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THE NUTRITIONAL COGNIZANCE, ATTITUDES, AND FLUID MILK CONSUMPTION OF MICHIGAN STATE UNIVERSITY STUDENTS

By

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ABSTRACT

THE NUTRITIONAL COGNIZANCE, ATTITUDES
AND FLUID MILK CONSUMPTION OF
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Milk consumption among those 18 to 24 years old has been decreasing. To describe a population within this age group, a questionnaire was designed to measure milk consumption, attitudes towards milk, and dairy nutritional knowledge. The instrument was mailed to a stratified random sample of 1200 Michigan State University undergraduates resulting in a return rate of 59%. The respondents' sex, class level, school residence, and age directly influenced milk consumption. A high level of nutritional knowledge was related to positive attitudes towards milk. Positive attitudes were related to a high level of milk consumption. Rural respondents tended to have both higher knowledge and attitude scores than those from urban backgrounds. Former 4-H members tended to have higher knowledge scores than those who were never 4-H members. A significant knowledge, attitude, and consumption interaction lent credibility to the hypothesis that consumer education might be a feasible means of dairy promotion.

To my parents, Francis and
Sophie Bissaillon . . . not
always in my home but
always in my heart

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To thank every individual who played a role in the design, execution and completion of this project is an impossible task. From friends who cheered me up during difficult times to office-mates who never complained about endless chatter and billows of smoke--you are all remembered!

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CHAPTER I

INTRODUCTION

The dairy industry is in a constant state of change. Currently, milk production is greatly exceeding consumer demand for both fluid and manufactured dairy products. According to United States Department of Agriculture (USDA) statistics, February 1982 was the thirty-fourth consecutive month for year-over-year gains in total milk production.[1] Total 1981 production has exceeded the record breaking 128.4 billion pounds of milk produced in 1980 by 3.2%.[2] Expanding cow numbers, increased production per cow, favorable milk-feed price relationships, and low cull cow prices are forecast to enhance even further milk production increases in 1982.[3] The record breaking milk production has resulted in combined commercial and government dairy product stocks of almost 19 billion pounds on a milk-equivalent basis.[4]

The vast dairy product surplus indicates that increased supply has not been matched by a similarly heightened demand. Commercial use of all dairy products (on a milk-equivalent, fat solids basis) was up

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[1] Dairy Outlook and Situation (United States Department of Agriculture, Economics and Statistics Service, March, 1982), p. 5.

[2] Ibid.

[3] Dairy Outlook and Situation (United States Department of Agriculture, Economics and Statistics Service, December, 1981), p. 6.

[4] Ibid., p. 18.

1% in 1981 on a year to year comparison.[5] This increase in use was the result of an increase in the production of manufactured dairy products.[6] The national commercial disappearance of fluid milk in recent years has experienced a downward trend.[7] Focusing on ten individual federal order milk markets, United Dairy Industry Association (UDIA) found that whole, lowfat , and skim milk sales decreased 0.71% from 1976 to 1979.[8] Whole milk, lowfat milk, and skim milk sales in Southern Michigan, Federal Order 40, decreased 8.5% between 1976 and 1980.[9] This steady annual 2% decrease in sales was the largest decrease shown within the ten markets studied.

This evidence clearly indicates that the greatest challenge of today's dairy industry is to match supply with demand. Dairy marketers in areas such as Southern Michigan, which are experiencing annual decreases in fluid milk sales should work to stabilize the demand for fluid products and eventually increase sales. High fluid (Class 1) sales are desirable since they return the highest dollars per hundredweight of milk marketed to the dairy farmer.

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[5] Dairy Outlook and Situation (United States Department of Agriculture, Economics and Statistics Service, September, 1981), p. 12.

[6] Ibid., p. 11.

[7] Ibid., p. 12.

[8] United Dairy Industry Association, "Ten Market Study Comparative Analysis" (Marketing and Economic Research Division, UDIA, 1981).

[9] United Dairy Industry Association, "Federal Market Order #40, Comparative Analysis" (Marketing and Economic Research Division, UDIA, 1981).

Ideally, the supply/demand problems of the dairy industry will be squarely faced and solved in terms of both production and consumption. The continuous escalation of milk production should be curbed. To stabilize and increase fluid milk consumption, extensive market research with subsequent agressive promotion campaigns should be initiated. Within the dairy community this area has developmental potential. According to George Cope[10], a fluid milk processor:

> There has been a tendency for taking milk marketing for granted. Ever since the introduction of low fat milk, 2% milk, and the gallon milk package, there have been few relatively new products. We apparently assume that people will buy milk out of habit.

John Sliter[11], Executive Vice President of UDIA, says:

> Consumers are the reason for our being. Just because we continue to produce a product does not mean that they are going to buy it. We must continue to work on the demand side.

These comments indicate that within the dairy industry an awareness of the full benefits of promotion is growing.

Some suggest[12] that increasing consumption in the 35 and older age group is the industry's greatest challenge. This may not be the

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[10]George Cope, "Opportunities of a Fluid Milk Processor" in Milk From Producer to Consumer, Proceedings of the 36th Annual Midwest Milk Marketing Conference (Department of Agricultural Economics, Michigan State University, East Lansing, MI, 1981), p. 27.

[11]John Sliter, "Our Work On The Demand Side - The Cheese Case" in Milk From Producer to Consumer, Proceedings of the 36th Annual Midwest Milk Marketing Conference (Department of Agricultural Economics, Michigan State University, East Lansing, MI, 1981), p. 46.

[12]Cope, p. 30.

case. A USDA household food consumption study[13] indicates the following:

> (Milk) users . . . under 23 years of age had considerably smaller average daily (milk) intakes in 1977 than in 1965. However, most groups of adult users (over 22 years of age) had the same or slightly higher average (milk) intakes in 1977.

Other reliable, but unreleased, sources indicate the same trend. The key aspect is that consumptive activities of the young have been shown to affect adult consumer behavior.[14] The attitudes and consumption patterns of today's young adults may influence the consumption habits of the next milk drinking generation. Given this basis, young adults and teenagers may be a good target group for extensive marketing and promotion research.

Statement of the Problem

The primary purpose of this study was to determine the nutritional knowledge of milk, the attitudes towards milk, and the fluid milk consumption patterns of young adults (18 to 24 years of age). Additionally, demographic factors which affect nutritional knowledge, attitudes, and consumption would be identified. To determine if a dairy product consumer education program might be effective as a means of dairy promotion, the relationship between nutritional knowledge, attitudes, and consumption was studied.

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[13] Elenor M. Pao, "Changes in American Food Consumption Patterns and their Nutritional Significance" Food Technology, vol. 35 (1981), p. 43.

[14] Lester P. Guest, "The Genesis of Brand Awareness" Journal of Applied Psychology, vol. 26 (1942), pp. 800-808.

Need for the Study

Comprehensive research concerning dairy products has been limited to "marketing information gathered by special interests, primarily unpublished data for in-house use".[15] Published university or industry studies are few. According to Helene Swenerton:[16]

> In the final analysis, we do not have full understanding of the interacting factors which mold the beliefs and attitudes of consumers; this lack is especially evident in the sensitive issues associated with food, nutrition, and health.

Participants in the "Animal Agriculture: Research to Meet Human Needs in the 21st Century" conference identified "information" related to human nutrition as a research priority. Specifically, they suggest:[17]

> Foods of animal origin have received a great deal of publicity in relation to the substances they contain, their place in the diet, and their role in relation to health and disease. . . . Research on evaluating the effectiveness of various approaches on consumer knowledge, attitudes and food consumption practices is . . . required. A system of monitoring trends in food consumption changes is important to the evaluation of areas needing emphasis.

Thus, a need has been identified. Objective studies in the realm of dairy consumer behavior are necessary and desirable, especially in this time of unbalanced supply and demand. The focus of this study will be on the consumer: What are their attitudes and nutritional perceptions of milk? Can these variables be related to consumption?

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[15] Helene Swenerton, "Consumers Concerns About Food and Nutrition" Journal of Dairy Science, vol. 65 (1982), p. 477.

[16] Ibid., p. 476.

[17] Animal Agriculture: Research to Meet Human Needs in the 21st Century Executive Summary (Boulder, CO, Western Press, 1980), p. 9.

From these beginnings and with subsequent studies, a clearer picture of the dairy product consumer will emerge. Utilizing this knowledge, the dairy industry will be better able to satisfy the consumer's needs and, as such, consequently increase sales.

Research Questions

The data collected during this study will be used to answer the following questions related to nutritional knowledge of milk, attitude towards milk, and fluid milk consumption.

1. What attitudes towards milk, objective or situational, elicit the highest level of agreement among the total research population?

2. What attitudes towards milk discriminate between respondents who consume different amounts of milk?

3. What demographics (population statistics) influence the respondents summated attitude towards milk?

4. What nutritional questions are most often correctly answered by the entire research population?

5. What nutritional questions, correctly answered, discriminate between respondents who consume different levels of milk?

6. What demographics influence the respondents summated nutritional knowledge score?

7. How much whole milk, lowfat milk, skim milk, and chocolate milk are the respondents consuming daily? What demographics influence the consumption of these different types of milk?

8. How much total milk are the respondents drinking daily? What demographics influence the respondent's total milk consumption?

9. Does attitude towards milk and/or nutritional knowledge of milk influence a respondents total milk consumption?

10. Which qualities of milk most encourage the respondents to drink milk?

Limitations of the Study

This study was limited to full-time undergraduate students registered for Spring Term 1981 at Michigan State University. Because of cultural differences, foreign students were eliminated from the research population.

Students living in Michigan State University dormitories were not offered the full range of milk types studied. Their choices were limited to lowfat milk, skim milk, and chocolate milk.

Definition of Terms

The following terms will be used frequently throughout this thesis. For ease of reference they are here defined.

Attitude.--A learned pre-disposition to respond consistently in a favorable manner with respect to a given alternative.[18]

Nutritional Knowledge or Cognizance.--The state of being aware of certain nutritional concepts related to milk and dairy products.

Heavy User.--One who drinks 3 or more 8 ounce glasses of milk daily.

Average User.--One who drinks 2-3 eight ounce glasses of milk daily.

Light User.--One who drinks 1 eight ounce glass of milk daily.

Occasional User.--One who drinks several eight ounce glasses of milk per week.

Non User.--One who rarely or never drinks milk.

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[18] James F. Engel, Roger D. Blackwell, and David T. Kollat, "Alternative Evaluation: Beliefs, Attitudes and Intentions" in Consumer Behavior (Hinsdale, IL, The Dryden Press, 1978), p. 389.

CHAPTER II

REVIEW OF LITERATURE

In order to position this research problem within the realm of both consumer behavior and dairy product marketing, the following subject areas are reviewed:

1. The Development of Attitude/Behavior Theory
2. A Model of Consumer Behavior
3. The Nutritional Perceptions, Attitudes, and Consumption Patterns of Milk Drinkers

The Development of Attitude/Behavior Theory

Attitude formation and attitude change are two of the most researched variables in both consumer behavior and its' parent field, social psychology. Recent developments in attitude theory and measurement are best appreciated within the historical framework from which they were formed. Thus, this review will follow the development of attitude/behavior theory from its simple beginnings to the recent expectancy-value attitude models. It may be noted here that while these attitude studies do not directly deal with marketing goods or services, they do have practical implications for pursuasive product marketing programs.

Attitude may be defined as "a mental and neural state of readiness to respond, which is organized through experience and

exerts a direct and/or dynamic influence on behavior."[1] The underlying assumption has been that a change in attitude will be followed by a change in behavior. In a 1963 review paper, Leon Festinger[2] questioned the direct and absolute relationship between attitude and behavior suggested in the theoretical literature of the time. His search of experimental literature resulted in only three relevant studies which attempted to support the hypothesis that a cognitive change in attitude will directly lead to a change in subsequent behavior. Each study failed to demonstrate that a pursuasive change in attitude would lead to stable behavioral changes. According to Festinger:[3]

> I would like to suggest one possible reason for a complex relationship between attitude or opinion change and behavior. I have no data to support this suggestion, but perhaps it may offer some conceptual basis for further research that will clarify the problem. I want to suggest that when opinions or attitudes are changed through the momentary impact of a persuasive communication, this change, all by itself, is inherently unstable and will disappear or remain isolated unless an environmental or behavioral change can be brought about to support and maintain it. . . . Otherwise, the same factors that produced the initial opinion and the behavior will continue to operate to nullify the effect of the opinion change.

Festinger was not the only academician of the time to question the direct attitude-behavior connection. Thought it was, and still is, maintained that an attitude and behavior relationship exists, the

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[1] G. Allport, "Attitudes," in C. Murchinson, ed., Handbook of Social Psychology (Worchester, MA, Clark University Press, 1935), p. 798.

[2] Leon Festinger, "Behavioral Support for Opinion Change" Public Opinion Quarterly, vol. 28 (1964), pp. 404-17.

[3] Ibid., pp. 414-16.

theory was defined, expanded and positively critiqued by researchers in the field. Early research maintained that attitude change was a function of attitudes towards an object. Milton Rokeach[4] hypothesized that a person's attitude is really a function of two attitudes:

1. The attitudes towards an object (A_o).
2. The attitudes towards a situation (A_s).

Rokeach[5] states:

> A preferential response towards an attitude-object cannot occur in a vacuum; it must necessarily be elicited within the context of some social situation about which . . . we also have an attitude.

The implication of this proposition is that "any attitude-toward-object has the inherent property of being differentially manifested along a range of values rather than a single value, depending upon the situation within which the attitude object is encountered."[6]

Using this dual attitude approach, Rokeach and Rothman[7] developed a model of cognitive interaction called the belief congruence model. It was hypothesized that subsequent behavior, either verbal or non-verbal, is the result of the relative importance of A_o and A_s in a given situation. The more important A_o is perceived to be in

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[4]Milton Rokeach, "Attitude Change and Behavioral Change" Public Opinion Quarterly, vol. 30 (1966), pp. 529-30.

[5]Ibid., p. 531.

[6]Ibid., p. 532.

[7]Milton Rokeach and G. Rothman, "The Principle of Belief Congruence and the Congruity Principle as Models of Cognitive Interaction" Psychology Review, vol. 72 (1965), pp. 128-42.

relation to A_s, the more the behavioral outcome will be a function of A_o and visa versa.

The belief congruence model was tested empirically by Rokeach and Mezei.[8] The study involved twenty-six negroes and twenty-four caucasians who applied for janitorial positions in Detroit, Michigan. After filling out application forms, each subject was made to wait for a job interview in a room with two negro and two caucasian "treatments," who were also apparently waiting to be interviewed. The four confederates, discussing controversial issues, drew each subject into the conversation. During the job interview each subject was asked to choose which two of the four confederates he would most like to work with. Given the salience of racial attitudes in our culture, it was expected that each subject would choose two co-workers of their same race. However, the most frequent basis of choice was not race but similarity of beliefs, which had become apparent to the subject in the pre-interview discussion. Rokeach[9] states that this behavior was the result of an interaction between A_o (racial attitudes) and A_s (working conditions). Here, the importance of A_s outweighed the importance of A_o.

The belief congruence model helped to explain one aspect of attitude/behavioral inconsistency found in the literature. Gross and Niman[10] investigated other areas of inconsistency and determined

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[8] Rokeach, Public Opinion Quarterly, pp. 539-40.

[9] Ibid.

[10] Steven J. Gross and C. Michael Nimen, "Attitude - Behavior Consistancy: A Review" Public Opinion Quarterly, vol. 39 (1975), pp. 358-68.

that personal differences, situational differences, and methodological problems were the "most popular variables postulated to contribute to the discrepancy between attitude and behavior."

Further clarification on the nature of attitudes was gained as researchers sought to define the process by which consumers form attitudes about an object. This led to the formation of expectancy-value models; the two most notable being those developed by Milton J. Rosenburg and Martin Fishbein.

Rosenburg's[11] general theoretical view invludes the following points:

1. When a person has a stable tendancy to respond to any given object, this tendency is associated with a cognitive structure. The cognitive structure is based upon the person's beliefs about the object mediated by evaluative aspects of these beliefs.

2. The sign (positive or negative) and extremity of the effect felt toward the object are correlated with the sum of the evaluated beliefs associated with the object.

With this view, Rosenburg[12] tested the hypothesis that one's attitude is the sum of the products VI_i (the importance of the ith value) and PI_i (the perceived instrumentality of an attitude with respect to the value i). Stated algebraically: $A_o = (VI_i)(PI_i)$. Stated simply, the intensity of a person's values covaries with their attitude towards an object.

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[11]Milton J. Rosenburg, "Cognitive Structure and Attitudinal Effect" Journal of Abnormal and Social Psychology, vol. 53 (1956), pp. 358-68.

[12]James F. Engel, Roger D. Blackwell, and David T. Kollat, "Beliefs, Attitudes, and Intentions" in Consumer Behavior (Hinsdale, IL, The Dryden Press, 1978), p. 394.

Fishbein's expectancy-value model appears similar to Rosenburg's; however, the theoretical basis differs considerably. Fishbein's[13] theory may be stated as follows:

1) An individual holds many beliefs about a given object.
2) Associated with each of related beliefs is a mediating evaluative response, i.e. an attitude.
3) The evaluative responses summate.
4) Through the mediation process, the summated evaluative response is associated with the attitude object.
5) On future occasions, the attitude object will elicit the summated evaluative response, i.e. this attitude.

Accordingly, an individual's attitude toward any object is a function of his beliefs about the object and the evaluative aspect of those beliefs.

Fishbein[14] empirically tested his theory with the specific hypothesis that "an individuals attitudes towards negroes is a function of (1) his beliefs about the characteristics and components of negroes (B_i), and (2) the evaluative aspects of those beliefs (a_i). Stated algebraically: $A_o = \Sigma B_i a_i$.

On the basis of ten descriptive beliefs about negroes, fifty student volunteers attitudes towards negroes were predicted using Fishbein's model. In support of this hypothesis, the correlation between predicted and obtained attitude scores was .801 ($P<.001$).[15]

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[13]Martin Fishbein, "An Investigation of the Relationships Between Beliefs About an Object and the Attitude Toward That Object" Human Relations, vol. 16 (1963), p. 233.

[14]Ibid., p. 234.

[15]Ibid., p. 239.

