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A Case Study of China's Commercial Pork Value Chain

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Abstract

In China, with the cost of improved technology rising, surplus labor shrinking, and demand for food quality and safety increasing, it will be just a matter of time before the country's hog production sector will be commercialized like that of developed countries. However, even if China's cost of production converges to international levels, as shown in this case study, China may continue to retain some competitive advantage because of the labor-intensive nature of the marketing services involved in hog processing and meat distribution.

The supply of variety meats offers the most promising market opportunity for foreign suppliers in China. The market may open further if the tariff rate for variety meats is reduced from 20% and harmonized with the pork muscle meat rate of 12%, and if the value-added tax of 13% is applied equally to both imported and domestic products. The fast-growing Western-style family restaurant and higher-end dining sector is another market opportunity for high-quality imported pork.

Keywords: commercial, cost structure, imports, pork value chain.

A CASE STUDY OF CHINA'S COMMERCIAL PORK VALUE CHAIN

Introduction

The meat consumption basket in China is dominated by pork (see Tables 1 and 2). Although shares of beef and poultry have both doubled since the 1980s from 4% to 10% and 9% to 16%, respectively, the share of pork is still high at 72%. The per capita annual pork consumption level in mainland China, which is at 33.8 kilograms, is among the highest in the world; only Hong Kong, the European Union, and Taiwan, countries or regions with relatively higher per capita incomes, are higher.

With sustained economic growth in the last decade in the range of 7.11% to 14.24% and with limited land area for feed grain production, China was expected to become a major importer of pork when, with its accession to the World Trade Organization, it would drop its duties on pork from 20% to 12%, and when it would allow foreign participation in pork distribution in the domestic market. But so far China has remained a small net exporter, averaging 40,000 metric tons from 1999 to 2003. Market penetration by foreign suppliers is believed to be modest because a large portion of China's pork supply is still produced by backyard producers, whereby surplus family labor is mostly used, investment in animal housing structure is very limited, and feeding practices utilize table scraps, vegetables, green fodder, and unprocessed grains and oilseeds, keeping production costs low.

In the last decade, the share of backyard producers has declined and growth in hog production has come mostly from specialized households with much larger operations compared with backyard producers, with 30 to 500 hogs in annual production. These farms still depend mostly on family labor and have minimal investment in animal facilities, but the animals used are from improved breeds and feeding practices utilize more commercially formulated feeds.

Large commercial hog operations have also emerged in China and have increasingly gained production share over time. As shown in Table 3, the share of pork production

from households (including backyard and specialized households) decreased from 97.50% two decades ago to 89.29%, while the share of commercial production (those with more than 500 hogs) increased from 2.5% to 10.71%. The trend toward commercialization is expected to continue at a faster pace in the future, driven by the reported increasing pockets of labor shortages and rising wages, the high cost of using advanced technology (e.g., genetics and nutrition), and improved farm management practices, which increase productivity. Also, a contributing factor in the commercialization of the livestock sector may be the rise of supermarkets. The sector, which has been growing at 30% to 40% per year and reached US\$71 billion in sales in 2003, is the main retail distribution channel in which volume and product quality and safety assurance are key, which only commercial operators can guarantee. Moreover, supermarkets increase procurement efficiency through centralized purchasing of large volumes (Gale 2004), so their interests are better served by dealing with commercial suppliers to reduce transaction costs.

If China's hog sector becomes dominated by large commercial operations, the question of interest is whether this will result in a fundamental change in its competitive relation relative to foreign suppliers. The household hog production system in China is well studied and documented, but this is not true of the commercial sector. Moreover, the few studies that have been done have focused on production, and very little if any attention has been given to processing and distribution. The purpose of this study is to present a detailed picture of a particular case of a commercial pork value chain in China, focusing on its practices, products, prices, and cost structure. Specifically, production and marketing costs will be compared to those of the United States to help identify broad areas in which China may hold some advantage, on the one hand, and market opportunities that are open to foreign suppliers, on the other.

Case Study of a Commercial Pork Value Chain

Because commercial establishments are sensitive about the proprietary nature of their information, the commercial hog sector in China is not well studied. In particular, a better understanding of the commercial pork value chain, from production to processing to retailing, is needed. Recognizing this gap of information, the Midwest Agribusiness Trade Research and Information Center (MATRIC) China project conducted a case study

of the commercial pork value chain in 2002. A research collaborator in China, Dr. Dinghuan Hu, visited and collected information from a commercial breeding and fattening farm in Hebei province. Then, the movement of the farm's production was traced to the processing and retailing stages, which were mostly in the Beijing area. For comparison purposes, a similar investigation on the slaughter and retail stages was conducted in Shanghai. Data collected from these visits are reported in this case study.

