

Wisconsin Farm Research Summary

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A PROFILE OF WISCONSIN'S DAIRY INDUSTRY, 1999

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Background

In the late winter and early spring of 1999, the Program on Agricultural Technology Studies (PATS)² surveyed over 1,600 of Wisconsin's dairy farmers. Because the sample was large, was drawn randomly from the Wisconsin Dairy Producers List, and yielded a relatively high response rate (50 percent), the results provide a scientifically reliable snapshot of the Wisconsin dairy farming sector as of the spring of 1999.

This report provides an overview of the initial findings of the overall study. The emphasis of this report is on the characteristics of the Wisconsin dairy farming sector, and on the characteristics of the operators and their families. We pay particular attention to Wisconsin dairy farmers' use of a wide range of dairy and crop production technologies or practices. In this survey, we also included questions about several emerging technologies, like genetically engineered crops and "information technologies" (such as use of computers and the internet, and precision farming).

This report summarizes the results for all dairy farms in the sample (usually on the far right hand side of each table). Because dairy farms in Wisconsin are quite diverse, we also disaggregate the results for dairy herds of different size. The tables below report the characteristics of farms in five herd size categories: 1-24 cows, 25 to 49 cows, 50 to 99 cows, 100 to 199 cows, and 200 or more cows. In each case, herd size measures include both milking cows and dry cows. More detailed reports and in-depth analyses of specific issues based on the survey will become available over the coming months.

Size of Dairy Operations

The results in Figure 1 and Table 1 demonstrate three things about Wisconsin dairy farms. First, most dairy farms in our Wisconsin dairy farm study could be considered moderate-scale, family-operated farming businesses. Nearly 75 percent of the farms in our sample reported milking between 25 and 99 cows in 1999. These medium-sized dairy farms with 25 to 99 cows accounted for 53.9 percent of the cows and for 50.7 percent of the milk sold by farms in the sample. Another 13 percent of the farms in the sample had 100 to 199 cows, and 3.6 percent of the sample had 200 or more cows. The farms with 200 or more cows were responsible for 22 percent of the cows and just over 25 percent of the milk produced by farms in the sample.

Second, however, there is tremendous diversity in the Wisconsin dairy farm sector. Nearly 10 percent of the farms in our sample are very small by modern standards (with less than 25 milk cows), while at the same time there is a small but rapidly growing number of very large dairy operations (those with 200 or more cows).

Third, the results in Figure 1 show that these very large dairy farms in Wisconsin produce a sizable share of Wisconsin's milk. It is worth noting, however, that these very large farms are somewhat more prevalent in our sample than they are in the state as a whole, and that very small farms are underrepresented in our sample. This is probably due mainly to the fact that persons with more education and higher income are more likely to respond to sample surveys than are less well-educated persons with lower incomes (Dillman, 1978). Table 1 shows, for example, that the percent of farms with herds of 200 cows or more in our sample exceeds the estimate

made by the Wisconsin Agricultural Statistics Service (1999) for 1998.³ In the remainder of the report it is worthwhile to bear in mind that very small dairy farms are underrepresented and very large dairy farms are somewhat overrepresented in our sample compared to the distribution of dairy farm sizes in the State as a whole.

Table 1 also shows that most Wisconsin dairy farms operate over 4 acres of farmland per cow in the milking herd. This contrasts with the situation in the U.S. south and west where very large herds are raised on farms with relatively little farmland. Not surprisingly, dairy herd size is very strongly associated with the number of acres of land operated. Farms with 24 or fewer cows averaged about 136 acres per farm, while farms with 200 or more cows operated over 1,200 acres per farm, on average. The operators of smaller dairy farms tend to own most or all of their land. By contrast, the operators of very large dairy farms were especially likely to rent farmland. The operators of very large dairy farms—those with 200 or more cows—averaged owning about 592 acres, while renting on average about 622 acres.

Dairy Farm Operator and Household Characteristics

Table 2 reports the data from our study on a number of indicators of the characteristics of dairy farm operators and their families. The average age of farmers in the sample was 46.8 years. Operators of the smallest dairy farms tended to be somewhat older (52.8 years old), while operators of farms with 50 to 99 cows were the youngest on average (45.3 years). These data suggest that a large share of the operators of very small dairy farms are at or approaching retirement age. On the other hand, Wisconsin's young dairy farmers, and those dairy farmers who entered most recently, tend to have medium-sized herds.

