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The Impact of Consumer Motivations and Sources of Information on Unpasteurized Milk Consumption in Vermont, 2013

ABSTRACT

In 2009, legislation in the state of Vermont allowed for on-farm sales of raw milk. Despite this recent change, little is known about the prevalence of raw milk sales in the state or the motivations and information that guide consumers' decisions regarding raw milk. This study describes the prevalence of raw milk consumption in Vermont, develops a profile of the raw milk consumer, documents the motivations of raw milk consumers, and identifies sources and channels of information. The results of a general population telephone survey indicate that 11.6% of those surveyed reported consuming raw milk and are on average educated, middle-aged, and middle-income earners in small households. U.S. Census data indicate no demographic differences between raw milk consumers and the average Vermonter. Motivations for consumption include preference for raw milk's flavor, believed health benefits, and knowing or being a farmer. The primary sources of information are dairy farmers, friends, family, and co-workers. The primary channel through which information is obtained is person-to-person discussions.

INTRODUCTION

Raw milk is any unpasteurized milk. Typically, cow or goat milk is consumed in raw form by non-infant humans. In recent years, it has entered the food and health discourse of some consumers because of claims of health benefits and superior flavor over store-bought milk. With this increased interest among consumers in the purchase of raw milk, lawmakers have begun to revisit existing legislation on the legality and restrictions related to its sale *(13)*.

Laws limiting the sale of raw milk were developed in the mid-twentieth century in response to public health risks originating from raw milk in large cities *(1, 10)*. Diseases such as bovine tuberculosis, salmonellosis, and brucellosis were linked to the consumption of unpasteurized milk in cities such as New York and Boston. These metropolitan areas led the nationwide approach to mandatory pasteurization. To address concerns regarding pathogens and other bacteria in milk, the Pasteurized Milk Ordinance required that milk for human consumption be pasteurized *(4)*. By the 1950s, most states in the nation required milk for sale to be pasteurized *(10)*. Following the 1986 Supreme Court case Public Citizen

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et al. v Margaret Heckler *(7)* and subsequent legislation from the FDA, the interstate sale of raw milk was prohibited, and intrastate sales are regulated by the individual states.

Today, state laws vary greatly, with some states allowing for raw milk's restricted sale and others prohibiting sales entirely. Although raw milk can be sold on-farm in 28 states, only a few states allow for its sale in stores *(2)*. In several states, including Michigan, Indiana, and Ohio, the sale of raw milk is illegal unless one owns the animals producing the milk. This has led to a rise in "cow-share" programs, wherein interested consumers purchase a "share" of a cow and as a result have access to the milk she produces *(4)*. Prior to 2009, the sale of raw milk in Vermont was prohibited. Today, only pasteurized milk can be purchased from traditional retail outlets such as grocery stores and convenience stores; unpasteurized raw milk must be purchased from local farmers and dairies *(12)*. The sale or barter of raw milk is allowed only on farms and through direct-to-consumer delivery and must not exceed specified volume restrictions (50 quarts and 160 quarts sales per day, respectively) *(12)*. Vermont law also requires that consumers be informed at the point of sale of the risks of consuming raw milk. Raw milk must be sold in containers filled and capped by hand or by mechanical means, and producers must have their milk tested twice per month by an accredited FDA laboratory *(12)*.

A previous study of raw milk consumption reported that 3.2% of the general population indicated consuming raw milk in the previous year *(3)*. Although no objective third party has quantified sales of raw milk since Vermont changed recently, local agricultural advocacy groups have indicated anecdotally that the sale of raw milk in Vermont has increased *(9)*. Research has identified consumer motivations for raw milk consumption *(4)*, such as having food in its "pure" form, nutrition and/or health benefits, community development, farmer support and supporting one's local food economy, or superior flavor. For those who consumed raw milk for health reasons, claims included benefits to the nervous, immune and digestive systems as a result of beneficial bacteria, enzymes and minerals that remain present as a result of avoiding pasteurization *(4)*.

In an effort to understand and mitigate this increase in raw milk consumption, the Centers for Disease Control (CDC) conducted a 13-year study between 1993 and 2006 on the risks of raw milk and the potential public health hazard related to unpasteurized milk products *(5)*. They found 121 health-related outbreaks linked with unpasteurized milk products in this time, affecting 1,571 people. Outbreaks were more numerous in states that had legalized the sale of raw milk. They also concluded that warning labels at the point of sale, though prevalent in states that allow the sale of raw milk, are not effective at reducing the sale of raw milk. Rather, the CDC concluded, efforts are necessary to promote research into the effectiveness and development of innovative methods to disseminate this information.

