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The Pennsylvania Food Processing Industry Importance and Future Issues

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Introduction

The Pennsylvania Food Processing Industry plays an essential role in the state's economy. In addition to the direct employment of approximately 90,000 people, the industry is also the primary market for the majority of the state's agricultural production. Furthermore, the industry provides an important linkage between the consumers of the northeastern United States and their food supply. Pennsylvania has a greater presence in food processing than either its agricultural production or it population would justify. This is the result of historical activity, past successes, and an advantageous location -Pennsylvania is called the "Keystone State" for good reasons. However, the food industry is undergoing substantial changes. The future of the industry in Pennsylvania will in part be determined by its response to these changes. This report is an attempt to gain a better perspective on the industry and its current situation so that it might be better able to respond to the demands of the 21st century.

This report contains two main parts, an overall description of the size and shape of the industry, and a section containing background on a variety of current and likely future industry issues based on a survey of the industry. These issues include labor availability and quality, water availability and quality, water and solid waste disposal, agricultural inputs, energy, and competitiveness.

Industry Issues

The information in this report is largely the result of a survey of industry members. This survey was conducted as part of a contract with the Pennsylvania Department of Agriculture, in cooperation with the Pennsylvania Food Industry Council. The goal of the survey was to gain a better understanding of the present and future status of the Pennsylvania Food Processing Industry.

The survey was sent the 1462 food processing operations listed in the 1988 Harris directory. Of these operations, approximately 100 either were out of business, had moved too long ago to still have their mail forwarded, were no longer involved in food processing, or did not consider themselves to be food processors. A number of the latter are feed mills, which are considered to be food processing firms by the Standard Industrial Classification (SIC) used by the U.S. Department of Commerce and most others, but do not sell any products for human consumption. As will be discussed subsequently, the inclusion or exclusion of such firms in the industry will not lead to much confusion, since their characteristics are unique in any case.

Each firm was sent a questionnaire (shown in the Appendix at the end of the paper) accompanied by a cover letter from the Pennsylvania Food Industry Council, and a postage-paid return envelope. The mailing coincided with publicity in trade association publications. Following the approach suggested by Dillman,[1] a follow-up post card and then a second mailing of the questionnaire were sent to non-respondents. After those surveyed had an opportunity to respond to these requests,

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[1] Don A. Dillman. Mail and Telephone Surveys: The Total Design Method. New York: John Wiley & Sons, Inc. 1978.

certain large firms that had not responded were contacted by telephone and asked to cooperate. In total 358 usable questionnaires were completed, about 25 percent of the firms surveyed. The responding firms employ approximately 27,500 people, or about 30 percent of the industry's work force.

Food Processing in Pennsylvania and the U.S.

The food industry has performed well in the 1980s, both nationally and statewide. Two vital indicators of the importance of an industry to the economy of the nation or a state are its contribution to employment and value-added. The most recent data indicate that in 1986 total value added for the food processing industry in Pennsylvania was $6.5 billion, or 12.3 percent of the total for all manufacturing industries in the state. The most recent data on employment in food processing indicate it provides 8.7 percent of all manufacturing jobs in Pennsylvania. The industry in March 1989 ranked fourth in total employment among the 20 major manufacturing industries in the state - very close behind the second and third ranked and historically dominant primary and fabricated metals industries (Table 1).

The evolving importance of the food processing industry in both the state and the nation is evident in employment trends in the 1980s. The economic performance of both the U.S and Pennsylvania over the decade can be split into a period of "recession and recovery" (1980-86) and one of expansion (1986-89). During 1980-86,

Table 1: Top ten major manufacturing industries in employment in Pennsylvania March 1989

Rank	Industry	Employment March 1989 (000s)
1	Machinery, except electrical	109.9
2	Primary metals	83.2
3	Fabricated metals	92.8
4	FOOD & KINDRED PRODUCTS	91.2
5	Electric & electronic equipment	90.1
6	Printing & publishing	83.5
7	Apparel & textile products	80.5
8	Chemicals & allied products	59.1
9	Transportation equipment	58.2
10	Stone, clay, & glass products	47.7

Source: Pennsylvania Department of Labor & Industry.

total employment expanded slowly in the nation but contracted slightly in the state. Total manufacturing employment declined slowly in the nation and precipitously in the state. Over the six years jobs in food processing declined in both Pennsylvania and the nation, but at a slower rate than in all manufacturing (Figure 1).

In contrast, from 1986-89 total employment expanded at a moderate pace in both the state and nation, while manufacturing jobs increased slowly in the nation and very slowly in Pennsylvania. The rate of job growth in food processing in the

nation was close to the growth rate for all manufacturing. However, the rate of food industry job expansion in Pennsylvania exceeded the national pace and state manufacturing employment growth over the three years. This suggests that at least individual food processing industries have a locational advantage in the Commonwealth and a potential for future expansion.

Indeed, the most current data indicate that of the 20 industries in the manufacturing sector, food processing was the third ranked industry in contributing new jobs to the state's resurging economy from 1986-88. It was well outdistanced by lumber and wood products, and printing and publishing - but not the metals and other durable goods industries (Table 2).

Recent Trends In Major Food Processing Industries in Pennsylvania:

Food processing is highly varied in Pennsylvania. A wide variety of products are produced by firms of various sizes. When food processing is divided into the nine sub-industries using the Standard Industrial Classification Codes (SIC) the diversity of the industry can be seen. In 1988, these industries ranged in size from bakery products (SIC 205) commanding over 18 percent of all food processing employment to fats and oils (SIC 206) with less than one percent. Total employment in food processing in the state in 1988 was divided rather equally among six industries - including meat products, sugar/confectionery products, preserved fruits and vegetables, and dairy products (Figure 2). This diversity in the industry mix of food processing in Pennsylvania suggests there may be some variation in the problems firms in specific industries currently face. The economics of these parts of the food

industry differ considerably from one another, which can have implications for future growth, profitability, and employment.

The performance of these nine sub-industries in the 1980s in Pennsylvania is also important to note. In the "recession-recovery period" of 1980-86, even though the employment decline in food processing as a whole was much less severe than for many other major manufacturing industries, seven of the nine industries experienced a loss in jobs. The exceptions were grain mill products (SIC 204) and miscellaneous food products (SIC 209). Significantly, there was an expansion of some 1,200 jobs in the miscellaneous food products industry. This was likely due to the rapid expansion in the output of new food products (Figure 3).

In contrast, from 1986-88 six of the nine industries added jobs. Firms in the preserved fruits and vegetables industry led the way with over 950 new jobs, followed by meat products with nearly 850.

Recent Trends in Selected Individual Industries in Pennsylvania

It was mentioned above that two indicators of national or state trends in an industry are employment and value added. Both measures are important. Value added, especially value added per worker, measures changes in output and efficiency - both of which can go up while employment is holding steady or actually declining. Individual firms in most industries need to improve their efficiency over time to remain competitive. This has been the pattern in the food processing industry as a whole in the United States in the past decade or so.

