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Enhancing the Dairy Industry: Lessons From the Field

by George W. Morse and Bernard J. Conlin

Dairying is Minnesota's largest single agricultural enterprise, accounting for over 20 percent of all farm cash receipts. For Becker and Otter Tail counties, the site of the activities reported in this article, it is even more important. With 30 percent of all farm receipts, dairying is the largest of any economic sector, accounting for 13 percent of the counties' total export base (goods and services sold outside the area). Dairy farms and milk processing plants directly employ 1,242 people, and these jobs in turn are estimated to support another 1,507 jobs.

Belying this economic importance, a large number of farms have discontinued dairying in the past decade, and local milk processing plants are struggling to maintain volume. Hoping to reverse this trend, local leaders initiated a Dairy Business Retention and Enhancement (Dairy BR&E) Program in 1995, with the support of the Minnesota Extension Service.

The primary goal was to join community and agribusiness leaders with dairy farmers to help strengthen the area's dairy industry. An initial step was to interview dairy farmers to learn about their concerns, information needs, and future plans. This led to the development of an action plan.

In this article we concentrate on actions taken as a result of both the survey interviews and the subsequent strategic planning by local leaders.

A statistical sample of 135 dairy farms, 12 percent of all Becker/Otter Tail dairy farms, was initially selected for visits. The sample included farms of different sizes, locations, and participation in DHIA programs. All but three of the farm visits were completed. These 132 farms constitute the basis of subsequent analysis in this article.

The sampled farms tended to be somewhat larger and have higher producing herds than the counties' average. Average herd size was 65 cows, compared to 46 cows per herd average for all dairy farms in the area. Overall, the productivity for the sampled farms was 25 percent above

*(See **Dairy** page 2)*

How Much Would Minnesotans Pay to Improve Their Drinking Water?

Yongsung Cho and K. William Easter

Minnesota, Land of 10,000 Lakes, is renowned for its surface water, but our major water source lies under ground. Ninety-four percent of the public water supply systems and 75 percent of all Minnesotans get their domestic water from groundwater supplies.

According to Minnesota Department of Health (MDH), the water quality of Minnesota's public water supply systems is generally good. With the exception of copper, heavy metals were reported in only a few public water supplies, and most of their concentrations were below federal maximum contaminant levels (MCL).

Copper contamination, which can be harmful, is found more frequently and often exceeds the MCL in Minnesota. An MDH study found that water in 15 percent of the 87 surveyed small communities exceed the standard copper level. The highest frequency of copper exceedance was in southwestern Minnesota.

*(See **Water** page 4)*

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(*Dairy* *continued from page 1)*

the counties' 1993 average. The smaller herds (under 50 cows) tended to have lower productivity (Table 1).

Strategic Planning Process

The Dairy BR&E Program is more than a survey or a research project, although both are important aspects of the program. It is a strategic planning process that identifies the concerns of dairy producers, develops alternative strategies for local leaders to respond to these concerns, builds a consensus on specific projects, and then moves to implementation.

The pivotal group in any BR&E effort is the local leadership team. In the Becker/Otter Tail program, this team recruited a 74 person task force that included dairy producers, agricultural suppliers and professionals, agricultural lenders, utilities, and economic development professionals and extension personnel. An estimated 1,725 hours, valued conservatively at over $34,000, were devoted by these volunteers.

After the interview results were summarized, a campus meeting was held to review the data. Thirty-five university faculty, state department of agriculture staff, agribusiness leaders, and farmers participated in this three-hour session. A research report summarizing the survey results and suggestions from this meeting was prepared by five university people.

These results were presented to the local task force in a subsequent four-hour mini-retreat. The group debated the implications of the findings and the suggested projects. The local leaders adopted modified forms of six of the campus review panel suggestions and developed two original projects. This was followed by public meetings to share the survey results and to announce the group's priority projects.

Strategies and Projects

Strategy 1: Make Existing Dairy Herds More Profitable

A third of the surveyed producers were not sure they would be in milk production three years from now. Their exit would reduce production by 6.3 million pounds per year in the two counties. It was the operators of larger farms who reported they were likely to expand. Almost all who were uncertain cited low profits as the primary reason they might exit.

