Beefpacking Costs Are Lower for Larger Plants

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Beefpacking plants with annual capacities of 10,000 head or more slaughter over 95 percent of the federally inspected cattle slaughtered. The trend is toward fewer and larger plants, as the number of these size plants declined from 296 in 1980 to 159 in 1990. The 18 largest plants, each with an annual capacity of 500,000 head or more, accounted for over half the federally inspected cattle slaughter in 1990.

Large plants can slaughter beef at considerably lower cost than small plants due to significant economies of size. Larger plants also have a cost advantage in further processing activities (division of carcass into smaller cuts). Clearly, small beefpacking plants are under pressure to find ways to reduce costs or increase returns.

A computer simulation model was used to determine the impact of plant size (number of head processed per hour) on costs and returns under various operating assumptions. The model can quickly calculate how costs change

Larger Beefpacking Plants Have Lower Costs and Higher Profits Than Smaller Plants

Item and plant size (head per hour)	Slaughter only		Slaughter and process	
	One shift	Two shifts	One shift	Two shifts
	Dollars per head slaughtered			
Total costs for:				
10-hph plants	73.440	60.415	133.895	116.416
47-hph plants	41.230	35.171	89.768	81.094
75-hph plants	39.136	32.764	83.710	74.735
120-hph plants	36.311	30.714	78.379	70.916
210-hph plants	34.188	26.249	74.010	64.249
300-hph plants	31.741	24.704	70.259	61.578
Revenue minus costs for:				
10-hph plants	-62.280	-49.255	-59.305	-41.826
47-hph plants	-30.070	-24.011	-14.978	-6.304
75-hph plants	-17.976	-11.604	.880	9.855
120-hph plants	-15.151	-9.554	6.211	13.674
210-hph plants	-13.028	-5.089	10.580	20.341
300-hph plants	-10.581	-3.544	14.331	23.012
	Number			
Employees for:				
10-hph plants	34	58	60	108
47-hph plants	70	125	160	302
75-hph plants	93	167	209	396
120-hph plants	129	237	312	598
210-hph plants	186	346	479	926
300-hph plants	250	466	648	1,255

Note: Estimates are from simulated data for research purposes and do not necessarily reflect actual costs or returns from any existing plants.

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Warehouse Clubs and Retail Discounters May Stimulate Case-Ready Beef Sales

Case-ready, vacuum-sealed individual beef cuts have been available for a few years. *Supermarket Business* reports that the Excel meatpacking company, which had supplied such cuts to as many as 1,000 supermarkets since 1986, suspended their program for further evaluation and study.

According to an Excel spokesperson, a major problem with case-ready, vacuum-sealed beef is getting consumers to make their first purchase, because of its dark red or purple color. Many consumers associate these colors with spoiled meat. Case-ready, vacuum-sealed beef is not bright red because it is deprived of oxygen. But the meat turns bright red once the seal is broken. Many supermarket meat managers believe that it would be too difficult and expensive to convince consumers that the purple color is indeed fresh.

The breakthrough in marketing case-ready, vacuum-sealed beef may come from warehouse clubs and other retail discounters. Professor Jack Allen, of Michigan State University, says this product offers discount retailers the opportunity to compete against supermarkets for beef sales. Discount retailers do not have the facilities to process beef so case-ready, vacuum-sealed beef allows them to enter the meat trade. K-mart has test-marketed the product.

With case-ready, vacuum-sealed beef, individual cuts are sealed in a vacuum pouch (without oxygen) at a packing plant, leaving the retailer to unload the shipping containers and stock the meat cases. Costs are thereby reduced: the retailer does not need expensive meatprocessing equipment and labor for handling or wrapping the meat. Costs are further reduced because supermarkets can substitute higher paid butchers with fewer, and lower paid, stocking help.

Case-ready, vacuum-sealed beef can also increase sales. A study sponsored by the National Livestock and Meat Board found that "shrink" (lost revenue from markdowns and price differentials on cuts that are at the end of their shelf life) in a supermarket meat department with $30,000 in weekly sales would be $720 per week—more than four times the weekly operating income of $170. With a longer shelf life, case-ready, vacuum-sealed beef would have less shrink.

The study also found that lost sales due to out-of-stock items were high for fresh beef cuts. Nine of the 39 cuts studied were out of stock 40 percent of the time or more. Keeping the meat case stocked with vacuum-sealed beef should be easier, as workers can move the desired cuts from inventory instead of waiting for the butchers to cut additional pieces.