Production

In general, the organization of commercial producers in China is similar to that in developed countries. Their level of technology (i.e., breeds and breeding practices and feeds and feeding practices) is comparable. As a result, their technical performance parameters (e.g., feed conversion ratio [FCR]) are very close. To ensure product quality, most of these farms are integrated, from feed supply, sow-piglet production, pig finishing, slaughter-processing, and distribution. They maintain their own transport and storage facilities. Although they sell some of their production through the wet market, they mostly cater to supermarkets, hotels, restaurants, and other institutional buyers. Also, they have access to the export markets, including Hong Kong, Russia, the Middle East, and other Asian countries.

The pig breeding and finishing farm in this case study is located in one of the cities in the province of Hebei, which is two and a half hours by train and three hours by bus southwest of Beijing. It is one of the major pig suppliers to the Beijing market. The case farm has 3.33 acres of total land area with a fixed capital valued at \$2.8 million (all figures given in U.S. dollars). The farm has 60 employees, with 10 serving administrative and sales functions and the other 50 working as farm laborers. The farm's annual overhead cost, which includes administrative salaries, office expenses, tools, and other materials expenses, amounted to \$93,029 (or \$6.20 per pig finished). Rental of land was \$2,537 per acre (or \$0.56 per pig finished) annually. This expensive rental rate may be due to the farm's proximity to a big city with a population of 9 million people.

The case farm used piglets weighing 25 kilograms and fattened them until they reached a marketable weight of 90 kilograms. In contrast, pigs in the United States are slightly lighter at the start, weighing only 23 kilograms, and are fattened to reach a heavier weight of 118 kilograms. The case farm's FCR is 3.00, which is lower than the 3.20 FCR reported for farms with more than 500 animals from the 1999 Research Center of

Rural Economy (RCRE) (Ministry of Agriculture) survey. Its mortality rate of 1.5% is much lower than the 4% rate used in the United States. The case farm produced 15,000 slaughter-ready hogs annually, placing the farm in the second-to-largest category of commercial farms, reported in Table 3. It sold 5,000 of its annual production to a food company in Beijing. The farm mixed its own feed requirement and processed the pig waste into organic fertilizer, which was then sold.

The following information taken from farm visits conducted in December 2002 was used in computing the cost of production for China (see Table 4).

China Assumptions.

1. A piglet at 25 kilograms cost \$ 24.163.
2. Average feed consumed over the entire fattening period is 195 kilograms at a cost of \$0.145 per kilogram of feed.
3. Utilities cost is \$93,029 per year (\$6.20 per pig)
4. Medical expense per pig is \$1.21
5. Mortality rate is 1.5% with each animal having a value of \$48.327.
6. The depreciation rate is 5%.
7. Land rent is \$2,537 per acre per year (\$0.56 per pig)
8. Transportation cost is \$3.26 per pig (\$0.036 per kilogram).
9. Labor cost is \$0.99 per pig (\$0.015 per kilogram weight gain).
10. Overhead cost includes administrative salaries, office expense, tools, and materials expense at \$93,029 (\$6.20 per pig)
11. Ending weight of pigs is 90 kilograms and the selling price to slaughter houses is \$0.797 per kilogram.

For the United States, estimates reported by Lawrence (2002) are used, which include the following assumptions.

U.S. Cost Assumptions.

1. A piglet at 23 kilograms cost \$39.26.
2. Corn is used for feed cost.
3. Variable cost includes labor, utilities, veterinary medicine, and transportation.

4. Overhead cost is miscellaneous expense and operating expense cost.
5. Fixed cost is assumed to be mostly depreciation cost.

Cost comparison always comes with a caveat because the cost estimates were collected without careful consideration for cross-country consistency.¹ Hence, exact comparability of costs, line item by line item, should be taken with caution. However, a rough comparison of costs can still uncover important patterns and is useful for making observations.

There are several observations that can be made on the cost of production of commercial hog producers in China (see Table 5). The cost structure of the case farm is quite similar to the cost structure of U.S. producers. That is, the largest share of cost is accounted for by feed cost, at 37.16% (39.36% in the U.S.), followed by feeder pig cost at 31.76% (36.90% in the U.S.). Other major cost items are capital replacement cost at 12.46% (11.33% in the U.S.), overhead cost at 8.15% (3.76% in the U.S.), transportation cost at 4.23% (1.88% in the U.S.), and labor cost at 1.30% (3.38% in the U.S.).