According to Rogers' Diffusion Theory *(8)*, consumer attitudes are shaped by both personal experience and information exchanged via mass media and within social networks. In order to more effectively promulgate public health concerns regarding raw milk, as called for by the CDC, the sources and channels of information related to one's decision to purchase and consume raw milk must be better understood. Research related to consumer trends and motivations around raw milk is scanty, with only two major studies addressing these areas *(3, 4)*, neither of which explored consumers' raw milk consumption patterns in relation to sources and channels of information.

This study seeks to build on previous research by exploring prevalence of consumption, motivations for raw milk consumption, and information sources and channels by asking the following research questions:

RQ1: How prevalent is raw milk purchasing in a state where raw milk can be sold on farm?

RQ2: What is the demographic profile of raw milk consumers in the state of Vermont?

RQ3: What are the motivations that drive consumer decisions to purchase or not purchase raw milk?

RQ4: What are raw milk drinkers' primary source and primary channel of information about purchasing raw milk?

MATERIALS AND METHODS

The data of this study were collected by the Center for Rural Studies at the University of Vermont through the annual Vermonter Poll. The research design and methods were reviewed and approved by the institutional review board. A random sample was drawn from a list of Vermont telephone numbers, which is actively updated and which includes both listed and unlisted telephone numbers. Cellular phone numbers were not included in the sampling frame. The survey was conducted between the hours of 9:00 a.m. and 9:00 p.m., beginning on May 1, 2013 and ending on May 17, 2013.

Telephone interviews for this survey were conducted through use of computer-aided telephone interviews. Only Vermont residents over the age of eighteen were interviewed. In total, 2,528 households were successfully contacted, yielding 776 complete responses; therefore, 30.7 percent of these calls resulted in a completed survey; the remaining 69.3% either refused to take the survey, were not reached after multiple attempts, or were not qualified (either under the age of 18 or not a Vermont resident.) Unlike previous research that provided questionnaires only to raw milk producers and consumers *(3)*, this study involved a representative sample of the adult population of the state of Vermont. The population of Vermont is older, whiter and

more rural than many other states. The results have a margin of error of plus or minus 4 percent, with a confidence interval of 95 percent.

Survey questions were multiple choice, open-ended, or open-ended with coded responses *(Appendix 1)*. Open-ended responses were analyzed and coded into categories, using inductive analysis *(6)*. Two researchers coded responses to achieve response quality assurance. Responses were analyzed using SPSS Statistics 20. To build the demographic profile, positive responses regarding raw milk consumption were analyzed in relation to five demographic categories: age, income, education level, household size and rurality. To determine statistical significance, a Pearson's Chi-square test of significance was performed.

RESULTS

Consumer profile

The first research question sought to quantify the prevalence of raw milk purchase in Vermont. Ninety respondents (11.6%) of the total 776 surveyed indicated purchasing or otherwise obtaining raw milk in the past year *(Table 1)*.

Raw milk consumers were questioned about the volume of unpasteurized milk obtained in the previous month *(Table 1)*. The largest number of individuals indicated having obtained no raw milk (33.3%). Of those who did obtain raw milk, many indicated that in the previous month they had obtained 5 gallons or more (16.1%), 1 gallon (13.8%), 3–4 gallons (11.5%), or less than .5 gallon (11.5%). Only 5.7% obtained 2 gallons of unpasteurized milk in the previous month; 3.4% obtained 0.5 gallons, and 4.6% did not know how much they had obtained.

The second research question sought to develop an understanding of the demographic values that influenced one's purchase or obtainment of raw milk *(Table 2)*. The median age of respondents in the general sample was 59 years. Most individuals who indicated raw milk consumption were between the ages of 40 to 69 years. No responses were found for those under the age of 20 or over the age of 90. There was no statistically significant difference between the ages of those who do and do not consume raw milk *(Table 3)*.

