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The New Nutrition Labels: A Study of Consumers' Use for Dairy Products

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With enactment of the 1990 Nutrition Labeling Education Act (NLEA), the Food and Drug Administration (FDA) and United States Department of Agriculture (USDA) have mandated that many foods will have nutrition information contained in their labels. In addition to mandating nutrition labeling, the NLEA established definitions for nutrient claims and conditions for use of health claims on food products. The NLEA provides guidelines for format and placement of a nutrition facts panel, nutrient claims, and health claims. The 1990 NLEA was implemented in August 1994.

Projected costs to industry from the new laels included costs of compliance with labeling, including designing and printing new labels, nutrient content analysis, and replacing the inventory of old labels. Estimates of compliance costs ranged from $1.6 billion to $2.6 billion (Frazao). Projected benefits accruing from the new nutrition labels include those from reduced medical costs and productivity losses from diet related diseases. Economic benefits resulting from the nutrition labels were estimated at $4.5 billion (Frazao). Therefore, estimated economic benefits were projected to outweigh estimated costs from mandatory labeling.

Benefits from nutrition labeling depend on consumers reading information in the new nutrition labels and using this information to alter purchase and intake patterns. The overall objective of this study was to estimate probability of readership for the new nutrition labels on dairy products and to determine how socioeconomic characteristics of shoppers, nutrition attitudes, and shopping habits affect nutrition label usage for dairy products. In addition, among label readers, the effects of label readership, perceptions about the importance of selected nutrients, frequency of dairy product purchases, and consumer demographics on changing purchase patterns due to label information were tested. Dairy product label readership was selected for this study because of the high frequency of dairy product purchases among consumers, prevalence of low and reduced fat dairy products offered in dairy cases (Barr) and results from past studies documenting consumers' concerns regarding nutrients in dairy products (Jensen and Kesevan; Hermann, Sterngold, and Warland). Data were obtained through a mail survey of a random sample of Tennessee residents with telephone listings.

Studies of Nutrition Label Use

Several studies have examined factors influencing nutrition label use by consumers. Findings from studies by Russell and The Roper Organization suggest that new product use influences label readership, with readership most likely occurring on products that have not previously been purchased by the consumer. Results from several studies have suggested that female heads of households or female food shoppers positively influence label readership (Russell; Bender and Derby; The Roper Organization). Higher incomes and education levels have also been linked to higher nutrition label readership (Wang, Fletcher, and Carley; Bender and Derby; The Roper Organization). Results for effect of age of consumer on label readership conflict between studies. Bender and Derby found that young females were likely to read labels, while older males were not likely to use nutrition labels. However, findings from a study by The Roper Organization were that the consumers most influenced by label information were 55 years old or older.

Influence of Nutrition Concerns and Label Readership on Purchases

Schutz, Judge, and Gentry examined the relative importance of various attributes to the

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purchase and consumption of 15 foods. Their results suggested that sensory attributes of foods are of more importance to consumers than nutrition, price, or brand. They did, however, find that female respondents rated nutrition more highly than did males. The percent of family income spent on food was positively correlated with nutrition importance. Their study found no correlation between nutrition importance ratings and education but that a negative correlation between nutrition importance ratings and income existed. Awareness and attitudes about nutrition have been shown to influence dairy products consumption. Jensen and Kesavan investigated the interaction among information sources, consumers' awareness of calcium and related health attributes, and consumption of dairy products. Their studies results suggested that the National Dairy Board's promotion of dairy products through nutrient-related advertisements had a positive effect on awareness and attitudes related to health. Furthermore, they found that "stronger" positive attitudes toward nutrients led to more frequent consumption of dairy products.

Findings from a study by Hermann, Sterngold and Warland suggest that several factors may be responsible for the changes in dairy product consumption patterns. One of these factors is increased concern about cholesterol and animal fat consumption. Individuals have been urged to reduce the amount of food with high fat content that they consume. The steady trend away from consumption of whole milk to that of lowfat and skim may be directly linked to the increased health concerns of consumers (Haidacher, Blaylock, and Myers; Hermann, Sterngold and Warland).

Models for Label Readership and Purchase Changes

The models of probability of label readership and purchase changes are described in this section. Names and definitions of variables used in each of the models are presented in Table 1.