On the other hand, over half of all those surveyed expected to enlarge their operations or were at least considering it. Almost two-thirds of those intending to expand would hire additional labor. Therefore, increasing profitability (e.g., though higher productivity, better cost control, expansion, etc.) was a key retention issue. Four projects were selected to address this first strategy.

Project 1: Provide educational programs on business planning

Information on business planning was the most frequently requested item for producers who were uncertain about continuing in the dairy industry and the third most-requested item for those continuing their operations (Table 2). Further, 28% of those planning to expand indicated that the development of a business plan would be a challenge to them. The local task force sponsored several activities to address these concerns, including:

- individual business plan consultations for dairy producers by extension educators.
- sessions of Minnesota Extension Service "Benchmarks for Profitable Livestock Systems" for dairy producers.
- a conference aimed at building a financial network for the area's dairy industry and distributed information on the SBA 504 loans.

Project 2: Encourage all types of profitable dairy operations

The task force found that to maintain the existing local dairy infrastructure (processing plants, input suppliers, veterinary services, etc.), area milk production must be increased. Since no single approach for increasing local milk production (e.g., increasing output per cow, increasing existing herd size, or attracting new large herds) was adequate, the task force encouraged local officials to provide the same opportunities and assistance to both new and expanding operations.

Project 3: Establish dairy diagnostic teams

The task force decided to establish dairy diagnostic teams to handle the concerns of individual producers. Each team would include a veterinarian, a feed dealer or nutritionist, an agricultural lender, a Minnesota Extension Service educator, and other dairy professionals. Each team would also include the farmer's entire involved family. The team would take a whole-farm approach to the identification of opportunities for improving the farm's profits and income. A committee is preparing a funding proposal to initiate this program.

Table 1. Percent of Farms by Production per Cow and Farm Size: Becker/Otter Tail Counties

Production per Cow	Herd Size			All Farms
	Small (< 50)	Medium (50-100)	Large (over 100)	
High productivity*	30%	54%	57%	46%
Low productivity	70	46	43	54
Number respondents	46	69	14	129

*Above 18,690 lbs per cow.

Table 2. Information Requests by Dairy Farmers: Becker/Otter Tail Counties

Information Requested	Expansion Likely (36 Producers)	Continuing Expansion Unlikely (15 Producers)	Producers Uncertain About Continuing in Dairy (26 Producers)
Milking systems	33%	13%	12%
Labor management	31	20	15
Business planning	28	27	27
Estate planning	25	33	19
Livestock housing	22	40	23
Manure management	22	0	19
Grain feeding	19	27	12
Financial records	19	7	15
Feedlot permits	17	27	19
Forage feeding	17	27	8

Project 4: Establish a dairy reception group for new dairy farms

Recognizing that small- to medium-sized dairy farms would benefit from additional milk production in the region, the task force formed a reception group to host individuals or firms interested in establishing new dairy farms. Members of the task force helped establish the Tri-State Dairy Group, covering portions of North Dakota, South Dakota, and Minnesota. The group has met monthly for the past year, with a number of meetings attended by the commissioners of agriculture from the three states. Recently group members toured new dairy operations in California and Idaho. The group is also preparing a promotional campaign to lure dairy operations from New Mexico and California.

Project 5: Hire a full-time dairy specialist

Implementation of a number of these recommendations will require time and expertise not now available locally. While volunteers are essential to many of these initiatives, they also require an experienced, well-trained professional who can quickly provide unbiased expertise and information. The task force is exploring ways to provide a full-time dairy specialist for these two counties.

Strategy 2: Link Dairy Industry with Regional Economy and Environment

Growing public concern with the environment was cited as a potential threat to the dairy industry by 82% of the producers. Planning and zoning services in the county were rated as fair or lower by 48% of the producers, making this the lowest rated community service. While the majority of producers felt that other farmers had positive attitudes toward dairying, over 40% felt that nonfarmers were indifferent or negative. Over 70% felt that city residents had such attitudes. Two projects were adopted to address these concerns.