Empirical research has not identified which model, Rosenburg's or Fishbein's, is superior in predicting behavioral response.[16] Neither model takes into account all of the mediating variables which might affect behavior. In 1972, Fishbein[17], himself, extended his model to include the factors relating to normative beliefs. The discussion of this and other sophisticated models is beyond the scope of this study. However, one can see in historical perspective that attitude theory has progressed from a simple linear "attitude towards the object" behavioral connection to the more complex multi-attribute models of Rosenburg and Fishbein.

It has been here discussed that a cognitive structure is associated with and affects the attitudes towards an object in a given situation. These attitudes, in turn, have some mediating effect upon behavioral intentions. Given this broad theoretical background the practical implications for consumer behavior research will now be explored.

A Model for Consumer Behavior

In consumer research, it is necessary to translate the language of social psychology into marketing terminology. For example, to the marketer of a given product or service the behavioral intentions described previously become synonymous with intent to purchase. Based

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[16] Engel, Blackwell, and Kollat, "Alternative Evaluation," p. 398.

[17] I. Ajzen and Martin Fishbein, "Attitudes and Normative Beliefs as Factors Influencing Behavioral Intentions" Journal of Personality and Social Psychology, vol. 3 (1972), pp. 1-9.

upon theoretical literature, the individual's psychological field concerning consumer decision processes has been set forth in the Engel, Blackwell and Kollat Model of Consumer Behavior.[18] According to the authors[19], the model offers advantages to researchers of consumer behavior. Specifically:

1. A frame of reference is provided for research.
2. Research findings can be integrated into a meaningful whole.
3. Models become useful in theory construction.
4. Explanations are provided for the performance of the system.
5. Students of consumer behavior are assisted in grasping the nature of the variables and their linkages.

The Engel, Blackwell and Kollat Model of Consumer Behavior is based upon their five stages of the consumer decision process: problem recognition, search, alternative evaluation, choice, and outcomes. Also represented are the variables which effect each of the phases. The relationships between cognitions, attitudes, and behavior are defined under the heading of "Product Brand Evaluations". The variables listed within this column are defined as follows:[20]

1. Evaluative Criteria: desired outcomes from choice or the use of an alternative expressed in the form of attributes or specifications used to compare various alternatives.

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[18]Engel, Blackwell, and Kollat, "Models of Consumer Behavior: Formalization and Quantification," pp. 543-563.

[19]Engel, Blackwell, and Kollat, "Consumer Decision Processes," p. 20.

[20]Engel, Blackwell, and Kollat, "Alternative Evaluation: Beliefs, Attitudes, and Intentions," p. 388.

2. Beliefs: information which links a given alternative to a specified evaluative criterion, specifying the extent to which the alternative possesses the desired attribute.

3. Attitude: a learned predisposition to respond consistantly in a favorable manner with respect to a given alternative.

4. Intention: the subjected probability that beliefs and attitudes will be acted upon.

For example, a hypothetical dieting consumer uses calorie count as an evaluative criteria for beverage consumption. She perceives whole milk to be high in calories compared to lowfat and skim milks. This belief is manifested in the attitude "whole milk is fattening and a poor beverage choice for weight-watchers." Given this attitude, the probability is low that this particular consumer would intend to purchase whole milk if the alternatives (lowfat or skim) were available.

In this model, intention is directly linked to choice, the act of purchase or use. As with Fishbein's extended model[21], Engel, Blackwell, and Kollat take into account other variables which affect "Product Brand Evaluations." These are grouped under the headings of "General Motivating Influences" (motives, personality/lifestyle, normative compliance) and "Internalized Environmental Influences" (cultural norms and values, reference group/family, anticipated circumstances). Although these variables will not be measured in this study, it is helpful to place cognitive, attitudinal, and behavioral findings within the entire known psychological field of the consumer.

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[21]Ajzen and Fishbein, p. 562.

Given the present level of knowledge of consumer behavior and the problems of conceptualization and measurement of each variable, it is unlikely that this model will ever receive definite empirical verification.[22] However, it serves as a valuable reference to evaluate consumer studies and marketing programs within the context of consumer behavior.

The Nutritional Perceptions, Attitudes, and Consumption Patterns of Milk Drinkers

No previous study which related a consumer's nutritional knowledge of milk with attitudes towards milk and the consumption of milk was located. However, several research organizations have studied these three variables separately. In 1971, the United States Department of Agriculture's (USDA) Special Survey Branch undertook a study entitled "Consumer Opinion About Dairy Products and Imitations."[23] This nationwide survey of homemakers measured, among other things, the nutritional image of whole and lowfat milk and the perceived fat content of these products. According to the results:

> . . . (whole) milk is credited by seven homemakers in ten with building strong teeth and bones. Better than half said it builds strong muscles and bodies, has a high calcium content, and is important in a balanced diet. Almost as many thought (whole) milk was high in vitamins. . . . On the unfavorable

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[22] Engel, Blackwell, and Kollat, "Models of Consumer Behavior: Formalization and Quantification," p. 562.

[23] Margaret Weidenhamer, Presentation, "Consumer Opinion About Dairy Products and Imitations" (United States Department of Agriculture Special Surveys Branch, Nov. 3, 1971).

> side, however, we find that about 4 homemakers in ten felt (whole) milk is high in calories and fat, and is a poor choice for weight watchers.[24]

In comparison:

> Lowfat milk was viewed primarily as low in fat and calories and a good choice for weight watchers. . . . No other (nutritional) attribute was selected by more than three respondents in ten.[25]

It may be inferred from these results that, while lowfat milk is viewed more favorably as far as fat content is concerned, it is not perceived to be as fully nutritious as whole milk.

Since the unfavorable image of milk and some other dairy products seemed to be based upon high fat content, USDA also measured the homemakers knowledge of the fat content of whole and lowfat milk. The results showed that:

> Lowfat milk was the only product for which homemakers gave an accurate answer - perhaps because the label . . . indicates the fat content. About half of the respondents chose the correct category (up to 5%), one in ten thought the answer was 'none' and about two in ten said lowfat milk contained 10% or more fat.[26]

Yet, "for whole milk only one in ten homemakers gave the correct answer (up to 5%). All of the others over-estimated with 30% thinking (whole) milk is 50% fat or greater."[27]

Mary Zehner conducted a similar study at eighteen dairy farm women's programs held throughout the state of Michigan in 1981. In

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[24] Ibid., p. 7.

[25] Ibid., p. 8.

[26] Ibid., p. 11.

[27] Ibid.

support of USDA, she found that 72% of these consumers correctly indicated the fat content of lowfat (2%) milk.[28] The percentage of fat in whole milk (3-4%) was correctly indicated by 47% of the farm women. Thirty-two percent thought that whole milk was from 5 to 50% fat and 5% indicated that whole milk was within the 50-100% fat range.[29] Zehner[30] concludes:

> These dairy women do have misconceptions about the fat content of milk, and it might be expected that consumers in general would share these inaccurate perceptions . . . the amount of fat and number of calories can influence the acceptance and consumption of milk, irrespective of the other nutritional contributions it may make to the diet . . . this may have a negative impact upon demand.

In an unpublished fact-finding study, this author explored the consumer's nutritional perceptions of milk (Appendix A). As expected, 72% correctly chose the 0-5% range as the fat content of lowfat milk. Only 25% correctly chose this response as the fat content of whole milk. Thirty-nine percent of the consumers thought whole milk was 5-25% fat and 22.5% indicated that whole milk was 25-75% fat.

In further support of the USDA survey, this author found that food value, flavor, calcium content, protein level, and vitamin content were the qualities of milk which encouraged many consumers to drink milk.

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[28]Mary Zehner, "Michigan Dairy Women's Understanding of Selected Dairy Products" (Consumer Marketing Information, Michigan State University, East Lansing, MI, 1981), p. 2.

[29]Ibid., table 1.

[30]Ibid., p. 4.

To summarize, it can be seen that milk, in general, is viewed as a nutritional food. However, its image is somewhat clouded by the high perceived fat content of whole milk. This perception might decrease the demand for whole milk in a weight conscious nation such as the United States.

Consumers' attitudes towards milk have been most successfully tracked by marketing and economic research conducted by United Dairy Industry Association (UDIA). This organization has conducted an attitude trend study in a nationwide probability sample of about 4,000 consumers bi-annually since 1972. The results of these surveys are valuable since they measure any positive or negative change in milk's image over time.

Compared with previous studies, the principle results of the 1980 Attitude Trend Study[31] are as follows:

1. Taste/Sensory Perceptions: These have deteriorated through the years. Most consumer dissatisfaction concerns milk's "flat and watery taste" and the concern that "milk doesn't taste as good as it used to".

2. Nutrition: The perception of milk as a food "needed for a balanced diet" and as a source of calcium, vitamins, minerals, and a source of energy has eroded since 1972. The only nutritional statement which elicited a positive change over the years was "Milk is a good source of riboflavin".

3. Behavior: The attitude change in this category was also negative. The strongest negative response concerned the statements "Adults should drink milk," "Young adults should drink milk," and "Everyone should drink three glasses of milk a day".

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[31] United Dairy Industry Association, "1980 Attitude Trend Study - Attitudes Towards Milk" (Marketing and Economic Research Division, UDIA, 1980).

4. Occasion: Mealtime milk drinking, with the exception of a negative change at lunchtime, has held quite steady. However, the image of milk as a coffee alternative or between meal snack has deteriorated.

5. Economics: Consumers indicate that the price of milk is too high. However, considering food value, milk was considered a more economical food choice in 1980 than in 1974.

6. Health/Naturalness: Milk continues to be viewed as a healthful, natural drink. However, all of the statements in this category have slipped in terms of the consumers high level of agreement.

In terms of the consumer's attitudes towards milk, UDIA found that, regardless of the level of agreement to a statement, the total image of milk has deteriorated to some extent over the years. Importantly, milk's image as a good food value has improved significantly. This should have some positive implications for marketing milk to today's value conscious consumer.

According to the theoretical basis of consumer behavior, a nationwide decline in the image of milk should coincide with a decrease in milk consumption. Likewise, the perceived high fat content of whole milk might lead to a shift from whole milk consumption to lowfat milk consumption. These trends will now be explored.

Per capita civilian sales of all fluid dairy products (on a fat solids basis) decreased from 264 lbs/capita in 1970 to 232 lbs/capita in 1980.[32] From 1974 to 1980, per capita sales of whole milk declined 36 pounds. This was partially offset by a 27.5 pound per

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[32]Dairy Outlook and Situation (United State Department of Agriculture, Economics and Statistics Service, June, 1981), p. 18.

capita increase of lowfat milk sales during the same time period.[33] Skim milk sales from 1970 to 1980 have remained stable.[34] These sales indicate a decline in national milk consumption. Apparently, many whole milk drinkers have shifted to lowfat milk in the past ten years. Skim milk remains a relatively unpopular dairy product (4.6 lbs/capita in 1980).[35]

In a ten federal order market survey, UDIA found that in-area sales of those markets decreased 0.71% from 1976 to 1979. Per capita sales in all federal order markets declined 2.52% in the same time period.[36] To support USDA statistics, UDIA also found a similar decrease in whole milk sales and increase in lowfat milk sales.

The ten market study also pinpointed regional sales changes in milk sales. It is interesting to note that Federal Order #40, Southern Michigan, experienced a total fluid sales decrease of 8.5% from 1976 to 1980.[37] This was the largest sales decrease of any of the federal markets studied. This statistic indicates the consumer studies of the Southern Michigan population might be valuable for the development of innovative sales promotions within that area.

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[33] Ibid., p. 20.

[34] Ibid., p. 26.

[35] Ibid.

[36] United Dairy Industry Association, "Ten Market Study Comparative Analysis" (Marketing and Economic Research Division, UDIA, 1981).

[37] United Dairy Industry Association, "Federal Market Order #40, Comparative Analysis" (Marketing and Economic Research Division, UDIA, 1981).

Summary

Bases of various attitude/behavior theories were explored. These indicated that attitude is a function of the entire psychological field of an individual including culture, background, and present beliefs. Each individual holds many beliefs concerning an object. These beliefs, weighted by the perceived importance of each belief, summate to form a person's total attitude towards an object. This attitude may be used to predict an individual's behavior towards the object in a given situation. A pursuasive change in attitude could lead to a behavioral change.

Theoretical terminology was translated into more practical marketing language with a model of consumer behavior. The beliefs about a product would incluence a consumer's attitude towards the product. The desired behavior, dependent upon attitude, would be product purchase. Given the marketer's viewpoint, it would be possible to increase sales by a persuasive positive change in the consumer's attitude towards a given product.

Present nutritional knowledge of milk, attitudes towards milk, and the consumption of milk were related to the model of consumer behavior. A decrease in the consumer's image of milk has corresponded to a decrease in total milk consumption. The high perceived fat content of whole milk may have influenced a sharp per capita decline in the consumption of whole milk and an increase in lowfat milk consumption.

CHAPTER III

METHODS AND MATERIALS

Population

The population or "theoretically specified aggregation of survey elements"[1] measured in this study was defined as full time undergraduate students attending Michigan State University. Because of cultural differences, non-United States citizens were excluded from the population. Michigan State University students were chosen as the population of interest for several reasons:

1. A state supported university is heterogeneous with respect to race, religion and social class.

2. The majority of undergraduate college students fall into the 18-24 year old age bracket.

3. Michigan State University is located within Federal Milk Marketing Order #40, a dairy market experiencing annual decreases in milk consumption.

4. A complete sampling frame was available for the population of interest.

According to Babbie:[2]

> The ultimate purpose of survey sampling is to select a set of elements from the population in such a way that descriptions of those elements . . . accurately describe the total population from which they were selected. . . . Random selection (where

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[1] Earl R. Babbie, "Sampling Concepts and Terminology" in Survey Research Methods (Belmont, CA, Wadsworth Publishing Co., 1973), p. 79.

[2] Ibid., p. 83.

each element has an equal chance of selection that is independent of any other events in the selection process) is the key to this process.

Within this guideline a stratified random sample of 1200 students registered for Spring Term 1981 was drawn by computer from Michigan State University's master student registration tape. A stratified random sample is defined as "one obtained by separating the population elements into non-overlapping groups, called strata, and then selecting a simple random sample from each stratum."[3] This sampling method often results in increased information for a given cost. Scheaffer, Mendenhall, and Ott[4] give several reasons to account for this:

1. The data should be more homogeneous within each stratum then in the population as a whole.

2. Separate estimates of population parameters can be obtained without additional sampling.

3. Reduced variability within each stratum produces stratified sampling estimators that have smaller variances than do the simple random sampling estimators from the same sample size.

The sample was stratified by class level (freshman, sophomore, junior, senior) with equal allocation to each stratum. In this study, stratifying by class level should have indirectly caused an age stratification since college students fall into relatively homogeneous age classifications.

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[3]Richard L. Schaeffer, William Mendenhall, and Lyman Ott, "Stratified Random Sampling" in Elementary Survey Sampling (N. Scituate, MA, Duxbury Press, 1979), p. 59.

[4]Ibid., p. 60.

This sample was used for the distribution of a self-administered questionnaire designed to address research questions 1-9 posed in Chapter 1. In addition, a separate simple random sample of 50 students was drawn for use in a telephone interview. The telephone interview was designed to determine the qualities of milk that influence students to drink milk (Research question 10).

Research Instruments

Development of the Self-Administered Questionnaire

The self-administered questionnaire, "A Survey of the Nutritional Cognizance, Attitudes, and Fluid Milk Consumption of Michigan State University Students," was developed by the researcher to survey the following:

1. The population's attitude towards milk.
2. The population's nutritional cognizance of milk.
3. The amount of fluid milk consumed by the population.
4. Certain demographic characteristics of the population.

In accordance with the four categories described, the questionnaire was divided into four parts. Part 1 contained 25 statements designed to measure attitudes in accordance with a Likert-type scale. Respondents were able to "strongly disagree(1)", "disagree(2)", have "no opinion(3)", "agree(4)", or "strongly agree(5)" in response to any given statement. Babbie[5] cites an advantage of Likert scaling:

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[5]Babbie, "Index Construction," p. 269.

> Whereas identical response categories will have been used for several items intended to measure a given variable, each such item may be scored in a similar manner. With five response categories, scores of . . . 1 to 5 might be assigned taking the direction of the response into account (for example, assign a score of 5 to 'strongly agree'). . . . Each respondent would then be assigned an overall score representing the summation of the scores he received for his several responses to individual items.

Using this rationale, a total attitude score could be given to each respondent based upon the responses given to a group of statements.

In accordance with Rokeach[6], the attitude section included attitudes towards the object, i.e. "Milk is a natural food," and attitudes towards the situation, i.e. "I usually order milk in restaurants."

Part 2 of the questionnaire measured fluid milk consumption. Four separate questions measured the consumption of whole, lowfat, skim, and chocolate milk, respectively. Since the response categories of close-ended questions should be "exhaustive and include all possible responses that might be expected,"[7] each question was given 6 possible responses. These ranged from "3 or more 8 ounce glasses per day" to "I never drink any . . . milk." Included in this section were three milk intolerance questions. These were used to differentiate between those who were non-milk drinkers because of choice and those who could not drink any milk for health reasons.

Part 3 was a test of nutritional knowledge. It consisted of 14 multiple choice questions drawn from a National Dairy Council

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[6]Milton Rokeach, "Attitude Change and Behavioral Change" Public Opinion Quarterly, vol. 30 (1966), pp. 529-30.

[7]Babbie, Guide to Question Construction," p. 141.

pamphlet[8], "Milk, Ageless Food With a Natural Appeal". In order to differentiate between different levels of knowledge, both well publicized items (the concept of pasteurization), and difficult items (the fatty acid composition of milk) were included. To reduce guesswork, each question included the response "I don't know".

The final section included demographic items important to the study, such as age, sex, class level, childhood habitation, school residence and 4-H Club Membership. In addition, respondents were able to request complimentary nutritional information, supplied by the Dairy Council of Michigan.

Throughout the research instrument, each question or statement was carefully written in accordance with the following recommendations set by Borg and Gall:[9]

1. Clarity is essential. If your results are to be valid an item must mean the same thing to all respondents. . . .
2. Short items are preferable to long items as short items are easier to understand.
3. Negative items should be avoided since they are misread by many respondents. . . .
4. Avoid "double-barreled" items, which require the subject to respond to two separate ideas with a single answer. . . .
5. Do not use technical terms, jargon, or "big words" that some respondents might not understand. . . .
6. Finally, it is important that an effort be made to avoid biased or misleading questions. . . .

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[8]National Dairy Council, "Milk, Ageless Food with Natural Appeal" (Chicago, IL, National Dairy Council, 1975).

