

# Livestock and Meat Production in the United States: An Overview

Meat production includes raising livestock and poultry for slaughter, carried out by livestock producers and poultry growers, and manufacturing meat and various byproducts, carried out by packers and poultry integrators. Meat products are consumed directly, or are used as ingredients in products made by other manufacturers. In addition, poultry integrators and some packers are involved in the wholesale trade and use of meat products in the production of other foods. Various nonfood manufacturers utilize meat byproducts not fit for human food consumption as materials in the production of other types of goods, such as pet food, adhesives, fertilizer, leather goods, vitamins, and pharmaceuticals. Thus, byproducts of meat production enter into the economy in various ways, from the leather in shoes, furniture, and wallets to the glue in plywood.

Livestock and dairy production together account for one of the largest uses of the Nation's land area (figure 1). Livestock grazing land in 1997, which also includes grazing by animals not raised for meat exclusively (e.g., dairy livestock and horses), accounted for 41 percent of all the land within the contiguous 48 States.<sup>1</sup> In contrast, land used for crops accounted for 31 percent, and urban uses accounted for 6 percent (figure 2). Most of the land used for grazing was grassland pasture and range, though substantial amounts of forestland and cropland were used for grazing.

Among the livestock and poultry industries, beef cattle production is associated with the largest number of farm and ranch operators and hired workers—over 700,000 in 1997 (figure 3).<sup>2</sup> In the same year, there were 224,000 employees engaged in poultry processing and 143,000 employees in livestock slaughtering.<sup>3</sup>

The percentage of total calorie intake represented by a food is a widely accepted method of comparing the quantities of food consumed from different food groups. People have a general tendency to consume roughly the same number of calories over the same period of time (based on their size, metabolism, age, “calorie consciousness,” etc.), regardless of the types of food products they consume. Meat accounts for an average of 15 percent of total calories in the American diet (figure 4).

Meat production accounts for a significant portion of the economy. The manufacturing industries classified as “poultry products” and “animal slaughtering products, except poultry” produced shipments valued at \$32 billion and \$49 billion, respectively, in 1999. Manufacturing firms and other firms that are engaged in the business of marketing livestock, meat, or poultry in commerce are subject to the P&S Act. Firms subject to the P&S Act generated approximately \$125 billion worth of wholesale livestock, meat, and poultry products in FY 2001.<sup>4</sup>

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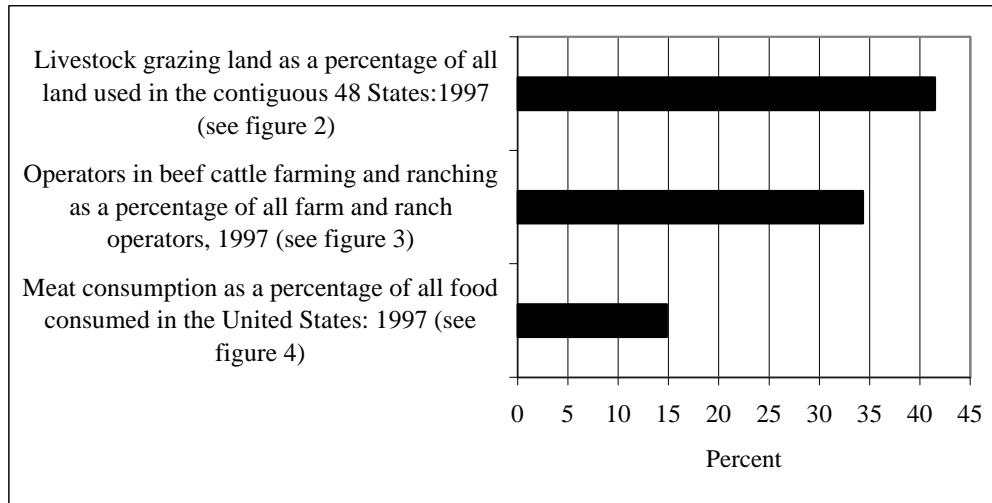
<sup>1</sup> Data for the year 1997 are the most current. Data on land use in all 50 States are not available.

<sup>2</sup> National Agricultural Statistics Service, *1997 Census of Agriculture*, March 1999.

<sup>3</sup> U.S. Department of Commerce, Bureau of the Census, *Bridge Between NAICS and SIC, 1997*, June 2000.

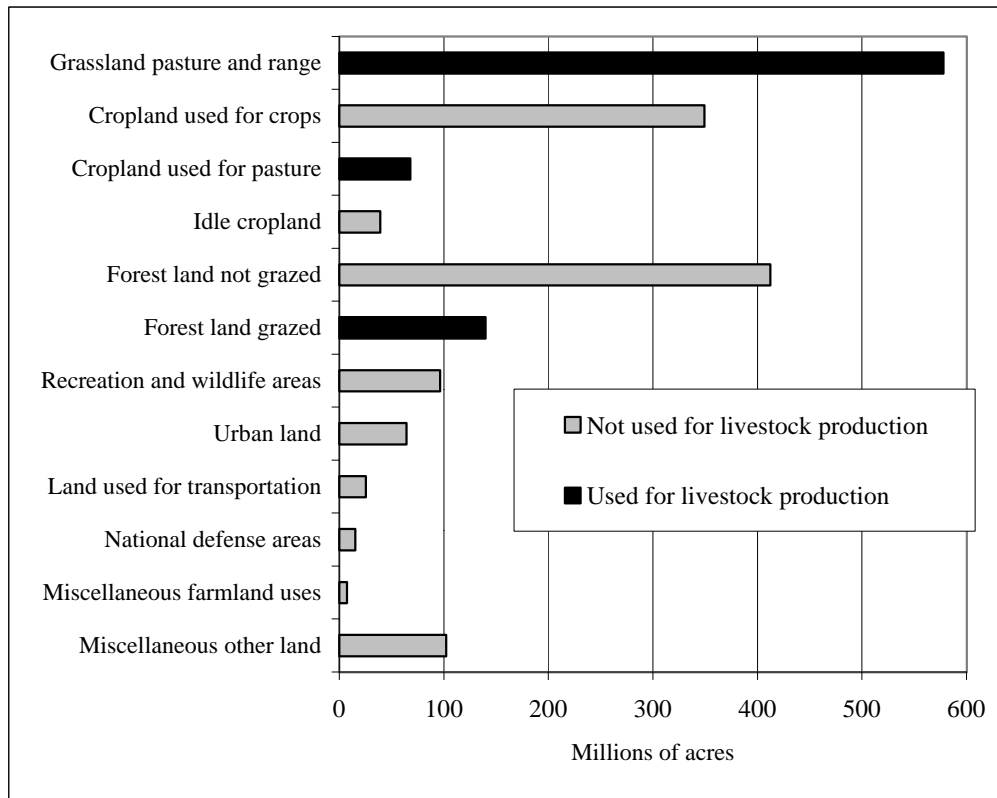
<sup>4</sup> Grain Inspection, Packers and Stockyards Administration, *2001 Annual Report of the Grain Inspection, Packers and Stockyards Administration*, GIPSA-USDA, December 2001.

Figure 1—Livestock and meat production and consumption shares in the United States



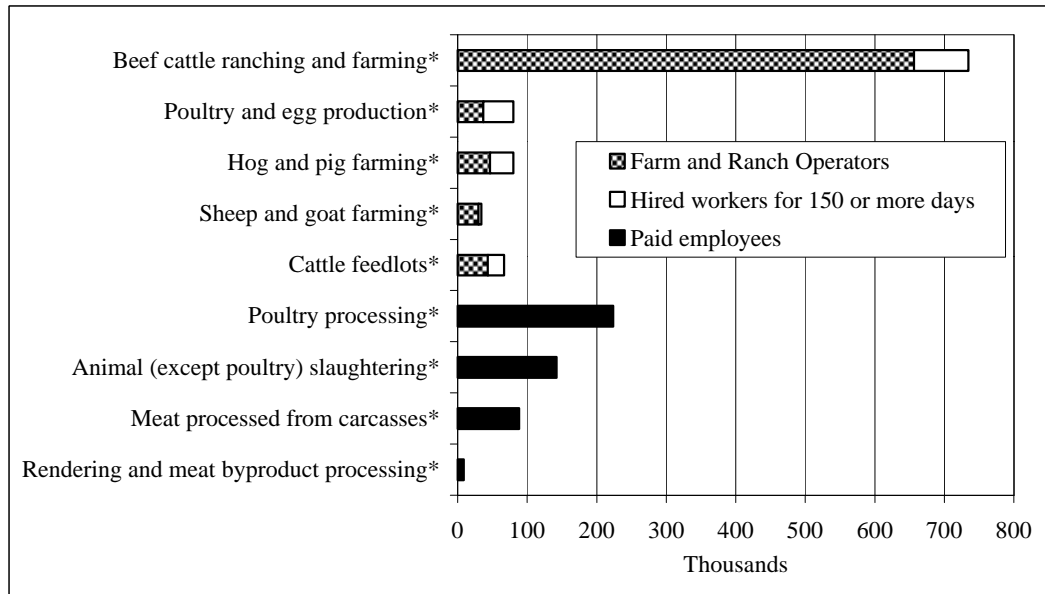
Sources: Land: Economic Research Service, USDA, *Agricultural Resources and Environmental Indicators, 2000*, Chapter 1.1, page 4. Farm Operators: National Agricultural Statistics Service, 1997 Census of Agriculture, March 1999. Food Consumption: Gerrior, S. and L. Bente. *Nutrient Content of the U.S. Food Supply, 1909-97*, Center for Nutrition Policy and Promotion, USDA, Home Economics Research, Report No. 54, 2001.

Figure 2.—Major uses of land in the contiguous United States, 1997



Source: Economic Research Service, USDA, *Agricultural Resources and Environmental Indicators, 2000*, Chapter 1.1, page 4.

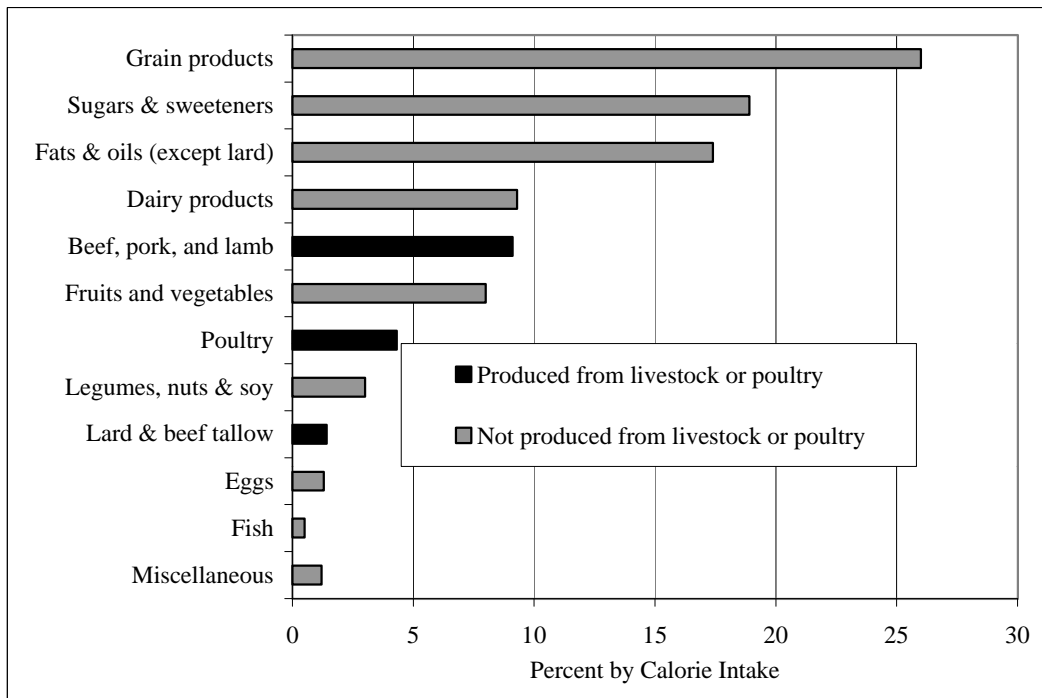
Figure 3.—Number of livestock and poultry farm operators and employees in meat processing, 1997



\* Categories are not mutually exclusive. For example, a farm that raises both cattle and sheep is included in both beef cattle farming and sheep farming. Categories are defined according to the North American Industrial Classification System (NAICS), where the following NAICS codes apply: Beef cattle ranching and farming (112111), poultry processing (311615), animal (except poultry) slaughtering (311611), poultry and egg production (1123), hog and pig farming (1122), cattle feedlots (112112), meat processed from carcasses (311612), sheep and goat farming (1124), and rendering & meat byproduct processing (311613).