Figure 1: Annual Change in Employment

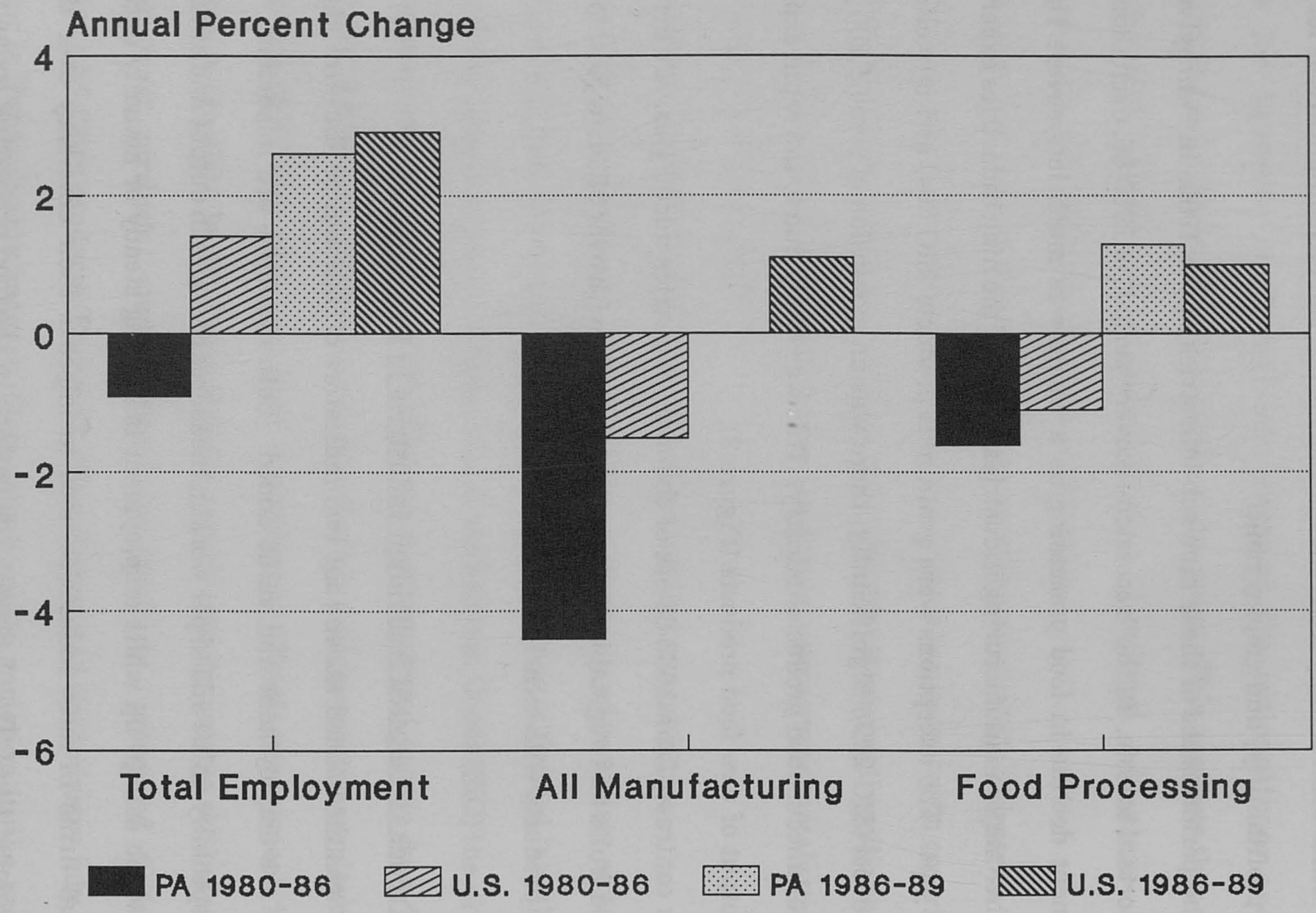


Table 2: Major manufacturing industries creating over 1,000 new jobs in Pennsylvania, March 1986 - 88

Rank	Industry	New Jobs March 1986-88
1	Lumber & wood products	5811
2	Printing & publishing	5757
3	FOOD & KINDRED PRODUCTS	2196
4	Rubber & miscellaneous plastics	2162
5	Fabricated metals	1438
6	Furniture & fixtures	1390
7	Transportation equipment	1117
8	Textile mill products	1074
9	Miscellaneous manufactures	1073
10	Paper & allied products	1015

Nationally the number of establishments in food processing declined sharply, and number of production workers declined moderately from 1977-87. However, over the same period both total real value added in the industry and real value added per worker increased significantly (Figure 4). Real value added is value added in constant dollars, i.e. with the effects of inflation removed.

Unfortunately, at the time of publication of this report comparable value added data were not yet available for the food processing industry as a whole in

Pennsylvania. However, data on 12 important 4-digit industries were accessible. Recent trends in establishments, production workers, and real value added in these industries shed important additional insight on what has been happening within the food processing industry in the Commonwealth. Often the trends in the 12 industries parallel what has been happening nationally to the food processing industry.

Looking first at the number of establishments and output per establishment in the 12 industries, two significant trends are apparent from 1977-87. First, each of the 12 industries experienced a decline in number of establishments over the ten year period. Second, most of the industries in Pennsylvania and all of the industries nationally achieved increases in real value added per establishment (Table 3).

All this suggests a shift in the industries to larger and presumably more efficient operations. In this connection it should be noted that in only four of the 12 industries was average real value added per establishment higher in Pennsylvania than in the nation in 1987. The lag in value added per establishment in the state could be due to the special product mix of establishments within the industries in the state versus the nation, or could indicate a need for establishments in the state to expand the output and efficiency of individual operations even further, and probably is due to both.