Project 6: Develop balanced planning and zoning regulations

The Minnesota Department of Agriculture has developed a model of county guidelines for feedlot ordinances, and the task force is working with that department and the Minnesota Pollution Control Agency on county options for such regulations. The task force will encourage the development of balanced planning and zoning laws that protect both the dairy and the tourism industries.

Project 7: Provide the public with information on dairy sector economic links and impacts

Minnesota's dairy industry, including dairy farms, feed dealers and other input suppliers, processing plants, and supporting firms, employed almost 53,000 persons in 1992. But if the 1985-91 current trends continue until the year 2000, that number is projected to fall by 16,000 jobs. The task force developed a video to help community leaders in these two counties understand the importance of the dairy industry. To date it has been shown to 500 local leaders. In addition, the task force collaborated in the development of a series of feature articles in the local newspaper, focusing on the importance of the dairy industry and issues facing it.

Strategy 3: Address Labor Shortages and Management Issues

The average dairy farm in these two counties employs 2.3 people on a full-time equivalent basis. Two-thirds of the dairy farmers reported either no weekends off or less than one weekend per month. While 19% of those farmers said they were satisfied, the rest are exploring ways to obtain more time off. Additional non-farm income was important to almost one-third of the farms. Eleven percent of the operators and 36% of the spouses worked full-time off the farm. For those expecting to expand, information on labor management was the second most frequently requested type of information. About one-fifth of those expecting to expand also anticipate difficulty recruiting labor. The following project will be undertaken in response to these concerns.

Project 8: Provide workshops on legal/procedural aspects of hiring and employee management

In 1996-97 the task force hopes to develop a series of educational programs on effective methods of advertising and screening job applicants, employee management skills, building good labor/management relations, and legal aspects of hiring new employees.

Benefits and Results

Since Becker and Otter Tail counties began this program, the dairy industry in the area has developed a more positive "can do" attitude. There has already been some tangible results. Three farms have adopted new technology, and over $3 million in dairy facility improvements have been initiated. Two new large herds in eastern South Dakota have added over 3,000 new cows to the region, reversing the downward trend in cow numbers in milk shed.

A local farmer adds testimony: "The survey and the informational meetings that were held in conjunction with the BR&E project provided a lot of different options and helped us decide to expand right here in Otter Tail County."

Other dairy regions in Minnesota might wish to simply adopt the Becker and Otter Tail results. But each area needs to look at its own concerns. As one extension educator said: "Unless local leaders go through the process of discussing their own problems and reaching a consensus, they are unlikely to see the kind of results we've achieved here."

Implementing a Dairy Retention and Enhancement Program

The Minnesota Extension Service, with the Minnesota Dairy Leaders Roundtable, assists communities with Dairy Business Retention and Enhancement Programs. Extension educators with special training and experience are certified to work with local groups undertaking the program. Faculty at the University of Minnesota help on the applied research side of the project. Interested local leaders should contact their county MES office and ask for the BR&E consultant or call Patricia Love at 612/644-0773.

(*Water* *continued from page 1)*

According to the U.S. Environmental Protection Agency (EPA), 99% of copper contamination comes from corrosion of household pipes and plumbing fixtures. So even if consumers receive water from an uncontaminated public water supply system, their water may still be contaminated with copper from their houses' water pipes.