In terms of magnitude, the case farm in China has the larger cost advantage compared to the costs in the United States in the feeder pig category with a cost differential of \$0.064 per kilogram. This is consistent with an earlier study by Fang and Fabiosa 2002. This is the case even if the U.S. piglets are lighter at the start and are fattened to a higher ending weight of 118 kilograms compared to the 90 kilograms finished weight in China. Moreover, this is the case even if the U.S. has 0.786 more piglets compared to China in sow productivity. This large cost differential may be because feeder pig production is more labor intensive, wherein China has a definite advantage. The next cost item for which China has some advantage is in the feed cost, which has a differential of \$0.041 per kilogram. This result is somewhat surprising considering that in 2002 the price of corn in China at \$129 per metric ton was 23% higher than the corn price in the United States during the same year at \$105 per metric ton. Moreover, Fang and Fabiosa's 2002 study reported that the feed cost of commercial farms in China was 6% to 41% higher than that of farms in the U.S. Midwest. A possible explanation is that since the China case farm mixed its own feed requirement, it may have used other grains in the ration that are cheaper, such as feed quality wheat and rice.² It should be noted, however, that this

particular case farm has an FCR that is much lower than the average FCR reported in the 1999 survey.

As expected, China has an advantage in labor cost, with a differential of \$0.020 per kilogram. On the other hand, the U.S. overhead cost is lower by \$0.035 per kilogram. Comparability in this cost category is suspect. The overhead cost in China included administrative salaries, office expenses, and tools and materials expenses, while in the United States, the overhead cost included operating interest and miscellaneous expenses. The transportation cost in the United States is also lower by \$0.019 per kilogram. This difference may be reasonable since the case farm delivered its slaughter hogs to Beijing, which is 180 miles away. Many U.S. farms deliver their slaughter-ready hogs to destinations of less than 100 miles.³ The other cost items for which the United States has some slight cost advantages are medical expenses at \$0.006 per kilogram, depreciation costs at \$0.003 per kilogram, and land rent⁴ at \$0.006 per kilogram. Overall, the cost of production in the case farm in China is lower by \$0.057 per kilogram compared to the cost in the United States.

During this period, both farms incurred losses: \$0.048 per kilogram in China and \$0.181 per kilogram in the United States. The higher U.S. losses were due to lower revenue and higher cost. The case farm in China also derived income from by-products such as animal waste sold as organic fertilizer. Moreover, it is reported that the China case farm received government support at a rate of \$0.040 per kilogram. When the revenue from by-products and from government payments are considered, the losses incurred from production are more than offset.

Slaughter

The distribution of production from the China case farm was traced to a slaughter facility in Beijing in order to investigate the slaughter (processing) stage of the commercial pork value chain. As was shown in the preceding section, the value of pigs at the farm level in China and the United States does not greatly differ. The value differential begins to depart significantly when the cost of marketing services are accounted for.

There is no recent cost estimate of pig slaughter in the United States for comparing with costs in China. Hayenga (1997) reported that the slaughter cost structure in the United States is dominated by the cost of the animal, at 70% of the total. Of the remaining 30%,

71% to 87% is variable cost,⁵ more than half of which is labor cost. The cost of packaging material accounts for only 10%. The same study also reports that further processing, such as closer trimming of external fat and deboning for retail, food service, and export customers, is very labor intensive and explains the high processing cost in the United States.

Hog processing in the United States generally involves the following main steps: (a) slaughter; (b) evisceration; (c) splitting of carcass into untrimmed primal cuts; (d) processing fresh wholesale cuts—closely trimmed or boneless primal cuts; and (e) further processing, such as curing and slicing, to meet customer specification. One difficulty in comparing costs of processing is that not all of these steps are performed at the “hog processing stage” in China. Generally, just the slaughter and evisceration would be done. The rest of the processing, beginning at the splitting of carcass into untrimmed primal cuts, is sometimes done at the retail level.

The Beijing processing company involved in the slaughter of the hogs had 10 acres of land and fixed assets of \$4.23 million (see Table 6). The company employed 85 workers: 16 administrators, 5 supervisors, 24 salespeople, and 40 laborers. The administrators, supervisors, and laborers were paid a monthly fee of \$182, \$121, and \$97, respectively, while the sales force was paid by commission at \$0.039 per kilogram of pork sold. Monthly costs incurred by the company were \$7,370 for salary of employees, \$3,625 for administrative cost, and \$6,041 for utilities. The capacity of the slaughter facility was 3,000 hogs per day but actual use averaged only 500 hogs, giving it a low 16.67% capacity utilization. The cost of operation on the basis of U.S. dollar per kilogram is given in Table 7. The largest share of the cost is for pig slaughter at 89.77%, which is much higher than the 70% share in the United States. This is followed by transport cost from the source to the slaughter facility at 3.02%. Labor cost is only 6% of total cost (when the cost of the pig is excluded) compared to the more than 50% share of labor cost from the total variable cost in the United States. Of the pigs slaughtered by the processing company, 80% came from its own pig production operation and only 20% came from outside sources such as the case farm in Hebei. On the revenue side, 84.50% of revenue came from the muscle meat and the other 15.50% came from the head, hock, and offal. This operation earned 9.64% of total cost as net profit. Depreciation cost was set at 6% of the value of fixed asset. With the low capacity utilization this cost accounted for 1.76% of total cost per kilogram produced. From a live weight of 90

kilograms per head, the slaughter yielded 61.30 kilograms of muscle meat and 14.06 kilograms total for the head, hock, and offals, giving a live-to-carcass conversion of 84%, which is higher than the U.S. average of only 73% because in China more non-muscle parts are retained for marketing.

