada:			
	Meat: Import controls converted to a TRQ of 76,409 tons per year, 1995-2000. Within-quota tariffs lowered from 4.41 cents/kg to zero, 1995. Over-quota tariffs lowered from 37.9% to 26.5%, 1995-2000. Special safeguard provisions were put in place to limit import surges. Imports from the U.S. and Mexico are not limited by the TRQ, but enter in any quantity with a zero tariff. **Offal:** Zero.	**Meat:** Zero. **Offal:** Zero.	**Meat:** Import controls converted to a TRQ of 39,844 tons per year for chicken, 1995-2000, and a TRQ for turkey of 4,467 tons in 1995, rising to 5,588 tons per year in 2000. Within both TRQs, the tariffs were lowered from 12.5% in 1995 to 5.38% in 2000. Imports of frozen chicken cuts above the TRQ faced a tariff of 292.9% in 1995, falling to 249% in 2000. Imports of frozen turkey cuts above the TRQ faced a tariff of 194.5% in 1995, falling to 163.5% in 2000. Imports from the U.S. and Mexico within the TRQs face a tariff of zero. Special safeguard provisions were put in place to limit import surges. **Offal:** Liver imports face a tariff of zero within a TRQ and 238% above the TRQ. Other offal appear to fall within the meat TRQs.
China:			
	Meat: Tariffs on fresh/chilled carcasses lowered from 30% to 20%, 2002-2004. Tariffs on frozen carcasses lowered from 33% to 25%, 2002-2004. Tariffs on cuts lowered from 25.2% to 12%, 2002-2004. **Offal:** Tariffs lowered from 15.2% to 12%, 2002-2004.	**Meat:** Tariffs lowered from 15.2% to 12%, 2002-2004. **Offal:** Tariffs lowered from 15.2% to 12%, 2002-2004	**Meat:** Tariffs lowered from 14% to 10%, 2002-2004. **Offal:** Tariffs lowered from 14% to 10%, 2002-2004.

	Beef	Pork	Poultry meat
EU:			
	Meat: Duty is sum of *ad valorem* and specific tariffs. *Ad valorem* tariff ceiling on meat lowered from 20% to 12.8%, 1995-2000. Additional specific tariffs lowered from range of 2210-4752 ecu/ton in 1995 to range of 1414-3041 ecu/ton, 2000. **Offal:** Tariffs of 7% on livers, and 4% on other offal lowered to 0, 1995-2000.	**Meat:** Duty is sum of *ad valorem* and specific tariffs. *Ad valorem* tariff ceiling on meat lowered from 3% to zero, 1995-2000. Additional specific tariffs lowered from range of 729-1358 ecu/ton in 1995 to range of 467-869 ecu/ton, 2000. TRQ of 7,000 tons for loins and bellies. **Offal:** Tariffs of 7% on livers, and 3% or 4% for other offal lowered to zero, 1995-2000.	**Meat:** Specific tariffs on frozen chicken cuts lowered from range of 292-1600 ecu/ton in 1995 to range of 187-1024 ecu/ton, 2000. TRQ of 15,500 tons for frozen chicken meat. TRQ of 15,500 tons for frozen turkey meat. Special safeguard provisions were put in place to limit import surges. **Offal:** Tariff on liver lowered from 10% to 6.4%, 1995-2000. Tariff on other offal lowered from 292 ecu/ton to 187 ecu/ton, 1995-2000.
Hong Kong:			
	Meat: Zero. **Offal:** Zero.	**Meat:** Zero. **Offal:** Zero.	**Meat:** Zero. **Offal:** Zero.
Indonesia:			
	Meat: Tariff of 5%. **Offal:** Tariff of 5%.	**Meat:** Tariff of 5%. **Offal:** Tariff of 5%.	**Meat and offal:** Tariff of 5%. Imports of poultry parts banned since Sept. 2000.
