CONSUMER KNOWLEDGE OF A GROWTH REGULATOR "ALAR" AND ITS EFFECT ON PURCHASES AND CONSUMPTION OF APPLES

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ABSTRACT

Persepsi Konsumen Terhadap Zat Tumbuh "Alar" dan Pengaruhnya Terhadap Pembelian dan Konsumsi Apel.

Penelitian ini mencoba mengungkapkan reaksi/ persepsi konsumen terhadap "Alar" suatu zat tumbuh yang digunakan pada apel yang berpotensi sebagai penyebab penyakit kanker pada konsumen. Konsumen telah memperoleh banyak informasi berbeda-beda tentang zat tumbuh "Alar" baik dari kelompok pengacara, produsen dan pedagang apel.Pertanyaan apakah konsumen merubah pola konsumsi terhadap apel. Pengamatan juga dilakukan terhadap faktor- faktor sosial ekonomi (jender, pendidikan dan pendapatan) yang dapat mempengaruhi konsumsi apel serta pengetahuan yang berhubungan dengan sumber informasi dan pola konsumsi.

Didalam mengevaluasi dampak informasi tentang Alar terhadap pembelian apel, 6 hipotesis yang dikembangkan dan di uji melalui 59 pembeli apel sebagai contoh di wilayah East Lansing, negara bagian Michigan, Amerika Serikat. Ke 59 sampel dipilih dengan menggunakan metoda non-probability-sampling yang diinterview oleh enumerator tentang pola konsumsi apel, sumber informasi tentang Alar dan pengetahuan tentang kimia.

Reaksi konsumen terhadap resiko kesehatan dari bahan makanan menunjukkan bahwa hampir semua responden (99%) tahu tentang Alar, namun hanya 20% yang mengurangi konsumsi apel. Pada umumnya, konsumen merasa khawatir atas peringatan-peringatan kesehatan ketika memperoleh banyak sumber informasi. Pada saat media mulai reda, kekhawatiran konsumen mulai menurun. Pengaruh media hanya pada periode tertentu yang pada akhirnya akan terlupakan dan menjadi tidak efektif.

Key word : Alar, apple consumption, chemical, growth regulator, and perception.

INTRODUCTION

Public concern about the chemical Alar has fluctuated over the past five years as different interest groups have debated the health risks involved in using Alar, a growth regulator on apples. Alar was first marketed in 1963 but was first reassessed by the Environmental Protection Agency (EPA) in 1984. In 1985, EPA experts found that traces of Alar remained on apples after they were sprayed, and even after the fruit was processed. The EPA called for a ban on the product, but pressure from the chemical industry caused the ban to be reversed.

The EPA in 1989 again proposed placing a ban on Alar. At this time the media TV, newspapers, and radio published a lot of information about the Alar, including sensationalist TV programs that captured the attention of millions of consumers. Following this massive media coverage, many consumer reacted by buying fewer or no apples. As consumer advocate groups and apple growers battled the significance of Alar on apples, consumers received confusing message about Alar as a health risk, particularly for children.

This study investigates the relationship between apple buyers knowledge about Alar and their consumption of apples as a result of this knowledge. It also examines various socioeconomic factors (gender, education and income) that may affect the extent of apple buyers' knowledge and influence the decision to purchase apples. As information plays a central role in the decision- making process, the study also looks at different sources of public information on Alar, and how they may be related to the consumption decision.

Consumer information about risks in food and actual consumer perceptions of this risk are important issues to several different interest groups, particularly in the case of apples and apple products. The reaction of consumers to a potential health risk and their level of awareness (knowledge) about the subject must be known by both consumer advocate groups and apple producers and retailers. When these groups know how the consumer will respond, they can wage more effective advertising and transmit informa-

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tion more comprehensively to the affected consumer population. In examining these issues, this study will investigate consumer reaction to and knowledge of Alar on apples and apple product, and the effect of the media on consumer behavior.