Probability of reading labels on dairy products (LABELS: 1 if read, 0 if do not) is hypothesized to be a function of attitudes about nutrition and other product attributes, use of nutrition information from alternative sources, use of new dairy products, and socioeconomic and demographic characteristics of shoppers. The hypothesized model is:

LABELS = f(FL2, FL3, PR2, PR3, NU2, NU3, NEWSPAPER, MEDIA, HEALTH, NEWP, CHILDREN, GENDER, EDUC, RURAL, AGEMP1, AGEMP2, AGEMP3, AGEMP4, AGEMP5).

The variables FL2-FL3, PR2-PR3, and NU2-NU3 represent consumer attitudes about the importance of product flavor, price, and nutrition respectively.[1] Lesser importance of flavor and price are hypothesized to have positive influences on the probability of label readership. Lesser importance of nutrition to shoppers is expected to have a negative influence on probability of label readership. Use of nutrition information from a variety of sources, such as newspaper or books, radio or television, or from health professionals (NEWSPAPER, MEDIA, HEALTH) is expected to positively influence probability of label readership. Higher proportion of purchases comprised by new products (NEWP) is expected to positively influence label readership, because it may reflect a willingness by the consumer to use nutrition information in trying new products. Presence of children in the household (CHILDREN) is expected to increase concerns about nutrition label information and increase the probability of label readership. Based on results from past studies, female gender of food shopper (GENDER) is expected to positively influence probability of reading nutrition labels. Less educated shoppers (EDUC) are expected to have a lower probability of label readership than more educated shoppers. Rural shoppers (RURAL) are expected to have a lower probability of readership relative to urban shoppers. Age and employment status of the food shopper is hypothesized to influence shopping time available for reading

[1] The respondents were asked to rate the importance of the flavor, price, and nutrition on a five point scale (1=very important, 2=important, 3=somewhat important, 4=minor importance, 5=not important). Responses for minor importance and not important were grouped with the responses 'somewhat important' due to low responses in those categories. The resulting category is 'somewhat important or less'.

Table 1. Variable Names and Definitions for Label Readership and Purchase Changes Models.

Variable Name	Definition
LABELS	Read nutrition information on dairy products considered for purchase, 1 if read, 0 if do not read
FL1	Importance of flavor on purchases of dairy products, 1 if very important, 0 if not (omitted category)
FL2	Importance of flavor on purchases of dairy products, 1 if important, 0 if not
FL3	Importance of flavor on purchases of dairy products, 1 if somewhat or less important, 0 if not
PR1	Importance of price on purchases of dairy products, 1 if very important, 0 if not (omitted category).
PR2	Importance of price on purchases of dairy products, 1 if important, 0 if not.
PR3	Importance of price on purchases of dairy products, 1 if somewhat or less important, 0 if not.
NU1	Importance of nutrition on purchases of dairy products, 1 if very important, 0 if not (omitted category).
NU2	Importance of nutrition on purchases of dairy products, 1 if important, 0 if not.
NU3	Importance of nutrition on purchases of dairy products, 1 if somewhat or less important, 0 if not.
NEWSPAPER	Use of nutrition information from newspapers, books, or magazines during the last year, 1 if have used, 0 if have not.
MEDIA	Use of nutrition information from radio or television during the last year, 1 if have used, 0 if have not.
HEALTH	Use of nutrition information from doctor, nurse, or other health professionals during the last year, 1 if have used, 0 if have not.
NEWP	Purchases comprised by new dairy products, 1 if new products comprise ten percent or greater of dairy products purchases, 0 if comprise less than 10 percent.
CHILDREN	Children present in household who are under the age of 18, 1 if children present, 0 if no.
GENDER	Gender of primary food shopper, 1 if female, 0 if male.
RURAL	Location of household, 1 if rural, 0 if urban.
EDUC	Education level of primary food shopper, 1 if high school graduate or less, 0 if greater than high school graduate.
AGEMP1	Age and employment status of primary food shopper, 1 if less than 35 years old and working full time, 0 otherwise.
AGEMP2	Age and employment status of primary food shopper, 1 if less than 35 years old and not working full time, 0 otherwise.
AGEMP3	Age and employment status of primary food shopper, 1 if greater or equal to 35 years old, but less than 60 years old and working full time, 0 otherwise.
AGEMP4	Age and employment status of primary food shopper, 1 if greater or equal to 35 years old, but less than 60 years old and not working full time, 0 otherwise.
AGEMP5	Age and employment status of primary food shopper, 1 if greater or equal to 60 years old and working full time, 0 otherwise.
AGEMP6	Age and employment status of primary food shopper, 1 if greater or equal to 60 years old and not working full time, 0 otherwise (omitted category).
PURCH	Dairy food products purchases changed by nutrition label information among label readers during the last year, 1 if at least 50 percent of products purchases changed, 0 if less than 50 percent of purchases changed.
PLABELS	Among label readers, of labeled dairy products considered for purchase, percent for which read nutrition labels.
DFREQ	Frequency of purchase of dairy products, 1 if purchase more than one type of dairy product on at least a weekly basis, 0 if do not (groups include fluid milk, frozen desserts, cheese, and other dairy products).
FATCH1	Importance of total fat and cholesterol in influencing changes in dairy products purchases, 1 if very important, 0 if not (omitted category).
FATCH2	Importance of total fat and cholesterol in influencing changes in dairy products purchases, 1 if important, 0 if not.
FATCH3	Importance of total fat and cholesterol in influencing changes in dairy products purchases, 1 if somewhat important or less, 0 if not.
CALD1	Importance of calcium and vitamin D in influencing changes in dairy products purchases, 1 if very important, 0 if not (omitted category).
CALD2	Importance of calcium and vitamin D in influencing changes in dairy products purchases, 1 if important, 0 if not.
CALD3	Importance of calcium and vitamin D in influencing changes in dairy products purchases, 1 if somewhat important or less, 0 if not.
HINC	1994 household income, 1 if under $15,000, 2 if $15,000-$24,999, 3 if $25,000-$34,999, 4 if $35,000-$44,999, 5 if $45,000-$59,999, 6 if $60,000 or greater.