Sources: Data on farm operators and hired workers are from National Agricultural Statistics Service, USDA, *1997 Census of Agriculture*, March 1999. Data on paid employees are from Bureau of the Census, U.S. Department of Commerce, *Bridge Between NAICS and SIC, 1997*, June 2000.

Figure 4.—Food consumption in the United States, 1997



Source: Gerrior, S. and Bente, L. 2001, *Nutrient Content of the U.S. Food Supply, 1909-97*, Center for Nutrition Policy and Promotion, USDA. Home Economics Research, Report No. 54.

As shown in figure 5, several other industries are dependent on livestock products and byproducts. The largest of these is pharmaceutical preparations, whose total value of sales in 1999 exceeded \$70 billion, although only a small fraction of this output is derived from livestock products.<sup>5</sup>

Total per capita U.S. consumption of meat and seafood doubled from 98 pounds in 1935 to 200 pounds in 2001 (table 1).<sup>6</sup> The increase reflects rising per capita incomes, changing consumer preferences, and changing relative prices of meat and other products. Technological changes in packaging and other preservation technologies and improved transportation, genetic and livestock production technologies have contributed to meat quality, while making meat more readily available at lower costs.

Studies have shown that American households increase their purchases of meat products in response to increases in income. For example, a recent study found that beef demand increases 0.90 percent for each 1-percent increase in total per capita income.<sup>7</sup> Expenditures for food accounted for 23.4 percent of a typical American family's budget in 1947, but only 10.2 percent in 2000.<sup>8</sup> This decline in the share of expenditures on food was due both to rising incomes and to declining prices of many food products.<sup>9</sup> Changes in consumer preferences over time have been reflected in an increased focus on health and safety issues, the development and marketing of new types of food products, and the growth of away-from-home eating.

Retail prices reflect the total cost of producing, processing, distributing, and marketing meat and poultry products from farmer to consumer. Technological changes, changes in product characteristics, and changes in the organization and structure of the various segments of the livestock and poultry industries have resulted in major changes in the relative costs of producing beef, pork, lamb, and poultry.

After adjusting for inflation, the cost of beef and pork was about the same in 2000 as it was in 1935. In contrast, poultry has become much less expensive. After adjusting for inflation, the cost of poultry in 2000 was about one-third what it had been in 1935.<sup>10</sup> Comparable data are not available for lamb.

Figure 7 shows sharp differences in historical trends in per capita consumption among beef, pork, poultry, lamb and seafood since 1935. Beef and pork were the principal meats in the American diet through most of the 20<sup>th</sup> century. Annual per capita consumption of each meat averaged about 40 pounds until around 1950 (table 1 and figure 7). Per capita

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<sup>5</sup> U.S. Department of Commerce, *Annual Survey of Manufactures Value of Product Shipments: 1999*, March 2001. Data are not available on the proportions of output of other industries that are derived from livestock products.

<sup>6</sup> The per capita consumption measures presented in this paragraph are based on a boneless, trimmed equivalent definition.

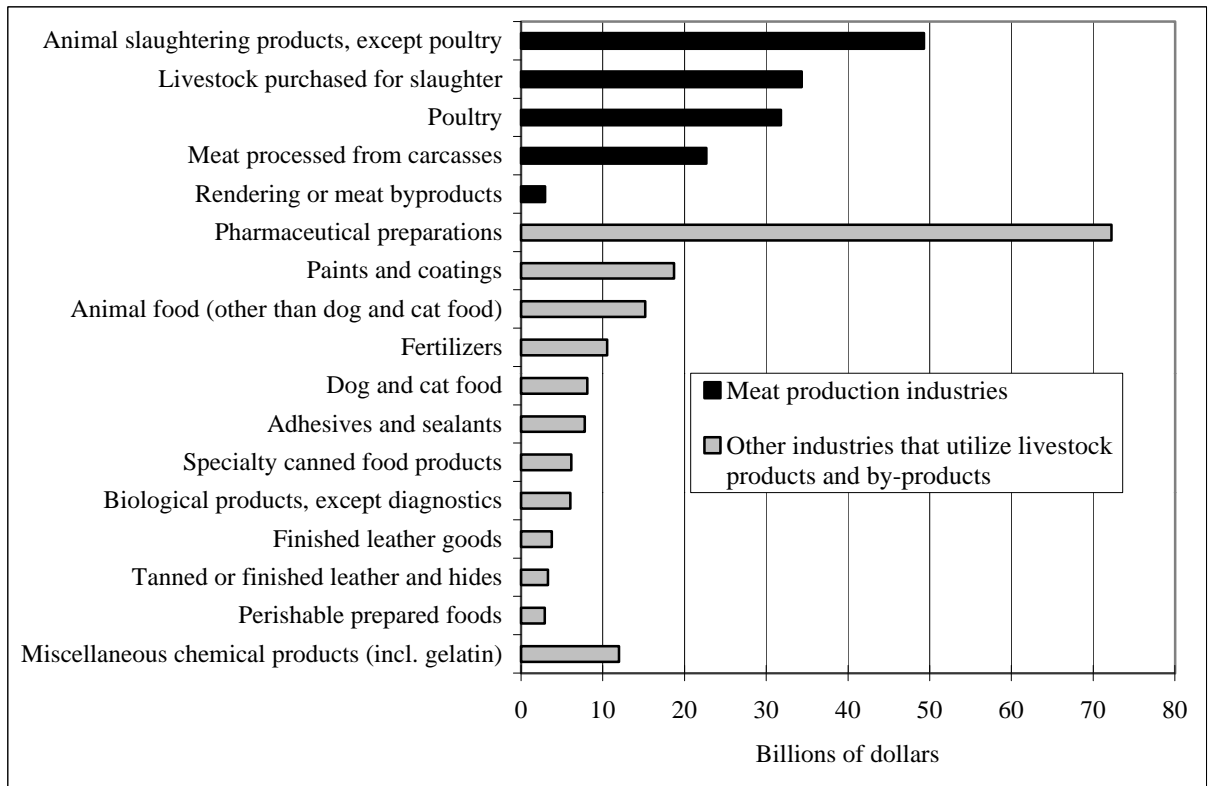
<sup>7</sup> Schroeder, Ted C., et al., "Beef Demand Determinants," Department of Agricultural Economics, Kansas State University, January 2000. <http://www.agecon.ksu.edu/livestock/Extension%20Bulletins/BeefDemandDeterminants.pdf>.

<sup>8</sup> Economic Research Service, "Food CPI, Prices, and Expenditures: Expenditures as a Share of Disposable Income," online data available at <http://www.ers.usda.gov/briefing/CPIFoodAndExpenditures/data/table7.htm>.

<sup>9</sup> Schroeder, Ted C., et al., "Beef Demand Determinants," Department of Agricultural Economics, Kansas State University, January 2000, p. 33. <http://www.agecon.ksu.edu/livestock/Extension%20Bulletins/BeefDemandDeterminants.pdf>.

<sup>10</sup> Based on price data, and consumer price index data, from U.S. Department of Commerce, Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1970, Bicentennial Edition, Part I*, 1975; and data provided by the Economic Research Service, USDA, January, 2002.

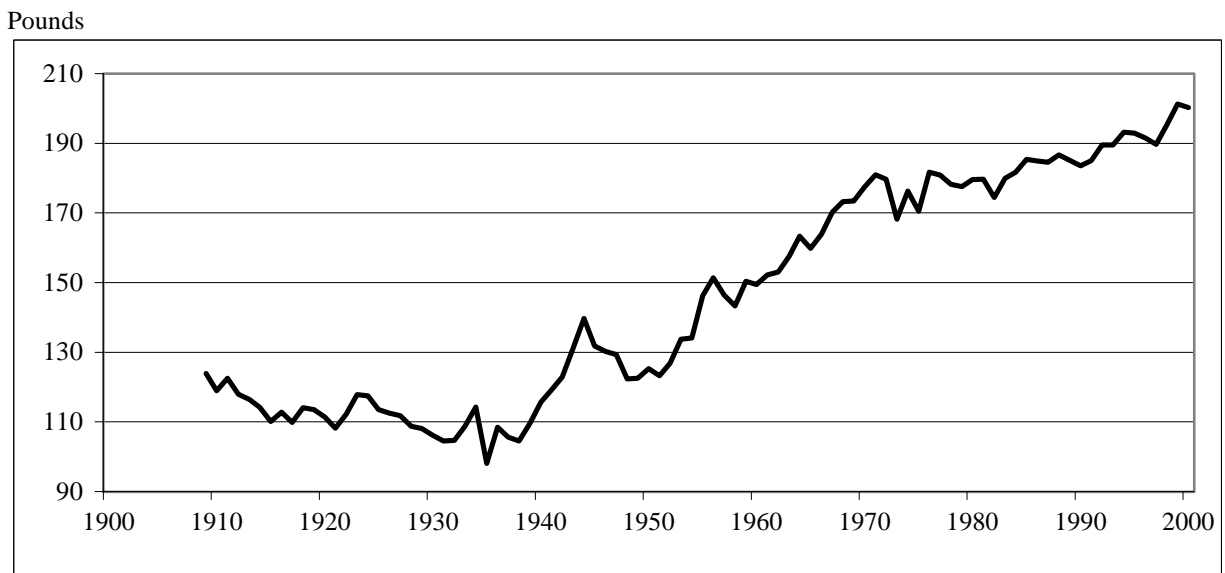
Figure 5.—Value of shipments of meat production and associated industries: 1999



Each industry corresponds to a specific NAICS category, except for livestock purchased for slaughter (defined by GIPSA) and finished leather goods (defined as the sum of NAICS categories for leather clothing, footwear, belts, gloves, handbags, and other leather goods). The values of shipments by category are not mutually exclusive because some of the industries listed provide materials to some of the other industries listed.

Sources: Data for "Livestock purchased for slaughter" are from Packers and Stockyards Programs, *Packers and Stockyards Statistical Report, 1999 Reporting Year*, GIPS SR-02-1, GIPSA-USDA, January 2002. All other data are from U.S. Department of Commerce, *Annual Survey of Manufactures Value of Product Shipments: 1999*, March 2001.