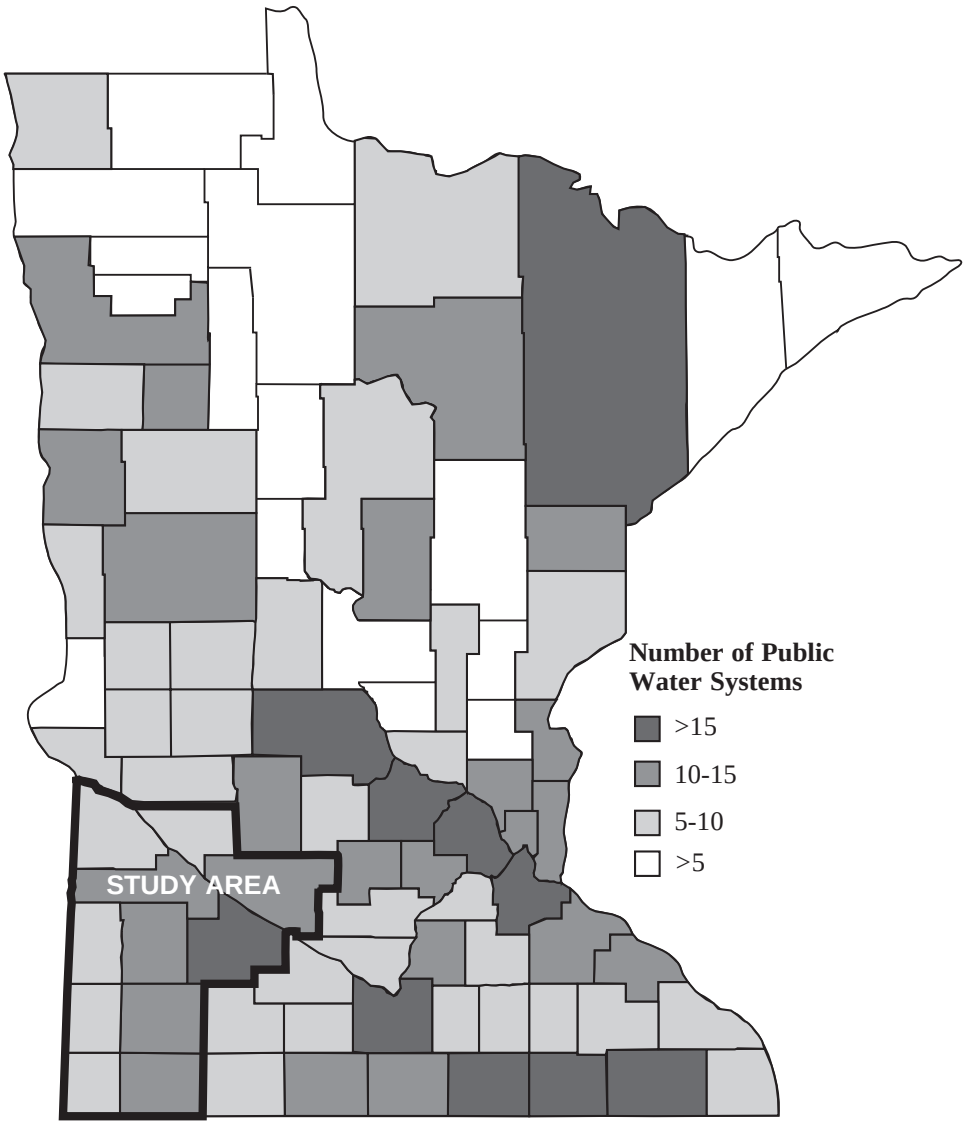
In 1991 the EPA established a new standard for controlling copper and lead levels in public water supplies. This new "action level" requires managers of water supply systems with excessive contaminant levels to provide new or additional measures to control corrosion. The measures include public education, service line replacement, and the installation of corrosion control equipment.

The nationwide capital costs of complying with this rule is expected to be between $2.9 and $5.7 billion, and operation and maintenance will cost an additional $240 million per year. This anticipated high cost of compliance led us to conduct a water quality survey of southwestern Minnesota (see Figure 1 for study counties. Figure 2 shows the size distribution of these systems). In this article we will review the results of that survey, paying special attention to respondents' reported willingness to pay for water quality improvements.

Our analysis of MDH monitoring data shows that 87% (84 out of 97) of public systems in southwestern Minnesota are above the level of hardness recommended for drinking water by the World Health Organization. More than 40% exceeded EPA's aesthetic quality standards for sulfate. The majority of systems (61%) have iron concentrations exceeding aesthetic quality standards.