[9]Walter L. Borg and Meredith Damian Gall, "The Methods and Tools of Survey Research" in Educational Research An Introduction (New York, NY, Longman, Inc., 1979), p. 297.

In order to measure the validity of the instrument, critique the wording of the questions, and increase the probability that the research objectives would be met with the survey, the first draft of the questionnaire was submitted to a panel for review. This panel included specialists in dairy science, dairy marketing, adult education, statistics, advertising, questionnaire development, and nutritional education (Appendix B).

The questionnaire was modified as suggested by panel members. As a final measure of validity, the second draft was pre-tested, with the cooperation of Dr. Russel Erickson, in two undergraduate dairy science classes at Michigan State University. The researcher was present at the pre-test to hear questions and comments concerning the instrument. As suggested by Babbie[10], the pre-test responses were reviewed for the following:

1. Failure to answer . . . when a given question produces a number of "no answers", this is a clue to problems in (the question).

2. Multiple answers . . . if one question produces a number of multiple answers, the researcher should suspect that either his answer categories are not mutually exclusive or else the question is being misunderstood.

3. "Other" answers . . . a large number of responses that are written indicates that the categories provided are not sufficiently exhaustive.

4. Qualified answers . . . these point to a lack of clarity in the questions and/or answers.

5. Direct commands: Often respondents point directly to problems in question working or format . . . (the researcher) should be on the alert for particular questions that generate more than their share.

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[10]Babbie, "Evaluating Pre-Tests and Pilot Studies," p. 214.

Based upon these guidelines, the survey instrument was slightly modified and finalized; this draft served as the data gathering instrument of the survey (Appendix C). A copy of the instrument and research proposal was submitted to the University Committee for Research Involving Human Subjects (UCRIHS) and approved by that body in March, 1981.

Development of the Telephone Interview

The sole objective of the telephone interview was to determine the qualities of milk which most influence students to drink milk. A simple telephone interview, approximately 4 minutes in length, was designed to meet this objective. The interview schedule was reviewed by the research committee and pre-tested on ten students randomly selected from the telephone directory.

The telephone interview schedule was revised on the basis of the review and pre-test. This instrument served as the second data gathering device of the study (Appendix D).

Data Collection

The self-administered questionnaire was administered during the second week of Michigan State University's Spring Term 1981. This time period was chosen for several reasons:

1. By this time, students would be adjusted to the routine of the term.
2. The academic work load would still be light for most students.
3. The time frame would allow for one follow-up mailing and telephoning a sample of non-respondents before final exam week.

Each questionnaire was accompanied by a cover letter and a self-addressed stamped envelope (Appendix C). The letter of transmittal briefly explained the importance of the study, guaranteed confidentiality, and included a due date. Since the researcher was also a student at Michigan State University, a peer-to-peer appeal to complete the questionnaire was made. Each return envelope included an identifying respondent number to monitor returns. The master list of student names and their corresponding number was destroyed at the completion of the data collection. The first mailing of the research instrument provided 531 usable questionnaires.

> The methodological literature on follow-up mailings strongly suggests this is an effective method for increasing return rates in mail surveys. In general, the longer a potential respondent delays replying, the less likely he is to do so at all. Properly timed follow-up mailings, then, provide additional stimuli for replying.[11]

Thus, two weeks after the initial mailing, a second questionnaire, letter of transmittal, and self-addressed stamped envelope was mailed to non-respondents of the first mailing. The follow-up mailing resulted in 171 additional usable questionnaires for a survey total of 702 returns. Excluding 14 surveys that could not be delivered (incorrect addresses, etc.) the return rate, based upon 1186 delivered questionnaires, was 59%. Fifteen questionnaires contained one or more missed pages and one questionnaire was completed by a graduate student. These were eliminated from the study and resulted in 686 surveys suitable for analysis.

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[11]Babbie, "Data Collection 1: Self-Administered Questionnaires," pp. 163-64.

Borg and Gall[12] suggest:

> If more than 20% of the questionnaires are not returned, it is desireable to check a portion of the non-responding group . . . if this sample . . . answers the questions in about the same manner as the responding group, it is probably safe to say that the responding group is an unbiased sample of those to whom you mailed the questionnaire.

Checking the response bias, 25 non-respondents were randomly selected and interviewed by telephone. Those who were contacted responded to the questions in a manner consistant with responses to the mailed survey. However, it is noted that 13 of the non-respondents were not contacted though attempts were made at different times of the day for one week. It is possible that non-respondents were busier and had more personal time commitments than respondents.

The telephone interviews were conducted in May, 1981. In the original sample of 50, ten students either did not have a telephone or were not listed in the directory. Thirty-six students were contacted and interviewed; one student refused to cooperate. It was not possible to contact three possible participants in this segment of the study.

Method of Analysis

The Self-Administered Questionnaire

Data from the self-administered questionnaire were coded and transferred to computer sheets. This information was then entered on computer for statistical analysis. Before any statistical tests were executed, the data were manipulated as follows:

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[12] Borg and Gall, p. 308.

1. A total attitude score, based upon 18 selected attitude statements (Appendix E), was assigned to each respondent. The score was determined by adding the numbered responses to the selected attitude statements and dividing by 18. This resulted in an average attitude score. Respondents whose attitude score ranged from 3.51 to 5.0 were defined as having "positive" attitudes towards milk. Scores ranging from 2.51 to 3.50 were categorized as having "no opinion" and respondents with an average score of 1.0 to 2.5 were labeled as having "negative" attitudes towards milk.

2. A total consumption score, as defined in Chapter 1 - Definition of Terms, was assigned to all respondents based upon their daily consumption of all types of milk.

3. A nutritional knowledge score, based upon the number of nutrition questions correctly answered, was assigned to each respondent. Those who correctly answered 10 to 14 nutrition questions were given a "high" knowledge score. Six to nine correct responses resulted in an "average" knowledge score and those who correctly answered one to five nutrition questions were assigned a "low" knowledge score.

Frequency counts, used for description and to rank certain questions, were obtained for all items. To determine relationships between variables, two and three-way contingency tables were constructed.

The statistical analysis was completed under the guidance of Drs. John L. Gill and Clyde Anderson. Computer expertise and counseling was provided by Mr. Larry Chapin.

Pearson's Chi-Square Test

Two and three-way contingency tables were analyzed using Pearson's Chi-Square Test. With two-way tables the null hypothesis tested is: "Effects of the row criterion are independent of the

effects of the column criterion."[13] If the test statistic exceeds the critical X^2 value, the null hypothesis is rejected, the row and column criteria are deemed dependent.

Pearson's Chi-Square Test is valid when all of the expected cell values exceed 2.5. Contingency tables including the variable Childhood Habitation may not be valid for those students living at their parents home. Only 12 respondents were catagorized as such--this number was too small for valid statistical tests.

Bonferroni's Chi-Square Test

Those contingency tables with dependent row and column criteria were further analyzed using "the Bonferroni method of making m separate tests of non-independent contingency tables taken from larger tables."[14] This test was used to determine which row(s) or column(s) were responsible for a significant Pearson's Chi-Square test.

Level of Significance

Levels of significance for the Pearson's Chi-Square Test were provided to the fourth decimal place by the statistical computer package used. For the Bonferroni Chi-Square Test, levels of

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[13]John L. Gill, "Introduction and Review" in Design and Analysis of Experiments in the Animal and Medical Sciences - Volume 1 (Ames, IO, The Iowa State University Press, 1978), p. 80.

[14]Ibid., p. 82.

significance were compared with tabled values[15] at either the .01 or .05 level. In both tests, the hypothesis of independence was rejected if the critical value exceeded the test statistic at the .05 level of significance.

The Telephone Interview

For descriptive purposes, frequency counts of each possible response were made. These were used to rank the qualities of milk which encouraged students to drink milk.

Summary

A self-administered questionnaire was developed to study research questions 1-9 listed in Chapter I. The questionnaire was reviewed by a panel and their suggestions were incorporated into the second draft of the survey. As a further test of validity, the instrument was pre-tested in two undergraduate dairy science classes. The final draft of the questionnaire included modifications suggested by the pre-test responses.

The questionnaire was mailed to a stratified random sample of 1200 undergraduate students at Michigan State University. Non-respondents to the first mailing were sent a follow-up mailing. Both mailings included a questionnaire, letter of transmittal and self-addressed stamped envelope. The overall return rate was 59%. To check

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[15] John L. Gill, "Appendix A.10" in Design and Analysis of Experiments in the Animal and Medical Sciences - Volume 3 (Ames, IO, The Iowa State University Press, 1978), p. 72.

for response bias, 25 non-respondents were randomly selected and interviewed by telephone.

A telephone interview schedule was developed to study research question nine listed in Chapter I. A simple random sample of 50 students was drawn for the interview. Thirty-six students were contacted and agreed to participate in the interview.

The self-administered questionnaire was analyzed using Pearson's Chi-Square Test and the Bonferroni Chi-Square Test. In order to permit the ranking of responses, frequency counts of each item in both the self-administered questionnaire and the telephone interview schedule were made.

CHAPTER IV

RESULTS

This chapter presents the analysis of data collected to answer research questions 1-9 posed in Chapter I. The data collection instrument used was a self-administered questionnaire, "The Nutritional Cognizance, Attitudes, and Fluid Milk Consumption of Michigan State University Students" (Appendix C). Also included is a summary of 33 telephone interviews designed to determine the qualities of milk which most influence students to drink milk.

Of the 1200 self-administered questionnaires mailed, 702 surveys were returned after two mailings. A telephone interview with a sample of non-respondents indicated that there was no response bias in the returns. Fifteen respondents did not complete one or more pages of the six-page questionnaire; one respondent was not a member of the population of interest. These 16 responses were eliminated from the analysis. To determine the relationships between variables, the remaining 686 surveys were analyzed using Pearson's Chi-Square and Bonferroni's Chi-Square. Only those relationships found to be significant at the .05 level are included here. Frequency counts of selected items are listed.

The Population

Table 1 lists the 7 demographics studied. Fewer males than females responded to the survey. Seventy percent of the respondents resided in university dormitories. This high percent was expected as Michigan State University's policy dictates that all freshmen and sophomores reside in university housing. Very few students were currently residing at their parent's house. Equal numbers of juniors and seniors responded to the questionnaire. The highest return rate came from the sophomore class; freshmen returned the lowest number of surveys. More than half of the respondents were 20 to 22 years old. Nearly 40% ranged from 17 to 19 years of age. A small percentage of the respondents were 23 years or older.

Most participants grew up in suburban areas. Smaller percentages grew up in urban and rural-non-farm areas. Students raised on the farm comprised 9% of the survey population. Almost 15% of the population indicated that they were, at one time, 4-H Club members. The type of 4-H project was not specified.

About 90% of the respondents indicated no personal or familiar problems with milk intolerance while the remainder indicated a family history of milk intolerance or personal problems with the digestion of milk. Forty seven respondents answered "I don't know" to the familiar milk intolerance question. These responses were not included in the milk intolerance percentages.

TABLE 1.--The Population Characteristics (Sex, School Residence, Class Level, Childhood Habitation, Age, 4-H Club Membership, Milk Intolerance) of Michigan State University Undergraduate Students, Spring 1981.

Characteristic	Frequency	Percent
1) SEX	681	100
Males	308	45.2
Females	373	54.8
2) SCHOOL RESIDENCE	686	100
Dormitory	480	70.0
Apartment	194	28.3
Parent's house	12	1.7
3) CLASS LEVEL	685	100
Freshmen	150	21.9
Sophomores	183	26.7
Juniors	176	25.7
Seniors	176	25.7
4) CHILDHOOD HABITATION	659	100
Urban	88	13.3
Suburban	394	59.8
Rural, non-farm	119	18.1
Rural, farm	58	8.8
5) AGE	685	100
-17 to 19 years	256	37.4
20-22 years	371	54.2
23+ years	58	8.4
6) 4-H CLUB MEMBERSHIP	681	100
yes	99	14.5
no	582	85.5
7) MILK INTOLERANCE	627	100
None	563	89.8
Family history, personal discomfort, or fluid milk elimination from the diet*	64	10.2

*Of the 64 respondents who indicated a family history of milk intolerance, 45 indicated that they also suffered discomfort after drinking milk. Forty-five of these eliminated milk from their diet for this reason.

Fluid Milk Consumption

Each respondent was requested to indicate the amount of whole, lowfat, skim, and chocolate milk he drank. Table 2 lists the frequency of consumption for each milk type. Lowfat milk consumption was higher than the consumption of any other milk type with 43% of the respondents drinking at least one glass daily. This can be compared to 27% consuming skim milk daily and 24% drinking whole milk daily. Chocolate milk was the least popular milk type with 8% of the respondents indicating daily consumption.

TABLE 2.--Fluid Milk Consumption by Milk Type, as Reported by Michigan State University Undergraduate Students, Spring, 1981. (Numerical Values Represent the Row Percent.)

	8 ounce glasses/day			Several/	Rarely	Never	
Milk Type	3+	2	1	Week	Drink	Drink	Total
Whole	11.77	5.95	6.11	5.66	48.88	21.61	100.00
Lowfat	16.37	12.20	14.58	9.97	35.71	11.16	100.00
Skim	8.18	7.74	11.31	6.40	38.54	27.83	100.00
Chocolate	1.19	2.38	5.06	5.95	60.12	25.30	100.00

Comparing the consumption of whole milk and skim milk, it is interesting to note that approximately half of the respondents who drink whole milk daily consume three or more glasses per day; only one third of daily skim milk drinkers gave this response.

Similar milk consumption trends were found by combining the "rarely drink" and "never drink" response categories. Eighty-five

percent of the students indicated that they rarely or never drink chocolate milk. Skim milk and whole milk were again comparable with 66% and 70%, respectively, indicating that they rarely or never drink these products. About 47% of the respondents reported that they rarely or never drink lowfat milk, the most popular milk type.

While more respondents reported that they rarely or never drink whole or chocolate milk compared to skim milk, a higher percentage never drinks skim milk compared to either whole or chocolate milk.

It is important to note here that the milk type consumption data may be misleading. After the mailing of the questionnaire, it was learned that the Michigan State University dormitory cafeterias do not serve whole milk. Seventy percent of the respondents did not have easy access to whole milk. The frequency of whole and lowfat milk consumption may have been different if dormitory students were given a choice of the four milk types studied here.

The consumption of each milk type was analyzed by studying the relationship between consumption and the following variables: sex, class level, school residence, age, and childhood habitation. The results follow:

Whole Milk

Sex and childhood habitation were significantly related to whole milk consumption. Table 3 relates whole milk consumption to sex. Males drank more whole milk than did females. Thirty-five percent of male respondents reported drinking at least one glass of whole milk daily while 15% of the females gave this response. Almost 30% of the

TABLE 3.--Whole Milk Consumption by Sex. (Numerical Values Indicate the Column Percent.)

Whole Milk Consumption	Female[a]	Male[a]	Total
3 or more glasses/day	5.21	19.93	11.86
2 glasses/day	4.11	8.31	6.01
1 glass/day	5.48	6.98	6.16
Several glasses/week	4.66	6.64	5.56
Rarely drink	50.96	45.85	48.65
Never drink	29.59	12.29	21.77
Total	100.00	100.00	100.00

[a]Like superscripts indicate significant group differences.

responding females indicated that they never drink whole milk. Only 12% of the males answered likewise. Of the males who indicated that they drink whole milk daily, more than half reported drinking 3 or more glasses per day.

Table 4 compares whole milk consumption with childhood habitation. There was no significant difference between urban, rural-non-farm, and rural-farm respondents. Those respondents from an urban or farm background drank significantly more whole milk than those from the suburbs. Sixty percent of the urban respondents and 56% of the farm respondents reported that they rarely or never drink whole milk while 76% of the suburban respondents were in this category. Farm respondents most frequently reported drinking 3 or more glasses

TABLE 4.--Whole Milk Consumption by Childhood Habitation. (Numerical Values Indicate the Column Percent.)

Whole Milk Consumption	Urban[a]	Suburban[a,b]	Rural, Non-farm	Rural, Farm[b]	Total
3 or more glasses/day	14.94	8.33	15.38	27.58	12.23
2 glasses/day	2.30	5.99	6.84	8.62	5.88
1 glass/day	11.49	4.95	6.84	5.17	12.23
Several glasses/week	11.49	4.95	5.13	1.72	5.57
Rarely drink	39.08	50.78	48.72	43.10	48.14
Never drink	20.69	25.00	17.09	13.79	21.98
Total	100.00	100.00	100.00	100.00	100.00

[a,b]Like superscripts indicate significant group differences.

of whole milk daily. However, as a group they did not differ significantly from urban or rural-non-farm respondents.

Lowfat Milk

Lowfat milk consumption was dependent upon sex and school residence. Lowfat milk consumption is summarized by sex in Table 5. Males reported drinking more lowfat milk than did females. Twenty-five percent of the men in the population drank 3 or more glasses of lowfat milk daily while 9% of the women gave this response. Fifty-four percent of the women indicated that they rarely or never drink lowfat milk compared to 38% of the men responding likewise.

Table 6 shows the relationship between lowfat milk consumption and school residence. Dormitory residents consumed more lowfat milk

TABLE 5.--Lowfat Milk Consumption by Sex. (Numerical Values Indicate the Column Percent.)

Lowfat Milk Consumption	Female[a]	Male[a]	Total
3 or more glasses/day	9.32	25.17	16.49
2 glasses/day	10.68	13.58	11.99
1 glass/day	15.62	13.25	14.54
Several glasses/week	10.14	9.93	10.04
Rarely drink	41.37	29.14	35.83
Never drink	12.88	8.94	11.09
Total	100.00	100.00	100.00

[a]Like superscripts indicate significant group differences.

TABLE 6.--Lowfat Milk Consumption by School Residence. (Numerical Values Indicate the Column Percent.)

Lowfat Milk Consumption	Dormitory[a,b]	Apartment[a]	Home[b]	Total
3 or more glasses/day	20.17	7.73	8.33	16.37
2 glasses/day	10.94	14.95	16.67	12.20
1 glass/day	12.66	17.53	41.67	14.58
Several glasses/week	10.30	8.76	16.67	9.97
Rarely drink	33.91	42.27	0.00	35.71
Never drink	12.02	8.76	16.67	11.16
Total	100.00	100.00	100.00	100.00

[a,b]Like superscripts indicate significant group differences.

than either those respondents living in apartments or those living at home. Forty-four percent of dormitory residents reported drinking lowfat milk daily with almost half drinking 3 or more glasses per day. There was no significant group difference between respondents living in apartments and respondents living at home. However, with small expected cell values, Pearson's Chi-Square test was not a valid test for those students living at home. Fifty-one percent of apartment residents reported that they rarely or never drink lowfat milk; only 17% of respondents living at home gave this response. Most students living at home reported drinking 1 glass of lowfat milk daily.