Figure 2: Food Industry Employment

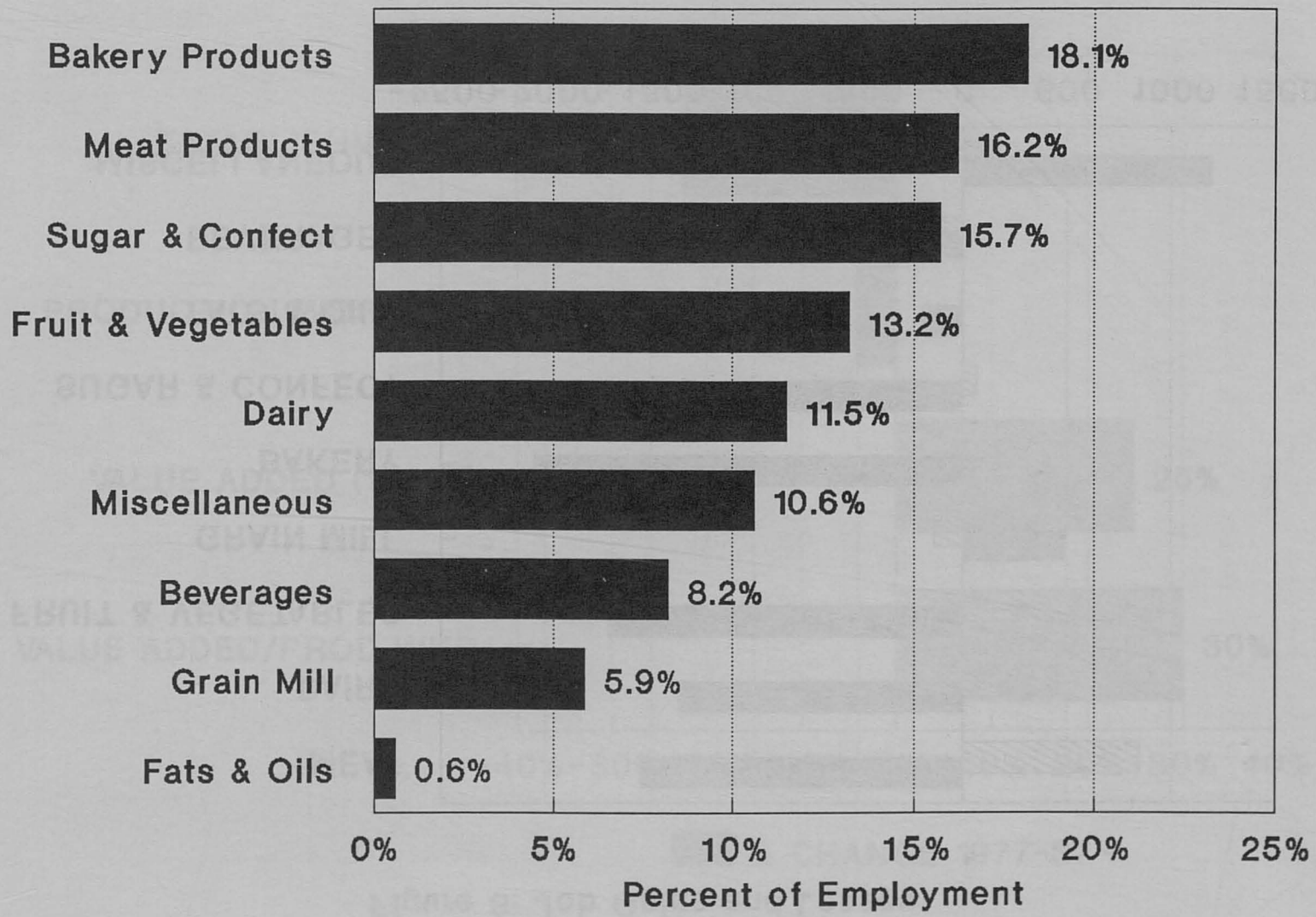


Figure 3: Job Gains and Losses

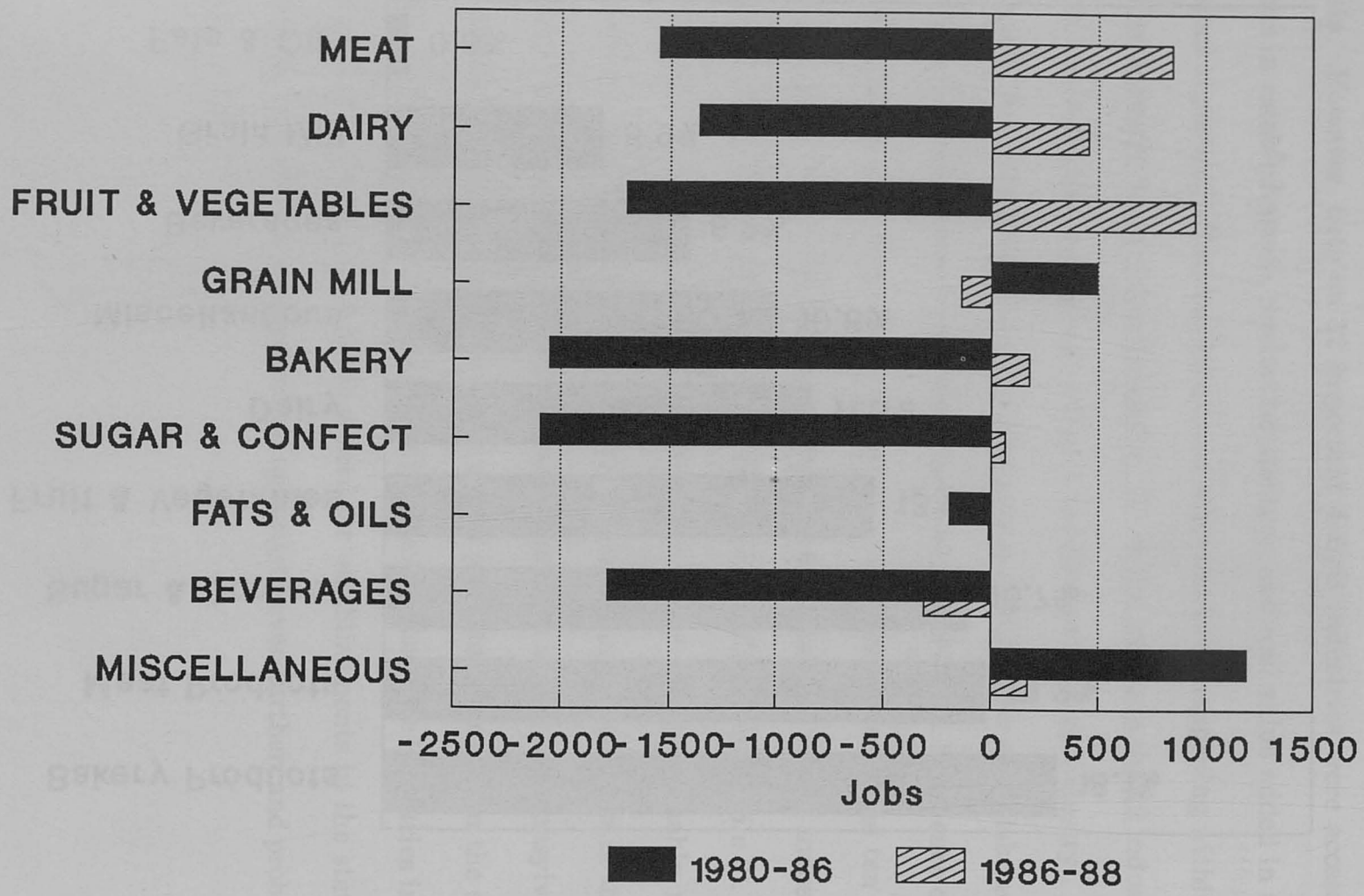
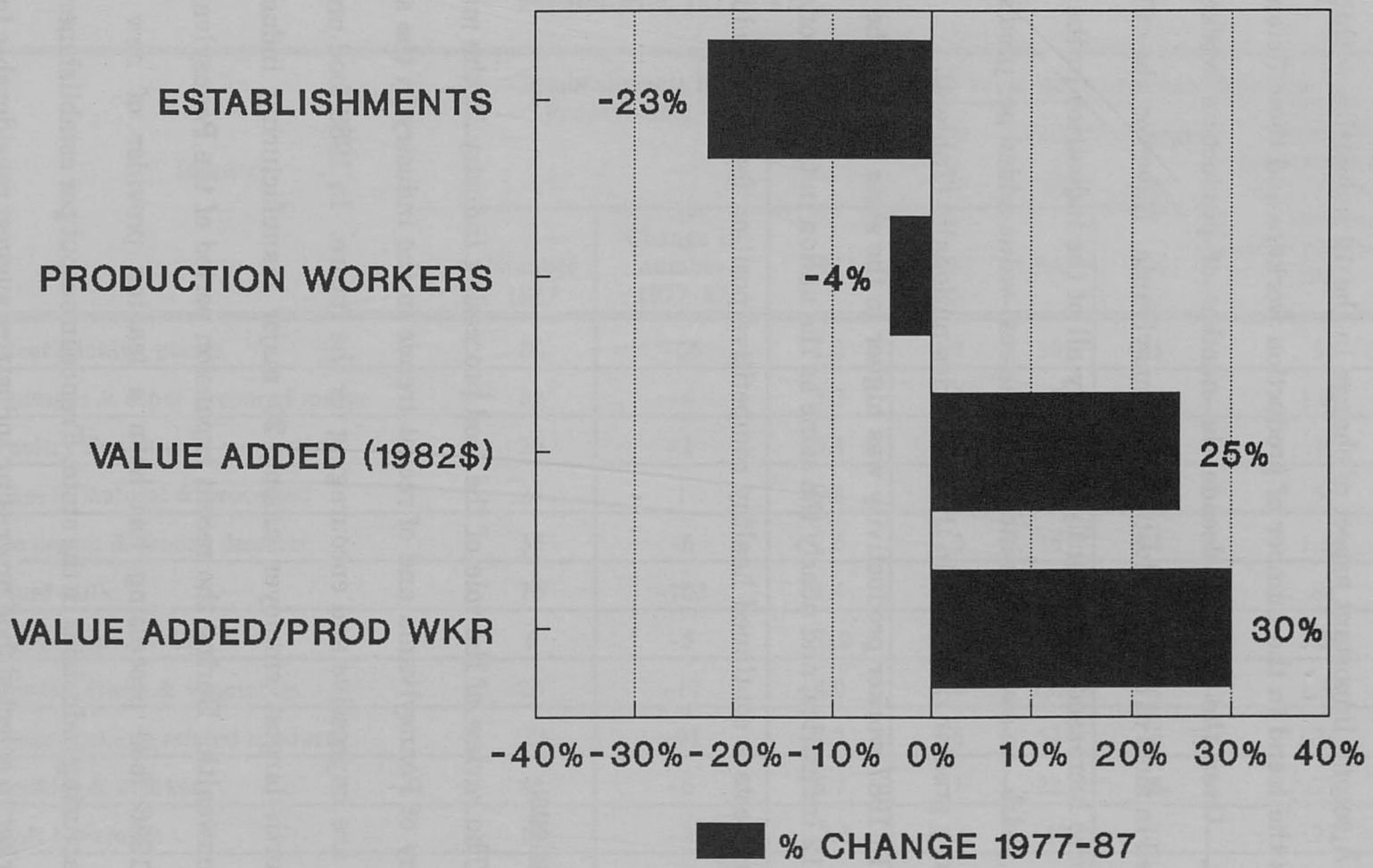