These high concentrations of iron and sulfate occur frequently in community systems serving fewer than 3,300 users. Only 12.5% and 25% of community systems serving over 3,300 users had high levels of iron and sulfate, respectively. Figure 4 shows that 54%, 66%, and 56% of community systems that had levels of hardness, iron, and sulfate above the desired levels were community systems serving less than 500 users. Significantly, 26 out of 97 community water systems were identified by MDH as systems exceeding the EPA's standard levels for copper and are in need of new or improved corrosion control.

Figure 1. Minnesota's Public Water Municipal Systems



Water Quality Survey

A questionnaire was mailed in the summer of 1995 to a random sampling of southwestern Minnesota residents receiving their water from one of the public water supply systems. (Almost 70 percent of residents in the study area obtain their domestic water supply from public water systems.)

The surveyed communities were selected because their water exhibited levels of iron, sulfate, hardness, or copper above desired water quality standards. Our study focused on concerns about these high concentrations. Respondents were asked to rate their own water supplies and to tell how much they might pay to improve their drinking water quality.

The survey resulted in a 70% response rate with 570 usable completed questionnaires; about 43% of the respondents were female and 57% were male. Thirty percent had children less than 13 years old in the household. The average age of the person filling out the form was 54 years. Over 80% had at least a high school education, and their average annual total household income was $33,000.

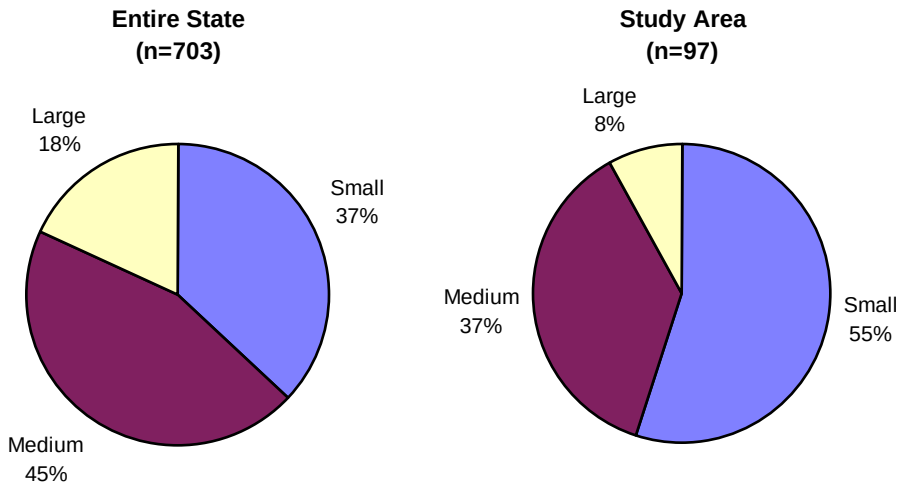
Over 90% of the respondents' houses were built before 1985, with 43% constructed between 1900 and 1945. The average home value was $45,000. The average reported residential water bill was $19.20 per month.

About 60% of respondents used either bottled water or had a home water treatment device. Almost 30% purchased bottled water regularly, and about 43% used a water treatment device, such as a filter or water softener. Among them, 13% both purchased bottled water and used a water treatment device.

The main reasons given for purchasing bottled water or using a water treatment device were taste (50%) and health concerns (40%). (Multiple responses were permitted). Other reasons were to soften the water for washing and laundry and to make better coffee or fruit drinks.

Concentrations of iron, sulfates, and hardness of water were all major concerns among survey respondents (Figure 3). Highly mineralized water can damage pipes and plumbing fixtures. Iron-rich water can be black or brown with an unpleasant taste. Sulfate-rich water can cause gastrointestinal problems and give water a rotten egg odor or a salty taste.