labels and attitudes toward importance of reading nutrition information. If the shopper is younger and employed full time (AGEMP1), this is postulated to have a negative influence on probability of readership compared with older shoppers who work less than full time (AGEMP6). Older shoppers would be postulated to have greater concerns about nutrition in dairy products, in particular with respect to calcium and fat. Employment status is hypothesized to influence the amount of available time for reading label information on an average shopping trip.

Among label readers, the probability of heavy influence of label information on purchases, (1 if changed 50 percent or greater of purchases, 0 if changed less than 50 percent) is hypothesized to be influenced by level of label readership, frequency of purchases, nutrients for which label information influences purchases, purchase of new dairy products, and demographic characteristics. The model for probability of heavy purchase change is:

PURCH = f(PLABEL, DFREQ, FATCH2, FATCH3, CALD2, CALD3, NEWP, CHILDREN, GENDER, EDUC, RURAL, AGEMP1, AGEMP2, AGEMP3, AGEMP4, AGEMP5, HINC)

The percent of dairy products for which labels are read (PLABEL) is hypothesized to have a positive influence on probability of heavy purchase changes. The impact of frequent purchases of dairy products (DFREQ) on probability of heavy purchase changes is not hypothesized a priori. However, more frequent purchasers may be more willing to try new products. Citing fat and cholesterol as important or somewhat important or less (FATCH2, FATCH3) is hypothesized to have a negative effect on probability of heavy purchase changes relative to citing fat and cholesterol as very important.[2] Compared with citing calcium and vitamin D as very important, perceptions that calcium and vitamin D (CALD2, CALD3) are important or somewhat important or less are hypothesized to have negative influences on probability of heavy purchase changes. Purchase of new products (NEWP) should reflect a consumer who is willing to try new products, and therefore will be expected to have a positive influence on purchase changes. Presence of children (CHILDREN) and female gender of primary food shopper (GENDER) are expected to have positive influences on probability of heavy purchase changes due to label information. Shoppers with lower education levels (EDUC) are predicted to be less willing to change purchases due to label information. Rural location of the shopper's household (RURAL) is hypothesized to negatively influence probability of heavy purchase changes, because rural shoppers may have fewer alternative products available in their markets. Younger shoppers with full time employment (AGEMP1) are hypothesized to have a lower probability of heavy purchase changes than older shoppers who are employed less than full time. Older shoppers will likely have stronger concerns about diet and will likely have more time to search the market for products based on their nutritional content. Higher household income levels (HINC) are expected to have a positive influence on probability of heavy purchase changes, as these consumers are able to afford a more diverse diet.