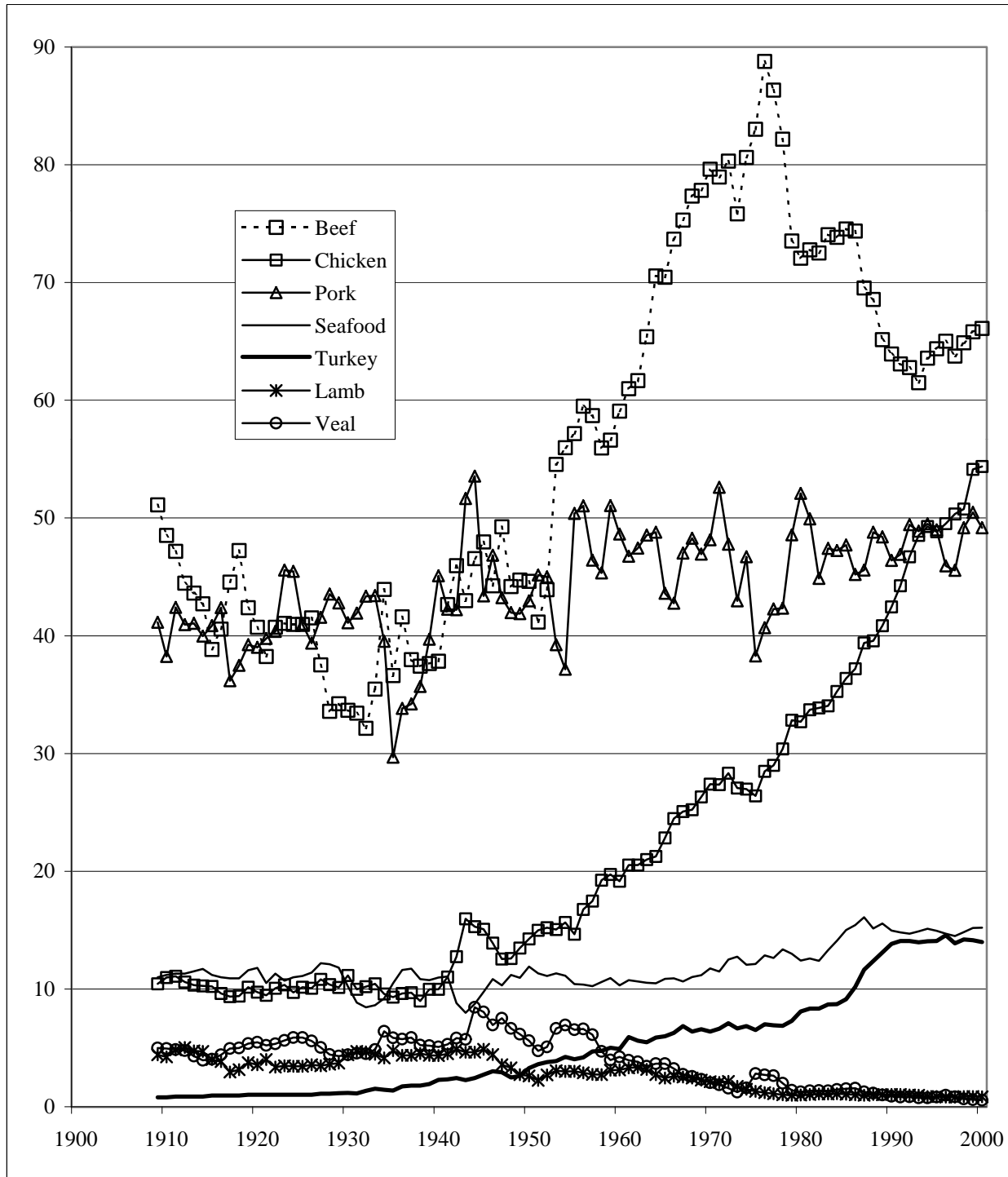
Figure 6.—Per capita consumption of meat and seafood in the United States, 1909-2000



Source: Economic Research Service, USDA, *Per Capita Food Consumption Data System*, January 2002.

Figure 7.—Per capita consumption of meat and seafood in the United States by commodity, 1909-2000

Pounds



Source: Economic Research Service, USDA, *Per Capita Food Consumption Data System*, January 2002.

Table 1.—Per capita consumption of meat and seafood in the United States, by commodity: 1909-2000

Year	Pounds (boneless, trimmed equivalent)										Total						
	Beef	Veal	Pork	Lamb	Chicken	Turkey	Seafood	Total	Year	Beef		Veal	Pork	Lamb	Chicken	Turkey	Seafood
1909	51.1	5.0	41.2	4.4	10.4	0.8	11.0	123.9	1955	57.2	6.5	50.4	3.0	14.7	4.0	10.4	146.2
1910	48.5	4.9	38.2	4.2	11.0	0.8	11.2	118.9	1956	59.5	6.6	51.0	2.9	16.8	4.2	10.4	151.3
1911	47.2	4.9	42.4	4.8	11.1	0.9	11.3	122.5	1957	58.7	6.1	46.4	2.7	17.5	4.7	10.2	146.4
1912	44.5	4.8	40.9	5.0	10.6	0.9	11.3	118.0	1958	55.9	4.7	45.3	2.7	19.2	4.7	10.6	143.3
1913	43.6	4.3	41.1	4.7	10.3	0.9	11.5	116.4	1959	56.6	4.0	51.0	3.1	19.7	5.0	10.9	150.4
1914	42.7	4.0	40.0	4.7	10.3	0.9	11.7	114.2	1960	59.1	4.2	48.6	3.1	19.1	4.9	10.3	149.4
1915	38.8	4.0	40.9	4.0	10.2	0.9	11.2	110.1	1961	61.0	4.0	46.8	3.3	20.5	5.9	10.7	152.2
1916	40.6	4.4	42.4	3.8	9.6	0.9	11.0	112.8	1962	61.7	3.8	47.4	3.4	20.5	5.6	10.6	153.1
1917	44.6	4.9	36.2	2.9	9.4	0.9	10.9	109.8	1963	65.4	3.4	48.5	3.2	21.0	5.5	10.5	157.5
1918	47.2	5.0	37.5	3.1	9.4	0.9	10.9	114.1	1964	70.6	3.7	48.8	2.7	21.3	5.9	10.5	163.4
1919	42.4	5.4	39.2	3.7	10.1	1.0	11.6	113.5	1965	70.4	3.7	43.6	2.4	22.8	6.0	10.9	159.8
1920	40.7	5.5	39.0	3.6	9.7	1.0	11.8	111.4	1966	73.7	3.2	42.8	2.6	24.5	6.3	10.9	163.9
1921	38.2	5.2	39.8	4.0	9.5	1.0	10.5	108.2	1967	75.3	2.8	47.0	2.5	25.1	6.8	10.6	170.2
1922	40.7	5.3	40.4	3.4	10.1	1.0	11.3	112.2	1968	77.3	2.6	48.3	2.4	25.2	6.4	11.0	173.2
1923	41.1	5.6	45.6	3.5	10.4	1.0	10.7	117.8	1969	77.8	2.3	46.9	2.3	26.3	6.6	11.2	173.4
1924	41.0	5.9	45.5	3.4	9.7	1.0	11.0	117.5	1970	79.6	2.0	48.1	2.1	27.4	6.4	11.7	177.5
1925	41.0	5.9	41.0	3.4	10.1	1.0	11.1	113.6	1971	79.0	1.9	52.6	2.1	27.4	6.6	11.5	181.0
1926	41.5	5.6	39.4	3.6	10.1	1.0	11.4	112.5	1972	80.3	1.6	47.8	2.2	28.3	7.1	12.5	179.7
1927	37.5	5.0	41.6	3.5	10.8	1.1	12.2	111.7	1973	75.8	1.2	43.0	1.7	27.1	6.6	12.7	168.2
1928	33.6	4.4	43.5	3.6	10.4	1.1	12.1	108.7	1974	80.6	1.6	46.7	1.5	27.0	6.8	12.1	176.3
1929	34.2	4.3	42.8	3.7	10.1	1.1	11.8	108.1	1975	83.0	2.8	38.3	1.3	26.4	6.5	12.1	170.5
1930	33.7	4.4	41.1	4.4	11.1	1.2	10.2	106.1	1976	88.8	2.7	40.7	1.2	28.5	7.0	12.9	181.7
1931	33.4	4.5	41.9	4.7	10.0	1.1	8.8	104.5	1977	86.3	2.6	42.3	1.1	29.0	6.9	12.6	180.9
1932	32.1	4.5	43.4	4.6	10.2	1.4	8.4	104.7	1978	82.2	2.0	42.3	1.0	30.4	6.9	13.4	178.2
1933	35.5	4.9	43.4	4.4	10.4	1.5	8.6	108.8	1979	73.5	1.4	48.6	1.0	32.8	7.3	13.0	177.6
1934	43.9	6.4	39.5	4.2	9.6	1.4	9.2	114.2	1980	72.1	1.3	52.1	1.0	32.7	8.1	12.4	179.6
1935	36.6	5.8	29.7	4.8	9.3	1.4	10.5	98.1	1981	72.8	1.3	49.9	1.0	33.7	8.3	12.6	179.7
1936	41.6	5.7	33.8	4.4	9.6	1.7	11.6	108.5	1982	72.5	1.4	44.9	1.1	33.9	8.3	12.4	174.4
1937	38.0	5.9	34.2	4.4	9.7	1.8	11.7	105.7	1983	74.1	1.4	47.4	1.1	34.0	8.7	13.3	180.0
1938	37.4	5.2	35.7	4.5	9.0	1.8	10.8	104.5	1984	73.8	1.5	47.2	1.1	35.3	8.7	14.1	181.7
1939	37.6	5.2	39.7	4.4	10.0	1.9	10.8	109.6	1985	74.6	1.5	47.7	1.1	36.4	9.1	15.0	185.4
1940	37.8	5.1	45.1	4.3	10.0	2.3	11.0	115.6	1986	74.4	1.6	45.2	1.0	37.2	10.2	15.4	184.9
1941	42.6	5.3	42.3	4.5	11.0	2.3	11.1	119.1	1987	69.5	1.3	45.6	1.0	39.4	11.6	16.1	184.5
1942	45.9	5.8	42.2	4.9	12.7	2.4	8.8	122.9	1988	68.6	1.1	48.8	1.0	39.6	12.4	15.1	186.6
1943	43.0	5.7	51.7	4.6	16.0	2.3	8.0	131.2	1989	65.1	1.0	48.4	1.0	40.9	13.1	15.6	185.1
1944	46.6	8.4	53.6	4.6	15.3	2.4	8.7	139.7	1990	63.9	0.9	46.4	1.0	42.4	13.8	15.0	183.5
1945	48.0	8.1	43.4	4.9	15.1	2.7	9.8	131.8	1991	63.1	0.8	46.9	1.0	44.2	14.1	14.8	185.0
1946	44.2	6.9	46.8	4.4	13.9	3.0	10.8	130.2	1992	62.8	0.8	49.4	1.0	46.7	14.1	14.7	189.5
1947	49.2	7.5	43.2	3.6	12.5	2.9	10.3	129.3	1993	61.5	0.8	48.9	1.0	48.5	14.0	14.9	189.5
1948	44.2	6.7	42.0	3.3	12.6	2.5	11.2	122.4	1994	63.6	0.8	49.5	0.9	49.3	14.1	15.1	193.2
1949	44.7	6.2	41.9	2.7	13.5	2.6	10.9	122.5	1995	64.4	0.8	49.0	0.9	48.8	14.1	14.9	192.9
1950	44.6	5.6	43.0	2.6	14.3	3.3	11.9	125.2	1996	65.0	1.0	45.9	0.8	49.5	14.6	14.7	191.6
1951	41.2	4.7	45.2	2.2	15.0	3.6	11.3	123.2	1997	63.8	0.9	45.5	0.8	50.3	13.9	14.5	189.7
1952	43.9	5.1	45.0	2.7	15.2	3.8	11.1	126.8	1998	64.9	0.7	49.2	0.9	50.8	14.2	14.8	195.4
1953	54.5	6.6	39.2	3.1	15.1	3.9	11.3	133.7	1999	65.8	0.6	50.5	0.9	54.1	14.2	15.2	201.2
1954	56.0	6.9	37.2	3.0	15.6	4.2	11.1	134.1	2000	66.1	0.6	49.2	0.8	54.4	14.0	15.2	200.2

Source: Economic Research Service, USDA, *Per Capita Food Consumption Data System*, January 2002.

beef consumption then began a rapid rise, reaching 89 pounds in 1976. It subsequently declined to 62 pounds by 1993, and then increased to 66 pounds in 2000.

Annual per capita pork consumption fluctuated widely from year to year but averaged about 40 pounds between 1910 and 1945. It rose after World War II and has averaged about 48 pounds since 1950. Year-to-year fluctuations in pork consumption have continued but the fluctuations have become smaller since the early 1980s.

Annual per capita chicken consumption averaged about 10 pounds between 1910 and 1940. It increased during World War II and, in 1950, began a steady rise from about 15 to 55 pounds in 2000. Chicken replaced pork as the second-most-consumed meat during the mid-1990s and approached per capita consumption of beef by the end of the century.

Annual per capita turkey consumption averaged 1-2 pounds between 1910 and the early 1930s, and slowly rose to about 9 pounds in the mid 1980s. It increased to about 14 pounds by 1992 and has remained at that level since then.

Annual per capita lamb consumption averaged about 4 pounds between 1910 and the end of World War II in 1945. Per capita consumption declined to about 3 pounds by 1950, and continued to decline slowly to about 1 pound in 1980 and 0.8 pounds in 2000.

Annual per capita seafood consumption averaged about 11 pounds between 1910 and 1970. Consumption increased to about 15 pounds per year in 1988, and since then has remained at roughly the same level.

Per capita consumption of meat and seafood products in 2000 consisted of 66.1 pounds of beef, 54.4 pounds of chicken, 49.2 pounds of pork, 15.2 pounds of seafood, 14.0 pounds of turkey, 0.8 pounds of lamb, and 0.6 pounds of veal.