Skim Milk

Skim milk consumption was significantly related to sex, class level, and school residence. Skim milk consumption by sex is shown in Table 7. Females drank significantly more skim milk than did males. Thirty-four percent of the female respondents indicated that they drink skim milk daily compared to 18% of the males. Most women who drank skim milk daily reported drinking one glass per day. About three quarters of the males indicated that they rarely or never drink skim milk; half of the females gave this response.

Skim milk consumption is related to class level in Table 8. Freshmen and sophomore students drank significantly more skim milk than did seniors with 30% and 35% respectively drinking skim milk daily; 27% of the seniors gave this response. Juniors consumed slightly higher amounts of skim milk daily than did seniors. However,

TABLE 7.--Skim Milk Consumption by Sex. (Numerical Values Indicate the Column Percent.)

Skim Milk Consumption	Female[a]	Male[a]	Total
3 or more glasses/day	7.14	9.24	8.10
2 glasses/day	10.44	4.29	7.65
1 glass/day	17.03	4.29	11.24
Several glasses/week	6.59	6.27	6.45
Rarely drink	39.29	37.62	38.53
Never drink	19.51	38.28	28.04
Total	100.00	100.00	100.00

[a]Like superscripts indicate significant group differences.

TABLE 8.--Skim Milk Consumption by Class Level. (Numerical Values Indicate the Column Percent.)

Skim Milk Consumption	Freshmen[a]	Sophomores[b]	Juniors	Seniors[a,b]	Total
3 or more glasses/day	13.51	9.66	8.62	1.73	8.20
2 glasses/day	5.41	11.36	9.20	4.62	7.75
1 glass/day	11.49	13.64	8.62	11.56	11.33
Several glasses/week	5.41	4.55	8.62	6.94	6.41
Rarely drink	40.54	32.39	37.93	43.35	38.45
Never drink	23.65	28.41	27.01	31.79	27.87
Total	100.00	100.00	100.00	100.00	100.00

[a,b]Like superscripts indicate significant group differences.

as a group, juniors did not differ significantly from freshmen, sophomores, or seniors.

Table 9 relates skim milk consumption to school residence. Respondents living in dormitories drank significantly more skim milk than those who lived in apartments. Thirty-one percent of dormitory residents reported drinking skim milk daily compared to 20% of the apartment dwellers. Seventeen percent of those living at home indicated that they drink skim milk daily. As a group, however, respondents living at home were not significantly different from either dormitory or apartment residents.

TABLE 9.--Skim Milk Consumption by School Residence. (Numerical Values Indicate the Column Percent.)

Skim Milk Consumption	Dormitory[a]	Apartment[a]	Home	Total
3 or more glasses/day	10.71	2.59	0.00	8.18
2 glasses/day	8.57	5.70	8.33	7.74
1 glass/day	11.35	11.40	8.33	11.31
Several glasses/week	6.00	7.77	0.00	6.40
Rarely drink	37.04	43.52	16.67	38.54
Never drink	26.34	29.02	66.67	27.83
Total	100.00	100.00	100.00	100.00

[a]Like superscripts indicate significant group differences.

Chocolate Milk

Chocolate milk consumption was dependent upon sex and school residence. Table 10 shows chocolate milk consumption by sex. Men consumed significantly more chocolate milk than women. Thirteen percent of the men reported drinking chocolate milk daily as compared to 5% of the women responding likewise. Chocolate milk was not a popular milk choice. Ninety percent of the female respondents and 80% of the male respondents indicated that they rarely or never drink chocolate milk.

TABLE 10.--Chocolate Milk Consumption by Sex. (Numerical Values Indicate the Column Percent.)

Chocolate Milk Consumption	Female[a]	Male[a]	Total
3 or more glasses/day	0.55	1.99	1.20
2 glasses/day	1.37	3.64	2.40
1 glass/day	3.56	6.95	5.10
Several glasses/week	4.66	7.62	6.00
Rarely drink	59.45	60.93	60.12
Never drink	30.41	18.87	25.19
Total	100.00	100.00	100.00

[a]Like superscripts indicate significant group differences.

Table 11 relates chocolate milk consumption to school residence. Apartment residents drank significantly less chocolate

TABLE 11.--Chocolate Milk Consumption by School Residence. (Numerical Values Indicate the Column Percent.)

Chocolate Milk Consumption	Dormitory[a]	Apartment[a,b]	Home[b]	Total
3 or more glasses/day	1.72	0.00	0.00	1.19
2 glasses/day	3.00	0.52	8.33	2.38
1 glass/day	6.65	1.55	0.00	5.06
Several glasses/week	6.01	5.67	8.33	5.95
Rarely drink	57.73	65.46	66.67	60.12
Never drink	24.89	26.80	16.67	25.30
Total	100.00	100.00	100.00	100.00

[a,b]Like superscripts indicate significant group differences.

milk than either respondents living in dormitories or respondents living at home. Only 2% of apartment residents reported drinking chocolate milk daily. Eleven percent of the dormitory respondents and 8% of those respondents living at home were daily chocolate milk drinkers.

Total Milk Consumption

Each respondent was classified as either a heavy, average, light, occasional or non user of milk based upon his consumption of the four milk types studied (see Definition of Terms, Chapter I). The total milk consumption score was analyzed by sex, class level, school residence, childhood habitation, age, and 4-H membership. Total milk consumption was found to be dependent upon sex, class level,

school residence, and age. Table 12 summarizes total milk consumption by sex. Males drank significantly higher amounts of total milk than did females with half of the men classified as heavy users. Only about 20% of the women were classified as such. An equal proportion of women were non-users of milk. Only 10% of the males were classified as non-users.

TABLE 12.--Total Milk Consumption by Sex. (Numerical Values Represent the Column Percent.)

Consumption Score	Females[a]	Males[a]	Total
Heavy User	21.72	50.97	34.95
Average User	24.40	18.83	21.88
Light User	19.30	10.06	15.12
Occasional User	12.87	10.39	11.75
Non-User	21.72	9.74	16.30
Total	100.00	100.00	100.00

[a]Like superscripts indicate significant group differences.

Table 13 shows total milk consumption by school residence. Those respondents living in apartments drank significantly less total milk than those living in dormitories. Apartment residents had a higher percentage of non-users and a lower percentage of heavy users than those living at home. However, as a group there was no significant difference between apartment residents and those living at home.

TABLE 13.--Total Milk Consumption by School Residence. (Numerical Values Represent the Column Percent.)

Consumption Score	Dormitory[a]	Apartment[a]	Home	Total
Heavy User	41.25	19.59	33.33	34.99
Average User	20.63	24.74	25.00	21.87
Light User	11.88	23.20	25.00	15.31
Occasional User	11.46	11.86	16.67	11.66
Non-User	14.79	20.62	0.00	16.18
Total	100.00	100.00	100.00	100.00

[a]Like superscripts indicate significant group differences.

Dormitory and home milk consumption was comparable. It is interesting to note that there were no non-users of milk living at home.

Table 14 relates total milk consumption to class level. There was no significant group difference between freshmen, sophomores, and juniors. Freshmen and sophomores drank significantly more total milk than did seniors. The percentage of both freshmen and sophomores classified as heavy users was twice the percentage of senior heavy users. A higher percentage of juniors were heavy users compared to seniors. However, as a group juniors did not differ significantly from seniors.

Total milk consumption is related to age in Table 15. Respondents ranging in age from 17 to 19 years drank significantly more total milk than those in the 23+ age group. Forty-four percent

TABLE 14.--Total Milk Consumption by Class Level. (Numerical Values Represent the Column Percent.)

Consumption Score	Freshmen[a]	Sophomores[b]	Juniors	Seniors[a,b]	Total
Heavy User	43.33	46.45	29.55	21.59	35.04
Average User	20.00	20.22	23.30	23.30	21.75
Light User	14.00	9.29	14.77	23.30	15.33
Occasional User	8.67	9.29	14.20	14.20	11.68
Non-User	14.00	14.75	18.18	17.61	16.20
Total	100.00	100.00	100.00	100.00	100.00

[a,b]Like superscripts indicate significant group differences.

TABLE 15.--Total Milk Consumption by Age. (Numerical Values Indicate the Column Percent.)

Consumption Score	Age (years) -17-19[a] "young"	20-22 "median"	23+[a] "old"	Total
Heavy User	43.75	32.35	13.79	35.04
Average User	21.48	21.83	22.41	21.75
Light User	12.89	15.63	24.14	15.33
Occasional User	9.38	11.86	20.69	11.68
Non-User	12.50	18.33	18.97	16.20
Total	100.00	100.00	100.00	100.00

[a]Like superscripts indicate significant group differences.

of the "young" respondents were classified as heavy users compared to 14% of the "old" respondents. The "median" age group had a lower percentage of heavy users than the "young" group and a higher percentage of heavy users than the "old" group. The "median" age group, however, did not differ significantly from the other two age categories.

Responses to the Attitude Statements

Survey participants were asked to respond to 25 attitude statements concerning milk. Table 16 ranks each attitude statement according to its average numerical response based upon all responses. Only 5 statements, averaging 3.500 or higher, elicited agreement throughout the entire survey population. The majority of statements, averaged from 2.500 to 3.499--the range of "no opinion." Four statements averaged below 2.499. The population as a whole disagreed with these statements.

Two-way contingency tables comparing total milk consumption to the responses to each attitude statement were made. Responses to all but one attitude statement ("I enjoy alcoholic drinks made with milk.") significantly differentiated between heavy and non-users of milk (Tables A-1 to A-23). More heavy users strongly agreed to positive statements and strongly disagreed to negative statements than non-users of milk.

To determine which responses to attitude statements further discriminated between different levels of milk consumption, both heavy and average milk users were compared to occasional users of milk.

TABLE 16.--The Average Numerical Attitude Response Given to 25 Attitude Statements Concerning Milk, Michigan State University Undergraduates, Spring, 1981.

Rank	Statement	Average Response
1.	Milk is an important part of a balanced diet.	4.278
2.	Milk is a natural food.	4.091
3.	Government regulation makes milk a uniform and safe product for me.	3.778
4.	Milk has an excellent balance of nutrients.	3.776
5.	Vegetarians should drink milk.	3.622
6.	Adults can use milk's nutrients to rebuild body tissues.	3.466
7.	My parents encouraged me to drink milk daily.	3.414
8.	Milk is an economical food choice.	3.366
9.	Most of my friends drink milk daily.	3.262
10.	Milk is a good food choice for weight watchers.	3.206
11.	Milk satisfies my thirst in cold weather.	3.178
12.	I drink more milk at my parent's home than at school.	3.151
13.	Milk is refreshing after vigorous exercise.	3.147
14.	I try to drink milk with all of my meals.	3.091
15.	I offer milk to guests in my home.	3.076
16.	I like to start my day with a glass of milk.	3.057
17.	Milk settles my stomach when I am ill.	2.952
18.	I should drink more milk than I do.	2.858
19.	I enjoy alcoholic drinks made with milk.	2.850
20.	A glass of milk relaxes me before bedtime.	2.834
21.	Milk gives me the energy to get me through my classes.	2.831
22.	Milk satisfies my thirst in warm weather.	2.471
23.	I usually order milk in restaurants.	2.296
24.	I only drink milk when I am home.	1.9401
25.	I usually drink milk before visiting the local bars.	1.9398

Responses to the following attitude statements discriminated between heavy and occasional milk users:

- "I should drink more milk than I do." (Table A-6)
- "I usually order milk in restaurants." (Table A-7)
- "Milk satisfies my thirst in warm weather." (Table A-8)
- "Milk satisfies my thirst in cold weather." (Table A-9)
- "Milk is an important part of a balanced diet" (Table A-10)
- "Most of my friends drink milk everyday." (Table A-11)
- "Milk gives me the energy to get through my classes." (Table A-12)
- "Milk has an excellent balance of nutrients." (Table A-13)
- "Milk is refreshing after vigorous exercise." (Table A-14)

Responses to the following attitude statements further discriminated between the finest comparison studied, average verses occasional users of milk:

- "I drink more milk at my parent's house than at school." (Table A-1)
- "I try to drink milk with all of my meals." (Table A-2)
- "I offer milk to guests in my home." (Table A-3)
- "I only drink milk when I am at home." (Table A-4)
- "I like to start my day with a glass of milk." (Table A-5)

Generally, respondents classified as heavy or average milk users had stronger positive responses to each individual attitude statement than occasional or non-users of milk.

Based upon responses to selected attitude statements (Appendix E) each respondent was assigned a total attitude score.

Thirty-six percent were classified as having positive attitudes towards milk; 53% were defined as having "no opinion" concerning milk; and 11% were classified as having negative attitudes towards milk. The total attitude score was analyzed using the variables of sex, class level, school residence, age, childhood habitation, 4-H membership, and the total milk consumption score. The total attitude score was dependent upon childhood habitation. Total milk consumption was dependent upon the respondents total attitude score.

Table 17 relates the total attitude score to childhood habitation. Farm respondents had a significantly higher percentage of positive attitude scores than did urban, suburban, or rural-non-farm respondents. Only 2% of farm respondents received a negative attitude score. More rural-non-farm residents received a positive attitude score than did urban respondents. There was no significant difference

TABLE 17.--Total Attitude Score by Childhood Habitation.
(Numerical values indicate the column percent.)

Attitude Score	Urban[a]	Suburban[b]	Rural, Non-Farm[a]	Rural, Farm[a,b]	Total
Positive	26.14	32.99	39.50	63.79	35.96
No Opinion	67.05	54.57	44.54	34.48	52.66
Negative	6.82	12.44	15.97	1.72	11.38
Total	100.00	100.00	100.00	100.00	100.00

[a,b]Like superscripts indicate significant group differences.

between either rural-non-farm and suburban residents or suburban and urban residents. In general, however, the percentage of positive attitudes towards milk increased as the level of urbanization decreased.

Table 18 illustrates the relationship between the total milk consumption score and the total attitude score. Respondents with positive attitudes towards milk drank significantly more milk than either those with "no opinion" or those with negative attitudes. Ninety-one percent of those with a positive attitude score were drinking at least one glass of milk daily while 74% of the "no opinion" attitude group and 22% of respondents with a negative attitude were drinking similar amounts of milk. Respondents classified as having "no opinion" concerning milk drank significantly less milk

TABLE 18.--Total Attitude Score by Total Milk Consumption Score. (Numerical Values Indicate the Column Percent.)

Consumption Score	Attitude Score			Total
	Positive[a]	No Opinion[a]	Negative[a]	
Heavy User	59.04	25.00	3.90	34.99
Average User	22.49	24.17	9.09	21.87
Light User	9.24	20.83	9.09	15.31
Occasional User	8.03	14.17	11.69	11.66
Non-User	1.20	15.83	66.23	16.18
Total	100.00	100.00	100.00	100.00

[a]Like superscripts indicate significant group differences.

than those with positive attitudes and significantly more milk than those with negative attitudes. The level of milk consumption was positively related to the strength of a respondents attitudes towards milk.

Responses to the Nutritional Knowledge Questions

Survey participants were asked to respond to 14 nutrition questions. Responses to these questions, ranked by the population percent indicating the correct answer, are listed in Table 19. Over 70% of the survey participants correctly responded to 6 of the nutritional knowledge questions. Twenty-five percent to 50% correctly answered three questions and at least 24% reported the correct response to the remaining 5 questions. Excluding the "I don't know" response, a higher percentage of students chose the correct answer to 11 questions compared to the other alternatives available. A higher percentage of respondents overestimated the fat content of whole milk than did those who chose the correct answer. A higher number of respondents overestimated the caloric contribution of milkfat in a glass of whole milk compared to those respondents who chose the correct answer. Most students felt that nutritional labeling is required for all foods--an incorrect response.

As with the attitude statements, the responses to each nutritional knowledge question were cross-tabulated with the respondents' total milk consumption score. Milk consumption was found to be significantly related to the respondents' knowledge of three nutritional facts: the amount of milk adults are advised to

TABLE 19.--Responses to the Nutritional Knowledge Questions Ranked by the Percent Responding to the Correct Answer.*

Rank	Question and Possible Responses	Frequency of a Response (%)
1.	For optimum freshness and flavor, milk should be. . . .	
	a. returned promptly to the refrigerator after use	9.82
	b. stored below 40 degrees farenheit	1.47
	c. kept in a closed container	0.73
	d.* all of the above	85.48
	e. I don't know	2.49
2.	The process of heating milk to assure its safety in consumption and improve its keeping quality is called. . . .	
	a.* pasteurization	81.64
	b. homogenization	7.14
	c. fortification	1.02
	d. I don't know	10.20
3.	Lowfat milk contains how much milkfat?	
	a.* 5% or less	75.33
	b. between 6 and 25%	4.09
	c. between 26 and 50%	1.02
	d. between 51 and 75%	0.15
	e. 76% or more	0.00
	f. I don't know	19.42
4.	The calcification of bones and teeth. . . .	
	a. occurs only before birth	0.15
	b. is important only in growing children	8.63
	c. stops at age 21	6.87
	d.* is a life-long process	72.51
	e. I don't know	11.84
5.	The process of breaking milkfat into fine globules and dispersing these globules uniformly throughout milk is called. . . .	
	a. pasteurization	6.43
	b.* homogenization	71.93
	c. fortification	0.88
	d. I don't know	20.76
6.	Does the number of calories in a glass of milk depend upon the fat content of the milk?	
	a.* yes	70.32
	b. no	6.58
	c. I don't know	23.10

Table 19.--Continued.