The data in Table 2 show that the vast majority of Wisconsin dairy farmers grew up on farms and became involved in dairy farming at an early age. On average, the dairy farmers in the sample first became involved in dairy farming when they were about 23 years of age, and were about 27 years old when they took over the farm they are currently operating. But it is not necessarily the case that Wisconsin dairy farmers have taken over their

traditional family farm. A little less than two-thirds of the dairy operators in the sample are farming land that was previously owned by their parents or the parents of their spouses.⁴

In Table 2 we include information on the role that farm and off-farm income plays in Wisconsin's dairy farm households. Off-farm work clearly plays a major role on Wisconsin dairy farms. About 15 percent of dairy farm operators and 41 percent of the spouses of operators reported having a regular off-farm job during 1998. For nearly half of the dairy farm households in our sample, either the operator, the operator's spouse, or both partners held down a regular off-farm job in 1998. Operators of small dairy farms were particularly likely (23.9 percent) to have a regular off-farm job—in fact, none of the operators of farms with herds of 200 or larger in our sample reported having a regular off-farm job in 1998.

The data in Table 2 on off-farm employment parallel the results in that table on sources of total family income. Nearly half of dairy farm households in the sample derived all of the family income from farming, but the percent doing so varied a great deal by herd size. About 42 percent of households with the smallest herds received all of their income from farming, compared to about 68 percent of households on farms with herds of 200 or more cows. Our data show that the smaller the herd size, the more likely it is that a sizable share of the household's income comes from off-farm sources.

In our 1999 Dairy Farm Poll we asked the respondents two questions about how they feel about their quality of life. The results in Table 2 show somewhat contradictory results. On one hand, most the respondents said that they were “very” or “somewhat” satisfied with their quality of life, and there is little variation in perceptions of quality of life by herd size. At the same time, we found that the scale of dairy farming was related to feelings about whether the quality of life had become “much” or “somewhat” *better* over the past five years; about 31 percent of respondents from farms with small herds reported that their quality of life had become better, compared to over 62 percent of respondents with herds of 200 or more cows.

We also asked respondents about their plans to continue in or exit from dairying. The data in Table 2 show that the size of dairy herd is associated with how long the household plans to remain in

dairying. Nearly 15 percent of the operators of dairy herds with 24 or fewer cows reported that they have already left farming or will leave within a year, compared to 3.4 of operators of farms with 200 or more cows. These reported intentions to stay in or leave farming are not, however, simple reflections of the economics of dairy farming. Data reported earlier in Table 2 showed that the operators of small dairy farms are older than Wisconsin farm operators as a whole, and thus it is not surprising that a larger share of them are planning to leave farming in the near future than is the case among medium-sized and large dairy farms.

Farm Enterprise Characteristics

In Table 3 we present the results of the 1999 Wisconsin Dairy Farm Poll on the characteristics of dairy farms. Table 3 shows that the vast bulk of Wisconsin dairy farms are organized as either single family or individual operators (72.9 percent) or family partnerships (18.5 percent). There is a great deal of variation, however, in the organization of farms according to herd size. Virtually all the smallest dairy farms—those with 24 or fewer cows—are either single family/individual operations or family partnerships (84.3 and 12.9 percent respectively). This is essentially the case as well for dairy farms with 25 to 49 and 50 to 99 cows. But for larger dairy farms, sizable shares are family corporations. Nearly 13 percent of farms with 100 to 199 cows and nearly 28 percent of farms with 200 or more cows are organized as family or non-family corporations.

Table 3 shows that Wisconsin dairy farms also vary a great deal in terms of family versus nonfamily sources of labor. For the typical small- or moderate-scale dairy farm (those with fewer than 100 cows) in Wisconsin, it is not common for there to be regular non-family employees. More than 95 percent of the total farms in the sample reported relying on family labor for all, or for more than half, of the work on the farm (63.1 percent and 32.1 percent, respectively). But the larger the dairy farm the more likely it is to rely heavily on hired labor. The vast majority (85.7 percent) of dairy farms with 200 or more cows reported hiring regular non-family workers.

The data in Table 3 show that Wisconsin farms vary a great deal in terms of their debt loads.

The results show three basic patterns. Very small dairy farms (24 or fewer cows) tend to be debt free or have very low levels of debt—indeed, their low debt loads along with low expenditures on hired labor are very likely among the reasons why many of these small dairy farms have “staying power” in Wisconsin dairying. Moderate-scale dairy farms (50 to 99 cows, and 100 to 199 cows) tend to have intermediate levels of debt, typically between 10 to 40 percent of asset values. Large dairy farms—especially the very large ones—tend to be very highly indebted; over half of our sample of farms with 200 or more cows reported having debts in excess of 40 percent of asset values.