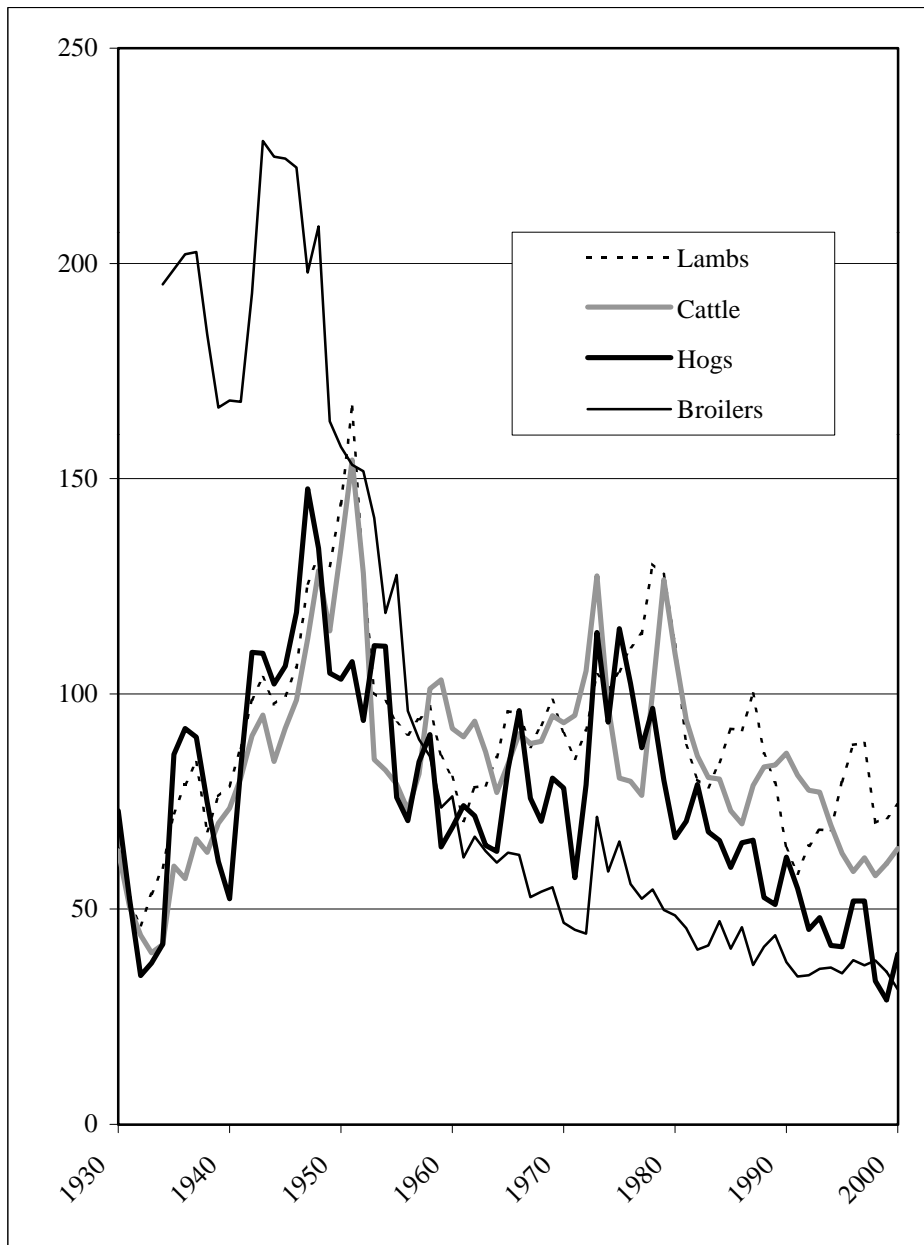
In the United States economic development has been accompanied by the substitution of meat for cereals. Rising per capita incomes played an important role in increased meat consumption in the United States during the 20<sup>th</sup> century. Future gains in per capita income in the United States are not expected to increase per capita meat consumption at the rates observed during the past century. However, rising average per capita income is expected to increase demand for meats with value-added characteristics such as pre-cooked products, entrees in microwavable packaging, and marinated meat cuts for grilling. Future changes in costs of production, which are reflected in the relative prices of meat and livestock (figure 8), could alter the relative proportions of beef, pork, poultry, lamb, and seafood consumed.

Given the role of income in the demand for meat, U.S. exports of meat products are affected by global economic development. Figure 9 shows U.S. international trade in red meat, poultry, and seafood from 1989 to 2000. Both exports and imports of red meat grew over this period. U. S. exports have exceeded imports since 1995. Exports represent a very small fraction of U.S. meat production, but are an important outlet for sales of meat cuts and products that are less demanded by U.S. consumers.



Figure 8.—Long-run trends in the prices of broilers, lamb, cattle, and hogs purchased for slaughter, 1930-2000

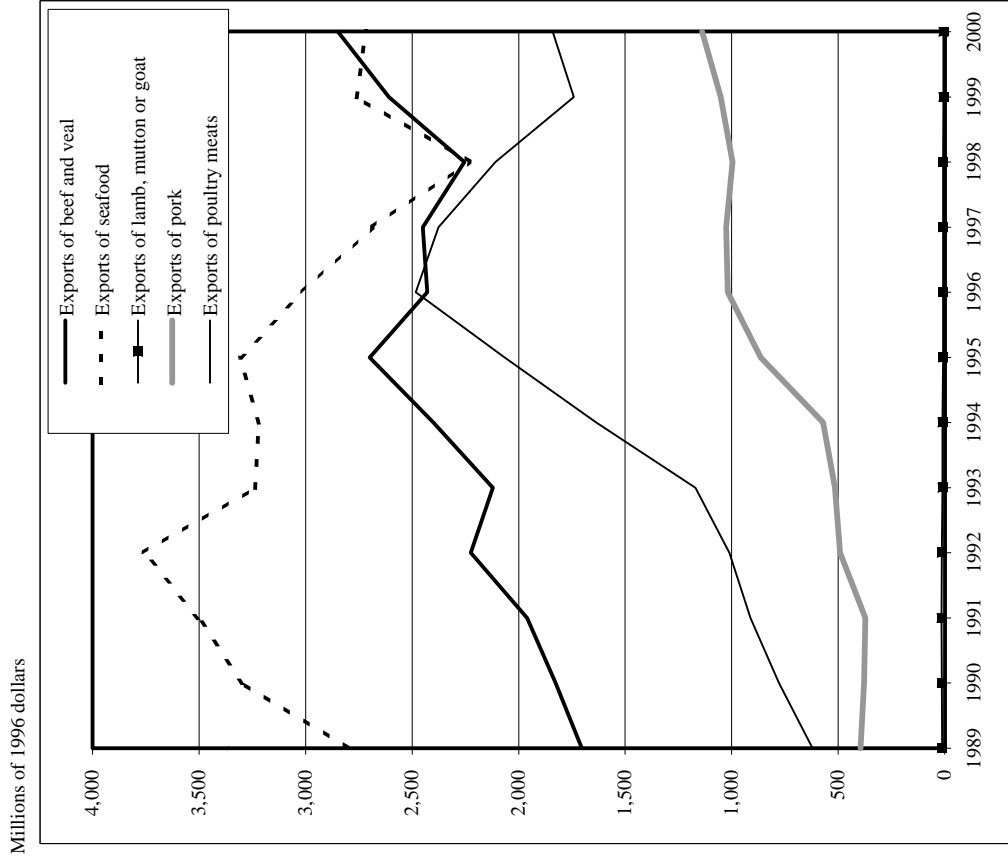
Constant 1996 dollars per 100 lbs. liveweight (or liveweight equivalent)



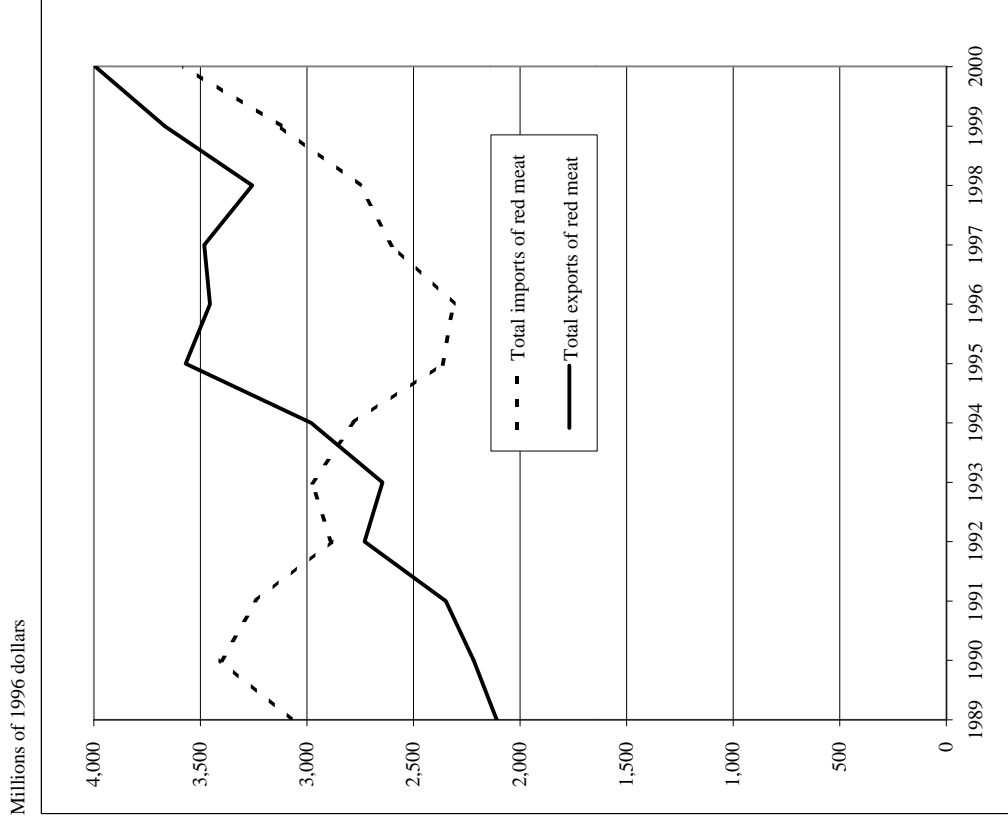
USDA, January 22, 2002; Broiler prices are from National Agricultural Statistics Service, USDA, *Poultry: Production and Value, Annual Summary*, 2002. Prices are deflated by Gross Domestic Product chain type price index, from the Bureau of Economic Analysis, U.S. Department of Commerce, *Survey of Current Business*, August 2001.

Figure 9.—International trade in red meat and competing commodities

U.S. exports of red meat, poultry, and seafood, 1989-2000



U.S. exports and imports of red meat, 1989-2000



Sources: Exports and imports in current dollars are from: Economic Research Service, USDA, *Foreign Agricultural Trade of the United States (fatts) database*, January 2002. Constant dollars were based on the Gross Domestic Product chain type price index, in Bureau of Economic Analysis, U.S. Department of Commerce, *Survey of Current Business*, August 2001, p. 133.

# General Economic State of the Cattle Industry

Drought conditions have been forcing cattle into feedlots, and herd expansion may be delayed for another year. Beef production in 2002 is expected to be nearly unchanged from 2001. Although cattle feeders have reportedly experienced large losses in early 2002, prices are expected to increase through the year. However, projected price increases for the year are below earlier expectations.

