

## Chapter 2

# The Setting

## Developments in Meat Consumption and Livestock Production

Cattle and hog slaughter plants operate in conjunction with meat buyers and with livestock suppliers. Over the years covered by this study (1963-92), the economics of slaughter industries have been affected by some important developments in meat consumption patterns and in methods of livestock supply.<sup>4</sup>

### Changes in Meat Consumption

Meat consumption patterns changed markedly in the last quarter century, shifting from red meats, and particularly beef, to poultry (table 2-1). Beef consumption dropped from 84.7 pounds per person in 1971-75 to 66.3 pounds by 1991-95. Over the same period, per capita pork consumption changed little from 51.9 pounds in 1971-75 to 52.1 pounds in 1991-95. In contrast, poultry consumption rose sharply. Per capita chicken consumption nearly doubled, from 36 pounds in the early 1970's to almost 70 pounds in 1995, while turkey consumption (not shown) jumped from 8 pounds in 1970 to 18 pounds in 1995.

The shifts derive from trends in relative prices among meats, health concerns, and the development of many new poultry products. But the changes forced slaughter industries to adapt. With declining per capita consumption, growth in beef demand, and consequently growth in demand for slaughter cattle, could come only from growth in population and in exports.

The U.S. population grew about 1 percent per year during 1970-95 or, compounded, 28 percent over the entire period. Coupled with declining per capita con-

sumption and only a slight increase in net beef exports, total U.S. demand for beef showed little growth.<sup>5</sup> But changes in animal production meant that constant beef demand could be met with fewer animals. Beef yields rose to almost 700 pounds per carcass in the early 1990's from just over 600 pounds two decades before; consequently, cattle slaughter (numbers) fell by 13 percent between the late 1970's and the early 1990's.

Hog yields grew slightly during the period, as did net pork exports, while per capita consumption showed little change. The net effect was modest growth (15 percent) in annual hog slaughter over the two decades; that is, demand for slaughter hogs grew, but by less than 1 percent per year.

Poultry stands in stark contrast. Growth in broiler size (average meat yields from a broiler grew by nearly 20 percent) also limited the growth in demand for slaughter livestock. But growth in population, exports, and per capita consumption caused broiler slaughter to jump from 2.9 billion animals a year in the early 1970's to 6.6 billion in the early 1990's.

Later chapters will show that dramatic structural changes affected each of the slaughter industries during the period, as production shifted to larger plants. But those shifts occurred in the face of widely varying economic environments. In cattle, production shifted to larger plants in the face of declining demand for slaughter cattle; the result was sharp declines in plant numbers and sharp increases in concentration. By contrast, shifts to larger plants in poultry slaughter accom-

<sup>4</sup> We emphasize the developments that affect slaughter plant economics. More complete descriptions of meat consumption and livestock production can be found in Crom (1988), McBride (1997), USDA (1995), and Putnam and Allshouse (1997).

<sup>5</sup> Net exports refer to exports minus imports, measured in quantities (rather than in dollar values). During the period, net exports grew from -7 to -4 percent; that is, exports grew faster than imports, creating some net demand growth for U.S. beef.

**Table 2-1—From meat demand to livestock slaughter**

Variables driving livestock demand	Annual average				
	1971-75	1976-80	1981-85	1986-1990	1991-95
	<i>Percentage increase</i>				
U.S. population growth	1.04	1.07	0.93	0.94	1.04
Per capita consumption:	<i>Pounds</i>				
Beef	84.7	85.6	78.1	72.5	66.3
Pork	51.9	50.1	51.8	50.4	52.1
Chicken	36.8	42.8	48.3	55.8	66.4
Net meat exports:	<i>Percent of domestic supply</i>				
Beef	-7.0	-7.7	-6.4	-5.7	-4.0
Pork	-2.3	-1.3	-3.6	-5.3	-1.7
Chicken	+1.3	+4.8	+3.9	+4.9	+8.7
Average carcass size:	<i>Dressed weight, pounds</i>				
Cattle	612	615	632	666	699
Hogs	169	170	173	178	182
Broilers	3.74	3.88	4.10	4.31	4.45
Commercial slaughter:	<i>Million animals</i>				
Cattle	36.6	38.3	36.3	35.0	33.3
Hogs	81.3	82.7	86.2	84.5	93.0
Broilers	2,889	3,575	4,198	5,223	6,580

Sources: Putnam and Allshouse, 1997; USDA, ERS, 1995.

modated growing demand, so fewer plants exited and concentration changed little.<sup>6</sup> With slow but positive demand growth for hogs, shifts to larger plants resulted in plant exits and some increase in concentration, but nothing like the sharp consolidation in cattle slaughter.