Japan:			
	Meat: Tariff lowered from 50% to 38.5%, 1995-2000. Special safeguard provisions were put in place to limit import surges. **Offal:** Tariffs on most beef offal lowered from 15% to 12.8% 1995-2000.	**Meat:** Tariff lowered from 5% to 4.3%, 1995-2000. Gate price lowered from 612 to 524 yen/kg for cut meat, 460 to 393 yen/kg for carcasses, and 1038 to 898 yen/kg for processed products, 1995-2000. Special safeguard provisions were put in place to limit import surges. **Offal:** Tariffs on most pork offal lowered from 10% to 8.5%, 1995-2000.	**Meat:** Tariff on frozen bone-in chicken legs lowered from 10% to 8.25%, 1995-2000. Tariff on other frozen chicken cuts lowered from 12% to 11.9%, 1995-2000. Tariff on frozen turkey cuts lowered from 5% to 3%, 1995-2000. **Offal:** Tariff on frozen poultry livers lowered from 5% to 3%, 1995-2000. Tariffs on other offal are the same as those on other frozen chicken meat, above.

	Beef	Pork	Poultry meat
Mexico:			
	Meat: Bound tariff lowered from from 50% to 45%, 1995-2004. Applied tariff, 2002, was 20% for fresh meat, 25% for frozen. Tariff for imports from U.S. and Canada is zero. Special safeguard provisions were put in place to limit import surges.	**Meat:** Bound tariff lowered from 50% to 45%, 1995-2004. Applied tariff was 20% in 2002. Tariff for imports from U.S. and Canada is zero. Special safeguard provisions were put in place to limit import surges.	**Meat:** TRQ of 39,543 tons/year for the U.S.,1,000 tons/year for other countries, 1995-2004. Within-quota tariff is 50%, but zero for the U.S. Over-quota tariff lowered from a maximum of 260% in 1995 to 234% in 2004. Special safeguard provisions were put in place to limit import surges.
	Offal: Bound tariff lowered from 25% to 22.5%, 1995-2004. Applied tariff was 10% or 20% in 2002, depending on the organ. Tariff for imports from U.S. and Canada is zero.	**Offal:** Bound tariff lowered from 50% to 37.5%,1995-2004, except for livers and certain other organs, which was lowered from 50% to 45%, 1995-2004. Applied tariff was 10% or 20% in 2002, depending on the organ. Special safeguard provisions were put in place to limit import surges. Tariff for imports from U.S. and Canada is zero.	**Offal:** Bound tariff on livers lowered from 50% to 37.5%, 1995-2004, with special safeguard provisions to limit import surges. Applied tariff on liver is 10% in 2003, and zero for the U.S. Other poultry offal is included in the meat TRQ regime.
New Zealand:			
	Meat: Zero.	**Meat:** Tariff lowered from 20% to 8.5%, 1995-2000. Zero tariff for imports from Australia.	**Meat:** Bound tariff lowered from 28.5% to 18.2%, 1995-2000. Applied tariff 5% in 2000.
	Offal: Bound tariff lowered from 20% to 12.8%, 1995-2000. Applied tariff zero, 2002.	**Offal:** Bound tariff lowered from 20% to 12.8%, 1995-2000. Applied tariff zero, 2002.	**Offal:** Bound tariff on frozen livers lowered from 20% to 12.8%, 1995-2000. Applied tariff on all offal 5% in 2000.
Philippines:			
	Meat: Tariff is 10%.	**Meat:** TRQ raised from 43,365 tons in 2000 to 50,595 tons in 2003. Within-quota tariff is 30%. Over-quota tariff lowered from 60% to 40%, 2002-2004.	**Meat and offal:** TRQ raised from 20,879 in 2002 to 22,968 in 2004. Within-quota tariff lowered from 45% to 40% in 2002. Over-quota tariff lowered from 50-60% in 2002 to 40% in 2003. Special safeguard provisions were put in place to limit import surges.
	Offal: Tariff is 10%, except for livers; liver tariff is 7%.	**Offal:** Tariff is 10%, except for livers; liver tariff is 7%.	
South Korea:			
	Meat: Quota raised from 123,000 tons in 1995 to 225,000 tons in 2000. Absolute quota ended in 2000. Simultaneous-Buy-Sell share of quota rose from 30% in 1995 to 70% in 2000. Maximum price mark-up lowered from 70% to zero, 1995-2000. Tariff raised from 20% in 1994 to 44.4% in 1995, and then lowered to 40% by 2004.	**Meat:** Quota raised from 21,930 tons in 1995 to 18,275 tons for first half, 1997. Absolute quota ended, 7/1/97. Tariffs raised from 25% in 1994 to 37% in 1995, then lowered to 25% by 2004.	**Meat:** Quota size raised from 7,700 tons in 1995 to 6,500 tons for first half, 1997. Absolute quota ended, 7/1/97. Tariff raised from 20% in 1994 to 35% in 1995, then lowered to 20% by 2004.