Rank	Question and Possible Responses	Frequency of a Response (%)
7.	How many eight ounce glasses of fluid milk are adults advised to drink daily?	
	a. 0	3.51
	b. 1	21.69
	c.* 2	46.27
	d. I don't know	27.53
8.	Milkfat is the carrier of which vitamin(s)?	
	a. B-complex	7.89
	b.* A,D,E, and K	36.26
	c. C	0.58
	d. there are no vitamins in milkfat	8.19
	e. I don't know	47.08
9.	Milk and milk products contribute how much of the total calcium in the diets of United States people?	
	a. 10%	4.85
	b. 25%	13.51
	c. 50%	14.83
	d.* 75%	27.75
	e. I don't know	39.06
10.	Exposing milk to light. . . .	
	a. produces an "off-flavor" in the milk	11.11
	b. reduces the riboflavin content of milk	4.97
	c. has no harmful effects	9.21
	d.* both a and b	23.54
	e. I don't know	51.17
11.	Regular whole milk (standardized) contains how much milkfat?	
	a.* 5% or less	23.13
	b. 6 to 25%	24.89
	c. between 26 and 50%	4.98
	d. between 51 and 75%	2.78
	e. 76% or more	2.05
	f. I don't know	42.17

Table 19.--Continued.

Rank	Question and Possible Responses	Frequency of a Response (%)
12.	Of the 150 calories found in an eight ounce glass of whole milk, about how many calories does the milkfat contribute?	
	a. 150	3.21
	b. 100	18.69
	c.* 70	16.79
	d. 30	6.72
	e. I don't know	54.60
13.	Nutritional labeling is required. . . .	
	a. for all foods	43.13
	b.* for those products to which a nutrient has been added	15.20
	c. for processed foods only	22.22
	d. I don't know	19.54
14.	The fat found in milk contains a blend of fatty acids. These fatty acids are. . . .	
	a. 100% saturated	7.74
	b.* around 60% saturated	11.53
	c. around 10% saturated	4.09
	d. I don't know	76.64

*Indicates the correct response to any given question.

drink daily (Table A-25), the percent fat in whole milk (Table A-26), and the percent fat in lowfat milk (Table A-27).

Fifty-five percent of heavy milk users compared to 33% of non-users correctly indicated that adults are advised to drink 2 eight ounce glasses of milk daily. Proportionately, twice as many heavy users as non-users correctly indicated that whole milk contains "5% or less" milkfat. A higher percentage of heavy users than non-users reported that lowfat milk contains "5% or less" milkfat. In response to each of these questions, a higher percentage of non-users indicated that they did not know the correct answer than did any other milk consumption group responding likewise.

Each respondent was assigned a total nutritional knowledge score based upon the number of correct responses given. Thirteen percent of the survey participants were given a "high" knowledge score; 55% were assigned an "average" score; and a "low" knowledge score was given to 32% of the respondents. The nutritional knowledge score was cross-tabulated and analyzed with the following variables: sex, class level, school residence, age, childhood habitation, 4-H membership, the total milk consumption score and the total attitude score. The students' nutritional knowledge score was found to be dependent upon home background and 4-H membership. The respondents' attitudes toward milk was dependent upon the students' nutritional knowledge of milk.

Table 20 relates the total nutritional knowledge score to childhood habitation. Farm residents had significantly higher knowledge scores than respondents with an urban background.

Nineteen percent of farm respondents received a "low" knowledge score compared to 41% of urban residents in the same knowledge group.

TABLE 20.--Total Nutrition Knowledge Score by Childhood Habitation. (Numerical Values Indicate the Column Percent.)

Nutrition Score	Urban[a]	Suburban	Rural, Non-Farm	Rural, Farm[a]	Total
High	6.82	12.18	16.81	22.41	13.20
Average	52.27	56.09	51.26	58.62	54.93
Low	40.91	31.73	31.93	18.97	31.87
Total	100.00	100.00	100.00	100.00	100.00

[a]Like superscripts indicate significant group differences.

Table 21 relates the total nutritional knowledge score to 4-H membership. Proportionately, almost twice as many former 4-H club members received a "high" knowledge score compared to respondents who never belonged to a 4-H club.

In Table 22, the total nutritional knowledge score is related to the total attitude score. Respondents with a "low" knowledge score differed significantly from both the "average" and "high" knowledge groups. A higher percentage of respondents with a "low" knowledge score had negative attitudes towards milk than respondents in the other knowledge groups. The highest percentage of respondents with positive attitudes towards milk received the "high" knowledge score.

TABLE 21.--Total Nutritional Knowledge Score by 4-H Membership. (Numerical Values Indicate the Column Percent.)

Nutrition Score	4-H Member		Total
	Yes[a]	No[a]	
High	21.21	12.03	13.36
Average	56.57	54.47	54.77
Low	22.22	33.51	31.86
Total	100.00	100.00	100.00

[a]Like superscripts indicate significant group differences.

TABLE 22.--Total Nutritional Knowledge Score by Total Attitude Score. (Numerical Values Indicate the Column Percent.)

Attitude Score	Nutritional Knowledge Score			Total
	Low[a,b]	Average[a]	High[a]	
Negative	16.06	9.81	5.49	11.22
No Opinion	57.34	51.99	42.86	52.48
Positive	26.61	38.20	51.65	36.30
Total	100.00	100.00	100.00	100.00

[a,b]Like superscripts indicate significant group differences.

As a group, however, respondents with a "high" knowledge score did not differ significantly from those with an "average" knowledge score. In general, a respondents' nutritional knowledge of milk was positively related to his attitudes towards milk.

The Relationship Between a Student's Nutritional Cognizance of Milk, Attitudes Towards Milk, and Total Milk Consumption

The respondents' total nutritional knowledge score, total attitude score, and total milk consumption score were cross-tabulated and analyzed to determine if a relationship existed between these three variables (Table 23). Using a log-linear model, an interaction of knowledge, attitude, and consumption was significant at the .058 level. The relationship can be most dramatically seen comparing the heavy user and non-user milk consumption categories. Table 24 shows the relationship between attitude and nutritional knowledge for heavy milk users. In this consumption category, no respondents with a "high" knowledge score had negative attitudes towards milk. Eighty-two percent of those heavy users with "high" knowledge had positive attitudes towards milk; 65% of heavy users in the "average" knowledge group had positive attitudes towards milk; and 47% of heavy users in the "low" knowledge group had positive attitudes towards milk. In total, 66% of the heavy milk users had "high" or "average" nutritional knowledge scores and fell into the positive or "no opinion" attitude categories.

Table 25 shows the relationship between nutritional knowledge and attitude for non-milk drinkers. Less than 10% of non-users had a

TABLE 23.--Total Nutritional Knowledge Score by Total Attitude Score by Total Milk Consumption Score. (Numerical Values are Actual Cell Frequencies.)

Nutritional Knowledge Score	Consumption Score	Attitude Score			Sub-Total	Total
		Positive	No Opinion	Negative		
High	Heavy User	27	6	0	33	
	Average User	13	15	0	28	
	Light User	6	9	0	15	
	Occasional User	0	5	0	5	
	Non-User	1	4	5	10	
	Sub-Total	47	39	5		91
Average	Heavy User	83	42	3	128	
	Average User	32	45	3	80	
	Light User	14	48	4	66	
	Occasional User	15	27	6	48	
	Non-User	0	34	21	55	
	Sub-Total	144	196	37		377
Low	Heavy User	37	42	0	79	
	Average User	11	27	4	42	
	Light User	3	18	3	24	
	Occasional User	5	19	3	27	
	Non-User	2	19	25	46	
	Sub-Total	58	125	35		218
	Total	249	360	67		686

TABLE 24.--The Total Nutritional Knowledge Score by Total Attitude Score for Heavy Milk Users. (Numerical Values are Actual Cell Frequencies.)

Nutritional Knowledge Score	Total Attitude Score			
	Positive	"No Opinion"	Negative	Total
"High"	27	6	0	33
"Average"	83	42	3	128
"Low"	37	42	0	79
Total	147	90	3	240

TABLE 25.--The Total Nutritional Knowledge Score by Total Attitude Score for Non-Users of Milk. (Numerical Values are Actual Cell Frequencies.)

Nutritional Knowledge Score	Total Attitude Score			
	Positive	"No Opinion"	Negative	Total
"High"	1	4	5	10
"Average"	0	34	21	55
"Low"	2	19	25	46
Total	3	57	51	111

"high" nutritional knowledge of milk. Forty-six percent of non-users had negative attitudes towards milk. The positive effect nutritional knowledge had upon attitudes towards milk and the consumption of milk was still evident here. Thirty-five percent of non-users had "high" or "average" knowledge scores and fell into the positive or "no opinion" attitude categories. Sixty-five percent of non-users had a low knowledge score and negative attitudes towards milk.

For average, light, and occasional users of milk, the positive relationship between nutritional knowledge and attitude exists but is not as clearly seen as with the heavy and non-users of milk. This is because most respondents in the median consumption categories concentrate in the "average" knowledge group and in the "no opinion" attitude group.

Responses to the Telephone Interview

Table 26 ranks the qualities of milk which encourage students to drink milk. Over 50% of the respondents to the telephone interview agreed that the top nine qualities encouraged them to drink milk. All but one respondent reported that "freshness" encouraged him to drink milk. This quality was most influential in the formation of the student populations' positive image of milk. Price, calorie count, and cholesterol were detrimental to most students' image of milk.

Each respondent was asked to personally generate up to five words he associated with milk. Table 27 ranks the frequency of these words by category. Most respondents reported a sensory quality of milk. Almost half of the participants mentioned farm related

TABLE 26.--A Ranking of the Qualities of Milk Which Encourage Michigan State University Undergraduate Students to Drink Milk. (N = 33*)

Rank	Quality	# of Positive Responses	% Responding Positively
1.	Freshness	32	97
2.	Taste	27	82
3.	Availability	26	79
4.	Food Value	26	79
5.	Vitamin Content	26	79
6.	Protein	24	73
7.	Appearance	22	67
8.	Calcium Content	21	64
9.	Purity	18	55
10.	Price	14	42
11.	Calorie Count	10	30
12.	Cholesterol Level	5	15

*Three non-milk drinkers did not respond to this question.

TABLE 27.--Responses to "Word Association: Can You Give Me Up To Five Words That Come To Mind When You Think Of The Word 'Milk'?" (Ranked Categorically by Frequency of Response.)

Rank	Category	Word	Frequency of Response
1)	Sensory		25
		cold(9)	
		refreshing(3)	
		light	
		tasty	
		full-bodied	
		thirst-quenching	
		creamy	
		liquid	
		white(6)	
2)	Farming		13
		cows(11)	
		farm	
		goats	
3)	Nutrition		10
		calcium(3)	
		healthy babies(2)	
		nutrition	
		health	
		vitamin D	
		good for you	
		growth	
4)	Non Dairy Foods		10
		cookies(3)	
		cereal(2)	
		sweet rolls	
		bakery	
		graham crackers	
		dinner	
		food	
5)	Dairy Foods		7
		dairy products(2)	
		ice-cream(2)	
		cheese(2)	
		pudding	
6)	Miscellaneous		4
		cow-juice	
		calcium build-up	
		gag	
		yech	

characteristics--most specifically, cows. About one third associated nutrition, non-dairy foods, and dairy foods with the word "milk." It is interesting to note that out of 35 original word associations, only three words, in the miscellaneous category, were negative towards milk. In general, respondents associated positive words with the word, "milk."

Some respondents gave reasons why they preferred their favored milk type over the other types available. Respondents preferred whole milk for the following reasons:

- I can't taste the difference between milks, and whole milk is available.
- I don't like the way other milks taste.
- I am on a diet, but there's no reason to switch milks.
- I am trying to gain weight.
- It counteracts sweet desserts.

Respondents drank lowfat milk for the following reasons:

- It is a family preference.
- It tastes better than skim and I'm dieting.
- That's all we can get in the dorm.
- It's healthier (than whole milk) for you.
- It tastes the best.
- I just drink what others buy.
- It's cheaper than whole milk.
- It has vitamin D.
- It tastes thicker than skim milk and whole milk is too thick.

Respondents preferred skim milk for the following reasons:

- You get used to the taste when you're on a diet.
- There's less fat in skim milk.
- I'm on a diet.
- It doesn't build fat around your heart.

Fifteen respondents gave no specific reason why they drank a particular type of milk. In most cases, these respondents drank several types of milk on a regular basis.

CHAPTER V

DISCUSSION

The results presented in Chapter IV indicated a clear relationship between fluid milk consumption and certain population characteristics. Specific attitudes and nutritional cognizance were found to be related to the students' level of milk consumption. Demographics affecting attitudes towards milk and the students' nutritional cognizance of milk were identified. When consumption, attitudes, and nutritional knowledge were related, a significant interaction between these three variables was discovered. This chapter is designed to explore further the nature of these relationships and their practical significance in the broad arena of dairy product marketing.

About 43% of the students reported drinking lowfat milk, the most popular milk type, daily. Only about 24% of the respondents reported drinking whole milk daily, but this low percentage was expected as 70% of the population did not have easy access to whole milk. Many dormitory residents indicated that, given a choice, they preferred whole milk over lowfat milk. It might be expected that the percentage of whole milk users would significantly increase if whole milk was served in student dormitories. Chocolate milk, the least popular type of milk studied, is offered in student dormitory cafeterias. Perhaps this choice should be eliminated and whole milk served in its place.

The consumption of each fluid milk type studied was found to be dependent upon the sex of the respondent. Males were consuming more whole milk, lowfat milk, and chocolate milk while females drank more skim milk. Weight reduction or maintenance is a strong concern in today's society. It may be that women are more weight conscious than men and are thus drinking milk types with a lower caloric count than whole milk. Eighty percent of the females reported that they rarely or never drink whole milk. A majority of the females who reported drinking either lowfat or skim milk daily were consuming one glass per day. Reasons for this may be found in the telephone interview results. In reference to skim milk, one respondent reported that "You get used to the taste when you're on a diet." It could be that females drinking skim milk, or even lowfat milk, are sacrificing taste for a lowered calorie count. Generally, they continue to drink milk but in lesser amounts than whole milk drinkers. A challenge for fluid milk processers would be to market a better tasting skim milk. "Filled skim milk", with a higher protein percentage than regular skim milk, may have potential in this area.

School residence affected the consumption of lowfat, skim, and chocolate milk. This relationship seemed to be based upon availability. Dormitory residents were drinking, to some degree, the three types of milk made available to them: skim, lowfat, and chocolate. Lowfat milk and lesser amounts of chocolate milk were served to those living with their families. Small amounts of skim milk were consumed at home. Apartment residents, with total responsibility for their eating habits, seemed to favor lowfat milk and lesser amounts of skim milk. Only

a negligible amount of chocolate milk was consumed by apartment residents.

Freshmen and sophomores reported drinking more skim milk than did seniors. This lends credibility to the "availability" hypothesis. All freshmen and sophomores are required to reside in university housing where skim milk is always served.

It was surprising to find that school residence did not affect whole milk consumption. Perhaps some dormitory residents believed that the lowfat milk they were drinking was actually whole milk.

Students who grew up on a farm reported drinking more whole milk than did those from any other childhood habitation. Those from a suburban background drank the least amount of whole milk. The reasons for these results are not obvious. Perhaps those respondents from a rural background grew up with stronger positions regarding health and naturalness as related to milk. Whole milk is the most natural milk type. Urban areas are the targets for the most concentrated dairy advertising and promotion campaigns. Suburban residents apparently did not have strong positions concerning milks' naturalness and were not subjected to intense dairy promotions. This may account for their low whole milk consumption.

The total milk consumption score was used to generalize the factors which affect the consumption of all types of milk. Males drink more total milk than females. Whether this difference in consumption is solely due to a woman's strong weight consciousness or other factors has never been tested.

The remaining demographics affecting the total milk consumption score may be interrelated. Dormitory residents and respondents living at home drank greater amounts of milk than did apartment residents. This could be based upon availability as previously described. Age could also have been a contributing factor. Younger survey participants drank larger amounts of milk than did respondents who were 23 years of age or older. In addition, college freshmen and sophomores drank considerably more milk than did seniors. With all Michigan State University freshmen and sophomores living in dormitories and most freshmen and sophomores belonging to the "young" age group, it would be simple to explain all of the above as being related to "availability". However, scrutinizing both the age and class level by total milk consumption data, one can see a decline in heavy users as either age or class level increases. As age increases it appears that milk consumption decreases. The factors which may influence this time-related decline in milk consumption might be explored.

Consumption patterns of the 17 to 23 year old age group are best illustrated by the milk consumption of apartment residents. It might be assumed that dormitory residents or those living at home would drink similar amounts of milk in similar circumstances. Only 45% of this group of respondents drank the recommended 2 eight ounce glasses of milk daily.

Besides sex differences, the strongest variable upon which milk consumption was dependent was the total attitude score. As hypothesized in the literature review, a student's total attitude towards milk could predict with some degree of accuracy the amount of milk the student

was drinking. Eighty-one percent of students with positive attitudes towards milk were heavy or average milk users. In contrast, 87% of respondents with negative attitudes did not drink the recommended 2 eight ounce glasses daily. Implications of this relationship are far more relevant to dairy marketers than the fact that the relationship exists. Given that a person's attitudes towards milk are positively related to his level of milk consumption, it becomes a challenge to pinpoint specific attitudes appropriate for a successful promotion campaign.

The 25 attitudinal statements studied were evaluated on the basis of their overall agreement within the entire research population. In general, attitudes concerning milk's naturalness and healthfulness ranked high in student agreement. The statement "Milk is an important part of a balanced diet," elicited the highest level of student agreement. Milk was also viewed as an economical food choice by most respondents. These results support both the attitude studies conducted by UDIA[1] and the USDA Consumer Opinion Poll[2].

Rokeach[3] has suggested that any attitude towards an object, i.e. milk, must be elicited within the context of some social situation about which a person also holds an attitude. None of the situational

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[1]United Dairy Industry Association, "1980 Attitude Trend Study - Attitudes Towards Milk" (Marketing and Economic Research Division, UDIA, 1980).

[2]Margaret Weidenhamer, presentation, "Consumer Opinion About Dairy Products and Imitations" (United State Department of Agriculture Special Surveys Branch, Nov. 3, 1971), p. 7.

[3]Milton Rokeach, "Attitude Change and Behavioral Change" Public Opinion Quarterly, vol. 30 (1966), pp. 529-30.

attitude statements were strongly agreed to by the population as a whole. Four situational statements, whose average numerical response fell into the high range of "no opinion", showed some promise. Students were somewhat agreeable to drinking milk after exercise, with breakfast, with all of their meals, and offering milk to guests in their home. A low level of agreement was also given to "Milk satisfies my thirst in cold weather". One statement in this range of agreement was negative. Students as a whole were drinking more milk at their parent's home than at school. To counteract this attitude, a high level of disagreement was given to the statement "I only drink milk when I am at home".