Study Survey and Data

The data used in this study are from a consumer mail survey conducted from a random sample of Tennessee residents. A random sample of Tennessee residents was obtained from telephone listings for the state of Tennessee using a CD-ROM database titled "Select Phone"™. Therefore, this sample includes only those residents of Tennessee with a telephone. This survey was designed using a modified Dillman's Total Design Method for mail surveys.[3] The total mail-

[2] The respondents were asked to rate the importance of information about nutrients on a five point scale (1=very important, 2=important, 3=somewhat important, 4=minor importance, 5=not important). Responses for minor importance and not important were grouped with the responses 'somewhat important' due to low responses in those categories. The resulting category is 'somewhat important or less'.

[3] Dillman suggests mailing a reminder postcard approximately one week after the first mailing of the survey. A second mailing of the survey is to be sent about three weeks after the first mailing. Due to cost considerations, follow up mailings were limited to a postcard sent about one week after the initial mailing.

out was 2,417 questionnaires with 456 questionnaires returned as nondeliverable. Of the total that were delivered, 254 consumers returned the questionnaire, giving a response rate of 12.9 percent. The survey included questions about nutrition label usage, nutrition awareness, food shopping habits, and demographics. The surveys were sent on June 25, 1995. A reminder postcard was mailed on July 6, 1995.

The means of the variables used in the model for label readership are presented in Table 2. Approximately 86 percent of the respondents stated that they read nutrition information contained on labels of one or more dairy products they consider purchasing. Product flavor was considered to be an important attribute influencing purchases of dairy products, with about 69 percent of respondents citing flavor as very important. Only 4 percent perceived flavor to be somewhat important or less. Nutrition was perceived as less important, with 51 percent of respondents stating that nutrition was very important. Only 29 percent of respondents considered price as very important in influencing purchases. About 89 percent had used nutrition information from newspaper, magazines, or books, while 59 percent had obtained it from media sources such as television or radio and 44 percent had obtained it from a health professional. Just over 16 percent of the shoppers purchased 10 percent or more new dairy products on a recent shopping trip. The percent of households with children present was 26.8. Over 64 percent of the primary food shoppers were female and 32 percent had education levels of high school graduate or less. About 32 percent of the households were located in rural areas. The sample was comprised of 11.3 percent young full-time employed shoppers, 3.6 percent young shoppers employed less than full time, 36.3 percent middle-aged shoppers employed full time, 16.4 percent middle aged shoppers employed less than full time, 5.9 percent older shoppers who were employed full time, and 26.5 percent older shoppers who were employed less than full time (omitted category, AGEMP6).

The sample means for all respondents show that the respondents are somewhat more urbanized, more educated, and have higher incomes than Tennessee state averages for individuals and households *(Tennessee Statistical Abstract)*. This would suggest the possibility of nonresponse bias. In particular, it is likely that survey recipients with strong interest in nutrition information were more likely to respond to the survey than were recipients with little interest in nutrition information.

The means of the variables for the model of purchase changes are displayed in the lower portion of Table 2. Note the sample only includes label readers. About 48 percent of the label readers in the sample changed greater than 50 percent of their dairy product purchases in the last year due to label information. The label users read labels on approximately 73 percent of the products they considered for purchase. Over 39 percent of the readers purchased one or more types of dairy products on at least a weekly basis. About 68 percent of label readers considered fat and cholesterol information as very important influences on their purchase decision (omitted category, FATCH1), while 23 percent considered it as important. Less than 10 percent considered the information as somewhat important or less. Information about calcium and vitamin D were considered very important (omitted category, CALD1) by only 20.8 percent of the label readers, but was considered important by 34 percent of label readers. Just under 18 percent of the label readers purchased greater than 10 percent new dairy products on a recent shopping trip (NEWP). Of the label readers, 35.4 percent had children present in the household, 68.4 percent were female, and 29.2 lived in a rural area. The average of household income categories was 4.31 (4=$35,000-$49,999, 5=$45,000-$59,999). The sample was comprised of 12.3 percent young, full-time employed, 4.6 percent young, employed less than full time, 39.2 percent middle-age and employed full time, 18.5 percent middle-aged and employed less than full time, 4.6 percent older and employed full time, and 20.8 percent older and employed less than full time (omitted category, AGEMP6).