Figure 4: Changes in the Food Industry
1977-87



A second important aspect of change in the 12 industries within the state to note is the trend in the number of production workers and the efficiency of worker output. Over the 1977-87 decade the number of production workers employed declined in most of the 12 industries in Pennsylvania. However, the efficiency of the workforce increased significantly in nearly all of the industries in the state during the 10 years. In seven of the industries the real value added per production worker grew at a greater rate than in the industries nationally (Table 4).

In 1987 worker productivity was higher in the state than in the nation in six of the 12 industries, and nearly the same as the nation in two additional industries. This suggests a continued healthy competitive position for these industries in the state.

Conclusions:

The review of the role of the food processing industry in the manufacturing economy of Pennsylvania and of recent trends in the industry in the state and the nation are impressive and encouraging for the future. In 1989 food processing was the fourth largest employer among 20 major manufacturing industries in the Commonwealth. During the recent expansion period of the Pennsylvania economy since 1986 food processing has been a leading provider of new jobs among manufacturing industries in the state. Trends in output per establishment and output per worker in selected food processing industries suggest considerable improvements in efficiency over the past decade.

Table 3: Changes in number of establishments and real value added per establishment in selected food processing industries in Pennsylvania, 1977 - 87.

SIC	Industry	Establishments in Pennsylvania		"Real" value-added per establishment (Pennsylvania)		Percent change 1977 - 1987		Ratio of Pennsylvania to U.S. Values added per establishment - 1987
		Number 1987	Change in number 1977-87	1977	1987	PA	US	
2011	Meat packing plants	80	-66	1.2	1.7	39	35	.55
2013	Sausages & other prepared meats	82	-4	3.2	3.0	-7	26	1.06
2015	Poultry slaughter & processing	26	-1	3.8	5.3	39	114	.70
2022	Cheese, natural & processed	24	1	0.8	1.9	128	95	.54
2024	Ice cream & frozen desserts	35	-6	2.6	3.0	16	28	1.50
2026	Fluid milk	76	-103	1.4	4.0	193	99	.81
2032	Canned specialties	6	-5	20.0	59.6	198	28	5.56
2033	Canned fruits & vegetables	25	-17	4.0	9.4	133	71	1.32
2051	Bread, cake & related products	155	-91	2.3	3.6	53	46	.94
2052	Cookies & crackers	45	-6	5.7	7.1	22	18	.77
2082	Malt beverages	12	-2	17.8	10.6	-40	57	.23
2086	Bottled & canned soft drinks	66	-71	2.0	3.9	91	126	.62

Source: U.S. Census of Manufacturers.

In brief, the food processing industry is a very important and vital part of the Pennsylvania economy. The remainder of the report looks at problems that may need to be addressed if future competitiveness of the industry is to be strengthened.

Labor Availability and Quality

Pennsylvania's economy and, therefore, its labor markets can be viewed as having two separate components. The eastern part of the state, especially the southeastern part, has a growing economy with low unemployment. Much of the western part of the state has the reverse, high unemployment and a stagnant economy. The labor situation of food processors cannot be viewed separately from the labor markets in which they operate. The industry is located mainly in the southeastern quarter of the state, and it may be argued that it's vitality is a contributor to the economic vitality of the area.

Industry members were asked if they had trouble recruiting new employees. Of those responding, 39 percent said they did and 59 percent said they did not have trouble recruiting new employees. The firms were asked what types of jobs they had trouble filling. The responses are listed in Table 5. The breadth of responses indicates that virtually all jobs are difficult for some firms to fill, with 10 firms stating all jobs and other firms listing everything from unskilled and semi-skilled jobs to highly skilled processing, supervisory, and office jobs. In general, the jobs require a fairly specialized set of skills, although often the firms would train employees they felt had potential.

Table 4: Changes in number of production workers and "real" value add per production worker in selected food processing industries in Pennsylvania, 1977 - 87.

SIC	Industry	Production workers in Pennsylvania		"Real" value-added per production worker (Pennsylvania)		Percent change 1977 - 1987		Ratio of Pennsylvania to U.S. Values added per establishment - 1987
		Number 1987	Change in number 1977-87	1977	1987	PA	US	
2011	Meat packing plants	2.9	-0.9	47.6	47.4	-0.4	-7	0.99
2013	Sausages & other prepared meats	3.6	-0.5	67.8	68.8	2	6	1.08
2015	Poultry slaughter & processing	4.6	0.0	22.5	10.1	34	10	1.13
2022	Cheese, natural & processed	0.8	-0.4	15.8	56.1	255	30	0.68
2024	Ice cream & frozen desserts	1.1	-0.1	88.8	95.5	8	-7	1.22
2026	Fluid milk	2.1	0.0	101.7	126.1	24	10	0.99
2032	Canned specialties	3.0	0.0	73.4	119.1	62	47	1.03
2033	Canned fruits & vegetables	3.1	-0.3	50.1	112.4	124	59	1.36
2051	Bread, cake & related products	5.0	-2.3	78.7	110.6	41	27	1.07
2052	Cookies & crackers	3.7	-0.6	69.3	86.5	25	39	0.84
2082	Malt beverages	1.3	-0.7	124.3	98.2	-21	120	0.36
2086	Bottled & canned soft drinks	1.5	-0.5	139.0	170.7	23	47	0.83

Source: U.S. Census of Manufacturers.