Statements whose average numerical response fell into the low end of "no opinion" elicited a low level of disagreement within the population. Students did not agree that milk settled the stomach, was relaxing before bedtime, was good in alcoholic drinks, or was energizing. Most students seemed to think that their personal milk consumption was adequate. The statement "I should drink more milk than I do," fell into the low end of the "no opinion" category.

The lowest ranking attitude statements were situational and elicited a strong level of disagreement within the population. Students strongly disagreed that milk was thirst-quenching in warm weather and that they ordered milk in restaurants. The students did not drink milk before visiting local bars.

In general, students had positive attitudes about the object, milk. They perceived milk to be nutritious, natural, and an important part of an adult's diet. However, milk was not rated high as a

refreshing, thirst-quenching beverage. The statement, "My parents encouraged me to drink milk daily," ranked in the high range of the "no opinion" category. Perhaps most parents encourage their children to drink milk because milk is good for them, not because it tastes good.

With an increasing percentage of today's society frequently eating in restaurants, the fact that few people order milk in restaurants is of some consequence to the dairy industry. The advertising and promotional branch of UDIA, the American Dairy Association (A.D.A.), has initiated a food service program. The success of this new promotion campaign remains to be seen. Nonetheless, the A.D.A. food service program is a positive step taken by the dairy industry. It is important that strategies be developed to gain a greater share of the restaurant beverage market.

Attitude statements which differentiate between heavy and occasional milk users and possess a level of acceptance within the entire population are chosen by UDIA for promotional strategies.[4] This position is supported by advertising research. There is evidence that a message which strongly deviates from a person's belief system is ignored by that person.[5] Using these criteria, the following attitude statements would comprise the strongest milk campaign for Michigan State University students:

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[4]United Dairy Industry Association.

[5]James F. Engel, Roger D. Blackwell, and David T. Kollat, "Changing Beliefs and Attitudes" in Consumer Behavior (Hinsdale, IL, The Dryden Press, 1978), pp. 414-17.

--Milk is an important part of a balanced diet

--Milk has an excellent balance of nutrients

--Most of my friends drink milk everyday

--Milk satisfies my thirst in cold weather

--Milk is refreshing after vigorous exercise

--I try to drink milk with all of my meals

--I offer milk to guests in my home

--I like to start my day with a glass of milk

Each of these statements fell into the range of high student agreement or the high end of the "no opinion" category. In addition, the level of agreement to each statement discriminated between either heavy and occasional users or both heavy and occasional users and average and occasional users.

According to the Engel, Blackwell, and Kollat Model of Consumer Behavior[6], the intent to purchase is affected not only by attitudes but also by the variables which influence attitudes. The populations' attitude towards milk was found to be highly dependent upon childhood habitation. In general, positive attitudes towards milk tended to increase as the level of home urbanization decreased. As with whole milk consumption by childhood habitation data, the reasons for area differences are not obvious. Besides 4-H membership, other factors related to childhood habitation were not measured. To fully understand the relationship between attitudes and childhood habitation, further research is necessary. Cultural norms, normative compliance, peer

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[6]Engel, Blackwell, and Kollat, "Models of Consumer Behavior: Formalization and Quantification," pp. 543-63.

pressure, religious beliefs, and personal motives are all related to the upbringing of an individual. Each of these variables should be studied and correlated with milk consumption and attitudes towards milk. Any variable that attitude was found to be dependent upon could be used in promotional strategies. Even with the general relationship found in this study, milk advertising aimed at parents or children would seem to be a successful marketing strategem. Results discussed here indicate that childhood habitation, a function of upbringing, strongly influenced the populations' attitude towards milk and attitude towards milk most strongly influences total milk consumption.

A positive relationship between a high nutritional knowledge of milk and positive attitudes towards milk was found. The nutritional knowledge of milk was studied in detail and insights into this relationship were gained. Over 70% of the respondents understood the processes of bone calcification, pasteurization, and homogenization. They knew the correct methods of storing milk, the relationship between fat content and calories, and the percent fat found in lowfat milk. Apparently, the dairy industry and other groups have successfully publicized these facts.

Supporting USDA[7], Zehner[8], and this author (Appendix A), most respondents did not correctly indicate the percentage fat found in packaged whole milk. Forty-two percent of the respondents indicated

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[7]Weidenhamer, p. 11.

[8]Mary Zehner, "Michigan Dairy Women's Understanding of Selected Dairy Products" (Consumer Marketing Information, Michigan State University, East Lansing, MI, 1981), Table 1.

that they did not know the answer to this question and 35% overestimated the fat content. The percentage of students who correctly indicated that whole milk is 0% to 5% fat was larger than the percentage responding likewise in the USDA study. Perhaps college students, as a group, are better informed then the population as a whole.

Nutritional labeling requirements were not understood by this population. Forty-three percent incorrectly believed that labeling is required for all foods. The deleterious effects of light upon milk, the number of calories contributed by milkfat in a glass of milk, and the fatty acid composition of milk were not well known by the population. Of these three statements, the low cognizance of the effects of light upon milk is of most consequence to the dairy industry. Since light can cause an "off-flavor" to develop in milk and negatively influence the consumption of this product, the consumer should be made more aware of this fact.

Responses to three of the nutritional knowledge questions discriminated between heavy and non-users of milk. More heavy users correctly reported that adults are advised to drink 2 eight ounce glasses of milk daily than non-users. The reasons for this difference may be psychological. Since non-milk drinkers rarely or never drink milk, they may believe that their consumption level is correct or justifiable. In addition, non-users have little or no interest in milk. This was reflected in the finding that the highest percent of non-milk users did not know the answer to this question.

A larger percentage of heavy users compared to non-users correctly indicated the fat content of both whole and lowfat milk. The consumers' high perceived fat content of whole milk and general concern with weight consciousness have been discussed previously and in the literature review. Zehner's[9] suggestion that fluid milk processers indicate the percent fat on whole milk cartons is both feasible and economical. For little or no extra cost, the processer could educate the consumer as to whole milk's fat content. In the long run, this could result in an increase in per capita whole milk consumption. Skim and lowfat milk are respectively advertised as being 99.9% and 98% fat-free. Perhaps whole milk could be marketed as 96.75% fat-free.

As with the total attitude score, the total nutritional knowledge score was dependent upon childhood habitation. Farms residents had a higher nutritional cognizance of milk than did urban residents. The influence of childhood habitation has been previously discussed here. In this case, 4-H membership, a variable related to childhood habitation, influenced the respondents' nutritional knowledge score. A higher percentage of 4-H members received a high knowledge score compared to those who never belonged to a 4-H club. Since the type of 4-H project involved with was not specified, it is here evident that the 4-H program has been successful in the overall education of young people.

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[9] Ibid., p. 5.

In support of the Engel, Blackwell, and Kollat Model of Consumer Behavior[10], a three-way interaction between knowledge, attitudes, and consumption was found to be significant. The level of a student's nutritional knowledge of milk influenced his attitudes towards milk. These variables, together, influenced the student's milk consumption. Whether these results are unique to a college population or applicable to a wide range of consumers requires further research. However, dairy product consumer education could be used as a means of promotion within the Michigan State University community.

The consumer education approach to promotion could range from the simplicity of whole milk's fat percentage written on the carton to organized dairy foods seminars. It would be interesting to implement various types of consumer programs and then test both the long and short term effects these programs might have upon milk consumption.

Figure 1 summarizes the general relationships discussed.

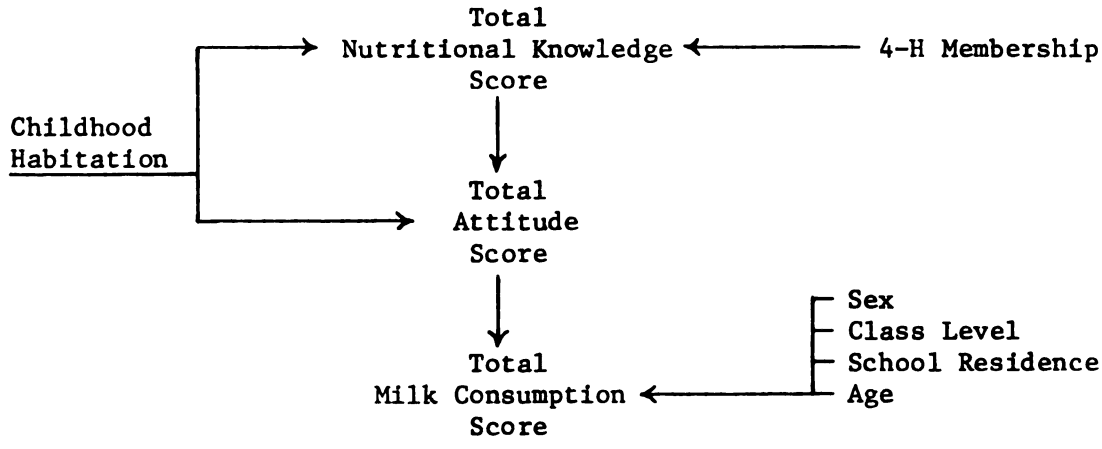

Figure 1.--Factors Which Affected Student Milk Consumption.

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[10]Engel, Blackwell, and Kollat, "Models of Consumer Behavior: Formalization and Quantification," pp. 543-63.

A high level of nutritional knowledge was related to positive attitudes towards milk. Positive attitudes towards milk, in turn, were related to a high level of milk consumption. Students who grew up in urban areas tended to have both higher nutritional knowledge scores and more positive attitudes towards milk than those students from urban backgrounds. Those students who belonged to a 4-H club tended to have higher nutritional knowledge scores than those who were never 4-H club members. Males reported drinking more milk than did females. Freshmen and sophomores reported drinking more milk than juniors or seniors. Students living in university dormitories reported drinking more milk than students living in apartments. Older students tended to drink less milk than the younger students. Sex, class level, school residence, and age may be related to lifestyle variables which were not measured in this study. Lifestyle characteristics may have important consequences for any type of consumer behavior and should be included in subsequent dairy consumer studies.

In order to successfully market any product, the marketer should know why consumers purchase and use that product. Respondents drank whole milk because of availability, taste, and high caloric content (for weight gain). Lowfat milk was also preferred on the basis of taste and availability. In addition, respondents drank lowfat milk because it was less expensive than whole milk or for dietary reasons. The only reason respondents gave for drinking skim milk was its low fat content.

"Freshness" was the quality which encouraged most of the students to drink milk. This quality was closely followed by taste,

availability, food value and vitamin level. The word association exercise supported these rankings. Most students associated a positive sensory word with the word "milk". One third of the students interviewed associated a nutritional word with the word "milk". The fact that milk is nutritious is not a variable; "freshness," however, is. From the farm to the grocery store to the consumer, milk must be handled properly. It seems safe to assume that if a fresh, tasty glass of milk is available to the consumer at all times, a positive image of milk is more likely to be retained.

CHAPTER VI

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The primary purpose of this study was to describe Michigan State University students' nutritional cognizance of milk, attitudes towards milk, and fluid milk consumption. In addition, demographics which affected these three variables were studied. The relationship between knowledge, attitudes, and consumption was analyzed to determine whether dairy product consumer education programs might be used as a means of promoting the consumption of milk and dairy products.

The impetus for this study came from today's expanding dairy surplus and the softening demand for fluid milk. In the dairy industry, the time is now ripe for aggressive milk promotion programs. Advertising campaigns should not be blindly executed; they should be based upon accurate consumer research.

Consumer behavior literature hypothesizes that attitudes towards a product can predict a consumer's intent to purchase or use that product. Many variables which affect attitudes also indirectly affect product purchase or use. One variable which could strongly influence a consumer's attitude towards a product is cognizance of or beliefs about that product. Several studies have been made of the consumption of milk and/or the nutritional perceptions of milk. The Marketing and Economics branch of UDIA has tracked consumers'

attitudes towards milk. Rarely, if ever, has attitudes and the consumption of milk been related to nutritional knowledge.

Michigan State University students were a logical target group for this study. Southern Michigan has experienced annual decreases in per capita fluid milk consumption. Because Michigan State University is a land-grant university, the majority of students are Michigan residents. Additionally, the milk consumption of young adults has been going downward in recent years. Results from this student population might have important promotional implications for both young adults and other Michigan residents.

The Research Instrument

A self-administered questionnaire was developed in accordance with the stated research objectives. The instrument contained 25 attitude statements, 6 questions related to fluid milk consumption, 14 nutritional knowledge questions, and 7 population descriptors. The questionnaire was reviewed by a 10-member panel of professionals and pre-tested in two Michigan State University undergraduate dairy science classes. The final draft of the questionnaire contained revisions as suggested by these groups.

The questionnaire was mailed to a stratified random sample of 1200 Michigan State University undergraduates. The sample was drawn by computer from the university's master list for Spring Term, 1981 student registration. Two mailings of the survey resulted in a return rate of 59%. A sample of non-respondents was interviewed by telephone. No response bias was detected.

In addition, a simple random sample of 36 students participated in a telephone interview. This interview was designed to determine the qualities of milk which most influence students to drink milk.

Major Findings

A total of 686 surveys were analyzed using Pearson's Chi-Square test and Bonferroni's Chi-Square test. Frequency counts were made of all questionnaire items.

Lowfat milk was the most popular milk type consumed by students. Whole milk and skim milk consumption was median and comparable. Very few students drank chocolate milk daily.

Males drank more total milk than did females. Class level, school residence, and age also were found to influence total milk consumption. These relationships may have been due to milk availability, especially in dormitories, and decreasing consumption with increasing age.

A student's total attitude towards milk was found to predict the level of milk consumed by that student. Overall, students had a positive attitude towards the object, milk, but did not seem to favor drinking milk in many situations.

The total attitude score was dependent upon the total nutritional knowledge score. Students had a good general nutritional knowledge of milk. The percent fat of whole milk was not well known. This perceived high content of fat in whole milk could negatively affect demand.

Students who have been 4-H members had a higher percentage of high knowledge scores than did non-members. Both nutritional knowledge

and attitude were found to be dependent upon childhood habitation. In both cases, respondents brought up in rural areas received higher scores.

A three-way interaction between nutritional knowledge, attitudes, and consumption was found to be significant.

Most students drank milk for its sensory ("freshness") and nutritional qualities.

A Profile of the Heavy Milk User and the Non-User of Milk

Heavy milk users and non-users of milk are two extremes of the milk consumption categories. Coverting low consumption groups to heavy use groups might be viewed as the idealistic goal of the dairy industry. Non-users of milk might be seen as the baseline or starting point for promotional campaigns designed to increase milk consumption. In order to illustrate the differences between the heavy user of milk and the non-user of milk these two groups, comprised of Michigan State University students, are described.

The heavy milk user tended to be a rural freshman or rural sophomore male living in a university dormitory. The non-user of milk tended to be an urban junior or urban senior woman living in an apartment. More younger students were classified as heavy users than older students. The factors influencing these characteristics were hypothesized to be lifestyle variables, cultural variables, or the availability of milk in dormitories.

For each attitudinal statement except one, heavy users possessed more positive attitudes towards milk than non-users. Most

significantly, they tended to consume milk in more social situations than the non-user of milk. A greater percentage of heavy milk users correctly answered the milkfat percentage questions than did the non-users. A greater percentage of heavy users knew the daily recommended dietary allowance of the milk group than did non-users of milk.

This description does not imply that all males are heavy milk users or that all non-users of milk have negative attitudes towards milk. The implication, however, is that unidentified social forces encourage, for example, males to drink more milk than women. It would be of some importance to identify the variables which mold the characteristics of the heavy milk user and incorporate these factors into dairy promotions designed to increase milk consumption.

Conclusions

The relationships found in this study suggest that the dairy product consumer conforms to both the theoretical and practical attitude/behavior models. As such, attitudes towards milk and variables which affect these attitudes would serve as a good basis for successful dairy promotions.

Nutritional knowledge was found to interact with both attitudes and consumption. This indicates that a dairy consumer education program might be a feasible means of promoting dairy products.

Recommendations

This study was a descriptive one. Significant relationships were described but not experimentally tested from a "cause and effect"

standpoint. Further work needs to be done exploring these relationships. Variables, other than nutritional knowledge, which affect attitudes and/or consumption need to be identified.

Some of the survey results have practical implications for the dairy industry. Recommendations for both research and the dairy industry follow.

Recommendations for Further Study

1. The effect of nutritional knowledge upon attitudes towards milk should be experimentally tested. A consumer program could be developed and administered to an experimental group. Any changes in subsequent attitudes towards milk could be compared to a control group. Since a persuasive change in attitude may be momentary, both experimental and control groups should be re-tested over time.
2. Factors which contribute to decreasing milk consumption with increasing age should be explored. Sex differences as related to milk consumption need to be studied.
3. Factors, such as religion, values, educational system, etc., which influence the upbringing of a child may be as influential as nutritional knowledge upon attitudes towards milk. As such, variables which are related to home background need to be correlated to attitudes towards milk.
4. Different lifestyles may influence the level of milk consumption and this should be explored.
5. All dairy consumer research should be based upon relevant consumer behavior literature, and should have practical implications for the dairy industry.

Recommendations for the Dairy Industry

1. With childhood habitation strongly influencing the consumers' attitude towards milk, more milk advertising should be directed to children or parents of young children.
2. Only 45% of those students living in apartments drank the recommended 2 eight ounce glasses of milk daily. There is marketing potential here to increase the percentage of heavy and average users in this age category.
3. To increase the level of skim milk consumption among skim milk users, fluid milk processers should work to develop a more satisfying skim milk product.
4. To help change the population's exaggerated perception of whole milk's fat content, fluid milk processers should print the correct fat content directly on the whole milk carton.
5. Michigan dairy marketers should encourage Michigan State University dormitory cafeterias to serve whole milk.
6. Dairy farmers, milk processers, and retail milk outlets should handle milk in such a way that fresh-tasting milk is always available to the consumer.
7. With today's supply/demand problems, it is the opinion of this author that dairy farmers must present a united front. They must actively work to curb production and should contribute generously to dairy promotion funds.
8. The dairy industry, USDA, land-grant universities and other interested groups must work together for the common good of the dairy farmer.

APPENDICES

APPENDIX A

Meridian Mall Dairy Consumer Survey, Okemos, Michigan

Researcher: Angela T. Bissaillon

September 1980

This survey attempted to measure broadly the consumers' consumption patterns, attitudes and nutritional knowledge of fluid milk.