Empirical Results

The estimated results for probability of label readership are presented in Table 3 and the estimated results for probability of purchase changes

are presented in Table 4. Both probabilities were assumed to follow normal distributions, therefore the probit method was used in estimating each of the models.

Table 2. Variable Means for Label Readership and Purchase Changes.

Variable	Means
Label Readership (N=220):	
LABELS	0.86
FL2	0.27
FL3	0.04
PR2	0.38
PR3	0.33
NU2	0.32
NU3	0.17
NEWSPAPER	0.89
MEDIA	0.59
HEALTH	0.44
NEWP	0.16
CHILDREN	0.27
GENDER	0.64
RURAL	0.32
EDUC	0.32
AGEMP1	0.11
AGEMP2	0.04
AGEMP3	0.37
AGEMP4	0.16
AGEMP5	0.06
Purchase Changes Among Label Users (N=130):	
PURCH	0.48
PLABEL	72.65
DFREQ	0.39
FATCH2	0.23
FATCH3	0.09
CALD2	0.34
CALD3	0.45
NEWP	0.18
CHILDREN	0.35
GENDER	0.68
RURAL	0.29
EDUC	0.30
AGEMP1	0.12
AGEMP2	0.05
AGEMP3	0.39
AGEMP4	0.18
AGEMP5	0.05
HINC	4.31

Table 3. Estimated Model for Probability of Nutrition Label Readership.

Variable	Estimated Coefficient[a,b]
CONSTANT	0.21320
	(0.5441)
FL2	0.81334**
	(0.3787)
FL3	0.19104
	(0.7197)
PR2	0.44233
	(0.4217)
PR3	0.09395
	(0.3791)
NU2	-0.76979**
	(0.3519)
NU3	-1.1021***
	(0.3885)
NEWSPAPER	1.3782***
	(0.4072)
MEDIA	-0.26108
	(0.3072)
HEALTH	0.50510
	(0.3131)
NEWP	0.16049
	(0.4105)
CHILDREN	0.87437**
	(0.4021)
GENDER	0.60634**
	(0.2962)
RURAL	-0.80010***
	(0.3052)
EDUC.	-0.06207
	(0.3010)
AGEMP1	-0.73732*
	(0.4475)
AGEMP2	-0.76297
	(1.002)
AGEMP3	-0.60437*
	(0.3636)
AGEMP4	0.25674
	(0.6494)
AGEMP5	-0.15628
	(0.6796)
Log Likelihood -57.9819	-57.1845
Chi-Square for Likelihood Ratio Test (19 df)	64.5394***
Percent correct Predictions	88.6

[a] *** indicates significance at .01.
** indicates significance at .05.
* indicates significance at .10.
[b] Values in parentheses are the standard errors.

As shown in Table 3, a likelihood ratio test indicated the estimated probit model of label

readership was significant at a probability level of .01. The model correctly predicted 195 out of 220 responses regarding label readership, or 88.6 percent correct predictions.

Shoppers' attitudes about importance of product characteristics influenced label readership. Compared with respondents who perceived product flavor as very important, citing flavor as important had a positive effect on probability of readership. Importance of price did not significantly affect label readership. However, lower level of importance of nutrition had a negative effect on probability of label readership. Compared with respondents who perceived nutrition as very important, citing nutrition as important or somewhat important or less lowered the probability of readership. Use of nutrition information from newspaper, books, or magazines had a positive influence on probability of label readership. However, use of information from television or radio and from health professionals did not have significant impacts on label readership. Unlike findings from studies by Russell and The Roper Organization, use of new dairy products did not significantly affect readership.

Several demographic characteristics of shoppers significantly impacted probability of label readership. Presence of children and female gender of food shopper positively influenced probability of label readership. The positive influence of female gender concurs with results from studies by Russell; Bender and Derby; and The Roper Organization. Rural location of the household had a negative influence on probability of label readership compared with urban households. Young and middle-aged food shoppers who were employed full time were less likely to read labels than were older shoppers who were not employed full time. A study by The Roper Organization also found that consumers over 55 were most influenced by label information. Although past studies (Wang, Carley, and Fletcher; Bender and Derby; The Roper Organization) have found a positive influence of education level, the results from this study showed that education level did not significantly influence label readership.