The industry members were also asked to indicate (1) which skills required in their business are often lacking in job applicants and (2) which skills they would be interested in further training for their current employees. The response to these questions are summarized in Table 6. Particularly noteworthy is the high response to work reliability. The traditional work ethic was found lacking by nearly half of those responding. A second group of deficiencies that were commonly checked are also indicative of changes in our society. Over 20 percent of the respondents often found applicants lacking in basic math, basic English, basic reading, and communications, presumably all skills that should be found in any high school graduate. Apparently, the deficiencies in our education system are evident to food industry employers first hand.

Relatively few employers are interested in providing training in these areas for their own employees, perhaps instead choosing not to hire the undereducated in the first place if they can avoid it. Of course if most employers refuse to hire the undereducated, they are unemployed longer and more potential employers see these individuals than see their more highly educated counterparts. To the extent that this occurs, the number of respondents that indicated basic skills deficiencies were often found in their applicants would be greater than the portion of the labor pool that is deficient in basic skills. Regardless, the responding food firms commonly noticed applicants with deficiencies that should have been corrected by the primary and secondary education system. A variety of other skills were frequently found lacking in applicants, and firms were often interested

Table 5 : Types of Jobs Firms Have Trouble Filling	
Job	Number of Firms Mentioning Trouble
Accounting	1
All	10
Hourly Positions	1
Baker Helpers	5
Bakers	9
Bench Helper	1
Bottling Machine	6
Butcher & Meat Cutters	6
Candy Dipper	3
Chemist	1
Clerical	5
Computer	1
Cooking	2
Dependable	1
Dishwashers	1
Electrical	1
Equipment Tech	1
Executive Secretary	1
Factory	8
Labor	22
Low End	1
Maintenance	5
Manufacturing	3
Mechanics	2
Mix Room	1

Packers	6
Part-Time	2
Process Workers	3
Production Line	12
Professional	2
Quality Control	2
Restaurant	3
Sales	4
Sales Route	4
Sanitation	2
Seasonal Jobs	1
Semi-Skilled	3
Skilled	7
Skilled/Unskilled Labor	1
Some Shifts	3
Store Clerks	2
Supervisors	2
Truck Driver	18
Unskilled	2
Utility/Lab Job	1
Warehouse	1

Table 6 : Skills Lacking in Labor Pool		
Skill	Often Found Lacking in Job Applicants	Interested in Further Training for Current Employees
	Number of Firms Mentioning	
Word Processing	26	23
Computer Skills	49	45
Basic Math	104	34
Basic English	77	24
Basic Reading	77	23
Communications	88	51
Work Reliability	173	48
Principles of Supervision	78	52
Stress Management	22	24

in further training for current employees in these areas. One-fourth of the firms also indicated they had trouble with employee retention.

Water Usage

The firms surveyed were asked about their water usage, whether they have had any quality problems, and their water recycling efforts. The responses are best understood when broken down by industry. The 3 digit SIC codes will be used for this breakdown. In general, this combines similar firms and separates them from dissimilar firms.

The water usage by the food industry, adjusted to represent the entire industry by weighting usage by employment within a 3 digit SIC group, is presented in Table 7. In Table 7, the estimated total water usage, whether by industry or by the entire food processing industry, contains considerable error. The aggregate estimate for the industry in 1989 of somewhat less than 10 billion gallons is probably reasonable. Because all firms did not supply estimates for all years and because all industries are not equally represented in the 1986 and 1992 industry totals, the estimates for 1986 and 1992 are probably high. In general the parts of the industry that use a lot of water are trying to conserve it, mainly because the water availability may limit firm growth. Of firms that provided estimates for all three years, on average they expected water usage to grow, primarily because most of these firms expected to grow.

The firms were asked for their water usage by source. In Table 8 the distribution of usage by source for the responding firms is indicated. About two-thirds of responding firms use municipal water with most of the remainder using water from their own wells. Bakers and candy companies, who tend to be in cities, use mostly municipal water, while the remaining firms, which are more often located in rural areas or smaller towns, used more well and surface water. About one-sixth of the firms using municipal water and one-eighth of the firms using well water indicated they have had water quality problems (Table 9). In addition 5 percent of firms on municipal water and 7 percent on well water had faced availability problems. In another study of food industry water usage, all portions of the industry except the millers indicated water quantity control would present a problem for them.

The types of water quality problems encountered are listed in Table 10. The importance of these problems obviously depends on their degree and duration. Certainly hardness is more easily handled than some of the bacterial problems. In many parts of the industry little can be done by the firms if they have problems. Some problems can be treated at the plant level. Water is an essential ingredient in many of the products. Soft drinks or beer cannot be made without water. Many other firms use water for cleaning.

Table 7: Total Water Usage by Industry

	Year		
INDUSTRY	1986	1989	1992
	(million gals)		
MEAT	1753	1476	1549
DAIRY	2731	1817	2202
FRUIT & VEG	2394	2068	2359
GRAIN	120	115	380
BAKERY	1234	1201	872
CANDY	725	276	261
BEVERAGES	627	823	925
OTHER	1211	1457	1901
TOTAL	10794	9231	10447
TOTAL *	11364	9727	11637

*Uses aggregate average usage rather than sum of the industry usages

Table 8: Number of Firms Indicating Water Source Used						
INDUSTRY	SOURCE					
	MUNICIPAL	WELL	SPRING	LAKE	QUARRY	OTHER
MEAT	25	19	0	0	0	3
DAIRY	25	20	0	0	0	1
FRUIT & VEG	13	12	2	0	1	0
GRAIN	23	15	0	0	0	2
BAKERY	26	4	0	1	0	0
CANDY	19	2	0	0	0	0
BEVERAGES	16	9	0	0	0	0
OTHER	38	12	0	0	1	0
TOTAL	185	93	2	1	2	6

TABLE 9: WATER QUALITY AND AVAILABILITY PROBLEMS BY SOURCE		
SOURCE	% OF FIRMS USING SOURCE INDICATING PROBLEMS	
	QUALITY	AVAILABILITY
MUNICIPAL	16%	5%
WELL	13%	8%
SPRING	0%	0%
LAKE	0%	0%
QUARRY	0%	0%
OTHER	17%	17%

The firms were asked about their current and potential water recycling efforts. Approximately 25 percent do some recycling, with a number recycling either internally or from a treatment facility. Table 11 indicates the average percentage of water recycled by firm size. Large firms recycle a larger portion of their water than do small firms, 11 percent versus 7.9 percent. The reasons for this are probably twofold. First the ability to adopt recycling technology is probably greater at a large firm that can spread the investment over more units. Also large firms are more likely to exceed the capacity of their wells or to face restrictions by water companies. About 22 percent of the firms indicated that technology is now available that would enable them to significantly increase the percent of water usage that is recycled. However, most indicated that it would not be profitable for their firm to adopt this technology. Obviously the responses to this may change as either the technology advances or the water problems get worse.