Figure 2. Public Water Systems: Many Serve Fewer Than 500 Users



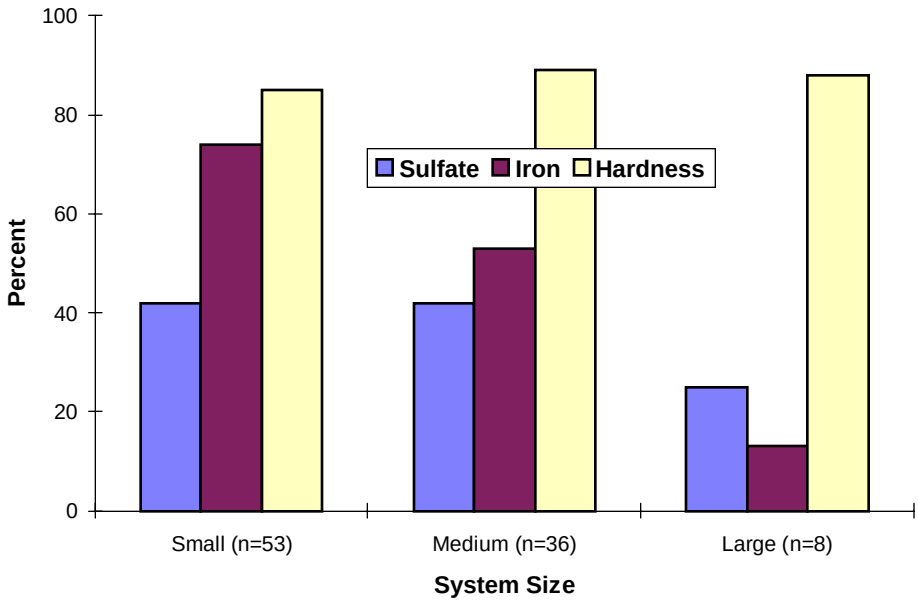
Definition of community size: "Small" systems less than 500 users, "Medium" systems 500-3,300 users, "Large" systems over 3,300 users.

Perception of Water Quality

Respondents were asked to rate their current tap water quality on a 5-point scale (1=very poor and 5=very good) based on taste, odor, color, softness, and safety from copper contamination. On average, the respondents rated their tap water quality at 3.4, 3.5, and 3.5 for taste, odor, and color. More than 20% found the taste, odor, and color of their water to be of "poor" or "very poor" quality (Figure 5). Over 45% said their tap water was hard (poor or very poor). The users on average gave their water a lower rating in terms of hardness (2.7) and safety from copper contamination (2.8). Yet, about three-quarters of the respondents (77%) judged their community's overall water quality as fair or better.

Consumers who do not use bottled water rated their tap water significantly better than those who do use bottled water based on taste (3.7 vs 2.6), odor (3.7 vs 2.7), color (3.8 vs 2.8), and overall water quality (3.6 vs 2.6). The ratings of those who do not use a home water treatment device were also higher than those who use a home water device, but the differences were small (e.g., 3.4 vs 3.3 for overall water quality). In addition, those with higher levels of education or with more

Figure 3. Reported Frequency of Water Problems by Community Size: Southwestern Minnesota Study Area



Definition of community size: "Small" systems less than 500 users, "Medium" systems 500-3,300 users, "Large" systems over 3,300 users.

children in the household gave lower ratings for all water quality characteristics. Many of these respondents said they purchased bottled water regularly or used a home water treatment device.

Willingness to Pay

Respondents were asked how much they would pay for improved water quality. The reported amount, their "willingness to pay" (WTP), was positively and significantly related to household income, housing values, and the level of education. WTP was negatively related to higher current water bills.

As expected, respondents with negative perceptions of their drinking water quality in terms of taste, odor, color, softness, and safety were willing to pay more to improve water quality. Specifically, consumers who perceived their water to be poor in terms of taste and softness were willing to pay more to reduce the levels of hardness.