The median annual income of raw milk drinkers was between $50,000 and $75,000 *(Table 2)*. A majority of respondents (32.9%) with an annual income of between $25,000 and $50,000 indicated consuming raw milk. All three groups earning between $50,000 and $100,000 plus indicated 17.1 percent, while only 15.9% of those who

TABLE 1. Frequency and volume of raw milk consumption in Vermont, 2013

	Frequency	Percent
Obtained unpasteurized milk in previous year (n = 776)		
Yes	90	11.6
No	686	88.3
Volume purchased in previous month, of those who obtained raw milk in the past year (n = 87)		
None	29	33.3
Less than .5 gallon	10	11.5
.5 gallon	3	3.4
1 gallon	12	13.8
2 gallons	5	5.7
3–4 gallons	10	11.5
5 gallons or more	14	16.1
Don't know	4	4.6

TABLE 2. Raw milk consumer profile (note: data may be skewed since they were only contacting people with land lines)

	Frequency	Percent
Age (n = 84)		
18–19	0	0
20–29	6	7.1
30–39	7	8.3
40–49	20	23.8
50–59	21	25.0
60–69	21	25.0
70–79	8	9.5
80–89	1	1.2
90+	0	0
Annual income (n = 82)		
$0–25,000	13	15.9
$25–50,000	27	32.9
$50–75,000	14	17.1
$75–100,000	14	17.1
$100,000 or greater	14	17.1
Highest level of education completed (n = 86)		
<9th grade	0	0.0
9–12th grade (no diploma)	0	0.0
High school graduate (including GED)	15	17.4
Some college (no degree)	12	14.0
Associates/technical degree	10	11.6
Bachelor's degree	21	24.4
Post-graduate/professional development	28	32.6

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TABLE 2. Raw milk consumer profile (note: data may be skewed since they were only contacting people with land lines) (continued)

Household size (n = 87)		
1 person	13	14.9
2 people	31	35.6
3 people	13	14.9
4 people	21	24.1
5–7 people	8	9.2
8–10 people	0	0.0
11+ People	1	1.1
Rurality (n = 87)		
Rural	68	78.2
Urban	8	9.2
Suburban	11	12.6

earned $25,000 or less per year reported consuming raw milk. There were no statistically significant differences among respondents reporting different income categories *(Table 3)*.

Nearly thirty-three percent of respondents who consumed raw milk indicated having earned a post-graduate degree. The next greatest response of raw milk consumption was from those with bachelor's degrees (24.4%), followed by high school graduates, including those with GEDs (17.4%). Statistically, however, there was no correlation between raw milk consumption and education level *(Table 3)*.

The median household size was 2 people. Of raw milk consumers, 35.6% indicated having 2 persons in their house, followed by 24.1% indicating 4 people and 14.9% for both 1 person and 3 person households; 9.2% of raw milk consumers reported living in households of 5–7 people, and 1.1% households of 11 or more people. No one reported living in a household of 8–10 people. Statistically, household size does not appear to play a significant role in one's decision to consume raw milk *(Table 3)*.

The only statistically significant demographic variable related to one's decision to obtain raw milk was their living environment *(Table 3)*. Of those who indicated consuming raw milk, 78 percent lived in a rural setting, 13 percent in an urban environment, and 9 percent in a suburban environment.

Motivations

The third research question sought to understand the motivations of consumers to purchase raw milk *(Table 4)*.

Among those individuals who obtained raw milk (N = 90) in the past year, most consumers reported doing so because they liked its flavor (21.8%) *(Table 4)*. Other reasons for drinking raw milk included a belief in health benefits of raw milk (20.7%) and that they know (17.2%), or are themselves (11.5%), a farmer. Other motivations included secondary uses for raw milk, such as cheese or yogurt production (5.7%), cost (3.4%), and consuming raw milk while they were growing up (2.3%). Finally, some consumers reported obtaining raw milk because it helps local farmers, because they provide it for their animals, or because they received it as a gift (1% each).

Among those who had not obtained raw milk in the past year (n = 687), the most common open-ended responses related to not consuming raw milk included availability (26.7%), not consuming milk (17.4%), and safety concerns (11.9%) *(Table 4)*. Other responses included accessibility (7.4%), health concerns (7.1%), non-interest (6.8%), dislikes the flavor (6.6%), lactose intolerance (4.9%), cost (1%) and doesn't know about it (.4%).

Sources of information

The final research question sought to identify the primary sources and channels of information on raw milk to Vermont consumers *(Table 5)*. Respondents who had purchased or otherwise obtained raw milk in the past year indicated that their primary sources of information about raw milk were the dairy farmers or producers themselves (38.9%), followed by friends, family or co-workers (25.6%), and other sources

TABLE 3. Chi² test of significance of demographic characteristics and raw milk consumption overall

Age (*P* = .080)

	18–39	40–49	50–59	60–69	70+	Overall
	(n = 93)	(n = 106)	(n = 187)	(n = 210)	(n = 152)	(n = 748)
Consumed raw milk	14.0%*	18.9%*	11.2%*	10.0%*	5.9%*	11.2%
Did not consume raw milk	86.0%	81.1%	88.8%	89.5%	94.1%	88.7%