Table 10: Type of Quality Problem

Problems	Frequency
None	302
Particular Matter	1
Excess Sediment	3
Discoloration	3
Turbulence	4
Mineral Content	7
Hard Water	2
Unclean	3
Murky Water	3
Turbid/Diaridas	1
Turbid/Cloridation	2
Minor Bacteria	2
TCE Contamination	2
Must be Treated	1
Sediment/Hardness	1
Nitrates	2
Taste	1
Solids	1
Chloramines	2
Cysts/Giardiasis	1
Coliform	2
Over Chlorination	1
Volatile Organics	1

Table 11: Water Recycling Efforts by Firm Size		
	1-99 Employees	100+ Employees
Annual Usage Recycled Internally	7.8%	11.0%
Usage Recycled at Treatment facility	3.3%	0.8%

Waste Disposal

Water

The firms were asked how their waste water is treated. Approximately two-thirds use municipal facilities, 20 percent have their own facility, and 15 percent do not treat their waste water. The distribution of practices by industry is shown in Table 12. As with water usage, bakers, who tend to be located in cities, tend to use municipal treatment facilities. Grain millers use very little water and also have the largest number of firms that do not have their waste water treated.

In general, large firms, regardless of location are more likely to be involved in waste water treatment. Table 13 indicates the percentages. Nearly half of large firms own a water treatment facility, while about 15 percent of small firms do. Of firms that treat their own water, about half provide primary water treatment, about one-third provide secondary treatment, and the remaining one-sixth provide tertiary treatment. Over time more firms may have to do their own treatment. For example York, PA was having problems with the biological oxygen demand coming from their waste water treatment facility. They identified a number of large firms, primarily food processors, and

Table 12: Waste Water Treatment Practices by Industry			
Industry	Municipal	Own Facility	No Treatment
Meats	55.4%	32.2%	17.9%
Dairy	64.6%	27.1%	14.6%
Fruits & Vegetables	55.6%	33.3%	18.5%
Grain Milling	53.7%	24.4%	29.3%
Bakery	92.0%	2.0%	6.0%
Candy	76.7%	13.3%	10.0%
Beverages	69.6%	17.4%	17.4%
Other	76.3%	18.6%	11.9%
Numbers Add Up to More than 100% Because Some Firms Use More than One Method			

Table 13: Waste Water Treatment Facility Ownership by Firm Size		
Firm Size	Own Facility	Do Not Own Facility
1-99 Employees	14.8%	85.2%
100 + Employees	44.3%	55.7%

told them that they would have to pretreat their waste water. The expense of treatment was shifted to the firms and the borough is now in compliance.

Over time, the acceptable levels of treatment are rising so that firms and the municipalities they are located in are likely to have to increase the level of treatment. Over half of the larger firms expect to have to either begin to treat their water or to improve their treatment system in the next five years. Fewer than 10 percent of the

small firms have this expectation. Over 80 percent felt this would be a critical expense for their firm. Industry members generally consider such expenses to be non-productive and worry that competitors in other locations can avoid these expenses, giving them an advantage. Most of the firms indicated that they might need both financial and technical assistance in order to upgrade or install a waste water treatment facility.

Solid Waste Disposal

The members of the industry were asked about their disposal methods for their solid wastes. They were asked to distinguish between processing wastes, such as apple peels and packaging wastes, such as containers. Table 14 shows the estimated tons of solid waste generated by the different SIC groups. Many firms did not know how much they generated. The table assumes that those that did not know how much solid waste they generated or did nor respond are similar to those that knew and responded. It is not known how representative these estimates are of actual industry totals.

In general, large firms can probably use their waste more readily than small firms, especially when it comes to byproducts utilization. Table 15 presents the disposal methods for processing wastes and packaging wastes in 1989 and projections for the future. The large firms are much less dependent on municipal waste disposal and are actively using their processing wastes as animal feed or spreading it on land. The smaller firms are doing less of this. The larger firms anticipate doing considerably more of these disposal methods in the future, predicting that the percent of processing wastes going to land fills or being disposed of by municipal authorities will fall from 69 percent of processing

Table 14: Solid Waste Generated by Industry	
INDUSTRY	Tons Generated
	(1000s)
MEAT	1353
DAIRY	21
FRUIT & VEG	215
GRAIN	10
BAKERY	40
CANDY	44
BEVERAGES	19
OTHER	1378
TOTAL	3081
TOTAL *	4832

* Calculated at total industry mean

wastes in 1989 to 55 percent in the future. The smaller firms expect less progress. Discussions with a few firms indicated that some recent recycling efforts had been initiated after solid waste sites closed or began to refuse certain byproducts. As disposal costs rise, certainly the incentives for innovative use of processing wastes increase.

The disposal of packaging wastes shows a similar pattern. Large firms, because they generate more such wastes, recycle more of them than do small firms. They expect to make considerable progress in the future. Small firms do less recycling now and anticipate doing only a little more in the future.

Table 15: Waste Disposal Methods				
Processing Wastes	SMALL FIRMS		LARGE FIRMS	
	1989	FUTURE	1989	FUTURE
Municipal	75%	72%	60%	50%
Incineration	6%	6%	3%	2%
Land Fill	3%	4%	9%	5%
Land Application	6%	5%	15%	16%
Animal Feed	5%	8%	12%	18%
By-Product Processing	2%	1%	1%	5%
Composted	1%	1%	0%	1%
Recycled	2%	3%	1%	4%
Total	100%	100%	101%	100%
Packaging Wastes				
Municipal	74%	71%	60%	45%
Incinerated	13%	11%	11%	11%
Land Fill	5%	3%	9%	4%
Recycled by Outside Company	4%	7%	15%	21%
Recycled by firm	2%	5%	5%	10%
Total	98%	97%	100%	91%
* Percentages may not total to 100% because of rounding or because respondents didn't provide estimates that totaled 100%				

About 20 percent of the firms expect they will have to either install new facilities or improve existing facilities in the next five years. As with the waste water facilities most thought this would be a "critical expense" and most felt they would need technical and financial assistance. In general firms in Philadelphia are less concerned about waste

water treatment or solid waste disposal than their more rural counterparts. Food firms are not especially large or troublesome compared to other Philadelphia companies, but firms in rural areas can be a major source of problems for their community's waste water treatment facility or their landfill.

Agricultural Inputs

The members of the industry were asked about their use of agricultural inputs of Pennsylvania origin. Obviously the breadth of the industry means that there is no simple answer to this question. Table 16 lists the percent of the inputs used that are of Pennsylvania origin for a number of important Pennsylvania-grown commodities.

Raising beef in the Pennsylvania has traditionally not been on the same scale as dairy. As a result the state's meat processing industry must look outside the state for their supplies. Somewhat more than half the beef usage by Pennsylvania food firms comes from Pennsylvania. Similar argument can be made about corn and wheat. Although Pennsylvania grows a lot of corn, most is used on the farm where it is grown. Pennsylvania is approximately self-sufficient in corn production, but the neighboring states are not. As a result part of the corn crop is sent to nearby states in the fall and early winter, only to be replaced by midwestern corn in the spring.

The flour usage data reflects the different varieties of wheat. Soft wheat which is grown in Pennsylvania is well suited for pretzels, pies, etc. However, bread, macaroni, and other baked products need wheat made from other wheat varieties, such as hard red winter wheat, hard red spring wheat, and durum wheat. These varieties are not grown in the state.