A more subtle reason for not offering case-ready, vacuum-sealed beef may be the supermarket meat manager. Meat managers often focus on gross margins rather than on net profits. Even though vacuum-sealed beef has lower handling and preparation costs, meat managers mark up vacuum-sealed beef as much as boxed beef. Since meat managers pay a higher price for case-ready, vacuum-sealed beef, it is priced higher than plastic-wrapped boxed beef, which reduces consumer purchases.

By taking into account lower costs, reduced shrink, and fewer out-of-stocks, the markup for vacuum-sealed beef can be reduced, which would lower its price to consumers and still generate as much profit as boxed beef.

However, labor contract obligations may reduce the incentive for meat managers to make the switch to vacuum-sealed beef. The existence of such contracts means that supermarkets may not be able to substitute lower cost stocking help for butchers.

—Stephen L. Ott

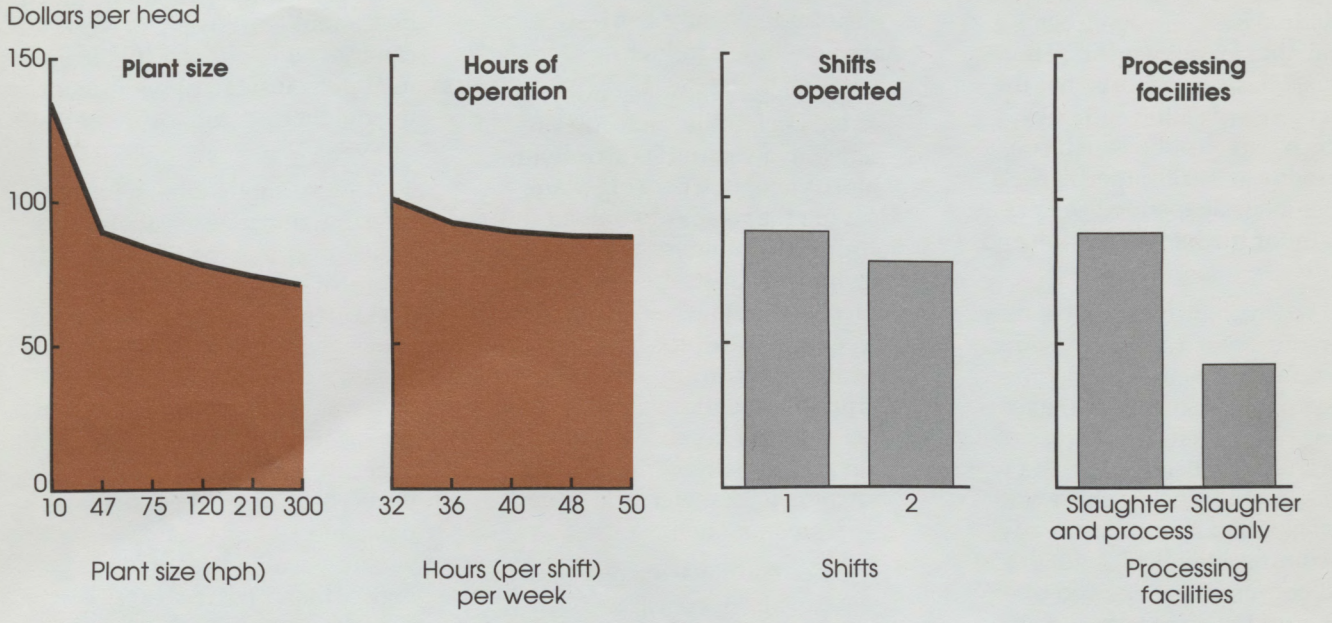
due to simulated plant size, number of shifts, and weekly shift operating hours. The change in costs and revenue from further processing (into boxed beef, for example) also can be estimated.

Large Plants Have Many Economic Advantages

Important economies of size exist. A 300-head-per-hour (hph) plant's slaughtering cost is almost 60 percent lower than a 10-hph plant and over 20 percent lower than a 47-hph plant (see table). Large plants have lower average fixed costs and require less labor per carcass. A 10-hph slaughtering plant requires 3.4 workers for each hph capacity, the 47-hph plant 1.5 workers, but the 300-hph unit needs only 0.8 workers.

Lower Packing Costs Are a Reflection of Economies of Size and Plant Utilization

Factors affecting production costs



Based on simulated plant: operating one shift, 40 hours per week, slaughtering and processing meat.