## The Supply Chain: Cattle Production

Cattle slaughter plants usually specialize in one of two types of cattle. Of the 35.7 million cattle slaughtered in 1996, 28.3 million were steers and heifers, while the rest were cows and bulls. Plants specialize because the animals have different shapes that require different settings for slaughter line equipment, and because the animals provide different meat products. Steers and heifers are fed a concentrated diet of corn rations

<sup>6</sup> Turkey slaughter also increased sharply, for similar reasons. Annual slaughter numbers in the early 1990's were 130 percent above those of two decades earlier, following sharp increases in per capita consumption and more modest growth in population and exports. Meat yields from turkeys rose 20 percent.

before slaughter, producing a more marbled cut of beef that is preferred for taste. Cows, fed on grass and forage, produce leaner meat that is usually mixed with trimmings from steer and heifer carcasses to produce ground beef.

Cows sometimes move through feedlots before going to slaughter plants, but more often move directly to plants from dairy farms and beef cow-calf operations. Because of that, cow and bull sales and slaughter plants are widely distributed across the country. Texas accounted for 12 percent of the Nation's 1996 cow and bull sales, and 15 other States, from all regions of the country, each accounted for at least 1 percent. Because sales are distributed over a wide geographic area, slaughter plants tend to be smaller than steer and heifer plants (larger plants would require uneconomically large catchment areas).

The animals that steer and heifer plants eventually purchase are first calved on a wide variety of farm operations spread across the country. Most producers are quite small. Calves are usually weaned from cows when they weigh about 400 pounds. Of those that are to be grown out for beef, 80 to 90 percent are placed

in growing operations (many of which are integrated with cow-calf operations), where they add weight while pasturing on grass and roughage. Feeder cattle often move among growing operations, and to many different locations around the country, as pasture and forage conditions vary.

Feeder cattle commonly move to feedlots when they weigh between 500 and 750 pounds. The animals remain in feedlots until they reach market weights of 950 to 1,250 pounds, and are sold to slaughter plants. Feedlots, and hence steer and heifer plants, are geographically concentrated. According to an annual USDA survey, 75 percent of all packer purchases of steers and heifers in 1996 came from just five States in the Great Plains—Colorado, Nebraska, Kansas, Oklahoma, and Texas (USDA, 1998).

Feedlots cover a wide range of sizes, but sales to packers are increasingly dominated by large commercial feedlots in which almost all feed is purchased (rather than grown onsite), almost all labor is hired, and the animals are confined to a relatively small area. A 1992 USDA survey of the largest steer and heifer plants shows they bought cattle from many different sellers—19,395 of them.<sup>7</sup> Most sellers (89 percent) were small farmer-feedlots—seasonal operations with capacity below 1,000 head, which are part of a diversified farm business. But, on average, the survey's farmer-feedlots sold less than 200 cattle each in 1992, in 2 to 3 transactions, and together those sellers accounted for only 14 percent of the cattle purchased in the survey.

Packers purchased far more animals from very large commercial feedlots; 150 sellers in the 1992 survey sold over 32,000 cattle each, and together accounted for 43 percent of all cattle purchased by the packers. These large commercial feedlots sold an average of 65,000 animals each in 1992, in over 400 different transactions.<sup>8</sup> Almost all were located in the Great Plains.

<sup>7</sup> Those plants slaughtered 23.1 million cattle, 87.6 percent of all commercial steer and heifer slaughter in that year. The relevant survey data were collected by USDA's Grain Inspection, Packers and Stockyards Administration (GIPSA), as summarized in Texas Agricultural Market Research Center (1996).

<sup>8</sup> Another 144 sellers, which each sold more than 16,000 cattle to the largest plants, accounted for 3.3 million head. The remaining 28.8 percent of steer and heifer sales came from 1,873 smaller commercial feedlots.

