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Consumers Respond to Information About Pesticide Residues

Young Sook Eom
(508) 793-7359

Food safety experts rank food-borne disease due to micro-organisms as the greatest health risk from the food supply. Yet for consumers, pesticide residues on fresh produce are a major food safety concern.

The Packer trade magazine reported that some consumers altered their buying habits between 1989 and 1990 because of concerns about pesticide residues on fresh produce, although changes were not dramatic. On the other hand, more than half of consumers responding to a 1989 University of Georgia survey said they maintained their purchase patterns for fresh produce, even though they perceived high risks from pesticide residues and desired some assurance of the produce's safety.

The apparent contrast between attitudes and behaviors concerning pesticide residues gives confusing signals to food marketers and regulatory policymakers.

The author is an assistant professor in the Department of Economics at Clark University, Worcester, Massachusetts. Partial support for this research was provided under a cooperative agreement with USDA's Economic Research Service at North Carolina State University with Kerry Smith and Edmund Estes.

Researchers at North Carolina State University conducted a consumer survey to gain information on how consumers trade off health risks with price. The researchers found that many consumers were willing to shift to produce that had

been tested for residues after they received information about pesticide residues. But their willingness to shift depended on the price difference between the tested and untested produce and their education level.



When asked to rate the seriousness of health risks from chemicals in the food supply (which might include additives, preservatives, and pesticides), more than 60 percent of consumers surveyed expressed high levels of concern.

Table 1
Consumers Perceive Risks From Chemicals in Food

Seriousness of health risk	Chemicals in food	Respondents perceive health risk from:		
		Commercially grown fruit & vegetables	Organically grown fruit & vegetables	Laboratory tested fruit & vegetables
<i>Percent of respondents</i>				
1 (no risk)	1	1	29	6
2	2	1	24	15
3	2	5	22	23
4	4	9	7	14
5	7	16	9	18
6	8	12	4	8
7	12	17	2	5
8	19	18	2	4
9	8	9	0	2
10 (very serious risk)	37	12	1	5
Mean	7.9	6.6	2.8	4.4

Consumers Concerned About Pesticides

The researchers distributed survey questionnaires to 1,860 shoppers at 24 food stores in Raleigh, North Carolina, in September and October 1990. Roughly a third of the questionnaires were returned, and 430 respondents completed all the questions and provided consistent answers.

Sixty-eight percent of the respondents were female. The average household size for these consumers was 2.6. The average annual household income was \$48,834—about a third above the national average. Education level averaged 16 years, compared with the national average of 13 years. Shoppers in the survey said they spent an average of \$75 per week on groceries, including \$11 on fresh fruit and vegetables for their families.

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Respondents were also asked about their perceived health risks from three types of fresh fruit and vegetables. On a scale of 1—"no health risk"—to 10—"very serious risk,"—the average ratings were 6.6 for produce grown with pesticides, 4.4 for produce tested for pesticides, and 2.8 for organically grown produce (table 1).

Consumers Respond to Risk Information

Survey respondents were asked to choose between two hypothetical produce labels. One described a produce item grown conventionally using pesticides (nontested produce). The other described produce grown the same way, but tested for pesticide residues (tested produce). Both items had similar quality features—freshness, appearance, taste, and nutritional value. But they differed with respect to price and health risks.

The labels contained information on health risks from pesticide residues. Health-risk estimates ranged from a low of 3 additional cancer cases per 50,000 consumers over their lifetimes to a high of 50 cases. Prices for the nontested produce ranged from \$0.30 to \$1.45 per produce unit. In the survey choices presented to each respondent, prices were increased as the probability of contracting cancer was lowered. Therefore, the health risk of the tested produce was lower and its price was higher com-



Consumers were willing to pay an average 64 cents more for produce that had been tested for pesticide residues—70 percent over the average price of 88 cents for untested produce.