Another representative processing company in Shanghai had a 16.57 acre lot with a fixed investment of \$1.81 million. It had 176 workers: 4 administrators, 42 laborers, and 130 salespeople. The capacity of the plant was only 556 heads per day but the actual slaughter number was 200, giving it a capacity utilization of 36%, which is still low but is twice as high as the company in Beijing. Live-to-carcass weight conversion was also slightly higher than the Beijing facility at 85%.

The cost structure of the Shanghai processor was slightly different from that of the one in Beijing. In this case, 92.28% of the total cost came from the cost of slaughter pigs, followed by depreciation and then transport cost. Labor cost was only 8% of total cost (excluding the cost of pig).

The processing cost excluding the cost of hogs ranged from \$0.067 to \$0.091 per kilogram slaughter liveweight. In comparison, Hayenga reported that the processing cost in the United States in the late 1990s was already \$0.20 to \$0.24 per kilogram slaughter liveweight.⁶

If production and processing are integrated operations, then the profit earned in processing is sufficient to cover the losses incurred in the production stage.

Retailing

Although wet markets are still popular outlets where Chinese consumers purchase fresh meat, Western-style supermarkets are gaining increasing patronage, especially among young and high-income consumers in major coastal cities. The Chinese government is providing incentives to encourage establishment of supermarkets with adequate refrigeration in order to ensure product quality and safety. This trend is expected to continue with the rise in per capita income and the corresponding increased concern over food safety and quality among urban consumers. It is reported (Bean 2003) that supermarkets, hypermarkets, and convenience store are gaining increasing foothold in the top, second-tier, and third-tier cities in China.

Many of these supermarkets have two to three suppliers of meat products, mostly integrated, commercial-type producers that can assure both product quality and consistency in supply. The meat products are displayed in supermarkets with the company name of the source identified. The set-up and display of products in supermarkets are comparable to those found in the developed countries (such as the United States). Refrigerated display cases for chilled and frozen meat products are adequate. Chinese supermarkets also have large sections for fresh meat, reflecting Chinese consumers' preference for fresh meat.

The supermarkets included in our case study rented out their stalls to retailers, who pay a rental equivalent of 10% of their gross revenue in the case of Beijing and 7% in the case of Shanghai. With this arrangement, the major cost for the retailer is the cost of pork, which accounts for 84.41% of the total cost (see Tables 8 and 9). This is followed by the rental of space in the supermarket, which accounts for 10.36%. Labor accounts for only 4.65%. The normal practice of distribution of fresh meat in retail outlets is to assign two workers to each stall. They sell two pigs a day and are paid \$145 per month each. Customers stop by at the stall and make their order specifying the part of the pig and the quantity they want.

Of the total revenue of retailers, 70% is derived from four major parts (see Table 8), namely, the rear end (ham) at 22.46%, the fore end (boston butt or picnic) at 16.85%, the fat-streaked pork (belly or side) at 15.35%, and the spareribs at 13.19%. The six highest retail prices are for tenderloin, spareribs, full loin, rear end, pork hock, and stomach. Table 8 also shows that many other non-muscle parts are sold at a relatively high price. Excluding the cost of pork, the retailing cost ranged from \$0.20 to \$0.21 per kilogram. In total, the retailer in Beijing incurred a cost of \$103.85 per head sold and generated a revenue of \$110.12, ending with a profit of \$6.27, representing 6.04% of the total cost.

For the retailer in Shanghai, the major sources of revenue were the hind legs, shoulder, square meat, and pork chops. More non-muscle meat received higher prices for the Shanghai retailer, including the stomach, kidney, and heart. The retailer incurred a total cost of \$119.01 per head and earned gross revenue of \$126.90, with a residual profit of \$7.89 per head, or a 6.63% mark-up of the total cost.

There is no U.S. pork retailing cost data to directly compare with the data collected in China. The closest is the wholesale-to-retail margin, which is at \$3.58 per kilogram. It should be noted, however, that this margin includes the mark-up, and that the retail

product is not very comparable since there is more trimming of fat and deboning in the United States.