Similar studies, although of greater depth and scope, have been done to determine the impact that health warnings have on purchases of affected commodities. For example, Schuker (1983) analyzed the effect of warnings about sacharin on diet softdrink sales. They regressed diet softdrink sales on diet softdrink price and advertising, regular softdrink price, trend and seasonality variables, and two dummy variables (appearance of warning labels and extent of media coverage). What did they find out? Swartz and Strand (1981) looked at the role of information about kepone contamination in the James River and its affect on oyster demand in Baltimore. This study incorporated the distributional impacts of the incident as well as the relationship between different levels of media coverage and sales response (Smith and Thompson, 1984). These reports provided insights into how important the media might be in influencing consumer opinion about perceived health risks. These insights became the basis for developing questions about the consumer's information source and its role in the consumer's decision to buy apples.

A Consumer Reports articles (May, 1989) described tests performed in their laboratories which revealed that some apples products contained significant traces of Alar, even after growers and retailers promised to stop using Alar on their crops. A 1989 National Resources Defence Council (NRDC) report, provided some relevant information on how Alar (daminozide) affects children and adults differently and how it poses much more of a health threat in processed than in fresh apples. The article mentioned that a lot of consumers have recently been subject to mis information about Alar - which is one of the questions examined in relation to how apple consumers have made their consumption decisions. Information from both the Consumer Reports article and the NRDC report were used to develop survey questions assessing consumer knowledge about Alar.

HYPOTHESES

To assess these various relationships between consumer knowledge, socioeconomic variables and the consumer's subsequent decision to buy apples, this study examines consumer behavior (consumption of apples) as a function of consumer knowledge, and knowledge in turn as a function of socioeconomic factors (gender, income, and education). Upon these relationships, one primary hypothesis and five secondary hypotheses are tested:

1) Consumers with greater knowledge about Alar will decrease their consumption of apples (primary hypothesis);

2) More educated consumers have greater knowledge about Alar and its potential effects on human health (secondary hypothesis; knowledge as a function of education);

3) Consumers with higher incomes have moreknowledge about Alar (secondary hypothesis; knowledge as a function of income);

4) Consumers with higher incomes will be more responsive to information on Alar's potential health affectsand will decrease their consumption of apples (secondary hypothesis; consumption, given knowledge, as a function of income);

5) More educated consumers withknowledge about Alar will decrease theircon sumption of apples (se-condary hypothesis; consumption, given know-ledge, as a function of education);

6) Female consumers with knowledge about Alar will decrease their consumption of apples more than male consumers with knowledge about Alar (se-condary hypothesis; consumption, given knowledge, as a function of gender).

Since the media play such an important role in the consumer's decision to buy apples, the study was also investigate wheather the consumer's source of knowledge about Alar (e.g., television versus radio versus written publications) has any significant effect on his/her consumption decision, and wheather there is a significant relationship between the consumer's source of information about Alar and his level of knowledge. The sampling method and survey instrument used to obtain the data for testing these hypotheses and relationships are discussed in the following sections.

RESEARCH APPROACH

The target population for this study consisted of consumers present at the Meridian Mall in East Lansing, Michigan at the time of the survey, who were apple buyers and had heard of the chemical Alar. The size of this

population varied depending on the time of day, the day of the week and weather on the days when the survey was conducted. This population was selected for two reasons. First, its members represented an approximate cross section of East Lansing Apple buyers and provided the information necessary for examining any change in consumer apple purchases and the role that knowledge and information played in these consumption decisions. Second, in the original research proposal the study was to be conducted at two grocery stores in the East Lansing/Lansing area. Problems in obtaining permission to survey consumers at these locations led the researchers to seek an alternative location.

Before selecting the sampling method and the format for the survey document, a rapid appraisal was conducted to increase the researchers' understanding of the Alar issue and better define the hypotheses and analyses to be used on the research data. The researchers interviewed key informants, including others doing research on Alar as well as potential survey respondents, and conducted an additional literature search to obtain more background information about Alar and consumer perseptions. In particular, the researchers obtained more information about the history of Alar, and the different interest groups involved in the debate over Alar as a health risk on apples. This information was used to formulate survey questions assessing consumer knowledge about the chemical.