Table 16: Percentage of Processing Use from Pennsylvania			
Product	1986	1989	1992
Beef	56.2%	57.0%	55.7%
Corn	60.6%	52.5%	50.9%
Flour	28.5%	26.8%	25.5%
Wheat	67.3%	66.0%	66.4%
Milk	84.2%	85.8%	85.4%

Milk usage is about 85 percent from state sources. As southeastern Pennsylvania loses more land from agriculture the states dairy herd may decline. The respondents did not predict any new shortages of milk from Pennsylvania.

Certain other important commodities are not used by enough firms to reveal the responses. However, from past work we know that about 40 percent of the potatoes used by Pennsylvania potato chip firms come from in-state sources. Part of the reason is timing of production, since potatoes are harvested in Pennsylvania in the fall but chippers use potatoes all year around. However, the potato chippers buy many fall crop potatoes from the Red River Valley in North Dakota and some from New York and Ohio. These out of state purchases reflect quality differences and availability during the fall season.[2] Most of the apple processors are located near the Maryland border, and process apples from Maryland, Virginia, and West Virginia. This is a continuation of a long standing practice.

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[2] Russell D. Powell, Thomas A. Brewer, James W. Dunn, Jon M. Carson, and Richard H. Cole. "Potential for Storing Chipping Potatoes in Pennsylvania." Marketing Research Report 6, Department of Agricultural Economics and Rural Sociology, Pennsylvania State University, March 1989.

Some parts of the food industry, such as the beverage industry, use very few Pennsylvania grown inputs. Others like the dairy industry, get most of their raw products from Pennsylvania. When asked why they have reduced their usage of Pennsylvania grown products, the firms said cost, availability, and quality. They indicated that they would increase their usage if a comparable local product was available at a competitive price.

Energy

Although the United States has not had energy problems since the early 1980s, the industry was asked about their energy usage. In light of recent events in the Persian Gulf, energy may once again be an important problem for the industry. Only 5 percent of the firms indicated they have had problems securing enough energy. These problems mostly involved fuel oil and natural gas.

Table 17 shows the sources of the energy food industry firms use for processing. Overall about two-thirds of the energy comes from electricity, with grain millers, meat processors, and beverage firms using more electricity than the food or total industry average. Bakery firms, fruit and vegetable processors, candy firms, and other food processors (primarily snack food firms like potato chippers) with their extensive heating requirements use large amounts of natural gas. Dairy processors are the group most dependent on fuel oil.

Despite being in a major coal producing state, only a few firms use coal. Only 2 percent of the firms indicated they were involved in electricity cogeneration. Sixty

percent indicated they had taken actions to reduce energy consumption. The average amount energy costs were lowered by these actions was just less than 10 percent.

As may be seen in Table 18, the large firms use somewhat less electricity and somewhat more natural gas than the small firms. This is partly a reflection of the percentage of total firms that are large in the heavy natural gas using businesses and the preponderance of small firms in the grain milling business.

Technology and Competitiveness

The firms were asked for their overall technological state, their competitive state, and where their competitors are located. They were also asked if technological innovations are now available that would improve their competitive position.

One fourth of the firms indicated they were lagging overall in their technological state, two-thirds said they were average, and one-twelfth indicated their firm was at the leading edge. The responses were distributed similarly across the food industry.

About 22 percent indicated their competitors were making inroads into their business, about 43 percent thought their competitors were a future threat, and the remainder thought their competitors have no real impact on their operation. The large firms felt considerably more at peril than the small, with 42 percent of the small firms but only 18 percent of the large firms considering their competitors no major threat. No doubt many of these small firms have a specialized market or geographic isolation that has protected them from competition so far. Large firms by their nature must serve a larger area, and in the process perhaps face more competitors in the marketplace.

When asked where their major competitors were located, 62 percent said within 50 miles, 37 percent said within Pennsylvania, 32 percent said in the northeastern region but outside of Pennsylvania, 24 percent said in the United States, and 9 percent said they were international. (Firms were told to choose all that apply.) In general, large firms and small firms answered this question differently with small firms viewing most of their competition within 50 miles and large firms seeing much more regional and national competition.

About half the firms indicated that technological innovations are now available that would make them more competitive, with another 25 percent that didn't know. About two-thirds of the firms indicating that existing innovation was available said they might need technical assistance to adopt it and 82 percent said they might need financial assistance.

Concluding Comments

The overall view one gets of the food industry from the survey is positive. The industry is comprised of firms of all sizes, including some of the largest corporations in the country and family operations of two or three people. As such, few blanket statements will portray them all. Perhaps the only characteristic they all share is a competitive marketplace, which will put them out of business if they do a poor job. Since their operating environment has been competitive for a long time, those firms that remain are generally attuned to changes in their operating environment and doing fairly well at adjusting to these changes. If they couldn't they would have been out of business long ago.

Table 17: Energy Use for Processing by Industry									
Fuel Type	Industry								
	Meat	Dairy	Fruit & Vegetable	Grain Mill	Bakery	Candy	Beverages	Other	Total
Electricity	73%	62%	50%	77%	49%	68%	74%	56%	64%
Fuel Oil	8%	20%	14%	6%	6%	6%	10%	11%	10%
Natural Gas	13%	16%	26%	11%	41%	25%	14%	32%	22%
Coal	1%	0%	2%	1%	1%	0%	0%	0%	1%
Propane	5%	2%	10%	3%	1%	1%	2%	1%	3%
Total	100%	100%	103%	99%	98%	100%	100%	100%	100%
Totals may not add to 100% because of rounding									

Table 18: Energy Source for Processing by Size of Firm		
	Firm Size	
Fuel Type	1-99 Employees	100+ Employees
Electricity	65%	58%
Fuel Oil	10%	12%
Natural Gas	21%	27%
Coal	1%	1%
Propane	3%	4%
Total	99%	101%

Despite this the industry is facing further challenges. Many of these are quite different from the more traditional market-based challenges. The future of the industry is going to depend to a large extent on how it reacts to problems of water quality and availability, waste water treatment, solid waste removal, and labor availability and quality. While firms in the industry have always been concerned with input procurement and quality and output quality and marketing, these issues have traditionally dealt with inputs such as apples or milk and outputs such as applesauce or ice cream.

Potential input problems have now broadened to include many inputs that historically have been readily available at reasonable prices and qualities, whether it be water, labor or energy. Potential output problems have broadened to include not only the primary product but also waste product disposal and utilization. Firms have considerable experience dealing with inroads in their market share by a competitor. They have less experience with sharp increases in costs because a waste product can no longer just be sent to the dump inexpensively.

The survey clearly indicates, however, that firms are aware of the problems, have already made some adjustments in response to the problems, and are planning further adjustments in anticipation of future problems. While knowing you have a problem and having some ideas about responding to is not the same as solving the problem, it is an important start. One consolation is that most competitors, whether local or not, face similar problems.

Undoubtedly some members of the food industry will not survive the 1990s. But the industry overall seems well poised to meet their challenges successfully.

Appendix

Survey Questionnaire

A DATA BASE FOR THE PENNSYLVANIA FOOD INDUSTRY

CONFIDENTIAL QUESTIONNAIRE

DEVELOPED AND FUNDED BY: **The Pennsylvania Department of Agriculture and The College of Agriculture, Pennsylvania State University**

SPONSORED BY: **The Pennsylvania Food Industry Council**

This survey is designed to find out more about the Pennsylvania Food Processing Industry. Your response will be strictly **CONFIDENTIAL**. The information gathered in this survey will not be released in any manner that will allow your firm and its responses to be identified.