	Offal: Quota ended as of 7/1/97 (except tongues and livers, previously liberalized). Tariff lowered from 20% to 18%, 1995-2004.	**Offal:** Tariff lowered from 20% to 18%, 1995-2004.	**Offal:** Tariff on liver reduced from 25% to 22.5%. Tariff on other offal reduced from 30% to 27%.

	Beef	Pork	Poultry meat
Taiwan:			
	Meat: Tariffs on special-quality beef lowered from 22.1 NT$/kg in 2001 to 10 NT$/kg in 2004. Tariffs on other beef lowered from 27 NT$/kg in 2001 to 10 NT$/kg in 2004. **Offal:** Tariff lowered from 20-50% in 2001 to 15% in 2004.	**Meat:** Tariffs on carcasses, hams, and shoulders lowered from 15% in 2002 to 12.5% in 2004. Tariffs on other meat cuts lowered from 14% in 2002 to 12.5% in 2004. TRQ on pork bellies raised from 6,160 tons in 2002 to 15,400 tons in 2004, and then eliminated in 2005. Within-TRQ tariff lowered from 15% in 2002 to 12.5% in 2004. Over-TRQ tariff lowered from 60% in 2002 to 50% in 2004. Tariff on bellies in 2005 and after will be 12.5%. **Offal:** TRQ raised from 10,000 tons in 2002 to 27,500 tons in 2004, and then eliminated in 2005. Within-quota tariff lowered from 25% in 2002 to 15% in 2004. Over-quota tariff lowered from 310% in 2002 to 265% in 2004. Tariff in 2005 and after will be 15%.	**Meat:** TRQ on chicken meat raised from 19,163 tons in 2002 to 45,990 tons in 2004, and then eliminated in 2005. Within-quota tariff lowered from 40% in 2001 to 20% in 2004. Over-quota tariff from 40-64 NT$/kg in 2003. Tariff on chicken meat in 2005 and after will be 20%. Tariff on duck meat 35%. Tariff on turkey meat 10%. **Offal:** TRQ on guts, bladders, and stomachs begun with 1,836 tons in 2002, rising to 3,674 tons in 2004, and then eliminated in 2005. Within-quota tariff 25% Over-quota tariff 400%. Tariff in 2005 and after on guts, bladders, stomachs not available. Tariff on chicken livers, hearts, and feet is 25%. Tariffs of 30% to 45% on other poultry offal.
United States:			
	Meat: TRQ of 378,214 tons/year for Australia, 213,402 tons/year for New Zealand, 200 tons/year for Japan, 20,000 tons/year each for Argentina and Uruguay, and 64,805 tons/year for other countries. No quantitative limits for Canada or Mexico. Within-quota tariff on cuts specially prepared for retail of 4% or 10%. Within-quota tariff otherwise 4.4 cents/kg. Over-quota tariff lowered from 31.1% to 26.5%, 1995-2000. Special safeguard provisions to limit import surges on over-TRQ beef. **Offal:** Zero.	**Meat:** Tariff on cuts specially prepared for retail lowered from 2.2 cents/kg to 1.4 cents/kg, 1995-2000. Aside from these cuts, tariffs are zero. **Offal:** Zero.	**Meat and offal:** Tariffs lowered from 22 cents/kg to 17.6 cents/kg, 1995-2000. Tariff on imports from Mexico is zero.

Sources: For updated information, use the sources below. For authoritative information, use country tariff schedules. Country schedules submitted to the WTO; U.S. International Trade Commission, *http://dataweb.usitc.gov/scripts/tariff2003.asp*; APEC Tariff Database, *http://www.apectariff.org/tdb.cgi*; AMAD tariff database, *http://www.amad.org/*; Foreign Agricultural Service, USDA, GAIN reports, *http://www.fas.usda.gov/scriptsw/attacherep/default.asp*