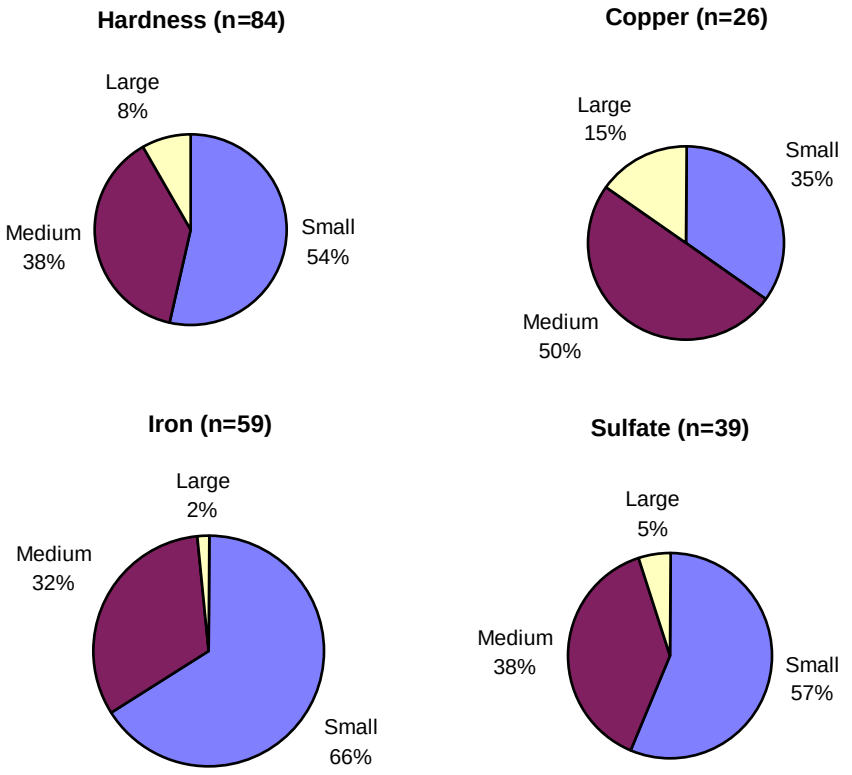
The WTP responses ranged from zero to $30 per month, but 90% of the responses fell between zero and $10 per month. Overall, 60% of the respondents said they would pay at least one dollar a month to improve water quality.

The results summarized in Table 1 show that individuals indicated a willingness to pay $5.25, $4.33, $5.33, and $4.38 per month to reduce the level of iron, sulfate, hardness, and copper in their water. Each amount is between 23% and 28% of estimated average monthly water bills. We estimate aggregate annual WTP for communities in southwestern Minnesota that do not meet desired water quality standards to be (separately) $2.4, $2.0, $6.7, and $2.6 million to (separately) reduce the levels of iron, sulfate, hardness, and copper, respectively.

We also found that residents in smaller communities may not be willing to pay enough to cover the full cost of providing improved water through their public water systems (Table 2). The average annual reported WTP is lower than the average household cost for water systems serving 500 or fewer consumers. (Average household cost includes the monitoring and compliance cost for a groundwater treatment system.) Adequate water systems to serve less than 500 consumers cost an average household $91 (in 1992 dollars.)

The average household cost of a central treatment system (construction, operation, and maintenance) decreases as the size of the population served increases. Small communities can capture none of this scale economy. Although the annual average WTP of residents in small communities is not significantly different from that in larger communities, the total WTP of all water users in small communities is not enough to finance the installation and maintenance of a new treatment system. We saw in Figure 2 that half of the public water supply systems in southwestern Minnesota serve fewer than 500 households. Thus, over half

Figure 4. Size Distribution of Systems Above Desired Levels of Contamination



Definition of community size: "Small" systems less than 500 users, "Medium" systems 500-3,300 users, "Large" systems over 3,300 users.

Table 1. Reported Willingness to Pay for Improved Drinking Water Quality

Item Category	Hardness	Copper	Iron	Sulfate
Median ($/Month)	$5.00	$3.00	$5.00	$4.00
Mean ($/month)	$5.33	$4.38	$5.25	$4.33
Mean WTP ($/month) as % of water bill	28%	23%	27%	23%