A likelihood ratio test showed the probit model of heavy purchase changes was significant at a probability level of .01 (Table 4). The model correctly predicted 99 out of 130 responses regarding purchase changes, or 76.1 percent correct predictions.

Table 4. Estimated Model for Probability of Heavy Purchase Changes.

Variable	Estimated Coefficient[a,b]
CONSTANT	-1.7905**
	(0.6991)
PLABELS	0.02252**
	(0.0050)
DFREQ	-0.59235**
	(0.2913)
FATCH2	0.19534
	(0.3295)
FATCH3	-0.51391
	(0.5121)
CALD2	-0.90071**
	(0.3801)
CALD3	-0.59664
	(0.3848)
NEWP	0.45412
	(0.3594)
CHILDREN	0.11598
	(0.3214)
GENDER	0.55616*
	(0.2997)
RURAL	0.89256***
	(0.3051)
EDUC	-0.00223
	(0.3098)
AGEMP1	-0.02590
	(0.5003)
AGEMP2	-0.69576
	(0.8670)
AGEMP3	-0.10626
	(0.4061)
AGEMP4	-0.11043
	(0.4809)
AGEMP5	0.67910
	(0.6461)
HINC	-0.01056
	(0.0992)
Log Likelihood	-67.3356
Chi-Square for Likelihood Ratio Test (17 df)	45.2700***
Percent Correct Predictions	76.1

[a] *** indicates significance at .01.
** indicates significance at .05.
* indicates significance at .10.
[b] Values in parentheses are the standard errors.

Increases in percent of dairy food products for which shoppers read labels had a positive

influence on probability of purchase changes. Shoppers with frequent purchases of several types of dairy products were less likely to change a large proportion of their purchases due to label information than less frequent purchasers. Importance of fat and cholesterol information on purchase decisions did not have a significant influence on probability of heavy purchase changes. However, compared with perceptions that calcium and vitamin D are very important, citing these nutrients as important or somewhat important or less had negative effects on probability of heavy purchase changes. The results are similar to findings from a study by Jensen and Kesevan that suggested a positive link between consumers' awareness of calcium and consumption of dairy products. Of the demographic characteristics, only rural location of household significantly influenced probability of purchase changes. Rural shoppers were more likely to change purchases as a result of nutrition label information than were urban shoppers. Neither income or age/employment status, presence of children, gender, or education levels significantly impacted probability of purchase changes.

Conclusions

The results from this study indicate tradeoffs between importance of flavor versus nutrition impacting label readership. The results also indicate that printed materials in newspapers, magazines, or books, are the more effective means of encouraging label readership that are information from health professionals or television and radio information sources. Female shoppers with children in the household are more likely to read nutrition labels on dairy products than male shoppers. However, the fact that young and middle-aged shoppers who were employed full time were less likely to read labels than older shoppers employed less than full time suggests that shopping time constraints and search costs of obtaining nutrition information may be considered higher by these shoppers.

Concerns about calcium and vitamin D information appear to be influential for changing purchase patterns. Concerns about fat and cholesterol did not significantly impact probability of purchase changes. However, with wide availability of low fat and reduced fat dairy products on the market, many nutritionally concerned consumers may already have made adjustments in their purchases on the basis of fat and cholesterol. While shoppers from rural households were less likely to read label information, among those who read the information, these households were more likely to alter their purchases than urban households. While income levels did not significantly affect probability of purchase changes, past studies have found mixed results regarding the relationship between nutrition attitudes and income.

Results from the model of purchase changes show that more frequent readership of the label information does positively affect purchase changes. Furthermore, results from the model of label readership indicate that use of alternative sources of nutrition information can strongly influence label readership. These results would suggest that information programs through printed media to encourage label readership could have significant impact on readership and on purchase patterns for dairy products.

These results suggest that nutrition information in food labels can serve as a important marketing tool for the dairy industry. Encouraging shoppers to read label information can influence changes in dairy products purchases. The results also indicate that nutrition information in printed materials in newspaper, magazines, or books are effective means for the dairy industry to encourage label readership. Because time constraints for younger full-time employed shoppers may limit label use, nutrition information in labels should be accessible and able to be read quickly.

It is important to note that this study examined perceptions by shoppers about label readership and purchase changes. Further research regarding impacts of the new labeling should extend this research to examine actual changes in purchase patterns.

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