Table 2
Consumers Willing To Pay More for a 33-percent Reduction in Risk

Consumer characteristics	Price premium Dollars per unit	Number of respondents Number		
			Risk reduction	Price premium Dollars per unit
Household income:	0.83 .64 .58	35 124 117	10 percent	0.60
			33 percent	.64
			50 percent	.67
Number of years of formal education:	.88 .50	103 173		
Attitude toward health:	.87 .55	200 76		

Note: Of the 430 people who completed all the survey questions and provided consistent answers, 270 respondents who decided to purchase either tested or nontested produce were included in the calculations of price premiums.

pared with the risk and prices of the nontested produce.

Respondents were asked whether they would purchase either the nontested or the tested produce. To realistically represent actual choices that confront consumers in food stores, the respondents were allowed the option of buying neither type of produce item.

Forty-two percent of the respondents expressed a preference for fresh produce that was tested and certified as having less risk, even though the tested item cost 35 cents more on average. Twenty-two percent preferred to continue purchasing untested produce, given the per-unit price and health risk levels presented. Eight percent said they would buy neither type of produce, and 11 percent said they preferred organically grown. The remaining 17 percent said they did not agree with the information presented on the labels or were not able to evaluate the risk information.

The survey found that when consumers receive information about

health risks, many will search for safer foods. However, changes in purchase patterns depend on the prices of tested produce and nontested produce (a substitute), the reduction in risk with tested produce, and education levels.

Price information did change consumer behavior. Each 1-percent increase in the price of the safer, tested produce reduced by 0.57 percent the likelihood of a consumer purchasing it over the nontested produce.

Risk information also mattered. Consumers appeared to revise their assessments of the risks from pesticide residues on fresh produce after comparing risk levels on the two produce labels. Consequently, a 1-percent reduction in risk associated with tested produce increased by 0.07 percent the likelihood of consumers' choosing tested produce over nontested, given the average prices for the two types of produce.

However, the relative importance of price in the decision to switch to tested produce was eight

Table 3
Consumers Willing To Pay Only Marginally More for Greater Reductions in Risk

Risk reduction	Price premium Dollars per unit
10 percent	0.60
33 percent	.64
50 percent	.67

times greater than that of changing health risks.

Consumers Are Willing To Pay More for Reduced Risk

Using the choices respondents made between the tested and nontested produce, the researchers calculated how much more willing survey respondents were to pay for the reduced risk offered by the tested produce.

On average, the respondents were willing to pay 64 cents more for a produce item that had been tested in exchange for a 33-percent reduction in health risk. This amounted to a 70-percent price increase over the average price of 88 cents for untested produce. However, about 10 percent of respondents were not willing to pay more for tested produce than they were currently paying for nontested produce.

The premium consumers were willing to pay did not change much despite the increase in risk reduction (table 3). Respondents were willing to pay 60 cents more per item for a 10-percent reduction in risk, but only 67 cents more per item for a 50-percent reduction. This may mean consumers in the survey were focusing on a general concern about food safety rather than differences in the level of risk.

Consumers were not willing to pay much more for a large reduction in risk versus a small reduc-

Labeling of Pesticide Residues on Produce

With the surging popularity of fruit and vegetables has come a growing number of consumer concerns about the long-term health effects of pesticide residues on produce.

However, according to the Food and Drug Administration (FDA), pesticide residues do not pose a serious risk to food safety. In its 1991 Residue Monitoring Program, FDA found that among the domestic and imported fruit and vegetables tested for residues, 68 percent contained no pesticide residues, while 2 percent contained residues in violation of legal tolerance levels established by the U.S. Environmental Protection Agency. Yet this information has not dispelled consumers' concerns.

No Federal Regulations for Retail Labels

Present legislation pertaining to pesticide labeling requires that pesticides applied to fruit and vegetables after harvest be declared on labels on the shipping container. However, such labeling is not required once the food is removed from the shipping container and displayed for sale. There are no Federal labeling regulations regarding pesticides applied to fruit and vegetables prior to harvest.

In the absence of Federal regulations, State regulations have evolved. For example, Maine requires supermarkets to post notices stating if any produce sold in the store has been treated with postharvest pesticides—such as "produce in this store may have been treated with one or more postharvest treatments." Untreated produce must be labeled as such. Upon request, stores must tell customers within 48

hours which pesticides were used on specific produce items.