Table 10 compares the retail prices of specific cuts and offals between China and the United States. As was cited in an earlier study by Hayes and Clemens (1997), U.S. and Chinese consumers are strongly complementary in their purchases of pork. That is, they each like the parts of the animal the other dislikes. This is evident in the current data in which U.S. retail prices are much higher than prices in China for muscle meat but the reverse (i.e., lower) is true in the case of variety meat products. For example, the price of tenderloin in China is only 24% to 29% that of the price of tenderloin in the United States. For the other cuts of muscle meat, prices in China are 30% to 57% that of the prices in the United States. In contrast, prices of variety meats in China are 1.10 to 13.44 times higher than U.S. prices (with the exception of ears).⁷ For example, hocks are five times more expensive in China and liver and kidneys are six and nine times more expensive, respectively. Within China, a weighted average price of all pork and all offals show that the price of muscle pork meat is only 1.48 to 1.51 times higher than pork offals. The price ratio of pork muscle to variety meat is much higher in the United States.

Distribution of the Consumer Dollar

Table 11 presents prices at different stages in the commercial pork value chain. Caution should be taken in interpreting the levels since adjustments have been made both in the U.S. and China numbers that may not be consistent at each stage across countries but is consistent across stages within a given country.

The distribution of the retail value is very different between the United States and China. Obviously, there is more value added to the pork as it leaves the farm in the United States compared with China. The farmer share of the retail value is only 21.29% in the United States, while it is more than triple that in China, accounting for more than half of the retail value at 64.06%. The biggest share of the retail value in the United States is accounted for by the wholesale-to-retail spread at 62.38%, while this is only 35.94% in China. Consumers' preference for quick, easy-to-prepare convenience foods is thought to drive the higher demand for food marketing services in the United States. In the year 2000, 47% of the total marketing bill was labor cost. In contrast, the lower de-

mand for convenience and cheap labor in China helps to explain the wide differential on the wholesale-to-retail spread between the two countries.

Conclusion and Implications

Of the three main hog production systems in China, the commercial sector is the least studied. Moreover, there has been very little attention given to the processing and distribution component of the commercial pork value chain. The purpose of this case study is to fill this information gap and provide a good picture of the commercial pork value chain in China, with the end goal of identifying where China may derive its advantage over foreign suppliers of pork and what market opportunities, if any, are open to foreign suppliers.

Several factors will drive the trend toward more commercialization of the pork value chain in China in the future, including the rising cost of adopting new technologies, likely pockets of labor shortage and the resulting rise in wages, and increasing demand for better food quality and safety by supermarkets and final consumers. As commercialization of the hog sector proceeds, the production of pigs in China will increasingly become like that of developed countries. The estimated cost differential in this case study is only \$0.057 per kilogram. However, even if China's production cost converges with that of developed countries, with commercialization, significant cost differences still remain in the processing of pigs and the distribution of meat. The labor-intensive nature of these marketing services may allow China to remain competitive in pork muscle meat.

There are several market opportunities that are open to foreign suppliers in China. The most promising market opportunity is the variety meats category, in which the price differential is the largest one favoring imports. However, according to China's official World Trade Organization schedule, the import of variety meats is still charged the higher duty rate of 20% compared to the 12% rate imposed on pork muscle imports. On top of the high duty, a 13% value-added tax is added. Some concern has been raised in the past on whether the value-added tax is uniformly applied to both imports and domestic products. Finally, the fast-growing Western family restaurant and higher-end dining sector may offer another market opportunity for high-quality imported pork.

Tables

TABLE 1. Level of per capita meat consumption in China

	Late 1980s	Early 1990s	Late 1990s	Early 2000s
Meat	Kilograms per person per year			
Beef	0.8	2.1	3.6	4.7
Pork	18.2	24.7	29.8	34.3
Broiler	1.8	4.1	6.8	7.5
Total	20.8	31.0	41.3	47.8

Source: FAPRI 2005.

TABLE 2. Growth of per capita meat consumption in China

	Proportion of Total		Growth		
	Late 1980s	Early 2000s	Early 1990s	Late 1990s	Early 2000s
Meat	Percent				
Beef	4.04	9.82	144.71	76.96	28.85
Pork	87.42	71.91	35.54	20.83	15.20
Broiler	8.54	15.62	133.26	65.04	8.94
Total	100.00	100.00	49.02	33.15	15.60

Source: Computed.

TABLE 3. Pork production share by scale of operation

Production System	1985	1993	1996	2002	2003
Household (< 500)	97.50	96.50	95.30	90.05	89.29
Commercial (>= 500)	2.50	3.50	4.70	9.95	10.71
500 ~ 2,999				4.81	5.55
3,000 ~ 9,999				2.69	2.65
10,000 ~ 49,999				2.11	2.16
Above 50,000				0.34	0.36

Source: Somwaru, Zhang, and Tuan 2003; Attache Report 2002-2003.