Scale, Technology, and Management Practices Among Wisconsin Dairy Operators

In Table 4 we show the results of our study on the use of selected production and management technologies. The technologies included in the table fall into three major categories: dairy production technologies, crop production technologies, and emerging or “high” technologies.

Our results show that there are only a few production technologies and practices that are used on most Wisconsin dairy farms. Most Wisconsin dairy operators report using regularly scheduled vet visits (67.1 percent), balancing dairy feed rations regularly (66.0 percent), and artificially inseminate most of their heifers (64.4 percent). Nearly 56 percent of the dairy operators in our sample reported keeping production records on individual cows in their milking herds. Most Wisconsin dairy operators use chemical herbicides (83.9 percent) and fertilizers (77.9 percent) on their corn fields, continue to use the moldboard plow for tillage (63.1 percent), and say they put manure directly into the spreader daily and/or spread manure daily (60.8 percent).

But while there are some technology use patterns that apply fairly generally to Wisconsin dairy farmers as a whole, most of the technologies in Table 4 are used far more extensively by one group of farmers than by others. The most common pattern was that the largest dairy farms were most likely to employ a particular production technology. For example, the use of milking parlors, freestall barns, total mixed ration machinery, three-times-per-day milking, and lined manure storage is very strongly related to size of the dairy herd. The use of 30” rows

in corn production and the use of agricultural chemicals were also strongly related to herd size.

By contrast, we found that the operators of smaller operations were most likely to use management intensive rotational grazing (MIRG) practices. While MIRG was used by over a third of the herds with under 50 cows, it was implemented on less than 10 percent of herds with over 100 cows in our sample.

In our study we included several questions on the use of high-visibility, “emerging” technologies. Just over 15 percent of our sample reported using BGH/rBST on any milk cows in their herds. About 19 percent reported planting a genetically engineered Bt corn variety, and 9.7 percent reported planting a herbicide-tolerant crop variety, in the 1998 growing season. About 5 percent of the sample reported being “very familiar” with “precision farming,” and 12.6 percent said they already use or plan to use precision farming technology. A little over 50 percent of the sample reported owning a computer, with 31.6 percent reporting they use the computer to manage farm records and another 19.2 percent reporting that they use their computer to access the internet for farm information. Our data thus show that use levels of emerging “high-technologies” remain quite low among Wisconsin dairy operators.

Our results on adoption of emerging technologies also suggest that the use of each of these practices is very strongly related to herd size. Thus, for example, fully 71.4 percent of farms with 200 or more cows reported using BGH/BST, while not one of the operators of very small dairy farms (<25 milk cows) in the sample reported using BGH/BST. Similarly, 42.9 percent of the operators of very large dairy farms reported using or intending to use precision farming, and zero percent of the operators of very small dairy farms reported such an intention. Medium-sized dairy farms tend to have intermediate levels of use of these emerging technologies.

Overview

By national standards Wisconsin has traditionally been a hospitable place for medium-sized family-type dairy farms (see the comparison of Wisconsin and U.S. 1997 Census of Agriculture data in Buttel, 1999). Indeed, medium-sized dairy farms—those on the smaller end with 25 to 49 cows, as well as the more typical 50 to 99-cow herds—still comprise the backbone of the Wisconsin dairy sector in terms of cow numbers and milk produced.

Despite the current predominance of the medium-sized family dairy farm in Wisconsin, its dairy production sector is also characterized by very considerable diversity. By being cautious about taking on debt, minimizing capital outlays, using practices such as Management Intensive Rotational Grazing, and availing themselves of off-farm work opportunities, very small dairy farms can provide adequate household incomes and have more “staying power” than is often appreciated. The majority of the operators of these very small dairy farms indicate that they plan to be in business for six or more years.