In the mid-1970's, large commercial feedlots accounted for less than a quarter of total steer and heifer sales. Since then, their growth has paralleled that of large slaughter plants. Technological innovations—such as feed additives, computerized onsite feedmills and feeding operations, and improved transportation—have heightened economies of size in cattle feeding (Glover and Southard, 1995). By building a large slaughter plant among a network of large feedlots, plant managers can ensure a steady supply of animals and can maintain high capacity utilization throughout the year. The economics of slaughter plant operation and pricing are intertwined with large feedlot operations and pricing.

## The Supply Chain: Hog Production

Meatpackers usually purchase hogs locally—within 150 miles of the slaughterhouse—so facilities consequently locate near hog farms, much as cattle slaughter plants locate near cattle feedlots. But hog finishing is not as geographically concentrated as cattle feeding. While the five largest cattle-feeding States form a contiguous region accounting for three-quarters of fed cattle sales, the five largest hog-finishing States form two distinct regions (the Western Corn Belt and the North Carolina-Virginia area), and together account for just over 60 percent of hogs marketed to slaughterhouses.

Hog production falls into several distinct phases: production of breeding stock, feeder pig production, and finishing. While hog producers usually maintain their own female breeding stock, most boars are supplied by specialized commercial breeders. In the next two stages, some producers specialize in either feeder pig production or finishing, with hogs transferred between the two stages in a commercial transaction. But most operations are farrow-to-finish.

Hog production at the latter two stages has undergone a dramatic and ongoing consolidation, represented by a shift toward larger production establishments and toward long-term contractual arrangements among the production stages and between production and slaughter. In 1978, 96 percent of all hog farms sold less than 1,000 head, and together accounted for just under two-thirds of all hog marketings. By 1997, 77 percent of all farms sold less than 1,000 head, but they accounted for only 5 percent of marketings (Lawrence, Grimes, and Hayenga, 1998). The very largest farms, those selling more than 50,000 head a year, handled 37 percent of all

hog marketings in 1997, up from 7 percent only a decade before. Of those producers, 18 sold at least 500,000 head in 1997, and those accounted for nearly one-quarter of all marketings. Very large hog producers are highly specialized, purchasing feed rather than growing it, and are frequently linked to slaughterhouses through contractual agreements or common ownership.

With hog production increasingly divorced from corn and soybean production, large operations could locate virtually anywhere in the country. Many of the very large hog farms have located outside of the traditional region of hog production—the Corn Belt States of Minnesota, Iowa, and Illinois—which includes about one-third of all U.S. hog farms and over 40 percent of hog marketings. But only 16 percent of the region's hog marketings come from farms selling at least 5,000 head—most marketings come from farms selling between 500 and 5,000 head per year. By contrast, in the newly emerging Southeastern hog production region (North and South Carolina and southern Virginia), nearly 80 percent of hog marketings come from farms that sell more than 5,000 head each. Similarly, very large producers underlie the expansion of the hog industry in Oklahoma and proposals for expansion in Utah and other nontraditional States. Large hog operations can bring odor and water problems, and may threaten small operations; as a result,

hog farm location has become a political and regulatory battleground in many States (Johnson, 1998; Drabenstott, 1998). Location of new hog production facilities may shift significantly in the near future, depending on how these issues are resolved.

Economies of size can account for much of the growth in hog farm size (McBride, 1995). Production costs per hog drop sharply as annual marketings increase to 1,000 head, and continue to decline, but more slowly, as size increases past that level. In turn, unit production costs decline largely because of improved feed efficiency and labor productivity on larger hog farms.

Economies of scale in hog and cattle slaughter emerged in the 1980's and 1990's. The largest slaughter plants in 1992 held significant cost advantages over smaller plants. Growth in slaughter plant size may be related to shifts in the size and location of hog producers and cattle feeders. Economies of scale in slaughter apply only if plant operators have access to an assured steady supply of cattle or hogs; large plants quickly lose any cost advantages if they cannot operate near full capacity. By locating among a network of large producers, and by forming long-term relationships with those producers, slaughter plants may reduce the risks associated with building and operating large plants.