Theoretically, the sampling frame for this study would have been a list of all the apple buyers with knowledge of Alar, in the Meridian Mall at the times when the survey was conducted. Since an actual list of these consumers could not be obtained within the study's time and resource constraints, a non-probability sampling method was used to select the respondents for the study. A purposive, non-probability method was chosen in order to identify those consumers who were apple buyers and had heard of Alar. The consumers interviewed were chosen randomly from among shoppers in the Mall by means of a decision rule. This rule required the enumerators to interview ten shoppers walking in one direction in the Mall and then ten walking in the opposing direction. As one interview was completed, the enumerators immediately chose the next passerby. This method was used to facilitate identification of potential respondents and to reduce some of the enumerator bias inherent in the selection process. A sample size of 60 respondents was required to yield sufficient data points for chi-square analysis to test the proposed hypotheses. A sample of 59 respondents was finally achieved; the 60th respondent was lost due to researcher error.

Data for the study was collected in August, 1989 at the Meridian Mall, at different time periods during the day in order to capture as large a cross-section as possible of the Mall apple buying population. A two-person team of enumerators interviewed 73 consumers during this period (subject to a 30% refusal rate by potential respondents), identifying 59 apple buyers who had heard of Alar. The survey document consisted of a series of closed and open-ended questions formulated in a logical order to reduce response bias to proceeding questions. The first questions were screening questions to determine if the respondent was indeed an apple buyer. The next closed-ended questions determined the respondent's consumption of apples and source of information about Alar. Following this, the respondent was asked a series open-ended questions to test his/her knowledge on the subject. The final questions concerned background information about the respondent's education level and income.

The survey data analyzed using SPSS-PC+ software. Descriptive data about the sample was generated with frequency distributions, as was some information about the respondent's information source about Alar. To test for significant relationships between the primary and secondary hypotheses, chi-square analysis was used for categorical data in four-cell matrices. Relationships found to be significant through the chi-square test were then verified using Goodman and Kruskal's gamma statistic. The continuous dependent variable, the number of correct responses to the knowledge questions, was tested againts different categorical independent variables (education, income, and gender) to look for significance in relationships. Analysis of variance was used to further define the relationship between the respondents' knowledge about Alar and their sources of information.

RESULTS AND DISCUSSION

The sample consists of 71.2% females and 28.8% males. A large proportion of the respondents have at least a college degree (39%), while 25% are high school graduates and 25% have had some college education. More than half (61.5%) of the respondents fall in the higher income range ($30,000 and above, net income), and 38.5% fall within the lower income designation (0 - $30,000, net income). About 70% of all respondents indicated that they had first heard of Alar only in the last six months. Of the remaining respondents, 23.7% had first heard of Alar sometime in the past year, but only 6.8% said they had first heard of Alar within the past two years. Consumers cited

their most important sources of information about Alar as TV (42.4%), written publications (40.7%), radio (6.8%), other sources (job, grocery store ads; 6.8%), and family or friends (3.4%). Even though they had some degree of knowledge about Alar, most of the respondents (79.7%) had not changed their consumption of apples at the time of the survey, although may indicated that immediately after hearing about Alar, they did decrease their apple consumption for a short period (Tables 1 and 10 for descriptive information).

Table 1. Summary statistic for sample of apple buyers in East Lansing, MI, 1989.

Description			Percentage (%)
Gender	:	- male	28.8
		- female	71.2
Education	:	- high school graduate	25.4
		- some college	25.4
		- associate or tech degree	1.7
		- college graduate	39.0
		- graduate or professional	8.5
Income (US $)	:	- less than 10,000	16.9
		- 10,000 - 20,000	5.1
		- 20,000 - 30,000	11.9
		- 30,000 - 40,000	23.7
		- 40,000 - 50,000	6.8
		- 50,000 - 60,000	10.2
		- 60,000 - 70,000	5.1
		- 70,000 and above	8.5
		- no response given	11.9
Apple consumption	:	- decreased	20.3
		- same	79.7

The first hypothesis states that consumers who have greater knowledge about Alar will decrease their consumption of apples. The study found that, at the good qualifier survey, consumption is no longer directly affected by consumer knowledge about Alar. This was determined through chi-square analysis which showed no significant relationship between consumption of apples and knowledge of Alar. In addition, of 11 (18.6%) respondents with a lot of knowledge, only 1 (9.1%) reduced his consumption of apples. This is due primarily to the fact that while some consumers did originally decrease their consumption of apples, most had returned to their original consumption pattern at the time of the survey (Table 2).