## Supply Factors

Cattle production and prices historically have followed a cyclical pattern, known as the “cattle cycle,” that is affected by the reproductive cycle of cattle (nearly 3 years from conception to maturity of an animal). A typical cattle cycle is 10–12 years long, consisting of approximately 6 years of growth in the number of cattle as the size of breeding herds increases (expansion), followed by 1–2 years of relatively constant inventories (consolidation), then typically 3–4 years of declining cattle inventories as breeding herds are reduced in response to relatively low cattle prices (liquidation). As producers retain heifers for breeding during expansion, the number of fed cattle available for slaughter typically declines, putting upward pressure on fed cattle prices. The opposite price effect occurs during liquidation, when producers send a larger proportion of heifers and cows to slaughter.<sup>1</sup>

The beef industry has been experiencing a liquidation of the cattle inventory since 1996, and the trend is expected to continue over the next couple of years.<sup>2</sup> A severe winter in 2000-2001 and widespread drought led producers to reduce the number of cows in breeding herds in 2001, and place heifers in feedlots rather than retain them for breeding. Weather conditions early in the year adversely affected cattle weight gains and resulted in reduced beef production and increases in fed cattle and beef prices.<sup>3</sup> Production increased in the second half of the year and prices declined sharply, but production for the year as a whole was about 3 percent less than in 2000, and prices averaged about 4 percent higher. Forage conditions and feed grain crop development in early 2002 will largely determine whether beef cow producers begin to retain heifers and enter the expansion phase of the cattle cycle.<sup>4</sup> USDA’s Economic Research Service (ERS) reports that drought conditions may delay herd expansion for at least another year.<sup>5</sup>

In early 2001, a major outbreak of foot-and-mouth disease (FMD), a highly contagious and economically devastating disease of cattle, hogs, and other livestock, infected livestock herds in Great Britain and, to a lesser extent, France, Holland, Germany, and Italy. FMD can spread widely and rapidly with grave economic consequences. There was concern that the disease might spread to the United States. Measures to prevent the spread of the disease to the United States by prohibiting the importation of livestock and

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<sup>1</sup> Mathews, Kenneth H. et al., *U.S. Beef Industry: Cattle Cycles, Price Spreads, and Packer Concentration*, Technical Bulletin No. 1874, ERS-USDA, April 1999.

<sup>2</sup> Economic Research Service, *Livestock, Dairy and Poultry Outlook*, LDP-M-95, ERS-USDA, May 15, 2002.

<sup>3</sup> Economic Research Service, *Livestock, Dairy and Poultry Outlook*, LDP-M-92, ERS-USDA, February 13, 2002.

<sup>4</sup> Economic Research Service, *Livestock, Dairy and Poultry Outlook*, LDP-M-92, ERS-USDA, February 13, 2002.

<sup>5</sup> Economic Research Service, *Livestock, Dairy and Poultry Outlook*, LDP-M-94, ERS-USDA, April 15, 2002.

certain livestock products from high-risk countries were successful throughout 2001, as FMD did not spread to the United States.<sup>6</sup> FMD has not affected cattle supplies in the United States.

## Demand Factors

There is some uncertainty about the trend in the demand for beef. Evidence indicates both positive and negative changes in demand. Some analysts suggest that decreased cattle prices late in 2001 reflected a decline in the demand for beef. They also point out that the terrorist attacks of September 11, 2001, contributed to a reduction in demand.<sup>7</sup> The Livestock Marketing Information Center (LMIC)<sup>8</sup> notes that available data suggest that retail demand for beef for at-home consumption has held up well, although demand for beef in the away-from-home market (hotels, restaurants, and institutions—HRI) appears to have weakened during 2001.<sup>9</sup> ERS reported that a relatively weak U.S. economy dampened domestic demand for beef in 2001, especially higher quality cuts, and predicts this effect will continue into 2002.<sup>10</sup>

## Trade

According to WAOB, U.S. beef exports were 2.3 billion pounds in 2001, a decline of about 8 percent from their level of 2.5 billion pounds in 2000. WAOB projects that exports will remain about the same in 2002 as in 2001.<sup>11</sup>

Exports declined generally due to high U.S. prices, slowing economies worldwide, and concerns about bovine spongiform encephalopathy (BSE) in Asia. Korea and Japan are two of the largest importers of U.S. beef. U.S. exports to Korea during February through August 2001 were the lowest since the Asian financial crisis in 1997 due to a buildup of stocks in 2000 as a result of a slowing Korean economy and concerns about BSE. Exports to Korea increased sharply in late 2001, and exports to Korea are expected to be higher in 2002 than in 2001.<sup>12</sup>

Exports to Japan, the largest importer of U.S. beef, declined 10 percent in 2001 on a carcass weight basis compared to 2000.<sup>13</sup> Concerns about BSE and a weak economy are expected to lower U.S. beef exports to Japan over the next year. U.S. beef price increases in response to tightening U.S. beef supplies also will have a negative effect on exports to

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<sup>6</sup> Testimony of Secretary of Agriculture Ann M. Veneman before the Senate Committee on Agriculture, Nutrition, and Forestry, September 26, 2001; also Animal and Plant Health Inspection Service, USDA, "USDA Safeguarding Measures Against Foot-and-Mouth Disease," News Release, July 2001.

<sup>7</sup> Sparks Companies Inc., *Cattle and Beef Update*, CB01-17, October 19, 2001; Kay, Steve, "Cash Cattle Prices Fall to \$60," *Cattle Buyers Weekly*, November 19, 2001.

<sup>8</sup> The LMIC is a cooperative effort between State university extension specialists, USDA economists, industry organizations, and Center staff. Five USDA agencies, including the Grain Inspection, Packers and Stockyards Administration, participate in the LMIC.

<sup>9</sup> Livestock Marketing Information Center, "Cattle Situation and Outlook," Letter #50, December 21, 2001.

<sup>10</sup> Clauson, Annette L., "The Outlook for Food Prices in 2002," presentation at Agricultural Outlook Forum 2002, ERS-USDA, February 21, 2002.

<sup>11</sup> World Agricultural Outlook Board, *World Agricultural Supply and Demand Estimates*, WASDE-386, WAOB-USDA, May 10, 2002.

<sup>12</sup> Gustafson, Ron, "The Outlook for Livestock and Poultry," presentation at Agricultural Outlook Forum 2000, ERS-USDA, February 22, 2002.

<sup>13</sup> Economic Research Service, *Livestock, Dairy and Poultry Outlook*, LDP-M-92, ERS-USDA, February 13, 2002.

Japan. Concerns about BSE also are expected to result in a shift of Japanese consumers' preferences, increasing demand for pork relative to beef.<sup>14</sup>

Beef imports increased 4 percent in 2001, to a record 3.2 billion pounds, primarily due to demand for processing beef exceeding domestic supply as cow slaughter declined. Further decreases in cow slaughter in 2002 will likely encourage additional increases in imports. WAOB predicts imports will increase 2 percent in 2002.<sup>15</sup> Strong U.S. feeder cattle demand and drought conditions in Canada and Mexico resulted in an 11- percent increase in cattle imports in 2001. Live cattle imports are expected to increase slightly in 2002.<sup>16</sup>

## Outlook for Cattle Producers

Drought and high hay prices had an adverse impact on many U.S. cow-calf and stocker operations in 2001, although strong feeder calf prices resulted in profitability for most cow-calf operations.<sup>17</sup> Cattle feeders did not fare as well as feeder cattle producers in 2001, in spite of fed cattle price increases in the early part of the year. Prices declined sharply in the second half of 2001.<sup>18</sup> The price for choice steers averaged \$65 per cwt (per 100 pounds) in the fourth quarter of 2001, versus \$79 per cwt in the first quarter of 2001.<sup>19</sup> Cattle feeders were estimated to have posted losses of approximately \$40 per head in July and over \$85 per head in September.<sup>20</sup>

Drought has continued to force cattle into feedlots so far in 2002, resulting in projected increases in production in the second and third quarters of the year relative to the same period in 2001.<sup>21</sup> Cattle feeders reported large losses in early 2002 as price declined in response to larger than expected supplies of all types of meat.<sup>22</sup> A Russian ban on imports of poultry from the United States contributed to the large supplies of meat and resulting low prices.<sup>23</sup>

The Russian ban on poultry imports was scheduled to be lifted in mid-April, but as of this writing shipments have not yet approached earlier levels<sup>24</sup>. WAOB projects that fed cattle prices will fall in the second and third quarters of 2002 before rising to \$70 to \$76 in the fourth quarter, and will average \$67 to \$70 per cwt for the entire year versus the 2001 average of \$73 per cwt.<sup>25</sup> Feeder cattle prices overall will average between \$84 and

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<sup>14</sup> Gustafson, Ron, "The Outlook for Livestock and Poultry," presentation at Agricultural Outlook Forum 2000, ERS-USDA, February 22, 2002.

<sup>15</sup> World Agricultural Outlook Board, *World Agricultural Supply and Demand Estimates*, WASDE-386, WAOB-USDA, May 10, 2002.

<sup>16</sup> Economic Research Service, *Livestock, Dairy and Poultry Outlook*, LDP-M-93, ERS-USDA, March 13, 2002.

<sup>17</sup> Livestock Marketing Information Center, *Analysis and Comments*, Letter #40, October 12, 2001.

<sup>18</sup> ERS uses the price of Choice steers in Nebraska as an index or representative measure of fed cattle prices, and Oklahoma City prices for feeder cattle.

<sup>19</sup> Economic Research Service, *Livestock, Dairy and Poultry Situation*, LDP-M-93, ERS-USDA, March 13, 2002.

<sup>20</sup> Livestock Marketing Information Center, *Analysis and Comments*, Letter #40, October 12, 2001.

<sup>21</sup> Economic Research Service, *Livestock, Dairy and Poultry Outlook*, LDP-M-94, ERS-USDA, April 15, 2002.

<sup>22</sup> Kay, Steve, "Market Hopes For Spring Demand Burst," *Cattle Buyers Weekly*, April 15, 2002.

<sup>23</sup> Statement by USDA Chief Economist Keith Collins, as reported in "USDA Economist Expects US Livestock Prices to Recover," Reuters, April 15, 2002.

<sup>24</sup> Economic Research Service, *Livestock, Dairy and Poultry Outlook*, LDP-M-95, ERS-USDA, May 15, 2002.

<sup>25</sup> World Agricultural Outlook Board, *World Agricultural Supply and Demand Estimates*, WASDE-386, WAOB-USDA, May 10, 2002.

\$87 per cwt in 2002 compared to the 2001 average of \$88. WAOB projects that fourth-quarter beef production will decline relative to 2001, and total beef production for the entire year will be about the same as in 2001.

### **Outlook for Beef Packers**

The outlook for beef packers in 2002 is uncertain, due in part to uncertainties about export potential, including the unknown duration and effects on supply of competing meats associated with the recent Russian ban on poultry products. Sparks Companies, Inc., a private market research and analysis firm, reports that packers have realized sizeable margins recently.<sup>26</sup> However, projected increases in production in the second and third quarters of 2002 may put pressure on beef packer margins, given expected abundant supplies of competing meats. Sparks Companies projects that the wholesale boxed beef values will decline in coming months, before returning to current levels in the last quarter of the year.<sup>27</sup>

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<sup>26</sup> Sparks Companies, Inc., "Cattle and Beef Comments," *Morning Comments*, April 24, 2002.

<sup>27</sup> Sparks Companies, Inc., "Cash Market Price History," *Livestock Desk Reference*, April 23, 2002.

# **Changing Business Practices in the Cattle Industry**

## **Structure of Cattle Feeding and Beef Packing**

Beef produced in the United States comes from two main sources—fed cattle and cull cattle. Fed cattle are steers and heifers that are fattened to slaughter weight in feedlots (fed beef) and used to produce whole-muscle cuts like steaks and roasts. Cull cattle are primarily mature beef cows, dairy cows, and bulls. Beef produced from cull cattle is primarily ground and sold as chopped meat; sold as lower-cost cuts to the hotel, restaurant, and institutional (HRI) trade; or used in processed meats like franks. Beef produced from fed cattle, called fed beef, usually is cut into primals or subprimals, vacuum packed, and shipped in boxes (boxed beef) to grocery retailers, the HRI trade, and others, either directly by packers and processors, or through wholesalers. Retailers generally cut the boxed beef into retail cuts. Some fed beef is shipped from packers in case-ready form, i.e., already cut and packaged into retail cuts at the packing plant for direct placement on the retail shelf.

Beef packing plants usually specialize either in steer and heifer slaughter or in cow and bull slaughter. Steer and heifer slaughter is concentrated in the High Plains near large commercial feedlots. Several plants are located near the Great Lakes and in the West. Cow and bull slaughtering plants generally are smaller and are not concentrated in particular geographical areas, although many are located in dairy producing areas.

Feedlots (also called “feedyards”) fatten (or “finish”) cattle owned by others as a service to those owners (“custom feeding”), or they buy feeder cattle that they finish and sell to packers for slaughter. Feedlots that custom-feed cattle are referred to as “custom feedlots.” Custom-fed cattle generally are owned by ranchers who produced them from calves, by investors who purchase feeder cattle to fatten, or by packers. Custom feedlots charge the owners of the cattle for the feeding services the feedlot provides, and many custom feedlots also offer financing, risk management, and marketing services to their customers. Most custom feedlots own at least some of the cattle they feed.