Retailers Respond to Consumer Concerns

In response to heightened consumer apprehension about pesticide residues, some retailers have developed private testing and certification services. The number of food retailers offering these grew from a single supermarket chain in 1987 to 14 retailers operating more than 740 grocery stores by the end of 1989.

However, retailers and growers have not been able to obtain higher prices for fruit and vegetables certified as having no detectable residues. Although growers and retailers may spend \$75,000-\$200,000 per year to operate residue-sampling programs, most view these as a means to document safe practices to buyers rather than as a marketing tool. Retailers do not pay price premiums to grower-shippers for residue-free produce.

Because various laboratories may use widely different testing procedures, national guidelines on laboratory performance and standards are being developed under the USDA-FDA National Laboratory Accreditation Program to promote more uniform testing.

Organic Produce an Alternative

Food retailers have also added "organic" sections to produce departments so shoppers can buy fruit and vegetables grown without synthetic chemical pesticides.

Currently, there are no national standards or definition of "organic," so consumers cannot be assured of what they are buying under such a label. For example, processed foods labeled "organ-

ic" could contain from 40 to 100 percent organically produced ingredients. Although FDA investigates intentional mislabeling, the investigations can be made only on a case-by-case basis since no legal definition of "organic" exists.

More than half the States have laws or regulations regarding organic products. Yet while there are similarities among State regulations, the lack of consistency between the different standards means farmers and processors produce and label their products differently for interstate commerce.

National standards are in the making, however. The 1990 farm bill included a provision which established procedures for developing a national program for organically grown foods. The provision requires USDA, with advice from a National Organic Standards Board, to set national minimum standards for the production, marketing, and labeling of organic foods by October 1993. (For more information on the provisions of this national program, see "Congress Mandates National Organic Food Standards" in the January-March 1991 issue of *Food Review*.)

Although consumers often associate "organic" with "grown without synthetic chemicals," many do not realize that organically grown produce may contain small levels of pesticide residues carried by rain, fog, irrigation water, drift from spray applied elsewhere, or even from traces of chemicals used years earlier. The term "organic" focuses on production methods employed—not on guaranteeing freedom from pesticide residues.

—For further information, contact Elizabeth Frazao at (202) 219-0864.

tion partly because the probabilities of contracting cancer were evaluated to be small (15 additional cancer cases per 50,000 consumers versus 13 or 7.5 cases). Thus, respondents seemed to regard the two reductions as comparable.

Surprisingly, consumers with annual household incomes below \$15,000 were willing to pay appreciably more to reduce the risk from pesticide residues than were people with higher incomes. Likewise, consumers who had not attended college were willing to pay more for risk reduction than were higher educated consumers. Perhaps more educated consumers are more skeptical about the accuracy of information on pesticide residues in food.

Prior interest in health plays a role in consumers' responses to pesticide risk information. Consumers who were more interested in their overall health were more responsive to the information on reduced risk from tested produce (table 2). They were willing to pay a higher price (87 cents per unit) for tested produce than were consum-

ers who were less interested in their health. Consumers who were less interested were willing to pay only 55 cents more for the same reduction of risk.

Implications for Tolerance Setting and Information Programs

In setting risk standards for pesticide use, policymakers must consider that the tradeoff between risk and price depends on consumers' attitudes toward the risks, their interest in their general health, and their education levels. Differences in these risk/price tradeoffs likely result in different levels of "acceptable" risks for each consumer. Thus, a uniform tolerance level for pesticide residues in food might not accurately reflect how consumers differ in the value they place on health risks.

Consumers in this study were able to update their risk perceptions when provided with new information. Thus, information programs—such as produce labeling or instore displays—can provide consumers with more opportunities to learn about health risks. Greater understanding on the part of consumers about the relative health risks from foods may narrow the disparity between consumers' perceived high risk from pesticides and the judgement of scientists who assign pesticides a low risk.

But the communication must be effective. For example, consumers in this survey seemed to have difficulty dealing with low probabili-

ties and distinguishing small changes in risks. Effective information programs must recognize the diversity in consumers' attitudes as well as consumers' varying abilities to understand and use information in making buying decisions.

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