Table 2. Consumers response to Alar in apples according to respondent's degree of knowledge. East Lansing, MI 1989.

Consumption of apples	Knowledge		Total
	Some*	Alot**	
Decrease	11	1	12 (20.3%)
Same	37	10	47 (79.7%)
Total	48 (81.4%)	11 (18.6%)	59 (100.0%) -

Chi-square test for independence is significant at 5% level.
* Corresponds to the nowledge level of hose espondents who answered 3 or fewer questions about Alar correctly.
** Corresponds to more than 3 correct answers about Alar.

The second hypothesis states that more educated consumers will have greater knowledge about Alar and its potential effects on human health. Chisquare analysis implies that this relationship does hold. The chi-square statistic is 3.01 and all expected cell frequencies are greater than 5. Goodman and Kruskal's gamma statistic, used to measure the degree and direction of the relationship, is .55 which indicates that a strong positive dependent relationship exists. Another indicator of this relationship is the mean number of correct responses to knowledge questions about Alar (Refer to Table 15 and Figure 1) for a descriptions of the distribution for the respondents' correct responses to questions about Alar.

The distribution of responses is normal because the curve is flatter than the normal distribution. The kurtosis coefficient = -0.934 and the median = 2.0. This occurs because the respondents' total correct responses lie principally between zero and four and are distributed rather evenly between the totals of one to four correct responses. Given the level of analysis presented here, no correction was thought to be necessary, especially since the mean approximately equals the median. The mean number of correct responses for the sample is 2.17, but the lowest mean number is for high school graduates (1.67), and the highest mean number is for those respondent graduate or professional degrees (3.4). (Tables 3 and 4). One can therefore infer that the respondent's mean response level, or total knowledge about Alar, the greater is his/her level of education.

Table 3. Consumer knowledge of Alar according to respondent's level of education. East Lansing, MI 1989.

Level of education	Knowledge		Total
	Some	Alot	
Low*	27	3	30 (50.8%)
High**	21	8	29 (49.2%)
Total	48	11	59 (100.0%)

* Corresponds to respondents who have high school or some college education.
** Corresponds to respondents who have an associate/technical, college or graduate professional degree.

Table 4. Mean correct responses level according to respondent's level of education, East Lansing, MI, 1989.

Level of education	Mean	Standard eviation	Caces
High school graduate/	1.67	1.29	15
Some college/	2.07	1.28	15
Associate's or technical/	2.00	0	1
College graduate/	2.30	1.26	23
Graduate or profes. degree/	3.40	1.52	5
Sample	2.17	1.33	59

The third hypothesis states that consumers with higher incomes will have more knowledge about Alar. Results from chi-square analysis show that no significant relationship exists between income and knowledge about Alar. This may seem like a trivial relationship; but one would suppose that higher income consumers have more access to information and can make their consumption decisions based on this amount of information. However, in the case of this study, the relationship is not proven to exist (Table 5).

Table 5. Consumer knowledge about Alar according to respondent's income level. East Lansing, MI 1989.

Knowledge	Income		Total
	Low	High	
Some	18	25	43 (82.7%)
Alot	2	7	9 (17.3%)
Total	20 (38.5%)	32 (61.5%)	52 (100.0%)

* Respondent's net-income is $ 30,000/year or less.
** Respondent's net-income is greater than $ 30,000/year.
x^2= 0.52, which is not significant at 10% level of significance.

The fourth hypothesis states that consumers with higher incomes will be more responsive to information on Alar's potential health affects and will decrease their consumption of apples. The data show that 21.2% of the respondents decreased their consumption of apples once they were informed about Alar, however, 78.8% did not. Of those who decreased their consumption of apples, 27.3% were in the lower income group (5.8% of the total respondents), and 72.7% were in the higher income group (15.4% of the total respondents). More higher income consumers decreased their consumption of apples than lower income consumers, but 75% of all high income and 85% of all lower income consumers did not change their consumption of apples. Therefore, a high proportion of respondents in each income group did not change their consumption behavior. Chi-square analysis does not show a strong relationship between these two variables, which is parallel to the lack of relationship between the two variables in hypothesis one (Table 6).