## **Concentration and Integration**

Prior to 1970 cattle feeding tended to occur in small-scale farmer-feeder operations with capacity of 1,000 head or less. Large specialized feedlots became prevalent during the 1960s and 1970s, and have continued to increase in size and in their share of total production. Between 1985 and 2001, the percentage of cattle marketed from feedlots with over 32,000-head capacity increased from 29 percent to about 42 percent (table 2).

In 2001, the 10 largest feedlot firms had a total one-time feeding capacity of 3.1 million head, 53 percent larger than in 1988.<sup>1</sup> The 20 largest feedlot firms increased their feeding capacity by 39 percent between 1988 and 2001.<sup>2</sup>

Cattle feeding has become more concentrated in recent years. In 2001, the 10 largest feedlot firms had estimated annual feeding capacity equal to 24 percent of total steer and heifer slaughter, versus 16 percent in 1988. The 20 largest feedlot firms had annual capacity equal to 35 percent of total steer and heifer slaughter in 2001, versus 25 percent in 1988.<sup>3</sup>

Table 2.—U.S. fed cattle output by size of feedlot, selected years, 1985–2001

Year	Feedlot capacity (number of head)						
	Less than 1,000	1,000 to 1,999	2,000 to 3,999	4,000 to 7,999	8,000 to 15,999	16,000 to 32,000	More than 32,000
	<u>Percent of total marketings</u>						
1985	19.0	4.0	6.1	7.3	15.0	19.7	29.0
1990	15.6	4.1	7.0	7.5	14.5	23.0	28.2
1995	9.7	4.1	5.3	8.1	14.2	21.1	37.6
2000	14.2	3.2	4.6	7.6	11.1	19.4	39.8
2001	13.0	3.2	5.0	7.2	10.7	18.8	41.9

Source: Nebraska Agricultural Statistics Service. *Nebraska Agricultural Statistics*, Nebraska Department of Agriculture, 1996 and 2000 issues; Agricultural Statistics Board, *Cattle on Feed*, Mt An 2-1 (2-02) NASS-USDA, February 15, 2002.

Slaughter plant size has also increased. Several plants can slaughter more than 5,000 head per day and can process 400 or more carcasses per hour. Between 1980 and 1999, the number of steer and heifer plants slaughtering 500,000 or more head annually increased from 8 to 20, with 14 of those plants slaughtering more than 1 million head each in 1999.<sup>4</sup> The share of total steer and heifer slaughter by plants slaughtering 500,000 or more steers and heifers rose from 24 percent in 1980 to 79 percent in 1999.

Concentration in beef packing has stabilized. Concentration in the top four firms in steer and heifer slaughter rose from 36 percent in 1980 to 72 percent in 1990 and 81 percent in 1993, but has remained relatively stable since then (table 3). The Herfindahl-Hirshman Index (HHI), a standard measure of industry or market concentration, is defined mathematically as the sum of each firm's squared percentage share of the total industry or market. The Department of Justice (DOJ) and the Federal Trade Commission (FTC) consider markets with HHI values below 1000 to be unconcentrated, and markets with HHI values over 1800 to be highly concentrated.<sup>5</sup> HHI for the steer and heifer slaughter

<sup>1</sup> Kay, Steve, "Big and Bigger: In Cattle Feeding as in Packing, Big Players Build Momentum," *Beef Today*, February 1998; Kay, Steve, "Feedlots Continue to Expand," *Cattle Buyers Weekly*, October 30, 2000; Kay, Steve, "Top Feedlots Keep Expanding," *Cattle Buyers Weekly*, October 29, 2001.

<sup>2</sup> Annual capacity estimated as 85 percent of maximum one-time capacity multiplied by 2.5 (the number of times the lot can be filled with cattle and the cattle fed to slaughter weight during 1 year).

<sup>3</sup> Kay, Steve, "Top Feedlots Keep Expanding," *Cattle Buyers Weekly*, October 29, 2001.

<sup>4</sup> Packers and Stockyards Programs, *Packers and Stockyards Statistical Report 1999 Reporting Year*, GIPSA SR-02-1, GIPSA-USDA, January 2002.

<sup>5</sup> The Horizontal Merger Guidelines issued by the Department of Justice and the Federal Trade Commission state, "The Agency regards markets [with HHI values over 1800] to be highly concentrated. Mergers producing an increase in the HHI of less than 50 points, even in highly concentrated markets post-merger, are unlikely to have adverse competitive consequences and ordinarily require no further analysis. Mergers producing an increase in the HHI of more than 50 points in highly concentrated markets post-merger



industry increased from 561 in 1980 to 2036 in 1995 and then decreased to 1942 in 1999 (table 3). Thus, the steer and heifer slaughter industry is highly concentrated but the level of concentration has been relatively stable in recent years.

Table 3.— Steer and heifer slaughter concentration, selected years 1980–2000<sup>1</sup>

	1980	1985	1990	1995	1998	1999	2000
Four-firm concentration (percent) <sup>2</sup>	35.7	50.2	71.6	80.8	80.4	81.4	81.5
HHI	561	999	1661	2036	1936	1942	NA

NA denotes not available

HHI denotes Herfindahl-Hirshman Index

<sup>1</sup>Data for 1980, 1985, and 1990 are based on firms' fiscal years as reported to P&SP. Data for 1995–2000 are based on calendar year for federally inspected slaughter.

<sup>2</sup>Percentage of total commercial slaughter accounted for by the four largest firms.

Source: Packers and Stockyards Administration. *Packers and Stockyards Statistical Report*, reporting years 1980, 1985, 1990; Packers and Stockyards Programs, *Packers and Stockyards Statistical Report*, reporting years 1995–99.

Some of the largest beef packing firms were involved in mergers and acquisitions in 2001 and early 2002. Tyson Foods, Inc. (Tyson) acquired IBP, inc. Although this acquisition expanded Tyson's share of overall meat and poultry processing, it did not result in an increase in concentration of slaughter in any individual type of animal, since Tyson was not previously engaged in slaughtering the type of animals slaughtered by IBP.

In August 2001, Excel Foods (Excel) acquired Emmpak Foods, Inc., of Milwaukee, Wisconsin (Emmpak). In February 2002, Excel acquired Taylor Packing Co. Inc., (Taylor) of Wyalusing, Pennsylvania. Excel primarily slaughters steers and heifers, and both Emmpak and Taylor primarily slaughter cows and bulls, so the impact of these acquisitions on steer and heifer concentration is small. The acquisitions will have a larger impact on cow and bull slaughter concentration and overall cattle slaughter concentration, but market share information is not publicly available to indicate the magnitude of the changes.

During 2001, Smithfield Foods acquired Packerland Holdings, Inc. and Moyer Packing Company. Smithfield claimed that Moyer Packing Company had a daily processing capacity of 2,375 head, and Packerland had a daily processing capacity of 6,150 head, for a combined 7-percent share of total beef slaughter capacity.<sup>6</sup> Based on information released publicly by Smithfield, the combination of previously separate Moyer and Packerland into a single entity resulted in only a 20-point increase in the HHI index for steer and heifer slaughter.

potentially raise significant competitive concerns, depending on the factors set forth in Sections 2-5 of the Guidelines. Where the post-merger HHI exceeds 1800, it will be presumed that mergers producing an increase in the HHI of more than 100 points are likely to create or enhance market power or facilitate its exercise." Department of Justice and the Federal Trade Commission, *Horizontal Merger Guidelines*, [http://www.usdoj.gov/atr/public/guidelines/horiz\\_book/15.html](http://www.usdoj.gov/atr/public/guidelines/horiz_book/15.html), April 2, 1992 (as amended April 8, 1997).

<sup>6</sup> Smithfield Foods News Releases, [http://www.smithfield.com/news/news\\_010622.html](http://www.smithfield.com/news/news_010622.html), June 22, 2001; and [http://www.smithfield.com/news/news\\_011024.html](http://www.smithfield.com/news/news_011024.html), October 25, 2001.

## Vertical and Horizontal Coordination

In some cases, feeder calf producers retain ownership of calves until they have been fattened for slaughter. However, the overall industry is characterized by separation of the stages of production, with cattle changing ownership several times during their lifetime.<sup>7</sup> Calves produced by cow-calf producers are sold to stockers who feed them on grass prior to selling them to feedlots where they are fattened for slaughter. Fattened, or “fed” cattle are then sold to packers.

Many believe arm’s-length cattle trading between separate stages of production has failed to adequately coordinate production and marketing decisions with consumers’ preferences. The result of an uncoordinated production and marketing system has been reduced demand for beef.<sup>8</sup> Some economists predict that if the price signals fail to effectively coordinate production with consumer preferences, then a non-price system of coordination can be expected to evolve, or the industry will shrink and lose market share to competing animal proteins. “Some of both have occurred: the beef system has lost over 30 percent of the market share it held in the 1970s and, especially recently, processors have moved aggressively to non-price systems of coordination, especially contracts and formula pricing arrangements.”<sup>9</sup>

In operations that are vertically integrated, one firm owns successive stages of production and marketing. In operations that use other forms of vertical coordination, participants maintain their independence but establish relationships for sharing information to set prices efficiently and improve the flow of products and information among the vertical production and marketing stages. As Ward explains,

vertical coordination encompasses many broad and varied methods of coordinating or synchronizing farm-level supplies with retail-level demand. Vertical coordination via market prices alone is at one extreme of a continuum of vertical coordination methods, while vertical integration is at the other extreme. Between the two extremes are numerous vertical cooperation arrangements, including various types of contracts, joint ventures, cooperatives, partnerships, and alliances.<sup>10</sup>

There is increased interest in the cattle and beef industries in vertical coordination, where successive production and marketing stages are linked through shared information and, frequently, shared risks and profits, rather than joint ownership. Vertical coordination partners work together to control and improve product development at all stages, from genetics to the retail meat case. Cooperatives and vertical alliances are two examples of vertical coordination used in the cattle industry.

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<sup>7</sup> Beef checkoff revenues divided by total annual cattle slaughter suggest cattle change ownership an average 2.5 times during their lifetime.

<sup>8</sup> Lusk, Jayson et al., “Will Consumers Pay for Guaranteed Tender Steak?” Research Bulletin 3-99, Research Institute on Livestock Pricing, Blacksburg, VA, February 1999.

<sup>9</sup> Purcell, Wayne, “White Paper on Status, Conflicts, Issues, Opportunities, and Needs in the U.S. Beef Industry,” Research Institute on Livestock Pricing, Bulletin 5-99, Virginia Tech, May 1999.

<sup>10</sup> Ward, C.E., “Beef Industry Alliances and Vertical Arrangements,” OSU Extension Facts WF-563, Oklahoma State University, Stillwater, OK, December 2001.

Cattle producers, feedlots, packers, and retailers have taken several steps to increase vertical and horizontal coordination.<sup>11</sup> Some coordination is as simple as packers providing information to sellers about the carcass quality of individual animals. Other forms of coordination include the use of forward sales agreements that establish ongoing relationships to increase information flow and coordination of decisions between the parties. Some producers, feedlot firms, and packers have entered into joint ventures in which the parties jointly own cattle on feed and share costs and revenues. Producers' use of cooperatives to market fed cattle also has increased in recent years.

Cooperatives are a traditional form of alliance, wherein producers act together either to purchase inputs or to sell outputs collectively. A cooperative may enhance producers' leverage in a market in which small producers have a disadvantage. Recently, there has been increased interest in cooperatives that go beyond simple collective purchasing and marketing, and instead actively operate in upstream or downstream stages of production. These cooperatives are often referred to as "new generation" cooperatives. An example of such a cooperative is U.S. Premium Beef, which owns a 30-percent interest in Farmland National Beef packing company. Farmland National Beef is jointly owned by Farmland Industries, another cooperative.

New generation cooperatives are closed to non-members, and among their members they allocate shares, or "delivery rights," that determine the number of cattle a member can sell through the cooperative. The members can buy and sell delivery rights among themselves, whose value can rise or fall depending, in part, on the cooperative's performance.<sup>12</sup>

Most of these cooperatives have an agreement with a packer providing that the cattle be sold to the packer with the price based on the quality of the carcasses. The agreements usually contain terms that allow sellers to obtain carcass information that helps the feeder make future production decisions.