TABLE 4. Characteristics of a commercial pig production farm in China

Land Area (acres)	3.3
Fixed Assets (US\$)	2,844,036.0
Workers (number)	60.0
Administrative and sales	10.0
Laborer	50.0
Production (number hogs)	15,000.0
Technical parameters	
Mortality rate (%)	1.5
Depreciation rate (%)	5.0
Beginning weight (kilograms)	25.0
Ending weight (kilograms)	90.0
FCR (index)	3.0

Source: MATRIC China survey.

TABLE 5. Comparison of cost of pork production (in US\$ per kilogram)

	China		United States		Difference
	Cost (\$/kg)	Share (%)	Cost (\$/kg)	Share (%)	
Revenue	0.797		0.721		0.076
Cost					
Feeder pig	0.268	31.763	0.333	36.903	-0.064
Feed cost	0.314	37.163	0.355	39.357	-0.041
Utilities	0.013	1.588	0.009	0.968	0.005
Medical	0.013	1.588	0.008	0.855	0.006
Mortality	0.008	0.953	0.014	1.571	-0.006
Depreciation	0.105	12.462	0.102	11.326	0.003
Land rent	0.006	0.741	0.000	0.000	0.006
Overhead	0.069	8.153	0.034	3.756	0.035
Transportation	0.036	4.288	0.017	1.880	0.019
Labor	0.011	1.301	0.031	3.384	-0.020
Total	0.845	100.000	0.902	100.000	-0.057
Profit	-0.048		-0.181		0.133

Source: MATRIC China survey and Lawrence 2002.

TABLE 6. Characteristic of commercial pork processing firms

	Beijing	Shanghai
Land area (acres)	10.00	16.67
Fixed asset (US\$)	4,228,601.00	1,812,257.00
Workers (number)	85.00	176.00
Administrative and sales	16.00	4.00
Workers	40.00	42.00
Supervisor	5.00	
Sales	24.00	130.00
Capacity (pigs per day)	3,000.00	556.00
Actual Use (pigs per day)	500.00	200.00
Utilization (%)	16.67	36.00
Live-to-carcass conversion (index)	0.81	0.85

Source: MATRIC China survey.

TABLE 7. Cost and return of slaughter firms in China

	Beijing		Shanghai	
	Cost (\$/kg)	Share (%)	Cost (\$/kg)	Share (%)
Cost of pig for slaughter	0.797	89.77	0.797	92.28
Transport cost	0.027	3.02	0.013	1.49
Labor	0.005	0.61	0.005	0.62
Administrative expense	0.003	0.30	0.006	0.74
Taxes	0.020	2.27	0.005	0.60
Depreciation	0.016	1.76	0.022	2.56
Utilities	0.004	0.50	0.002	0.22
Sales	0.016	1.75	0.013	1.49
Total	0.888	100.00	0.864	100.00
Revenue	0.974	100.00	1.016	100.00
Pork	0.823	84.50	0.948	93.30
Other	0.151	15.50	0.068	6.70
Profit	0.086	9.64	0.152	17.59

Source: MATRIC China survey.

TABLE 8. Cost and return of a retailer in Beijing

	Weight (kg/pig)	Share (%)	Price (\$/kg)	Value (\$/pig)	Share (%)
Cost					
Material					
Pork	61.30	81.34	1.21	74.06	71.32
Others	14.06	18.66	0.97	13.59	13.09
Sales expense				10.76	10.36
Labor				4.83	4.65
Overhead				0.60	0.58
Total	75.36	100.00		103.85	100.00
Revenue					
Fore end	13.25	17.58	1.40	18.55	16.85
Rear end	15.75	20.90	1.57	24.73	22.46
Fat-streaked pork	13.00	17.25	1.30	16.90	15.35
Tenderloin	1.00	1.33	2.66	2.66	2.42
Full loin	4.00	5.31	1.93	7.72	7.01
Joint	2.50	3.32	1.09	2.73	2.47
Spareribs	6.00	7.96	2.42	14.52	13.19
Cavity bone	4.00	5.31	1.21	4.84	4.40
Pork hock	1.80	2.39	1.57	2.83	2.57
Tail bone	0.25	0.33	0.97	0.24	0.22
Head	4.00	5.31	0.72	2.88	2.62
Tongue	0.50	0.66	1.31	0.66	0.59
Stomach	0.75	1.00	1.50	1.13	1.02
Lard	1.50	1.99	0.77	1.16	1.05
Heart	0.50	0.66	1.25	0.63	0.57
Liver	1.00	1.33	1.20	1.20	1.09
Lungs	1.25	1.66	0.97	1.21	1.10
Intestines	1.50	1.99	1.21	1.82	1.65
Ear	0.25	0.33	1.45	0.36	0.33
Kidney	0.50	0.66	1.60	0.80	0.73
Feet	2.06	2.73	1.25	2.58	2.34
Total	75.36	100.00		110.12	100.00
Profit				6.27	

Source: MATRIC China survey.