At the opposite end of the dairy farm size spectrum there is now a growing prevalence of large and very large dairy farms in Wisconsin. The two largest scale categories in our study—farms with 100 to 199 cows, and those with 200 or more cows—are both larger than the traditional scale of dairy farming in Wisconsin. Even so, there are considerable differences between these two categories of large dairy farms. In terms of the characteristics of the farm enterprise (e.g., debt load, use of hired labor, rental of land, legal incorporation), and use of technologies (e.g., BGH/BST, milking parlors, internet access, precision farming), the large dairy farms (those with 100 to 199 cows) in our sample tend to have a number of similarities to medium-sized operations. By contrast, the very large dairy farms (200 or more cows) appear to stand out as being distinct types of operations in terms of these characteristics. These data lead us to speculate that the 100 to 199 cow Wisconsin dairy farm, while it used to be considered a very large operation, is increasingly taking on many of the characteristics (a family operation or partnership, younger-than-average age of operator, primary reliance on family labor) of family farms, whereas the very large dairy farm is much more likely to have non-family characteristics such as relying on non-family workers for the majority of the labor.

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Endnotes

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² PATS is a joint program of the Departments of Rural Sociology, Agricultural and Applied Economics, and Urban and Regional Planning at the University of Wisconsin-Madison College of Agricultural and Life Sciences, with partial funding through UW Cooperative Extension.

³ More detailed analysis of the differences in the size distribution of farms between our sample and WASS' estimates indicate that the most significant difference between the two actually is that our sample has a lower share of very small dairy farms (<25 cows) compared to the state as a whole. We thus believe that our data underestimate the share of cows and milk accounted for by small dairy farms. At the same time we feel that our data on the operator, enterprise, and technology characteristics of small dairy farms are accurate.

⁴ The results of PATS research on entry into dairying show that there appear to be very rapid changes in the age of entering dairy farmers and the extent to which they farm land owned (or previously owned) by their parents (or spouse's parents). Recent entrants into Wisconsin dairying are tending to be older (typically persons in their 30s) than has been the case for dairy farm enterers in previous decades (Jackson-Smith, 1994). A 1996 survey of recent Wisconsin dairy farm entrants also found that only about a third of enterers were operating the land of one of the operator's or spouse's parents (Buttel et al., 1999).

Figure 1: Significance of Dairy Farms by Size of Milking Herd

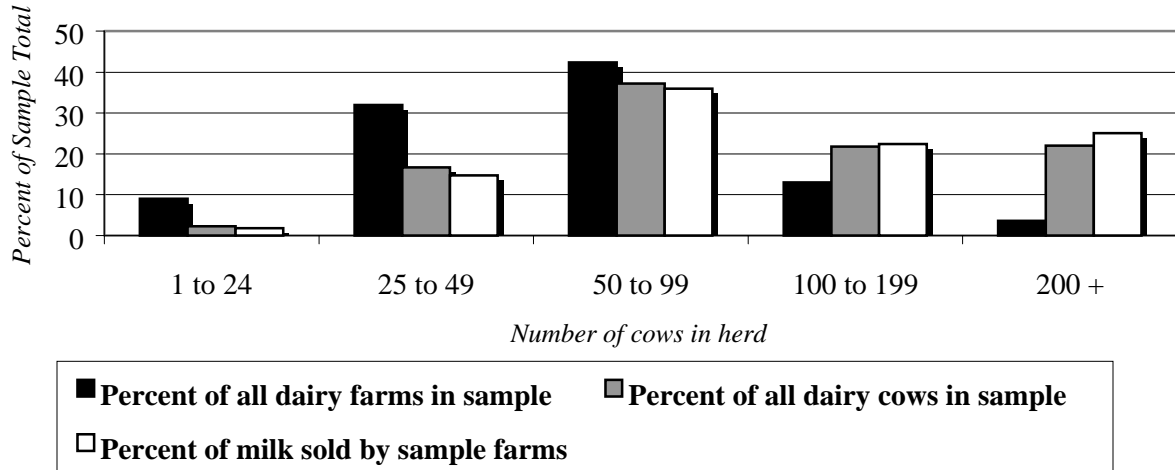


TABLE 1: Size and Productivity of Respondents to the 1999 Wisconsin Dairy Farm Poll.

Characteristics	Herd Size					All Wisconsin Dairy Farms
	1 to 24 Cows	25 to 49 Cows	50 to 99 Cows	100 to 199 Cows	More than 200	
Number of respondents	72	256	339	104	29	804
Percent of all dairy farms in sample	9.0	32.0	42.4	13.0	3.6	100
(Est. proportions in Wisconsin Dairy Sector, 1998) ¹	18.7	31.7	38.7	8.5	2.4	100
Average number of cows in milking herd	18.6	37.7	63.4	121.1	439.1	71.8
Average milk shipped per lactating cow per day	49.0	55.9	61.4	65.2	72.5	59.5
Reported rolling herd average ²	17,670	18,412	20,431	21,041	22,821	20,093
Estimated rolling herd average ³	15,386	17,553	19,280	20,473	22,765	18,683
Mean acres of farmland operated (total)	136.3	196.9	313.6	607.0	1213.9	326.7
Mean acres owned	107.2	142.9	224.5	411.2	591.6	224.1
Mean acres rented	27.5	48.0	89.1	195.8	622.3	102.4

¹ Estimates by the Wisconsin Agricultural Statistics Service, Wisconsin Dept. of Agriculture, Trade, and Consumer Protection (WASS, 1999).