The cattle and beef industry has also shown interest in vertical alliances between producers and feedlots; between packers and retailers; and among producers, feeders, packers, and retailers. Vertical alliances facilitate coordination between the production and marketing stages. A trade magazine identified 31 alliances in the cattle and beef industry in 2000. Seven of them began operations prior to 1990, 11 began operations between 1991 and 1996, and 13 began operations between 1996 and 2000.<sup>13</sup> Other sources have identified additional vertical alliances, and noted that there has been an evolution in how the alliances are structured.<sup>14</sup>

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<sup>11</sup> Vertical coordination involves linkages between two or more successive stages of production, such as between cow-calf producers and feedlot operators. Horizontal coordination involves linkages between two or more firms at the same stage of production, such as a group of cow-calf producers forming a cooperative to jointly market their calves.

<sup>12</sup> Torgerson, Randall E., "New Cooperative Marketing Initiatives: Roles Lenders Can Play," talk presented to the panel on New Marketing Structures for Producers, Farm Credit Council Annual Meeting, January 15, 2001, San Diego, CA.

<sup>13</sup> "Alliances 2000: The Yellow Pages," *Beef*, August 2000.

<sup>14</sup> Ward, C.E., "Beef Industry Alliances and Vertical Arrangements," OSU Extension Facts WF-563. Oklahoma State University, Stillwater, OK, December 2001.

A survey by Oklahoma State University of alliance organizations identified several characteristics of alliances and vertical arrangements.<sup>15</sup> These characteristics are not common to all alliances, but they indicate the types of characteristics many alliance partners look for in a vertical arrangement. They include:

- Organizational characteristics – stated objectives, stages of cooperation, and commitments;
- Input requirements – breed specification, source verification, and management practices;
- Marketing programs – branded beef programs and pricing method; and
- Information exchange – carcass data.

A recent development in vertical coordination in the beef production industry has been the creation of integrated beef systems (IBS), which control the beef product from ranch to retail. These are the most advanced vertical arrangements in the beef industry today. Many IBSs are new entities, while others are spin-offs of existing firms. One IBS owns a packing and processing plant and has an agreement to provide a specific grade of beef to a major retail grocer. In order to ensure a consistent supply of the product, the IBS has agreements with feedlots and ranches to produce cattle that meet certain grade specifications.

## **Spot Market Procurement Methods**

The spot market for fed cattle refers to sales of cattle that are ready for slaughter at the time the agreement is entered into. Pricing of cattle in the spot market may be on a liveweight basis, dressed carcass weight basis, grade and yield basis, or formula basis. The use of the spot market to buy and sell fed cattle has long been an institution in the beef industry. The location at which trading occurs has changed, however. Years ago, most spot market trading occurred at terminal markets and auctions. More recently, trading shifted to feedlots, where packers purchase fed cattle directly from cattle owners or from feedlot managers who represent owners, or through marketing agencies.

Spot market procurement of fed cattle generally occurs over a week-long period. At the beginning of the week, packer buyers visit feedlots where they receive a list of cattle available for purchase, known as the “show list.”<sup>16</sup> The buyers view the cattle on the show list to estimate their value, and the feedlot manager informs the buyers of the asking prices for the cattle. The buyers may or may not make offers. A packer’s head buyer, who is usually located at the packer’s corporate headquarters, generally sets the maximum price that can be offered by the buyers representing that packer.

The process by which buyers and sellers arrive at bid and ask prices is part of the process referred to as price discovery. Buyers and sellers monitor publicly reported spot market

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<sup>15</sup> Ward, C.E., and T.L. Estrada, “Vertical Coordination and Beef Industry Alliances,” *Visions*, 72(1999):2, pp. 16–21.

<sup>16</sup> The sales process tends to be somewhat simpler for smaller farmer-feeder operations than the description in this section. For example, farmer feeders would likely sell cattle less frequently and might not have a show list of more than one pen of cattle available for sale in any given week.

prices, the Chicago Mercantile Exchange (CME) Live Cattle Futures quotes, wholesale meat prices, and other factors to help determine how much they will bid or accept. In recent years, buyers have generally increased bids in \$0.50 or \$1.00 per cwt increments while bidding. Managers of custom feedlots may contact the cattle owners (customers) before accepting a bid on behalf of the owners, to apprise them of offers or general market conditions, and to make recommendations about whether to accept a bid. When a deal is struck, the seller and buyer then agree on a date and time for the cattle to be shipped.

The date and time of delivery, and who pays for delivery, are important elements of a transaction. For example, a packer may be willing to offer a price premium to a feedlot that is willing to deliver a specific number of cattle at a specific time every morning so the packer has a guaranteed inventory of cattle to start its first slaughter shift of the day.

Buyers and sellers engage in price discovery through the week, monitoring several information sources before making trades. Eventually, the market price is established and trade occurs. The bulk of trading may occur during a relatively short period. Some feedlot managers report that they often receive multiple bids in rapid succession, and must decide quickly whether to accept an offer or wait for a better one. The term “trading window” is used in the cattle industry to refer to the time interval during which the bulk of cattle are sold each week. Many have perceived a reduction in the length of the trading window, though the extent of any such reduction remains uncertain.

## **Non-Spot Marketing Methods**

Non-spot market transactions for fed-cattle refer to all transactions in which fed cattle are committed to a packer before the cattle are ready for slaughter. Three common non-spot marketing methods are marketing agreements, forward contracts, and packer-fed cattle. Collectively, cattle purchased through these methods are referred to as captive supplies. GIPSA defines captive supply as “livestock that is owned or fed by a packer more than 14 days prior to slaughter; livestock that is procured by a packer through a contract or marketing agreement that has been in place for more than 14 days prior to slaughter; and livestock that is otherwise committed to a packer more than 14 days prior to slaughter.”<sup>17</sup>

There are a number of reasons why feedlots and packers use non-spot marketing methods.<sup>18</sup> Packers may gain a more predictable supply of cattle, be better able to utilize their plant capacities, reduce procurement transaction costs, and reduce price risks. Likewise, feedlots may be able to better utilize feedlot capacities, have an assured market for their cattle, reduce marketing costs, and reduce the risks associated with variation in spot market prices.

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<sup>17</sup> Grain Inspection, Packers and Stockyards Administration, *Captive Supply of Cattle and GIPSA's Reporting of Captive Supply*, GIPSA-USDA, January 11, 2002.

<sup>18</sup> Schroeder, Ted C., and Rodney Jones, “Captive Supplies in Fed Cattle Markets,” *White Paper on Status, Conflicts, Issues, Opportunities, and Needs in the U.S. Beef Industry*, Research Bulletin 5-99, Research Institute on Livestock Pricing, Blacksburg, VA, May 1999.

## Marketing Agreements

Marketing agreements, which may be written or verbal, establish an ongoing relationship for selling fed cattle, rather than negotiating single-lot transactions.<sup>19</sup> They may include minimum and maximum numbers of head to be delivered over a specified period of time, delivery specifications, auditing practices, and pricing method. Pricing often is by formula, based on average prices for other cattle slaughtered at the plant or publicly reported prices, with premiums and discounts applied for differences in cattle quality.

Marketing agreements generally permit the seller to have substantial influence over the week of delivery, while the packer usually determines the day of delivery within the week.<sup>20</sup> In a typical marketing agreement transaction, the feedlot manager will notify the firm that the feedlot is ready to deliver a specified number of head for slaughter the following week. Employees at the plant will schedule the cattle for slaughter in the following week. The feedlot will be notified of the date and often the time of day that the cattle will be picked up at the feedlot. The seller usually pays the freight costs for these cattle.

After the packer slaughters the cattle, the carcasses are weighed and chilled for at least 24 hours before being sent to a grading stand. A USDA grader assigns quality and yield grades to the carcasses that the packer wants graded, and the grades are recorded in the packer's records. Payment is calculated based on a formula that generally derives its base price from either a plant average price or USDA-reported market prices. The base price is adjusted with premiums and discounts derived from USDA prices, plant average cattle prices, or boxed beef prices. Packers often provide information on the quality characteristics of the cattle slaughtered to the feedlot; this information is used to assess the quality of the feeder animal or the feeding program used to fatten the animal while at the feedlot.

## Forward Contracts

A packer and a seller who enter into a forward contract agree upon future delivery of a specific lot or quantity of fed cattle. Price may be fixed when the contract is entered, but usually the parties agree to use a pricing formula based on other information, such as market prices on the Chicago Mercantile Exchange Futures Board (futures contract prices), or other publicly reported prices, to determine the base price in the contract. When the base price is based on futures contract prices, the parties agree on a differential from futures market prices for a specified futures contract month. That differential is called the "basis," and these contracts are commonly referred to as "basis contracts."

In a typical basis contract, sellers and packers agree on a delivery month, the specific cattle to be delivered, cattle quality standards, and the basis. The seller may lock in the

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<sup>19</sup> The term "lot" is commonly used to represent a group of cattle purchased as a unit in a transaction.

<sup>20</sup> Schroeter, John R. and Azzeddine Azzam, "Econometric Analysis of Fed Cattle Procurement in the Texas Panhandle," Report to Grain Inspection, Packers and Stockyards Administration, Department of Economics, Iowa State University, and Department of Agricultural Economics, University of Nebraska-Lincoln, November 1999; GIPSA investigative files.

price by selecting the date when the futures price will be determined, if selected before the delivery month. For example, a seller may place cattle on feed in January to be ready for delivery in June. The seller and the packer agree on a delivery month (e.g., June), a futures contract month (e.g., May), quality standards (e.g., 55 percent Choice), and a basis (e.g., \$1.50/cwt). As the delivery month approaches, the seller notifies the packer of the day he or she desires to lock in the price. The adjusted base price is determined by applying the basis to the futures market price for that date. The packer and feeder then agree on a delivery date and time. Carcass quality characteristics are determined the same way under forward contracts as they are under marketing agreements (described above). Premiums and discounts are applied to the adjusted base price for differences in animal quality or other specified non-quality factors.

## **Packer Feeding**

Packers slaughter some cattle that they own and feed themselves, either in their own feedlots or in custom feedlots. In some instances, packers may enter into joint ventures, sharing ownership of cattle with feeders. A joint venture is a profit-sharing agreement in which the feeder and packer share the costs and revenues. When packer-fed cattle are ready for slaughter, the feedlot manager generally notifies the plant that the cattle have reached the desired weight and degree of finish, and the plant schedules the delivery day. Cattle owned under a joint venture agreement are paid for under the terms specified in the agreement, typically using a value-based pricing method.

## **Fed Cattle Pricing Methods**

Pricing methods are used to determine the price paid for a specific lot of cattle. Types of pricing methods include “liveweight,” “in-the-beef,” “grade and yield,” and “formula.” The same price may be paid for all animals in a lot (called “lot-average pricing”) or the price for each animal may be determined individually (called “carcass-merit” or “value-based” pricing).

## **Lot-Average Pricing**

Lot-average pricing is the traditional pricing method used in cattle sales. Price negotiations are based on the estimated average quality of all cattle in a lot. Lot-average pricing includes liveweight and in-the-beef pricing methods. In liveweight pricing, the buyer pays a single agreed-upon price per hundred pounds of live weight for all cattle in a lot. The amount paid for a lot of cattle is the total live weight divided by 100 and multiplied by the price per cwt. In in-the-beef pricing, the buyer pays an agreed-upon price for each hundred pounds of dressed weight for all cattle in a lot. Dressed weight is the weight of a carcass after evisceration. The amount paid for a lot of cattle is the total dressed weight divided by 100 and multiplied by the price per cwt. Lot-average pricing is the most common method of pricing for spot market transactions.

## **Carcass-Merit or Value-Based Pricing**

Many packers and sellers favor carcass-merit or value-based pricing because it allows buyers and sellers to establish prices for cattle that more accurately reflect differences in carcass quality. In value-based pricing, cattle prices depend on agreed-upon carcass quality factors such as USDA quality grade and yield grade, genetic factors, or other specified factors. Value-based pricing mechanisms often have a base price plus premiums and discounts for individual carcass quality characteristics. The final price cannot be determined until the cattle are slaughtered and the carcass quality factors are measured.

**Grade and Yield Pricing**—A frequently used value-based pricing method is grade and yield pricing, which starts with a specified dressed-weight base price and a schedule of premiums and discounts that are based on carcass quality characteristics. The base price is typically specified for a carcass with a quality grade of USDA Choice and a Yield Grade of 3.<sup>21</sup> Carcasses with quality attributes above this benchmark receive the base price plus a premium. Carcasses that grade below the benchmark receive the base price minus a discount. Yield Grades 4 and 5, for example, might receive a \$10 per cwt discount. Grade and yield pricing is often used in spot market transactions.