Please fill in the requested information as accurately as you can. If you do not have the exact values make your best estimate. It will certainly be more accurate than our best estimate. The survey has been coded in order to selectively contact nonrespondents.

SOLID WASTE

1. How many tons of solid waste did your operation generate in 1989?
   Tons _____ Don't know _____

2. Please indicate the percent of solid waste from your operation disposed of using each method in 1989 and the probable future use of each method.

DISPOSAL METHOD	Percent disposed by method in 1989	Percent disposed by method possible in the future
Processing wastes		
Handled by municipal authority or a private outside company	____ %	____ %
Handled in-house by your company		
Incinerated	____ %	____ %
Land fill	____ %	____ %
Animal feed	____ %	____ %
Land application	____ %	____ %
By-product processing	____ %	____ %
Composted	____ %	____ %
Recycled	____ %	____ %
Other (list) _____	____ %	____ %
_____	____ %	____ %
Total	100 %	100 %

Packaging wastes		
Handled by municipal authority or a private outside company	_____ %	_____ %
Recycled by an outside company	_____ %	_____ %
Handled in-house by your company		
Incinerated	_____ %	_____ %
Land fill	_____ %	_____ %
Recycled	_____ %	_____ %
Other (list) _____	_____ %	_____ %
Total	100 %	100 %

3. Do you plan, or feel you will be required, to install new waste disposal facilities or improve your existing facilities in the next five years?
   Yes ____ No ____ Don't know ____

   a. If YES - Will the installation of new disposal facilities or the improvement of existing facilities involve a "critical" expense for your operation? Yes ____ No ____ Don't know ____

   b. Please check the type(s) of assistance you might need to install new disposal facilities or improve existing facilities.

      Technical assistance _____
      Financial assistance _____
      Other (list) _____

WATER USAGE AND TREATMENT

1. Please indicate how much water by source your business used annually.

Water source	Gallons used 1986	1989	1992 (Estimated)	Please check if in 1989 you had any quality problems	availability problems
Municipal	_____	_____	_____	____	____
Well (company)	_____	_____	_____	____	____
Stream/river	_____	_____	_____	____	____
Lake	_____	_____	_____	____	____
Quarry	_____	_____	_____	____	____
Other	_____	_____	_____	____	____

2. If you have had quality problems, what kind of problem? _____

3. What percent of your annual usage is currently recycled internally? ____ %
   Reused from the treatment facility? ____ %

4. Is technology now available that would enable you to significantly increase the percent of your water usage that is recycled/reused?
Yes ____ No ____ Don't know ____

If YES - Would it be profitable for your business to adopt this technology?
Yes ____ No ____ Don't know ____

What are the obstacles for adopting this technology?

_____

_____

5. How is your processing waste water treated?
Municipal Facility ____ Own Facility ____ No Treatment ____

If you have your own facility, how much waste water did you treat?

Method of treatment	Gallons treated 1989	Gallons discharged 1989	Gallons recycled 1989
Primary	_____	_____	_____
Secondary	_____	_____	_____
Tertiary	_____	_____	_____
Untreated	_____	_____	_____

6. Do you plan, or feel you will be required, to install a waste water treatment system or improve your existing system in the next five years?
Yes ____ No ____ Don't know ____

a. If YES - Will the installation of a new system or needed improvement of your existing system involve a "critical" expense for your operation? Yes ____ No ____ Don't know ____

b. Please check the type(s) of assistance you might need to install a new system or improve your existing treatment system?
Technical assistance _____
Financial assistance _____
Other (list) _____

LABOR

1. Please indicate in the following table your employment in 1986, 1989 and your best estimate for 1992.

Type of employee	Employment in 1986 Annual average	Employment in 1986 Peak month	Employment in 1989 Annual average	Employment in 1989 Peak month	Estimated Employment in 1992 Annual average	Estimated Employment in 1992 Peak month
Full-time	_____	_____	_____	_____	_____	_____
Part-time	_____	_____	_____	_____	_____	_____

2. Are you currently having difficulty recruiting new employees?
Yes ____ No ____ Don't know ____

a. If YES - What types of jobs do you have trouble filling?
Please list job types _____
_____
_____

3. Please indicate the following in table below:
a. Skills required in your business that are often lacking in job applicants.
b. Skills in which you would be interested in further training for your current employees.

Skill	Often found lacking in job applicants	Interested in further training for current employees
	(CHECK AS MANY AS APPLY)	
Word processing	_____	_____
Computer skills	_____	_____
Basic math	_____	_____
Basic English	_____	_____
Basic reading	_____	_____
Communications	_____	_____
Work reliability	_____	_____
Principles of supervision	_____	_____
Stress management	_____	_____
Other (please list) _____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

4. Have you had problems with employee retention? Yes ___ No ___

USE OF AGRICULTURAL INPUTS

1. Please indicate the agricultural products purchased most frequently as inputs in your processing operations.

Agricultural product (LIST PRODUCT)	Unit of purchase (tons, lbs etc.)	Amount purchased			Percent of purchases grown in PA		
		1986	1989	Estimate 1992	1986	1989	Estimate 1992
_____	____	____	____	____	____	____	____
_____	____	____	____	____	____	____	____
_____	____	____	____	____	____	____	____

2. Please indicate the reasons for any recent reductions in the use of Pennsylvania grown agricultural products by your business?

_____

_____

3. What factors would increase their use? _____

ENERGY

1. Do you have any problem securing enough energy for your processing operation?
   Yes ____ No ____ Don't know ____

   If YES - What type(s) of energy? _____

2. Please list your energy usage by source.

Energy Source	Percent of total energy use by cost
Electricity	_____ %
Fuel Oil	_____ %
Natural Gas	_____ %
Coal	_____ %
Propane	_____ %
Total	100 %

3. Is your firm involved in cogeneration of electricity? Yes ___ No ___

4. Has your firm taken any actions to reduce your energy consumption?
   Yes ___ No ___
   If yes, by what percentage do you estimate that your total energy costs are lower? _____ %

COMPETITION AND TECHNOLOGY

1. How do you perceive your company's overall technological state?
   Lagging _____ About Average _____ Leading Edge ____

2. Would you say that your major competitors: (CHECK ALL THAT APPLY)
   Are currently making significant inroads _____
   Are a future threat _____
   Have no real impact on our operation _____

3. Generally where are your major competitors located? (CHECK ALL THAT APPLY)
   Within 50 miles of our plant _____
   Elsewhere in Pennsylvania _____
   In Northeast (outside of PA) _____
   In U.S. (outside of Northeast) _____
   International _____

4. Are technological innovations <u>now available</u> that would improve your competitive position if you were to adopt them?
   Yes ____ No ____ Don't know ____

   If <u>YES</u> - Check the type(s) of assistance you might need to adopt this technology.
   Technical assistance _____
   Financial assistance _____
   Other (list) _____

OPTIONAL QUESTIONS

1. What can the Pennsylvania Food Industry Council do to help your firm?

   _____

   _____

   _____

2. What can the Pennsylvania Department of Agriculture do to help your firm?

   _____

   _____

   _____

3. Do you have anything else you would like to add?

   _____

   _____

   _____

   _____

THANK YOU FOR YOUR COOPERATION

Please return to
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