Table 6. Consumer response to Alar according to respondent's income level, East Lansing, MI 1989.

Consumption of apple	Income		Total
	Low*	High**	
Decrease	3	8	11 (21.2%)
Same	17	24	41 (78.8%)
Total	20 (38.5%)	32 (61.5%)	59 (78.8%)

* Respondent's net-income is $ 30,000/year or less.
** Respondent's net-income is greater than $ 30,000/year.
x^2= 0.26, which is not significant at 10% level of significance.

The fifth hypothesis states that more educated consumers with knowledge about Alar will decrease their consumption of apples. Chi-square analysis shows no significant relationship between these two variables. Given that most consumers did not change their consumption behavior (79.7%), this result is not suprising. One would probably need a much larger sample size to pick up any relationship regarding this small subset of the population (those whose consumption did change). More importantly, since no significant relationship was found between knowledge and consumption, but it is known that knowledge and education are positively related, it follows logically that there is no relationship in the case of education and consumption of apples at the time of the survey. (Table 7).

Table 7. Consumer response to Alar, given any degree of knowledge according to respondent's education level, East Lansing, MI 1989.

Level of education	Comsumption		Total
	Decrease	Same	
Low*	6	24	30 (50.8%)
High**	6	23	29 (49.2%)
Total	12 (20.3%)	47 (79.7%)	59 (100.0%)

* Corresponds to respondents who have high school or some college education.
** Corresponds to respondents who have an associate/technical, college or graduate/professional degree.
x^2= 0,07, which is not significant at 10% level of significance.

The sixth hypothesis states that female consumers with knowledge about Alar will decrease their consumption of apples more than male consumers with knowledge about Alar. The study found a significant relationship between the gender of the consumer and his/her consumption of apples, given any degree of knowledge about Alar. Chi-square analysis shows that at a significance level of 5% gender and consumption behavior are related. The Goodman-Kruskal gamma statistic (gamma = .70) shows that a very strong, positive relationship exists between gender and consumption behavior. In another test, it was found that the mean number of correct answers to questions about Alar for male and female consumers was very similar (2.19 for women and 2.12 for men). Therefore, one can infer that although men and women have approximately the same amount of information about Alar, women chose to change their consumption more often than men did (Tables 8 and 9).

Table 8. Consumer response to Alar according to respondent's gender. East Lansing, MI 1989.

Level of consumption	Gender		Total
	Female	Male	
Decrease	11	1	12 (20.3%)
Same	31	16	47 (79.7%)
Total	42 (71.2%)	17 (28.8%)	59 (100.0%)

Goodman and Kruskal's gamma stat. = 0.70
x^2= 3.08, witch is significant at 10% level of significance.

Table 9. Mean correct responses level according to respondent's gender, East Lansing, MI 1989.

Gender	Mean	Standard deviation	Cases
Female	2.19	1.42	42
Male	2.12	1.11	17
Sample	2.17	1.33	59

The study was also designed to determine how the consumer's source of information on Alar might influence his/her consumption of apples. Most respondents' primary source of information about Alar was TV and written publications (83%) (Table 10). Of those who obtained more information from TV, 16% consequently decreased their consumption of apples.
Of those respondents whose most important source was written publications, 21% decreased their consumption of apples. 25% of those whose information came from radio or other sources (job, grocery store, ads.) decreased their consumption of apples (Table 11). A more interesting question is how much knowledge (information) each of these sources provided to consumers. It is knowledge, in turn, which formed the basis for respondents' consumption decisions. Respondents who listened to radio had a mean correct response level of 4.8 answers.

Table 10. Consumer sources of information on Alar, East Lansing, MI 1989.