Based on simple average of six plant sizes, operating one shift, slaughtering and processing meat.

Based on simple average of six plant sizes, each shift operating 40 hours per week, slaughtering and processing meat.

Based on simple average of six plant sizes, operating one shift, 40 hours per week.

The advantage of size is demonstrated in other ways. Significant cost savings are possible by adding a second shift, as fixed costs are spread over twice as much output. But even with this savings, the smallest plants still have higher costs than a single shift 300-hph plant. A 120-hph plant with a second shift is about equal in cost to a single shift 300-hph plant.

Even the risk associated with uneven cattle supplies favors larger plants. A simulated 300-hph plant that has to close 1 day per week due to lack of cattle has costs similar to a 120-hph plant operating 5 days per week. Of course, if a smaller plant lacks cattle to slaughter, then its average fixed costs increase rapidly.

Smaller plants are further disadvantaged in revenues generated. Smaller plants may receive less per head than larger plants due to differing byproduct values. A minimum volume is needed before it is economical to process certain byproducts into salable commodities. For example, the simulated 10- and 47-hph plants do no edible rendering. In addition, the simulated 75- and 120-hph plants have facilities for edible rendering only if they do further processing (boxed beef).

Further Processing Increases Net Revenue

Beef slaughtering plants have gradually moved from selling carcasses to selling boxed beef, which involves cutting into primal and subprimal cuts before shipping. Dividing carcasses into cuts is less costly at packing plants (slaughtering plants with further processing) than at retail stores. Labor is more efficient because the cutting is done on a disassembly line, and wage levels are usually lower.

Net revenues increase for all size plants when they box as well as slaughter beef, because the in-

Computer Simulation Model Easily Calculates Slaughtering Costs

The ERS computer program, called "PACKER" (written in the BASIC interpreter language), translates detailed input data into simulated packer cost estimates. PACKER first divides the whole beefpacking plant or operation into 20 stages, ranging from procurement to kill floor to sales. Under each stage are up to 10 accounts, such as investment in facilities, wages and salaries, and supplies and containers. Each account can be further divided into up to 10 subaccounts, such as depreciation, interest, electricity cost, grading fees, salary fringe benefits, and others.

The model simulates any size plant for which data are provided. This article was prepared using data from six basic plant sizes (10, 47, 75, 120, 210, and 300 head per hour) for either one or two shifts per day. Five alternative work configurations are included: 32, 36, 40, 50, and 60 hours per week per shift.

Data for the simulated plants were obtained from a number of sources, including an earlier study by researchers from the University of California, several packing plants, and equipment manufacturers. Costs included provisions to meet USDA sanitation and other requirements for federally inspected slaughtering facilities.

The model develops simulated costs and returns, based on several assumptions that may or may not apply to a specific plant. It was designed to make comparisons of calculated costs for research purposes or to answer "what if" questions—not to replicate or prescribe operational decisions for any particular firm or plant. Individual users can easily input their own data to develop specific cost estimates.

For more information about the model see *Beefpacking and Processing Plants: Computer-Assisted Cost Analysis*, AGES 9115, by Lawrence A. Duewer and Kenneth E. Nelson, USDA, ERS, April 1991.

Order your copy by calling toll-free 1-800-999-6779. The report and an accompanying 5.25" disk of the program and data are available at cost from the same number.

crease in receipts for boxed beef is greater than the costs of cutting and boxing. Given the price and cost assumptions made, our computer model indicated that net revenue goes from negative to positive when boxed beef processing is added for all but the two smallest plants.

As in slaughtering, there are also economies of size in boxed beef processing. For example, a 300-hph plant can box beef for less than $40 per head, while the cost is almost $60 per head for a 10-hph plant. However, the decrease in cost is not as great on a percentage basis for boxing beef as it is for slaughtering.

Ways Smaller Plants Can Compete

For smaller plants to compete with larger ones, they should first fully utilize their present capacity. Costs can be significantly reduced by adding a second shift or by operating more hours per shift. For example, the 47-hph boxed beef plant can reduce costs by 1.4 percent by operating on Saturdays and by 9.7 percent if a second shift is added.

Smaller plants can also increase revenues by developing niche markets for certain types of beef slaughter or by providing special services not offered by the largest plants. Niche markets may include specially branded beef or unique types of beef, such as lean, natural, or gourmet. Extra trimming or portion control cuts are special services that can be provided. Daily delivery or delivery of small quantities is another example. ■