TABLE 9. Costs and returns of a retailer in Shanghai

	Weight (kg/pig)	Share (%)	Price (\$/kg)	Value (\$/pig)	Share (%)
Cost					
Pork	67.05	82.76	1.43	95.99	80.66
Others	12.65	17.24	0.55	6.98	5.87
Sales expense				7.59	6.38
Labor				4.83	4.06
Overhead				3.62	3.04
Total	79.70	100.00		119.01	100.00
Revenue					
Shoulder	11.87	14.89	1.67	19.82	15.62
Chops	14.16	17.77	1.93	27.33	21.54
Tenderloin	9.75	12.23	2.15	20.96	16.52
Square meat	0.47	0.59	3.14	1.48	1.16
Hind leg	8.41	10.55	1.68	14.13	11.13
Spareribs	6.00	7.53	1.84	11.04	8.70
Feet	2.82	3.54	1.16	3.27	2.58
Knuckle	1.84	2.31	1.33	2.45	1.93
Pork hock	9.68	12.15	0.72	6.97	5.49
Soup ribs	0.23	0.29	0.97	0.22	0.18
Tailbone	1.82	2.28	1.67	3.04	2.40
Backbone	0.30	0.38	1.40	0.42	0.33
Fat with rind	4.00	5.02	0.69	2.76	2.17
Trimming	0.50	0.63	1.80	0.90	0.71
Lard	1.00	1.25	2.14	2.14	1.69
Liver	0.49	0.61	0.97	0.48	0.37
Lungs	0.30	0.38	2.05	0.62	0.48
Intestines	0.70	0.88	1.57	1.10	0.87
Heart	1.30	1.63	0.85	1.11	0.87
Stomach	1.50	1.88	1.64	2.46	1.94
Kidney	0.50	0.63	2.42	1.21	0.95
Feet	1.21	1.52	1.67	2.02	1.59
Knuckle	0.85	1.07	1.16	0.99	0.78
Total	79.70	100.00		126.90	100.00
Profit				7.89	

Source: MATRIC China survey.

TABLE 10. Retail price comparison

	United States	Beijing	Shanghai	Beijing	Shanghai
	US\$ per kilogram			U.S.-China Ratio	
Muscle meat					
Tenderloin	10.89	2.66	3.14	0.24	0.29
Shoulder	2.91	1.40	1.67	0.48	0.57
Ham	3.92	1.57	1.93	0.40	0.49
Ribs	6.05	2.42	1.84	0.40	0.30
All pork		1.56	1.84		
Offals					
Ears	1.68	1.45		0.86	
Hearts	0.44	1.25	2.05	2.84	4.66
Hocks	0.31	1.57	1.67	5.06	5.39
Stomach	0.55	1.50	2.14	2.73	3.89
Tongues	1.19	1.31	1.80	1.10	1.51
Kidney	0.18	1.60	2.42	8.89	13.44
Livers	0.20	1.20	1.57	6.00	7.85
Lungs	0.09	0.97	0.85	10.78	9.44
Feet	0.32	1.25	1.67	3.91	5.22
All offals		1.05	1.22		
Meat:offal		1.48	1.51		

Notes: Prices of pork offals in the U.S. are taken from the “USDA By-product Price Report” for November 18, 2002 (USDA-AMS 2002). Prices of kidney, livers, and lungs are pork pet foods FOB supply point. The rest are FOB central U.S. basis. Prices of muscle meat in the U.S. are taken from the USDA scanner database (USDA-ERS n.d.).

TABLE 11. Price spread and share of retail revenue

	United States	Beijing	
		Actual	Adjusted
Price-cost			
Cost	0.92	0.85	
Farm	1.22	0.80	0.94
Wholesale	2.16	0.94	0.94
Retail	5.74	1.47	1.47
Spread			
Total	4.52	0.67	0.53
Wholesale-retail	3.58	0.53	0.53
Farm-wholesale	0.94	0.14	0.00
Share of retail revenue			
Wholesale-retail	62.38	35.94	35.94
Farm-wholesale	16.33	9.70	0.00
Farmer share	21.29	54.36	64.06
	100.00	100.00	100.00

Source: MATRIC China survey.

Notes: United States: Retail value is the estimated weighted average of BLS prices of retail cuts from pork carcass. The value of wholesale quantity is equivalent to 1 kilogram of retail cuts. The market value to the producer for 1.869 kg of live animal is equivalent to 1 kilogram of retail cuts less a portion of gross farm value attributed to edible and inedible by-products.

China: The farm price is adjusted to a comparable retail price. An adjustment using a carcass-retail conversion factor would make the farm value exceed the wholesale value. Therefore, an adjustment factor was chosen to equalize the two values. The retail value is the weighted average of all retail cuts. All others are actual reported values.