Source of information	Percentage (%)
TV	42.4
Written publication	40.7
Radio	6.8
Other (job, grocery store ads)	6.8
Family or friends	3.4

Those used written publications as information sources had a mean of 2.29 correct answers, while those who watched TV had a mean of 1.72 correct answers (Table 12). Analysis of variance also shows that the variance in knowledge level among respondents is related to differences between the source of information categories (Table 13).

Table 11. Consumer response to Alar according to information source, East Lansing, MI 1989.

Source of information	Consumption		Total
	Decrease	Same	
TV	4	21	25 (42.4%)
Radio	1	3	4 (6.8%)
Written publication	5	19	24 (40.7%)
Family or friend	1	1	2 (3.4%)
Other	1	3	4 (6.8%)
Total	12 (20.3%)	47 (79.7%)	59 (100%)

Table 12. Mean response level according to respondent's source of information, East Lansing, MI 1989.

Source of innformatiuon	Mean	Standard deviation	Cases
Radio	4.00	0.82	4
Family of friend	3.50	0.71	2
Written publication	2.29	1.27	24
Other (jobs, grocery stores)	1.75	1.71	4
Sample	2.17	1.33	59

Table 13. Analysis of variance on number of correct responses about Alar.

Source	Sum of sq.	Degrees of freedom	F-Statistic	Prob (SF)
Between Source of Information	23.06	4	3.9277	0.0072
Within Source of Information	79.25	54	-	-

In addition, education level is linked to the consumer's primary source of information on Alar. Respondents with graduate and professional degree cited radio and written publications as their most important sources, while those with a four-year college degree cited written publications. High school graduates got most of their information from TV (Table 14).

The role of the media appears to be very important in influencing consumers, primarily in the short run. In fact, most consumers (81%), and heard of Alar, primarily through TV and written publications and could recall very well which source was most influential. Although the study did not establish a direct relationship between consumption of apples and knowledge about Alar (see hypothesis one), this relationship is known to exist in the short run for most consumers. Smith, van Revenswaay and Thompson (1984), commented that respondents made about their consumption behavior over the past six months, a relationship has been illustrated between knowledge about a potential health risk in a food product and decreased consumption of that product in the short run. Although at the time of the survey, most consumers had reverted to their previous consumption patterns, many indicated that they had been affected by information on Alar when there was more media coverage and had subsequently decreased their consumption of apples for a short period.

The study found that many different types of consumers (of different income and education levels) can be reached through different media channels (TV, written publications, radio broadcasts, etc.). It also found, however, that behavior cannot be specifically predicted for any one group. For Examples, low income apple buyers will react to consumer information in a certain way). In general, however, one can expect a response of immediate concern following the release of the information, followed by waning interest on the part of most consumers.

This finding has important implications for producers and retailers of apples as well as consumer advocate groups interested in informing the public and increasing general awareness about potential risks in food products. No matter what the vehicle of information, most people only absorb a certain amount and only act on it for a short period of time. Therefore, advertising and information transmittal will only be effective in the short run in reaching the general population of apple buyers and increasing their awareness about Alar. After a certain time period most consumers will disregard any additional information and most likely resume their previous consumption patterns.

The limitations of this study should be mentioned so as to give a perspective to the results. These include the time period in which the study was conducted and size of the sample used for analysis and interpretation of the results. This study was conducted six months after the major media release about Alar, and it appears that immediately following this widespread information, many people either decreased their consumption of apples or boycotted them all together. In the proceeding months, most people then resumed their normal consumption of apples as media coverage about Alar decreased.

Table 14. Respondent's primary source of information according to level of education, East Lansing, MI 1989.

Level of education	Source of information					Total
	TV	Radio	Written Publication	Family or friend	Other	
High school graduate	11	-	2	-	2	15 (25.4%)
Some college	4	2	7	1	1	15 (25.4%)
Associate's or technical	1	-	-	-	-	1 (1.7%)
College graduate	9	-	12	1	1	23 (39.0%)
Graduate or professional	-	2	3	-	-	5 (8.5%)
Total	25 (42.4%)	4 (6.8%)	24 (40.7%)	2 (3.4%)	4 (6.8%)	59 (100.0%)

Therefore, this study captures only that portion of the population that permanently decreased their consumption of apples, and not the immediate effect of the primary information release about Alar. There is some merit in knowing the intermediate term effects of this information on consumption of apples, but one cannot extend this analysis over time to draw conclusions about the long term effects on consumption or what the magnitude of the short term effects might have been. A more appropriate study would be a time series analysis of consumption behavior from the first news release on Alar to the present.