² Not reported by all farms; Reported rolling herd average reflects subset of farms who keep production records on individual cows in the herd.

³ Estimated using reported levels of average milk shipped per cow per day; assumes 314 day lactation for constructing

TABLE 2: Dairy Operator and Household Characteristics

Characteristics	Herd Size					All Wisconsin Dairy Farms
	1 to 24 Cows	25 to 49 Cows	50 to 99 Cows	100 to 199 Cows	More than 200	
Age and Farm Background						
Average age of principal operator (years)	52.8	47.6	45.3	45.5	48.3	46.8
Mean age when first become a farm operator (years)	23.7	23.7	22.4	21.4	20.5	22.7
Mean age when took over this farm (years)	29.7	28.6	27.0	24.6	26.1	27.4
<i>(percent of survey respondents)</i>						
Operators parents farmed	87.3	85.9	91.7	95.1	86.2	89.7
Current farm was originally owned by parents	60.0	62.8	64.0	70.6	62.1	64.1
Participation in off-farm employment						
Operator	23.9	21.1	13.4	3.9	0.0	15.1
Spouse ¹	24.2	46.2	37.9	49.5	34.5	40.8
Either or both ²	40.9	57.9	45.9	52.0	34.5	49.6
Proportion of total household income from farming						
All of income from farming	42.0	36.9	56.7	51.5	67.9	48.7
More than half from farming	31.9	38.8	30.7	34.0	25.0	33.7
Evenly split between farm and off-farm	13.0	11.0	8.1	6.8	3.6	9.1
Most of income from off-farm sources	13.0	13.3	4.5	7.8	3.6	8.5
Totals ³	99.9	100.0	100.0	100.1	100.1	100.0
Family's quality of life						
Very or somewhat satisfied	85.5	79.4	77.8	84.3	96.6	80.5
Become much or somewhat better during past 5 years	30.9	39.4	36.2	39.8	62.1	38.2
Estimated years operator able to continue farming						
Will not continue or out of farming already	4.6	2.4	0.6	1.9	3.4	1.8
One more year	9.2	10.4	6.5	4.8	0.0	7.5
2 or 3 years	15.4	13.3	9.8	7.7	10.3	11.1
4 or 5 years	16.9	13.7	12.9	9.6	6.9	12.8
6 or 10 years	12.3	20.1	20.9	23.1	6.9	19.7
Indefinitely - sufficient farm returns	24.6	26.1	40.6	46.2	72.4	36.5
Indefinitely - sufficient off-farm income	16.9	14.1	8.6	6.7	0.0	10.5
Totals ³	99.9	100.1	99.9	100.0	99.9	99.9

¹ Percent of farm households where spouse is present.

² Percent of all responding farm households.

³ Totals may not equal 100 due to rounding.

TABLE 3: Farm Enterprise Characteristics

Characteristics	Herd Size					All Wisconsin Dairy Farms
	1 to 24 Cows	25 to 49 Cows	50 to 99 Cows	100 to 199 Cows	More than 200	
<i>(percent of respondents)</i>						
Organizational Form of Farm Enterprise						
A single family or individual operation	84.3	81.5	76.0	47.6	24.1	72.9
A family partnership	12.9	15.0	16.9	34.0	27.6	18.5
A non-family partnership	0.0	0.4	0.3	1.9	3.4	0.6
A family corporation	1.4	2.0	5.9	11.7	27.6	5.8
A non-family corporation	0.0	0.0	0.0	1.0	0.0	0.1
Others	1.4	1.6	1.5	4.9	24.1	2.7
Totals ¹	100.0	100.5	100.6	101.1	106.8	100.6
Hire any regular non-family employees	2.9	6.0	25.2	52.0	85.7	22.8
Share of farm labor done by farm household						
All	87.1	77.7	59.7	36.5	13.8	63.1
More than half	11.4	20.7	38.8	50.0	37.9	32.1
Less than half	1.4	1.6	1.5	13.5	48.3	4.8
Totals ¹	99.9	100.0	100.0	100.0	100.0	100.0
Ratio of farm debts to value of farm assets						
Zero debt	52.9	29.1	17.2	14.6	6.9	23.4
Less than 10% of asset values	12.6	17.5	14.5	13.9	3.5	14.8
Between 10% and 40% of asset values	25.1	39.1	50.2	50.6	35.8	44.0
Over 40% of asset values	9.4	14.3	18.1	20.8	53.7	17.8
Totals ¹	100.0	100.0	100.0	99.9	99.9	100.0