**Grid Pricing**—Grid pricing may be used in either spot market or non-spot market transactions, and it is very similar to grade and yield pricing. Grid pricing is frequently referred to as formula pricing.<sup>22</sup> Instead of using a predetermined base price as in the grade and yield pricing method, grid pricing uses a base price that is determined after the transaction is negotiated. Often the base price is calculated from an average price reported by the Agricultural Marketing Service's (AMS) Market News or from average prices paid by the packer for cattle purchased on the spot market during the week of slaughter or the previous week. Other plant average measures may be used as well. Plant average prices are calculated by the packer.

**Boxed-Beef Pricing**—Major beef packers are increasing their use of a relatively new pricing method that directly utilizes the wholesale value of beef (boxed-beef cutout prices) to determine cattle prices. Boxed-beef pricing involves the use of inventory carcass valuations or boxed beef cutout values<sup>23</sup> as reported by USDA to determine premiums and discounts to be applied to a base price, which may be determined using several different methods such as plant averages, USDA-reported prices or top-of-the-week prices.

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<sup>21</sup> USDA has a uniform system of grades for slaughtered cattle. Quality grade represents palatability, and is a function of firmness of muscling and other physical characteristics. Quality grades for steers and heifers range from Prime, the most favorable, to Choice, Select, Standard, Commercial, Utility, Cutter, and Canner. Slaughter cattle also are assigned one of five yield grades, with Yield Grade 1 representing the highest degree of cutability, and Yield Grade 5 representing the lowest degree of cutability. Agricultural Marketing Service, USDA, "United States Standards for Grades and Slaughter Cattle," July 1996.

<sup>22</sup> The term "formula" may refer to the use of an external price (such as a publicly reported price) to establish the base price in grid pricing, or may include the calculation of the final price, including the application of all premiums and discounts.

<sup>23</sup> Cutout values are composite values of beef carcasses derived from the value of individual cuts.



## Changes in Beef Marketing

Changing technology and consumer preferences have been major driving forces behind recent developments in meat marketing.<sup>24</sup> Much of the fabrication of beef carcasses that was formerly done by skilled butchers in the retail store is now done in the processing plant by semi-skilled employees on a “disassembly” line. Processing plants transform cuts of meat into ready-to-cook or precooked entrees or full meals. And these new meat products are being sold in new ways, including through electronic marketplaces.

### Product Development

Until recently, packers largely limited their beef businesses to slaughter and to fabrication into boxed beef, with minimal fabrication into retail cuts. Recent developments in packaging and processing technologies now enable packers to further process beef and add value to their products by producing case-ready, branded, and convenience products.

Case-ready meats are retail cuts that are packaged at packing or processing plants and shipped, ready for the meat case, to retail outlets. Case-ready meats are typically sold in one of two ways: vacuum-packaged, in which the plastic packaging fits tightly around the meat, or in modified-atmosphere, or “gas-flushed” packaging, in which various combinations of gases are flushed into the package.<sup>25</sup> Packers cite production of case-ready beef as a way to reduce the need for labor at the retail level, address consumers’ concerns about food safety, and provide a more uniform product.<sup>26</sup>

As packers produce more case-ready products, they also are increasing the use of brand names. Packers produce products under their own brand names, under other firms’ brands, and under a number of industry-wide certification programs. By the end of 2001, the USDA Meat Grading and Certification Service listed 44 different certified and process verified beef programs, an increase from only 10 programs in 1996 and 13 programs in 1997.<sup>27</sup> The number of carcasses certified by USDA graders to meet certified beef programs has grown from 850,000 in 1993 to approximately 4.1 million in 2001. This number understates the total number of carcasses marketed under branded programs because some programs do not require USDA certification.<sup>28</sup> The oldest and most widely recognized beef certification program is the Certified Angus Beef® Program (CAB®). In 1999, 495 million pounds of beef were marketed as CAB® products to

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<sup>24</sup> Putnam, J., and Shirley Gerrior, “Trends in the U.S. Food Supply, 1970-97,” in *America’s Eating Habits: Changes and Consequences*, Elizabeth Frazao (ed.), ERS-USDA, Agriculture Information Bulletin No. 750. 484 pp, May 1999.

<sup>25</sup> AMI. “AMI Fact Sheet: Case Ready Meats,” <http://www.amif.org/FactSheetCaseReadyMeat.pdf>, June 2001.

<sup>26</sup> “IBP to Open Case-Ready Meats Plant in Texas,” Meat Industry Insights News Article No. 000753, July 2000, <http://www.spcnetwork.com/mii/2000/000753.htm> (21 February, 2001); Smith, Gary S. and Morgan, J. Brad, “Understanding Today’s Customers and Marketing to Their Needs; Industry Trends and Projections for the Future; Current and Future Food Safety Issues-Staying Ahead (1998-1999),” presented at the Wakefern Food Corporation Seminar, Edison, NJ, September 14-15, 1999.

<sup>27</sup> Agricultural Marketing Service, “USDA Certified Beef Programs: Individual Specifications and Contact Information,” AMS-USDA, 2001. <http://www.ams.usda.gov/lsg/certprog/speccomp.pdf> (1 Feb, 2002).

<sup>28</sup> “Quality Audit Shows Improvement in Beef,” *The High Plains Journal*, Dodge City, KS, February 12, 2001. <http://www.hpj.com/archives/feb01/0205ncba-qualityauditmrncjml.htm>.

retail, foodservice, and other outlets. In 2000, marketings under this program rose to 555 million pounds.<sup>29</sup>

Branded product lines include both fresh meats and value-added products that are already prepared for consumers, such as pre-cooked roasts or beef stews. Packers combine recent advances in food processing technology with research and experimentation to develop products that are convenient and can be prepared quickly and easily. Most of the processed branded products are seasoned, marinated, or prepared with gravy. Packers also produce precooked beef products that maintain their flavor and palatability under the stress of microwave preparation and reheating.<sup>30</sup>

## E-commerce

Meat packers have shown increased interest in e-commerce. In the fall of 2000, a survey by the American Meat Institute (AMI) of its 300 member businesses found that 66 percent of the companies surveyed planned to move to some kind of e-commerce strategy by 2002. The survey also found that 83 percent of the companies were interested in e-commerce, and roughly 50 percent of them had already been contacted by suppliers regarding their potential to participate in Internet-based business initiatives.<sup>31</sup>

Adoption of Internet-based marketing by the meat industry has been slow. Theoretically, an electronic food exchange could provide buyers and sellers with detailed information on products and prices offered on the market. For example, buyers would be able to seek out alternative cuts and sources for the types of meat that they wish to purchase. However, the necessary supply-chain software is so expensive to develop, implement, and maintain that the task of Web-enabling the industry is falling to those with the greatest financial resources.<sup>32</sup>

In March 2000, AMI announced an exclusive partnership with FoodUSA.com, an Internet meat exchange, to provide trading opportunities for the global meat and poultry industry.<sup>33</sup> FoodUSA.com went on line April 12, 2000, and achieved some early success—\$10 million in sales in its first 46 days<sup>34</sup> and \$30 million in sales by October 2000<sup>35</sup>. However, activity slowed and FoodUSA.com ceased operating in January 2001.<sup>36</sup>

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<sup>29</sup> Certified Angus Beef Program, "2000 Statistics and 2001 Projections," 2001.

<http://www.certifiedangusbeef.com/cabprogram/html/stats2000.html> (February 8, 2002).

<sup>30</sup> Thornsberry, Max, D.V.M., "Producer Perspective on Direct Marketing," Presentation at the R-Calf Annual Convention, February 2, 2001.

<sup>31</sup> Information distributed at AMI Foodservice Marketing & Technology Conference, Las Vegas, NV, October 12–14, 2000.

<sup>32</sup> Joiner, Harry, "E-commerce: Moving at the Speed of Sludge," *Meat Marketing and Technology*, August 2001.

<sup>33</sup> American Meat Institute, "Leading National Trade Association Announces E-Commerce Partnership with .Com,"

<http://www.meatami.com/Template.cfm?Section=Current&NavMenuID=274&template=PressReleaseDisplay.cfm&PressReleaseID=29>, March 21, 2000.

<sup>34</sup> "On-line Meat Exchange Closes \$10 Million in Sales," Meat Industry Insights News Article No. 000647, June 16, 2000. <http://www.spnnetwork.com/mii/2000/000647.htm>.

<sup>35</sup> Justfood.com editorial team, "USA: FoodUSA.com follows Foodline.com into oblivion," January 4, 2001. [http://www.just-food.com/news\\_detail.asp?art=21371&c=1](http://www.just-food.com/news_detail.asp?art=21371&c=1).

<sup>36</sup> Feuerstein, Adam, "B-to-b food marketplace shuts down," January 3, 2001. <http://www.upside.com/texis/mvm/story?id=3a536f51a>

In early 2000, Tyson Foods, Inc.; IBP, inc. (now part of Tyson Foods); Gold Kist, Inc.; Cargill, Inc.; and Farmland Industries, Inc. announced the formation of Commerce Ventures, described as a Web-based exchange open to the entire meat industry.<sup>37</sup> This consortium of meat and poultry industry firms used a startup fund of \$17 million to develop Provision X, a Web-based network exchange for buyers and sellers of beef, pork, and poultry products.<sup>38</sup>

Provision X was formed with the objective of consolidating the buying and selling process down to a “simple browser-based dashboard.”<sup>39</sup> Provision X began trading in March 2001 and offered access to a network where buyers and sellers could negotiate price interactively.<sup>40</sup> The network replaced the phone calls, faxes, and other methods of communication that meat and poultry companies used in the past to negotiate price.

In September 2001, Provision X formed an alliance with iTradeNetwork (iTN), another electronic exchange. According to a Provision X press release, “iTN provides online solutions for 34 percent of the U.S. retail grocery and food service industries, including seven of the top fifteen food retailers in the nation.”<sup>41</sup> The alliance was intended to allow online interaction between meat processors and some of the largest retail grocery and foodservice companies in the United States.

In February 2002, iTN signed an agreement to acquire Provision X. An iTN press release indicated the original meat company participants in Provision X would continue as suppliers, but details regarding the nature of their participation were not available.<sup>42</sup>

E-commerce is also being used for livestock marketing. Numerous sites are listed on the Internet for livestock marketing. Cattle feeders use the Internet to purchase feeder cattle directly from producers, and also use auctions on the Internet and satellite video auctions. Video auctions have been in operation longer than Internet marketing for feeder cattle.

Approximately one dozen Web sites have regularly scheduled auction sales. In many instances, established auction market locations conduct an advertised special sale on the Internet. Some Internet marketers list cattle for sale, but are not actively engaged in selling cattle on the Web. There are thousands of Web sites that list cattle or beef products for sale. The vast majority of these sites do not actually sell cattle. They are “classified ad” sites or marketers of agricultural food and gifts.

Some individuals and firms purchase feeder cattle to place in feedlots solely as an investment. They are not otherwise involved in the cattle business and many do not have the time or experience to purchase their own livestock. Some custom feedlots purchase feeder cattle for such investors as a service. Some of these custom feedlots maintain their

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<sup>37</sup> “IBP, Cargill, Smithfield, Tyson, Gold Kist, Farmland plan e-commerce system for meat and poultry,” Cargill, Inc. Press Release, April 11, 2000. [http://www.cargill.com/today/releases/00\\_4\\_11tyson.htm](http://www.cargill.com/today/releases/00_4_11tyson.htm).

<sup>38</sup> Holzer, Del, “The Provision X Files,” *The National Provisioner*, 2001 State of the Industry Report, August 2001.

<sup>39</sup> Provision X homepage at <http://www.provisionx.com/facts.html>.

<sup>40</sup> “State of the Industry Report,” *The National Provisioner*, September 26, 2001. <http://www.provisionx.com/news.html>.

<sup>41</sup> Provision X homepage at <http://www.provisionx.com/releases.html>.

<sup>42</sup> “iTradeNetwork to Acquire Provision X and Extend Its Global E-Business Solutions,” Press Release. <http://www.itradenetwork.com/pressreleases02-08-02.cfm> (March 8, 2002).

own Web sites where producers may offer feeder cattle for sale. The feedlot's buyers review the information these sellers post on the Web site and may make an offer to purchase the livestock, either for custom feeders or for themselves.