Endnotes

1. Comparability based on the size of operation between the farm in China and the one in the United States is not assured.
2. Also, the Chinese government's policy of importing soybeans to support the domestic crushing sector has resulted in surplus soymeal supply in China, reducing the upward pressure on feed prices.
3. Farms of similar size in the United States sold their hogs within 50 miles (18%), 50 to 99 miles (21%), 100 to 149 miles (26%), and 150 miles and above (35%).
4. The United States does not report a separate land rent cost.
5. The fixed cost consists of the costs of replacement of plant and equipment, interest on investment, property taxes, and insurance.
6. A custom processing cost estimate in 2003 by Johnson and Miller was \$0.208 per kilogram.
7. Prices in China are on the retail level, while those in the United States are closer to wholesale prices.

References

- Bean, R. 2003. "Peoples Republic of China Retail Food Sector Report 2003." GAIN Report No. CH3825, Nov. 12. U.S. Department of Agriculture, Foreign Agricultural Service. <http://www.fas.usda.gov/gainfiles/200311/145986787.pdf> (accessed July 2005).
- Boessen, C., J.D. Lawrence, and G. Grimes. 2004. "Production and Marketing Characteristics of U.S. Pork Producers – 2003." Agricultural Economics Working Paper 2004-4, Department of Economics, Iowa State University. <http://www.econ.iastate.edu/faculty/lawrence/Final%20Draft%20Survey%20Article%202004.pdf> (accessed July 2005).
- Fang, C., and J.F. Fabiosa. 2002. "Does the U.S. Midwest Have a Cost Advantage Over China in Producing Corn, Soybeans, and Hogs?" MATRIC Research Paper 02-MRP 4. Midwest Agribusiness Trade Research and Information Center, Iowa State University.
- Food and Agricultural Policy Research Institute (FAPRI). 2005. *FAPRI 2005 U.S. and World Agricultural Outlook*. Staff Report 1-05. Food and Agricultural Policy Research Institute, Iowa State University and University of Missouri-Columbia.
- Foreign Agricultural Service, U.S. Department of Agriculture (FAS-USDA). 2005. "Peoples Republic of China Livestock and Products Semi-Annual 2005." GAIN Report No. CH5010. January 31. <http://www.fas.usda.gov/gainfiles/200501/146118612.pdf> (accessed July 2005).
- Gale, F. 2004. "Supermarket Development in China: Implications for US-China Trade in Food Products." Invited paper prepared for a conference, Supermarkets and Agricultural Development in China: Opportunities and Challenges, May 24-25, Shanghai, China.
- Johnson, A.S., and M. Miller. 2003. "Pork Processing profile." Agricultural Marketing Resource Center, Iowa State University. February. <http://www.agmrc.org/agmrc/commodity/livestock/pork/porkprocessingprofile.htm> (accessed July 2005).
- Hayenga, M.L. 1997. "Cost Structure of Pork Slaughter and Processing Firms: Behavioral and Performance Implications." Staff Papers Series #287, Department of Economics, Iowa State University. May.
- Hayes, D., and R. Clemens. 1997. "The Chinese Market for U.S. Pork and Pork Variety Meats. *U.S. Meat Export Analysis and Trade News*. Meat Export Research Center, Iowa State University.
- Lawrence, J. 2002. "Estimated Returns for Farrowing and Finishing Hogs or Producing Feeder Pigs in Iowa." Cooperative Extension Service, Iowa State University. <http://www.econ.iastate.edu/faculty/lawrence/EstRet/FA/FA02.pdf> (accessed July 2005).
- Pan, C., and J. Kinsey. 2002. "The Supply Chain of Pork: U.S. and China." Working Paper 02-01. The Food Industry Center, University of Minnesota.
- Somwaru, A., X. Zhang, and F. Tuan. 2003. "China's Hog Production Structure and Efficiency." Paper presented at the American Agricultural Economics Association annual meeting, Montreal, Canada, July 27-30.

U.S. Department of Agriculture, Agricultural Marketing Service. (USDA-AMS). 2002. USDA Market News, "By-Product Price Report." Nov. 18 (NW_LS440). Des Moines, IA. <http://www.ams.usda.gov/mnarchive/2002/nov/11%2D18%2D2002/nw%5Fls440.txt> (accessed July 2005).

U.S. Department of Agriculture, Economic Research Service (USDA-ERS). n.d. Retail scanner prices for meat, database. Livestock Marketing Information Center. <http://www.retail-lmic.info/CD/default.asp?ERSTab=3> (accessed July 2005).

Wiseman, P. 2005. "Chinese Factories Struggle to Hire; Rapid Development, Healthy Farm Economy Soak Up Workers." *USA Today*, Money Section, April 12, p. B.1.