Number of completed surveys: 92

Breakdown of questions:

1. How many glasses of fluid milk do you drink a day?
   Whole ____ Low-fat ____ Skim ____ Flavored ____

   A. Whole milk - 30 (33%)
      Drank an average of 2 glasses daily
   B. Lowfat milk - 43 (47%)
      Drank an average of 1.9 glasses daily
   C. Skim - 9 (9.8%)
      Drank an average of 1.9 glasses daily
   D. Flavored - 3 (3.2%)
      Drank an average of 1.3 glasses daily
   E. No Response - 11 (11.9%)
      *3 of the 11 noted that they were milk intolerant

2. Has this increased? ____ decreased? ____ or stayed the same? ____ since last year.

   A. increased - 14 (15%)
   B. decreased - 23 (25%)
   C. stayed the same - 55 (60%)

3. Which of the following qualities encourage you to drink milk?

   A. food value - 56 (61%)
   B. flavor - 50 (54%)
   C. calcium content - 30 (33%)
   D. protein level - 30 (33%)
   E. vitamin content - 27 (29%)
   F. absence of harmful additives - 13 (14%)
   G. calorie count - 9 (10%)
   H. price - 7 (8%)
   I. Appearance - 3 (3%)
   J. peer pressure - 2 (2%)
   K. cholesterol - 2 (2%)

4. Do you keep milk in the house?

   A. always - 80 (87%)
   B. often - 8 (8.6%)
   C. rarely - 3 (3.2%)
   D. never - 0
   E. no response - 1

5. Do you order milk in restaurants?

   A. always - 7 (7.6%)
   B. often - 34 (37%)
   C. rarely - 23 (25%)
   D. never - 26 (28%)

6. Has radio and television advertisements positively influenced your present milk drinking habits?

   A. yes - 8 (8.6%)
   B. no - 84 (91.3%)

7. If milk were to increase in price would you still drink it?

   A. yes - 85 (92%)
   B. no - 4 (4.3%)
   C. no answer - 3 (3%)

8. What is the percent fat in standardized whole milk?

   A. 0-5% - 23 (25%)
   B. 5-25% - 36 (39%)
   C. 25-50% - 13 (14%)
   D. 50-75% - 6 (6.5%)
   E. 75-100% - 2 (2%)
   F. no response - 12 (13%)

9. What is the percent fat in lowfat milk?

   A. 0-5% - 66 (72%)
   B. 5-25% - 15 (16.3%)
   C. 25-50% - 2 (2%)
   D. 50-75% - 0
   E. 75-100% - 0
   F. no response - 9 (9.2%)

10. Milk is a good food choice for weight watchers.

    A. true - 53 (58%)
    B. false - 36 (39%)
    C. no response - 3

11. Adults should drink at least two glasses of milk a day.

    A. true - 68 (74%)
    B. false - 19 (21%)
    C. no response - 5

12. Teenagers should drink four or more glasses of milk a day.

    A. true - 73 (79%)
    B. false - 12 (13%)
    C. no response - 7

13. Milk is included in one of the four major food groups.

    A. true - 86 (93%)
    B. false - 1 (1%)
    C. no response - 5

14. Milk supplies most of the calcium in U.S. diets.

    A. true - 79 (86%)
    B. false - 8 (9%)
    C. no response - 5

15. Milk protein has such a high value that it is used as the standard for evaluating the protein in other foods.

    A. true - 58 (63%)
    B. false - 24 (26%)
    C. no response - 10

APPENDIX B

Panel of Professionals

The following people reviewed "A Survey of the Nutritional Cognizance, Attitudes, and Fluid Milk Consumption of Michigan State University Students" and offered invaluable guidance in the development of the questionnaire.

Dr. Gale Baumgardner
Department of Animal Science
Michigan State University

Dr. Harold Hafs
Chairman, Department of Dairy Science
Michigan State University

Dr. Glynn McBride
Department of Agricultural Economics
Michigan State University

Mary Zehner
Department of Agricultural Economics
Michigan State University

Dr. Richard Houang
Department of Educational Psychology/Special Education
Michigan State University

Rae Ramsdell
Learning and Evaluation Service
Michigan State University

Dr. Brude VandenBergh
Department of Advertising
Michigan State University

Bonnie Lynch
Executive Director, American Dairy Association of Michigan

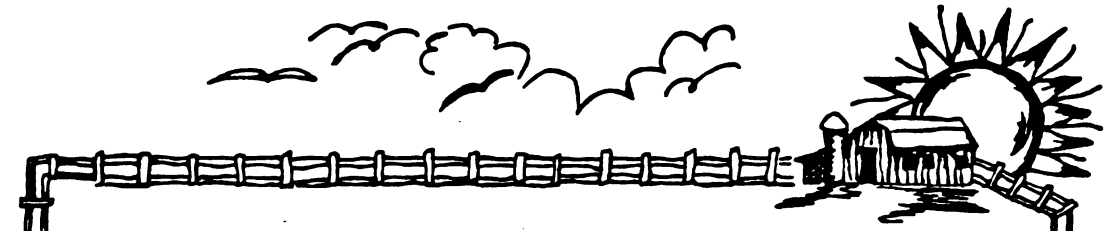
Carolyn Shafer
Executive Director, Dairy Council of Michigan

Glenn Lake
President, United Dairy Industry Association

APPENDIX C

Research Instrument and Accompanying Cover Letters

"A Survey of the Nutritional Cognizance, Attitudes, and Fluid Milk Consumption of Michigan State University Students"



April 20, 1981

Hello!

My name is Angie Bissaillon and I am a fellow M.S.U. student working on a Master's degree in Animal Science. As part of my research project, I am-studying the fluid milk consumption and attitudes of undergraduate students attending Michigan State. The results of this study will be used to develop relevant and interesting dairy product consumer programs targeted especially towards college students.

Enclosed you will find a questionnaire. I encourage you to relax, take a break from your studies, and accurately respond to the questions. When completed, just enclose the questionnaire within the supplied envelope and drop it in the nearest mailbox by April 30, 1981. (If you live on campus, please use the campus mail facilities in your dormitory.) What could be easier?

Participation in this study is strictly voluntary. All responses to the questionnaire will remain confidential.

I thank you for your time and effort and I hope to be hearing from you soon.

Sincerely yours,

Angie Bissaillon

Angie Bissaillon
Graduate Research Assistant
Department of Animal Science

May 4, 1981

Hello Again!

On April 20, I sent you a questionnaire designed to measure M.S.U. student's milk consumption, attitudes towards milk, and nutritional knowledge of milk. Thus far, the return rate has been good but WE STILL NEED YOUR RESPONSE. Your personal reply is important and will help to make the study as accurate as possible.

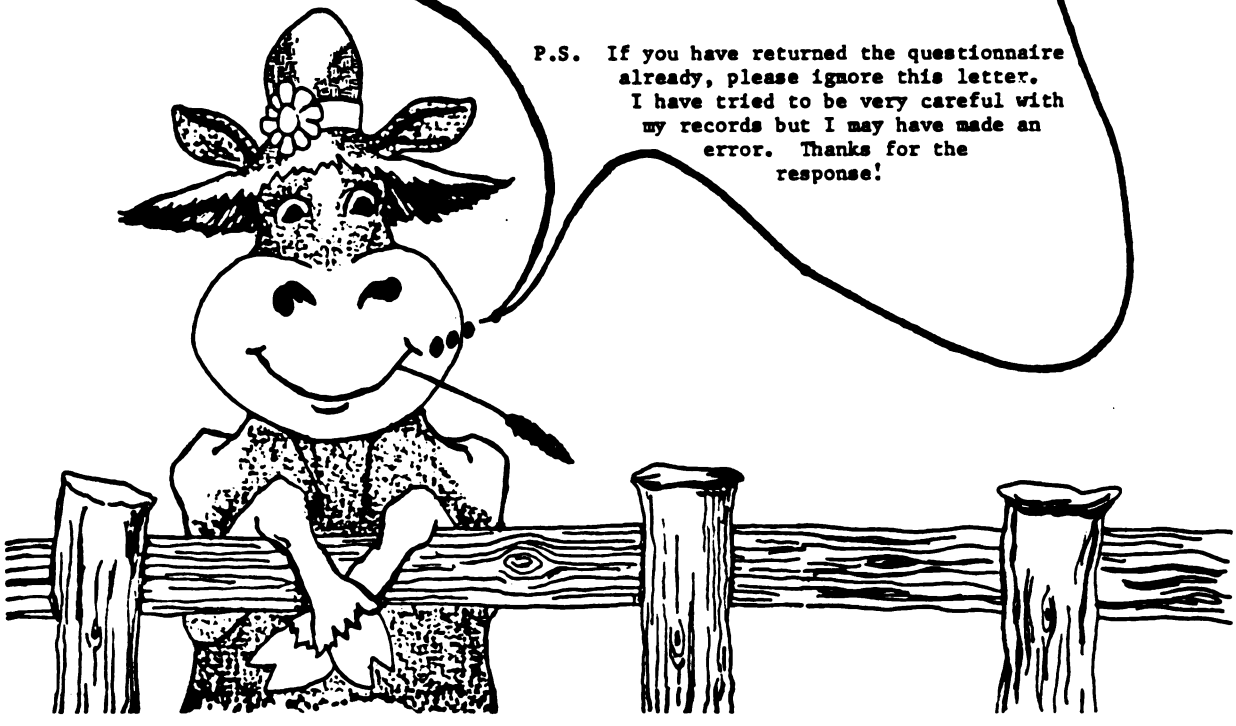
I realize that Spring Fever, as well as the academic pressures of Spring term, has set in. You may not have had the opportunity to sit down and answer my questions; you may have even misplaced the questionnaire. With this in mind, I have enclosed another questionnaire and self-addressed envelope. Could you please respond at your earliest convenience and return the questionnaire back to me by May 14, 1981??? (Once again, those who live on campus are requested to use CAMPUS MAIL.) All viewpoints are welcome and all responses will remain strictly confidential.

I am looking forward to hear from you soon. If you have any questions at all about the questionnaire feel free to call me at 353-7290. Have a nice day!

Sincerely,

Angie Bissaillon
Graduate Research Assistant
Department of Animal Science

P.S. If you have returned the questionnaire already, please ignore this letter. I have tried to be very careful with my records but I may have made an error. Thanks for the response!



PART 1 - CONSUMPTION TRENDS AND ATTITUDES

THIS IS A SERIES OF STATEMENTS CONCERNING YOUR UNIQUE MILK CONSUMPTION TRENDS AND ATTITUDES. EACH STATEMENT IS FOLLOWED BY THE NUMBERS 1 THROUGH 5. THE NUMBERS ARE DEFINED AS FOLLOWS:

1 - I STRONGLY DISAGREE WITH THE STATEMENT.

2 - I DISAGREE WITH THE STATEMENT.

3 - I HAVE NO OPINION ON THIS STATEMENT.

4 - I AGREE WITH THE STATEMENT.

5 - I STRONGLY AGREE WITH THE STATEMENT.

PLEASE CIRCLE THE NUMBER WHICH REPRESENTS YOUR REACTION TO EACH STATEMENT.

		disagree				agree
1.	Milk is a good food choice for weight watchers.	1	2	3	4	5
2.	Milk is refreshing after vigorous exercise.	1	2	3	4	5
3.	I like to start my day with a glass of milk.	1	2	3	4	5
4.	A glass of milk relaxes me before bedtime.	1	2	3	4	5
5.	I try to drink milk with all of my meals.	1	2	3	4	5
6.	I should drink more milk than I do.	1	2	3	4	5
7.	I usually order milk in restaurants.	1	2	3	4	5
8.	Milk satisfies my thirst in warm weather.	1	2	3	4	5
9.	My parents encouraged me to drink milk daily.	1	2	3	4	5
10.	Milk satisfies my thirst in cold weather.	1	2	3	4	5
11.	Milk is an important part of a balanced diet.	1	2	3	4	5
12.	Most of my friends drink milk everyday.	1	2	3	4	5
13.	I usually drink milk before visiting local bars.	1	2	3	4	5
14.	Vegetarians should drink milk.	1	2	3	4	5
15.	Milk is an economical food choice.	1	2	3	4	5
16.	Milk is a natural food.	1	2	3	4	5
17.	Milk gives me the energy to get through my classes.	1	2	3	4	5
18.	I enjoy alcoholic drinks made with milk.	1	2	3	4	5
19.	I drink more milk at my parent's home than at school.	1	2	3	4	5
20.	Adults can use milk's nutrients to rebuild body tissues.	1	2	3	4	5
21.	Milk settles my stomach when I am ill.	1	2	3	4	5
22.	I offer milk to guests in my home.	1	2	3	4	5
23.	I only drink milk when I am at home.	1	2	3	4	5
24.	Milk has an excellent balance of nutrients	1	2	3	4	5
25.	Government regulation makes milk a uniform and safe product for me.	1	2	3	4	5

PART 2 - PRODUCT USAGE

THIS SET OF QUESTIONS IS CONCERNED WITH THE AMOUNT OF MILK THAT YOU ACTUALLY DRINK. PLEASE FOLLOW THROUGH THE QUESTIONS AND CIRCLE THE LETTER TO THE LEFT OF YOUR RESPONSE.

1. Does the consumption of fluid milk cause any physical discomfort (stomach cramps, diarrhea, etc.) for adults in your family, excluding yourself?

   a. yes
   b. no
   c. I don't know

2. Does the consumption of fluid milk cause any physical discomfort for you?

   a. yes (if yes, go on to question 3)
   b. no (if no, go on to question 4 and answer all of the remaining questions)

3. Is fluid milk eliminated from your diet as a result of this physical discomfort?

   a. yes (if yes, please go on to Part 3 of this questionnaire and answer all of the remaining questions)
   b. no (if no, go on to question 4 and answer all of the remaining questions)

4. How much regular whole milk do you drink?

   a. 1 eight ounce glass per day
   b. 2 eight ounce glasses per day
   c. 3 or more eight ounce glasses per day
   d. Several eight ounce glasses per week
   e. I rarely drink any whole milk
   f. I never drink any whole milk.

5. How much low-fat milk do you drink?

   a. 1 eight ounce glass per day
   b. 2 eight ounce glasses per day
   c. 3 or more eight ounce glasses per day
   d. Several eight ounce glasses per week
   e. I rarely drink any low-fat milk
   f. I never drink any low-fat milk

6. How much skim milk do you drink?

   a. 1 eight ounce glass per day
   b. 2 eight ounce glasses per day
   c. 3 or more eight ounce glasses per day
   d. Several eight ounce glasses per week
   e. I rarely drink any skim milk
   f. I never drink any skim milk

7. How much chocolate milk do you drink?

   a. 1 eight ounce glass per day
   b. 2 eight ounce glasses per day
   c. 3 or more eight ounce glasses per day
   d. Several eight ounce glasses per week
   e. I rarely drink any chocolate milk
   f. I never drink any chocolate milk

PART 3 - NUTRITIONAL KNOWLEDGE

THE FOLLOWING QUESTIONS ARE CONCERNED WITH THE NUTRITIONAL QUALITIES OF MILK. PLEASE READ EACH QUESTION AND CIRCLE THE LETTER TO THE LEFT OF THE RESPONSE THAT YOU FEEL IS MOST CORRECT.

1. How many eight ounce glasses of fluid milk are adults advised to drink daily?

   a. 0
   b. 1
   c. 2
   d. I don't know

2. The process of breaking milkfat into fine globules and dispersing these globules uniformly throughout milk is called . . .

   a. pasteurization
   b. homogenization
   c. fortification
   d. I don't know

3. The process of heating milk to assure its safety in consumption and improve its keeping quality is called . . .

   a. pasteurization
   b. homogenization
   c. fortification
   d. I don't know

4. Nutritional labeling is required . . .

   a. for all foods
   b. for those products to which a nutrient has been added
   c. for processed foods only
   d. I don't know

5. Exposing milk to light . . .

   a. produces an "off-flavor" in the milk
   b. reduces the riboflavin content of milk
   c. has no harmful effects
   d. both a and b
   e. I don't know

6. For optimum freshness and flavor, milk should be . . .

   a. returned promptly to the refrigerator after use
   b. stored below 40 degrees farenheit
   c. kept in a closed container
   d. all of the above
   e. I don't know

7. Regular whole milk (standardized) contains how much milkfat?

   a. 5% or less
   b. between 6 and 25%
   c. between 26 and 50%
   d. between 51 and 75%
   e. 76% or more
   f. I don't know

8. Low-fat milk contains how much milkfat?

   a. 5% or less
   b. between 6 and 25%
   c. between 26 and 50%
   d. between 51 and 75%
   e. 76% or more
   f. I don't know

9. Of the 150 calories found in an eight ounce glass of whole milk, about how many calories does the milkfat contribute?

   a. 150
   b. 100
   c. 70
   d. 30
   e. I don't know

10. Does the number of calories in a glass of milk depend upon the fat content of the milk?

   a. yes
   b. no
   c. I don't know

11. The fat found in milk contains a blend of fatty acids. These fatty acids are . . .

    a. 100% saturated
    b. around 60% saturated
    c. around 10% saturated
    d. 100% saturated
    e. I don't know

12. Milkfat is the carrier of which vitamin(s)?

    a. B-complex
    b. A, D, E, and K
    c. C
    d. there are no vitamins in milkfat
    e. I don't know

13. The calcification of bones and teeth . . .

    a. occurs only before birth
    b. is important only in growing children
    c. stops at age 21
    d. is a life-long process
    e. I don't know

14. Milk and milk products contribute how much of the total calcium in the diets of United States people?

    a. 10%
    b. 25%
    c. 50%
    d. 75%
    e. I don't know.

* * * * * * * * * * * * * * *

FINALLY, WE WOULD LIKE TO HAVE SOME INFORMATION ABOUT YOU . . .

1. What class level are you?

    a. freshman
    b. sophomore
    c. junior
    d. senior

2. Where do you presently live?

    a. university housing
    b. rented room, apartment, or house
    c. your parent's house

3. Are you . . .

   a. female
   b. male

4. How old are you?

   a. 17 or younger
   b. 18
   c. 19
   d. 20
   e. 21
   f. 22
   g. 23
   h. 24 or older

5. How many years have you been living away from home?

   a. 1
   b. 2
   c. 3
   d. 4
   e. 5 or more
   f. I have always lived at home.