Figure 5. Water Quality Characteristics and Rating

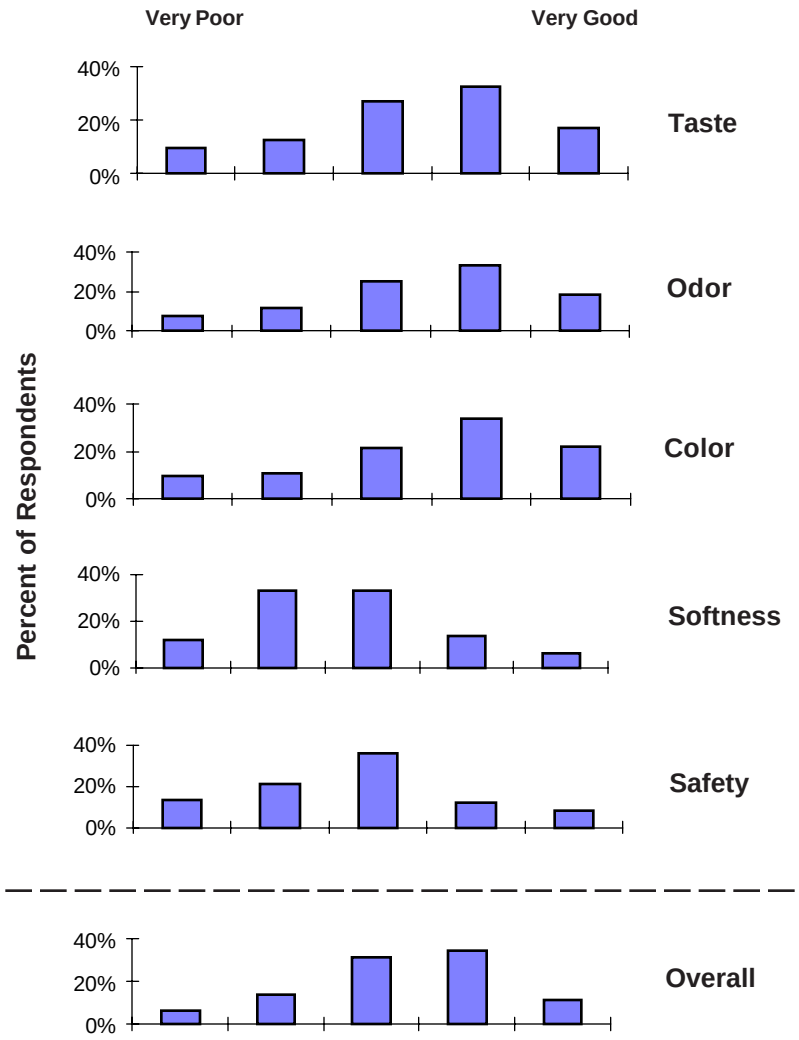


Table 2. Annual Average WTP and Average Household Cost for Treatment Facility

Size of System (Persons Served)	Annual Average WTP ($)				
	Hardness	Copper	Iron	Sulfate	Average Cost
Less than 500	$68.29	$50.16	$64.12	$54.53	$91
500-1,000	$68.35	$54.75	$77.70	$59.35	$39
1,000-3,300	$59.00	$51.08	$46.09	$42.00	$21
3,300-10,000	$68.80	$66.86	N/A	N/A	$16

of the study area's communities are likely to have problems financing improvements in their public water systems.

Conclusion

Public concern over drinking water quality and consumer desire for better quality water not only lead state and federal governments to broaden regulatory activities but also encourage local water providers to improve the taste, odor, and color of their product. To better assess these demands for improved water quality, decision makers need to have accurate estimates of the benefits to consumers from improved water quality.

The two major objectives of this study were to estimate the economic value of an improvement in drinking water quality and to determine which socioeconomic characteristics were statistically significant in influencing the indicated values. Our study showed strong community support for better quality of drinking water. We found that people were willing to pay an additional $4 per household per month to improve their drinking water quality. Estimated WTP in small communities was not different from larger communities. But in small communities the combined WTP of all individuals may be insufficient to finance the installation and maintenance of new or improved water treatment systems.

The survey responses revealed significant positive relationships between indicated WTP and household income, house values, and number of children in the household. Because smaller communities had relatively higher portions of families with no children and lower incomes, these communities may face special problems in financing improvements in water quality. They may need assistance from the state or federal government or they may have to work jointly with other communities to improve their water systems.

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