¹ Totals may not equal 100 due to rounding.

TABLE 4: Use of Various Technologies and Management Practices among Wisconsin Dairy Farmers.

Characteristics	Herd Size					All Wisconsin Dairy Farms
	1 to 24 Cows	25 to 49 Cows	50 to 99 Cows	100 to 199 Cows	More than 200 cows	
<i>(percent of respondents)</i>						
Milking and Housing Facilities						
Milk in stanchion or tie-stall barn	98.5	97.2	92.2	60.8	10.7	87.3
Milk cows in parlor (flat barn, pit, or other parlor)	1.5	2.8	7.8	39.2	89.3	12.7
Has freestall barn for milking herd	1.5	4.4	17.0	50.9	92.8	18.8
Dairy Management Practices and Technologies						
Uses regularly scheduled vet visits	23.9	58.3	74.3	84.2	100.0	67.1
Balances feed rations at least 4 times/year	19.4	49.2	77.0	93.1	96.4	66.0
Uses artificial insemination on at least 75% of heifers	55.9	66.1	65.7	61.6	64.3	64.4
Keeps production records on individual milk cows	7.6	46.0	64.7	71.3	85.7	55.5
Uses total mixed ration machinery (TMR)	6.0	10.2	31.1	64.6	89.3	28.6
Uses rBST on any cows	0.0	5.7	16.3	30.6	71.4	15.3
Milks cows three times per day	0.0	0.8	1.8	4.1	50.0	3.4
Forward contracts at least some of milk production	1.5	2.0	5.4	8.2	25.0	5.1
Uses management intensive rotational grazing (MIRG)	39.7	32.5	18.5	9.8	7.1	23.3
Manure Management Practices						
Put manure directly into spreader and/or spread daily	72.2	68.0	61.1	47.1	13.8	60.8
Store manure in lined structure ¹	6.9	16.4	28.2	39.4	82.8	25.9
Has written a nutrient management plan for farm	5.7	13.4	31.3	34.0	62.1	24.7
Corn Production Practices in 1998²						
Raises any corn for grain or silage	80.0	92.1	98.5	99.0	100.0	94.9
Used moldboard plow to prepare fields for corn planting	68.6	71.8	61.3	53.5	28.6	63.1
Used no-till planting methods on corn fields	5.7	14.3	20.1	34.7	21.4	18.9
Used chemical herbicides on corn fields	48.6	77.4	91.9	96.0	92.9	83.9
Used chemical fertilizers on corn fields	45.7	73.4	85.3	86.1	82.1	77.9
Used corn insecticides	8.6	32.1	46.2	49.5	75.0	39.8
Used 30-inch row spacing on corn fields	21.4	22.6	43.8	56.4	71.4	37.6
Took soil tests for nitrogen before sidedressing corn	8.6	18.3	35.4	35.6	32.1	27.4
Grew a Bt corn variety	12.9	11.9	19.8	30.7	46.4	19.0
Planted any herbicide-tolerant crop varieties on farm in 1998 ³	2.9	3.6	11.6	20.0	21.4	9.7
Precision Farming / Computer Usage						
Very familiar with the use of precision farming	1.5	2.4	5.8	9.1	14.3	5.1
Uses or plans to use precision farming techniques	0.0	6.9	13.4	24.0	42.9	12.6
Owns a computer	8.8	41.1	58.6	68.3	75.0	50.5
Uses a computer to manage farm records	1.5	23.3	35.1	48.5	75.0	31.6
Accesses the internet for farm information	1.5	15.0	22.0	25.7	42.9	19.2

¹ Includes concrete pit, slurry system or clay-lined basin.

² Use of specific corn production practices represents percent of respondents who grew any corn in 1998.

³ Percent of all respondents; includes either herbicide resistant corn or soybean varieties.



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