6. In what type of area were you brought up?

   a. urban
   b. suburban
   c. rural, non-farm
   d. rural, farm

7. Were you ever involved in 4-H clubwork?

   a. yes
   b. no

8. Would like to receive some consumer information concerning milk and other dairy products? If yes, please supply us with your name and address below. Your responses to the questionnaire will still remain confidential.

_____

_____

_____

_____

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE.

Sincerely,

Angie Bissaillon

Angie Bissaillon

APPENDIX D

Research Instrument

"The Telephone Interview Schedule"

Hello . . . my name is Angie Bissaillon from the Animal Science Department here at M.S.U. I am conducting some research on student's attitudes towards milk. Would you mind answering a few questions for me?

1. How much milk, on the average, do you drink each day? _____

   If "0", . . . Is this due to some physical discomfort you get from drinking milk or some other reason?

   _____

   _____

   _____

   If "other", . . . What is the reason?

   _____

   _____

   _____

2. What type of milk do you usually drink (i.e., whole, lowfat, skim)? Is there any specific reason why you prefer _____ milk over the other types available?

   _____

   _____

   _____

3. Using word association, can you give me up to five words that come to mind when you think of the word MILK?

_____ _____

_____ _____

_____ _____

_____ _____

4. Now it's my turn . . . I am going to name several qualities of milk which may or may not encourage you to drink milk. After each quality that I mention, say YES if the quality encourages you to drink milk and NO if the quality in no way influences you to drink milk. Do you understand the instructions? Then let's start . . .

taste	_____	cholesterol level	_____
calcium content	_____	purity	_____
food value	_____	appearance	_____
calorie count	_____	freshness	_____
vitamin content	_____	price	_____
protein	_____	availability	_____

Well, that's all the questions that I have . . . Do you have any further questions or comments?

Thank you for your time . . . Good-bye.

APPENDIX E

Selected Attitude Statements Used to Determine the Respondents Total Attitude Score*

- Milk is a good food choice for weight watchers
- Milk is refreshing after vigorous exercise
- I like to start my day with a glass of milk
- A glass of milk relaxes me before bedtime
- I try to drink milk with all of my meals
- I usually order milk in restaurants
- Milk satisfies my thirst in warm weather
- Milk satisfies my thirst in cold weather
- Milk is an important part of a balanced diet
- Vegetarians should drink milk
- Milk is an economical food choice
- Milk is a natural food
- Milk gives me the energy to get through my classes
- Adults can use milk's nutrients to rebuild body tissues
- Milk settles my stomach when I am ill
- I offer milk to guests in my home
- Milk has an excellent balance of nutrients
- Government regulation makes milk a uniform and safe product for me

*Attitude statements which were not related to respondent's personal beliefs about milk, statements implying the use of alcoholic beverages, and negative statements were excluded from the total attitude score.

APPENDIX F

ADDITIONAL TABLES

TABLE A1.--Responses to "I Drink More Milk at My Parent's Home Than at School" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a,b]	11.72	33.05	17.99	18.41	18.83	100.00
Average User[c]	11.41	26.85	13.42	26.17	22.15	100.00
Light User	10.48	20.00	17.14	29.52	22.86	100.00
Occasional User[b,c]	8.75	17.50	2.50	31.25	40.00	100.00
Non-User[a]	32.11	16.51	6.42	31.19	13.76	100.00
Total	14.37	25.22	13.20	25.37	21.85	100.00

[a,b,c]Like superscripts indicate significant group differences.

TABLE A2.--Responses to "I Try to Drink Milk With All of My Meals" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a,b]	1.26	6.28	8.37	35.15	48.95	100.00
Average User[c]	10.07	28.19	12.08	31.54	18.12	100.00
Light User	17.14	51.43	12.38	14.29	4.76	100.00
Occasional User[b,c]	26.25	31.25	11.25	22.50	8.75	100.00
Non-User[a]	62.16	29.73	3.60	2.70	1.80	100.00
Total	18.42	24.71	9.36	24.42	23.10	100.00

[a,b,c]Like superscripts indicate significant group differences.

TABLE A3.--Responses to "I Offer Milk to Guests in My Home" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a,b]	5.00	17.50	26.67	37.50	13.33	100.00
Average User[c]	8.00	20.00	20.00	45.33	6.67	100.00
Light User	8.57	21.90	30.48	32.38	6.67	100.00
Occasional User[b,c]	21.25	26.25	12.50	27.50	12.50	100.00
Non-User[a]	37.84	23.42	5.41	25.23	8.11	100.00
Total	13.41	20.70	20.70	35.28	9.91	100.00

[a,b,c]Like superscripts indicate significant group differences.

TABLE A4.--Responses to "I Only Drink Milk When I Am At Home" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a,b]	57.50	31.67	2.92	3.75	4.17	100.00
Average User[c]	45.33	42.00	6.67	5.33	0.67	100.00
Light User	19.23	55.77	5.77	10.58	8.65	100.00
Occasional User[b,c]	28.75	45.00	11.25	7.50	7.50	100.00
Non-User[a]	35.14	32.43	9.91	15.32	7.21	100.00
Total	42.04	39.27	6.28	7.45	4.96	100.00

[a,b,c]Like superscipts indicate significant group differences.

TABLE A5.--Responses to "I Like to Start My Day With a Glass of Milk" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a,b]	5.00	13.75	12.92	30.00	38.33	100.00
Average User[c]	6.67	25.33	21.33	26.00	20.67	100.00
Light User	13.33	38.10	16.19	25.71	6.67	100.00
Occasional User[b,c]	23.75	28.75	15.00	16.25	16.25	100.00
Non-User[a]	57.66	31.53	4.50	4.50	1.80	100.00
Total	17.35	24.64	14.14	22.74	21.14	100.00

[a,b,c]Like superscripts indicate significant group differences.

TABLE A6.--Responses to "I Should Drink More Milk Than I Do" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a,b]	21.67	41.67	17.92	12.08	6.67	100.00
Average User	17.33	32.00	16.67	24.00	10.00	100.00
Light User	11.43	30.48	8.57	35.24	14.29	100.00
Occasional User[a]	12.50	23.75	13.75	25.00	25.00	100.00
Non-User[b]	17.27	12.73	10.00	29.09	30.91	100.00
Total	17.37	31.09	14.45	22.48	14.69	100.00

[a,b]Like superscripts indicate significant group differences.

TABLE A7.--Responses to "I Usually Order Milk in Restaurants" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a,b]	13.75	29.58	14.58	28.33	13.75	100.00
Average User	28.86	36.91	10.07	21.48	2.68	100.00
Light User	39.05	43.81	6.67	8.57	1.90	100.00
Occasional User[a]	38.75	38.75	7.50	10.00	5.00	100.00
Non-User[b]	78.38	16.22	1.80	1.80	1.80	100.00
Total	34.31	32.26	9.49	17.37	6.57	100.00

[a,b]Like superscripts indicate significant group differences.

TABLE A8.--Responses to "Milk Satisfies My Thirst in Warm Weather" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a,b]	13.81	27.20	15.06	28.87	15.06	100.00
Average User	28.67	30.00	14.67	20.67	6.00	100.00
Light User	35.58	27.88	14.42	21.15	0.96	100.00
Occasional User[a]	35.00	28.75	10.00	20.00	6.25	100.00
Non-User[b]	64.86	22.52	4.50	6.31	1.80	100.00
Total	31.14	27.34	12.57	21.20	7.75	100.00

[a,b]Like superscripts indicate significant group differences.

TABLE A9.--Responses to "Milk Satisfies My Thirst in Cold Weather" by Total Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a,b]	3.75	11.25	21.25	41.25	22.50	100.00
Average User	6.71	13.42	22.15	48.32	9.40	100.00
Light User	9.52	21.90	23.81	41.90	2.86	100.00
Occasional User[a]	11.25	18.75	27.50	35.00	7.50	100.00
Non-User[b]	51.83	19.09	10.91	17.27	0.91	100.00
Total	13.89	15.50	20.91	38.30	11.40	100.00

[a,b]Like superscripts indicate significant differences.

TABLE A10.--Responses to "Milk is an Important Part of a Balanced Diet" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a,b]	1.67	0.42	3.77	33.47	60.67	100.00
Average User	0.67	2.00	4.00	44.00	49.33	100.00
Light User	2.86	4.76	6.67	43.81	41.90	100.00
Occasional User[a]	1.25	5.00	7.50	40.00	46.25	100.00
Non-User[b]	6.36	7.27	14.55	50.00	21.82	100.00
Total	2.34	3.07	6.43	40.79	47.37	100.00

[a,b]Like superscripts indicate significant group differences.

TABLE A11.--Responses to "Most of My Friends Drink Milk Everyday" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a,b]	3.75	19.58	15.00	47.08	14.58	100.00
Average User	4.70	26.85	21.48	36.91	10.07	100.00
Light User	3.85	23.08	20.19	44.23	8.65	100.00
Occasional User[a]	8.75	25.00	26.25	33.75	6.25	100.00
Non-User[b]	10.91	29.09	20.91	31.82	7.27	100.00
Total	5.71	23.87	19.47	40.41	10.54	100.00

[a,b]Like superscripts indicate significant group differences.

TABLE A12.--Responses to "Milk Gives Me the Energy to Get Through My Classes" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a,b]	4.18	10.88	51.46	24.69	8.79	100.00
Average User	3.33	24.00	49.33	18.67	4.69	100.00
Light User	8.57	24.76	45.71	20.95	0.00	100.00
Occasional User[a]	11.25	25.00	47.50	11.25	5.00	100.00
Non-User[b]	45.05	29.73	18.02	6.31	0.90	100.00
Total	12.12	20.58	44.23	18.25	4.82	100.00

[a,b]Like superscripts indicate significant group differences.

TABLE A13.--Responses to "Milk Has an Excellent Balance of Nutrients" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a,b]	0.42	6.25	23.33	45.83	24.17	100.00
Average User	0.00	4.67	26.67	47.33	21.33	100.00
Light User	0.95	8.57	22.86	54.29	13.33	100.00
Occasional User[a]	0.00	11.15	21.25	46.25	21.25	100.00
Non-User[b]	5.45	6.36	34.55	42.73	10.91	100.00
Total	1.17	6.86	25.55	47.01	19.42	100.00

[a,b]Like superscripts indicate significant group differences.

TABLE A14.--Responses to "Milk is Refreshing After Vigorous Exercise" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a,b]	4.60	17.57	7.95	38.08	31.80	100.00
Average User	9.33	25.33	13.33	38.67	13.33	100.00
Light User	17.14	36.19	13.33	24.76	8.57	100.00
Occasional User[a]	20.00	22.50	10.00	32.50	15.00	100.00
Non-User[b]	31.53	35.14	14.41	11.71	7.21	100.00
Total	13.72	25.55	11.24	31.24	18.25	100.00

[a,b]Like superscripts indicate significant group differences.

TABLE A15.--Responses to "Milk is a Natural Food" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a]	0.42	3.35	6.69	44.35	45.19	100.00
Average User	0.67	2.67	13.33	54.00	29.33	100.00
Light User	1.90	10.48	11.43	43.81	32.48	100.00
Occasional User	0.00	8.75	11.25	51.25	28.75	100.00
Non-User[a]	4.50	6.31	16.22	46.85	26.13	100.00
Total	1.31	5.40	10.95	47.59	34.74	100.00

[a]Like superscripts indicate significant group differences.

TABLE A16.--Responses to "Adults Can Use Milk's Nutrients to Rebuild Body Tissues" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a]	2.92	5.83	37.92	38.33	15.00	100.00
Average User	0.68	8.78	39.19	37.16	14.19	100.00
Light User	2.86	7.62	35.24	45.71	8.57	100.00
Occasional User	3.75	8.75	40.00	31.25	16.25	100.00
Non-User[a]	9.01	13.51	42.34	28.83	6.31	100.00
Total	3.51	8.33	38.74	36.84	12.57	100.00

[a]Like superscripts indicate significant group differences.

TABLE A17.--Responses to "Milk Settles My Stomach When I Am Ill" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a]	7.53	21.34	30.96	29.71	10.46	100.00
Average User	8.00	18.00	26.00	37.33	10.67	100.00
Light User	12.38	22.86	29.52	28.57	6.67	100.00
Occasional User	13.75	23.75	31.25	17.50	13.75	100.00
Non-User[a]	41.44	23.42	18.92	9.91	6.31	100.00
Total	14.60	21.46	27.74	26.57	9.64	100.00

[a]Like superscripts indicate significant group differences.

TABLE A18.--Responses to "Government Regulation Makes Milk a Uniform and Safe Product for Me" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a]	1.67	3.77	21.34	48.54	24.69	100.00
Average User	2.67	4.00	21.33	48.00	24.00	100.00
Light User	2.86	5.71	17.14	54.29	20.00	100.00
Occasional User	3.75	6.25	30.00	42.50	17.50	100.00
Non-User[a]	5.41	12.61	30.63	36.04	15.32	100.00
Total	2.92	5.84	23.21	46.57	21.46	100.00

[a]Like superscripts indicate significant group differences.

TABLE A19.--Responses to "My Parents Encouraged Me to Drink Milk Daily" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a]	5.83	12.92	22.08	29.17	30.00	100.00
Average User	8.00	14.67	12.00	38.67	26.67	100.00
Light User	14.29	14.29	20.00	30.48	20.95	100.00
Occasional User	15.00	15.00	20.00	27.50	22.50	100.00
Non-User[a]	19.82	23.42	20.72	23.42	12.61	100.00
Total	10.93	15.45	19.10	30.32	24.20	100.00

[a]Like superscripts indicate significant group differences.

TABLE A20.--Responses to "I Usually Drink Milk Before Visiting Local Bars" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a]	35.86	25.32	27.85	6.33	4.64	100.00
Average User	35.57	34.90	21.48	7.38	0.67	100.00
Light User	46.67	37.14	12.38	3.81	0.00	100.00
Occasional User	47.50	27.50	16.25	5.00	3.75	100.00
Non-User[a]	68.18	17.27	10.00	3.64	0.91	100.00
Total	44.05	28.19	19.82	5.58	2.35	100.00

[a]Like superscripts indicate significant group differences.

TABLE A21.--Responses to "Milk is a Good Food Choice for Weight Watchers" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a]	4.17	13.75	26.67	36.25	19.17	100.00
Average User	4.00	26.67	25.33	33.33	10.67	100.00
Light User	6.67	25.71	17.14	37.14	13.33	100.00
Occasional User	7.50	22.50	30.00	28.75	11.25	100.00
Non-User[a]	20.72	34.23	20.72	19.82	4.50	100.00
Total	7.58	22.74	24.34	32.22	13.12	100.00

[a]Like superscripts indicate significant group differences.

TABLE A22.--Responses to "A Glass of Milk Relaxes Me Before Bedtime" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a]	9.17	19.58	37.92	20.83	12.50	100.00
Average User	8.00	21.33	40.00	23.33	7.33	100.00
Light User	13.46	26.92	25.96	22.12	11.54	100.00
Occasional User	17.50	17.50	32.50	21.25	11.25	100.00
Non-User[a]	46.85	28.83	12.61	7.21	4.50	100.00
Total	16.64	22.34	31.82	19.42	9.78	100.00

[a]Like superscripts indicate significant group differences.

TABLE A23.--Responses to "Vegetarians Should Drink Milk" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a]	1.25	3.33	46.25	25.00	24.17	100.00
Average User	1.33	2.00	41.33	30.67	24.67	100.00
Light User	1.90	2.86	44.76	33.33	17.14	100.00
Occasional User	2.50	1.25	43.75	27.50	25.00	100.00
Non-User[a]	8.18	7.27	48.18	21.82	14.55	100.00
Total	2.63	3.36	44.96	27.30	21.75	100.00

[a]Like superscripts indicate significant group differences.

TABLE A24.--Responses to "Milk is an Economical Food Choice" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree	Total
Heavy User[a]	3.75	12.50	32.08	35.83	15.83	100.00
Average User	0.00	15.17	35.17	32.41	17.24	100.00
Light User	4.76	18.10	23.81	43.81	9.52	100.00
Occasional User	6.25	12.50	35.00	35.00	11.25	100.00
Non-User[a]	9.01	20.72	41.44	21.62	7.21	100.00
Total	4.26	15.27	33.33	33.92	13.22	100.00

[a]Like superscripts indicate significant group differences.

TABLE A25.--Responses to "How Many Eight Ounce Glasses of Fluid Milk are Adults Advised to Drink Daily?" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	0	1	2*	I Don't Know	Total
Heavy User[a]	1.69	16.46	54.85	27.00	100.00
Average User	4.67	25.33	46.67	23.33	100.00
Light User	3.81	30.48	46.67	23.33	100.00
Occasional User	3.75	27.50	37.50	31.25	100.00
Non-User[a]	5.41	21.62	33.33	39.64	100.00
Total	3.51	22.69	46.27	27.53	100.00

*2 eight ounce glasses is the correct answer.

[a]Like superscripts indicate significant group differences.

TABLE A26.--Responses to "Regular Whole Milk (Standardized) Contains How Much Milkfat?" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	≤5%*	6-25%	26-50%	51-75%	≥76%	I Don't Know	Total
Heavy User[a]	31.80	22.59	2.93	1.67	2.51	38.49	100.00
Average User	20.81	22.15	6.71	4.03	2.01	44.30	100.00
Light User	21.90	33.33	7.62	2.86	1.90	32.38	100.00
Occasional User	13.75	23.75	3.75	2.50	2.50	53.75	100.00
Non-User[a]	15.45	26.36	5.45	3.64	0.91	48.18	100.00
Total	23.13	24.89	4.98	2.78	2.05	42.17	100.00

*≤5% is the correct answer.

[a]Like superscripts indicate significant group differences.

TABLE A27.--Responses to "Low Fat Milk Contains How Much Milkfat?" by Total Milk Consumption Score. (Numerical Values Indicate the Row Percent.)

Consumption Score	≤5%*	6-25%	26-50%	51-75%	≥76%	I Don't Know	Total
Heavy User[a]	77.41	5.02	0.42	0.00	0.00	17.15	100.00
Average User	78.00	4.67	0.67	0.00	0.00	16.67	100.00
Light User	76.19	4.76	2.86	0.95	0.00	15.24	100.00
Occasional User	80.00	0.00	1.25	0.00	0.00	18.75	100.00
Non-User[a]	63.06	3.60	3.60	0.90	0.00	32.43	100.00
Total	75.33	4.09	1.02	0.15	0.00	19.42	100.00

*≤5% is the correct answer.

[a]Like superscripts indicate significant group differences.

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