The size of the sample also limits the types of analysis that can be performed and the conclusions that can be drawn. With a larger sample, one might capture more significant results from cross-tabulations of the variable relationships implied by the hypotheses. A similar study, using a larger sample size and a more representative sample of the East Lansing apple-buying population, would allow more sensitive analysis of the relationships implied here that were beyond the time and resource limitations of this study. Again, time series analysis using a larger sample of apple buyers would furnish information on consumers' changing behavior and attitudes over time and better representation of the actual East Lansing apple-buying population. In this manner, the researcher would be able to validly reliably estimate the population parameters that this study could not estimate.

CONCLUSION

This study has investigated consumer knowledge about the chemical Alar and how this knowledge and has influenced purchases of apples. Although one might expect consumers to reduce their consumption of apples after receiving information that Alar is a potential carcinogen, most consumers reacted to the media information for only a short period by decreasing their consumption of apples. At the time of the study (six months after the major media releases), most cosumers had resumed buying apples and were no longer greatly influenced by addition information on Alar. The implications for those trying to transmit consumers information to increase awareness about potential health risks in food products are clear. Initial information is the most important and has the greatest effect on consumers. As an available information decreases, consumers begin to disregard it, either because they believe that it is no longer important or because they are overwhelmed by the disparate information they have received.

The implication is that consumer must be awared the potential risk of every chemical or insecticide used in food processing.

Table 15. Frequency distribution for values of respondents total correct responses to questions about Alar, East Lansing, MI 1989.

Total Correct	Frequency	Percent (%)	Cumulative Percent
0.0	7	11.9	11.9
1.0	13	22.0	33.9
2.0	14	23.7	23.7
3.0	14	23.7	81.4
4.0	10	16.9	98.3
5.0	1	1.7	100.0
6.0	0	0.0	100.0

Summary statistics.			
Mean	2.170	Standard deviation	1.330
Kurtosis	-0.934	Median	2.000
St. error	0.613	Skewness	-0.002

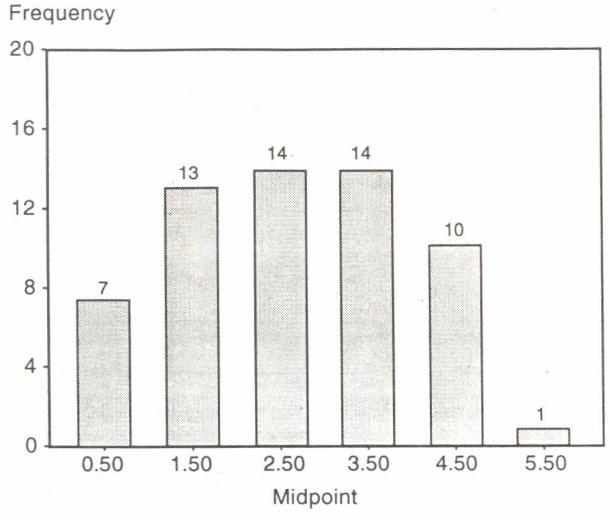

Figure 1. Histogram frequency of total correct responses to questions about Alar, 1989.

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REFERENCES

Consumer Report, Bad Apples, Vol 54, No. 5, May 1989.

NRDC National Resources Defense Council, Intolerable Risk : Pesticides in Our Children's Food, Washington D.C., February 1989.

Schuker. 1983. Effect of Sacharin on diet softdrink. Consumer Report, Environmental Protection Agency (EPA) Washington.

Smith, van Revenswaay and Thompson, "The Economic Consequences of Food Contamination : A Case Study of Heptachior Contamination of Oahu Milk, Agricultural Economics Report # 449, Michigan State University, June 1984.

Swartz and Strand. 1981. Impact of information on oyster demand. John Hapkins, Baltimore.