Income (*P* = .460)

	$0–25,000	$25–50,000	$50–75,000	$75–100,000	$100,000+	Overall
	(n = 121)	(n = 173)	(n = 131)	(n = 110)	(n = 142)	(n = 677)
Consumed raw milk	10.7%	15.6%	10.7%	12.7%	9.9%	12.1%
Did not consume raw milk	88.4%	84.4%	89.3%	87.3%	90.1%	87.7%

Household size (*P* = .159)

	1 Person	2 People	3 People	4 People	5+ People	Overall
	(n = 159)	(n = 320)	(n = 102)	(n = 122)	(n = 55)	(n = 758)
Consumed raw milk	8.2%	9.7%	12.7%	17.2%	16.4%	11.5%
Did not consume raw milk	91.2%	90.3%	87.3%	82.8%	83.6%	88.4%

Rurality (*P* = .001)

	Rural	Suburban	Urban			Overall
	(n = 468)	(n = 181)	(n = 100)			(n = 749)
Consumed raw milk	14.5%**	4.4%**	11.0%**			11.6%
Did not consume raw milk	85.5%	95.6%	88.0%			88.3%

Education (*P* = .413)

	Did not complete high school (n = 27)	High school diploma (n = 272)	Associate's Degree (n = 77)	Bachelor's Degree or higher (n = 381)		Overall (n = 757)
Consumed raw milk	0.0%	9.9%	13.0%	12.9%		11.4%
Did not consume raw milk	100.0%	90.1%	87.0%	86.8%		88.5%

P < .1 =*
P < .01 =**

TABLE 4. Motivations for purchasing raw milk

Reasons for obtaining raw milk (n = 90)	Frequency	Percent
Flavor (like it)	19	21.8
Health benefits	18	20.7
Knows farmer	15	17.2
Is farmer	10	11.5
Misc.	9	10.3
Secondary use (cheese, yogurt, etc.)	5	5.7
Cost	3	3.4
Don't know	3	3.4
Grew up on it	2	2.3
Helps local farmers	1	1.1
Gift	1	1.1
For animals	1	1.1
Reasons for not obtaining raw milk (n = 687)		
Availability	181	26.7
Doesn't drink milk	118	17.4
Safety concerns	81	11.9
Don't know	58	8.6
Access	50	7.4
Health concerns	48	7.1
No interest	46	6.8
Dislikes	45	6.6
Lactose intolerance	33	4.9
Cost	7	1.0
Refused response	7	1.0
Doesn't know about it	3	.4
Miscellaneous	1	.1

TABLE 5. Sources and channels of information

	Frequency	Percent
Primary source of information (n = 89)		
Dairy farmers or producers	35	39.3
Family, friends or co-workers	23	25.8
Other	22	24.7
Don't know	7	7.9
Doctors or medical professionals	2	2.2
Primary channel of information (n = 89)		
Individual person-to-person discussions	45	50.6
Online resources	18	20.2
Printed resources	13	14.6
Other	6	6.7
Don't know	3	3.4
Lecture or conference presentations	2	2.2
Broadcast resources	2	2.2

(24.4%). Only 2.2% of consumers reported doctors or other health professionals to be their primary source of information.

The primary channels through which individuals receive raw milk information were person-to-person discussions (50%). Online resources (20%) and printed resources (14.4%) were the next frequently referenced channels. Only 2.2% reported receiving information via lectures or conference presentations or broadcast resources.

DISCUSSION

The average consumer of raw milk lives in a household of 2–3 people and earns between $50,000 and $75,000 per year. They are highly educated, with at least a bachelor's degree, and are middle-aged.

What makes this assessment interesting is that raw milk purchasers are not significantly different from the general population in terms of demographic characteristics. At least one-third of Vermont's population has a bachelor's degree or higher *(11)*, the average household has 2.34 people *(11)*, the median household income is $53,000 *(11)*, and the median age is 41.5 years *(11)*. The profile of raw milk consumers is also that of the average individual in the state of Vermont.

What is most significant in our findings is the suggestion of an increase in raw milk consumption from frequencies reported in prior research. However, it should be noted that the previous research was conducted only in California, a state which may not be directly comparable to Vermont. Headrick et al. *(3)* reported that in a general population study in California, only 3.2% of the public consumed raw milk. Respondents in our study indicated consumption rates at nearly four times this rate. As shown in *Table 1*, 11.6% of the Vermont population has consumed raw milk in the

previous year. However, it should be noted that an apparent increase in the percentage of consumers purchasing raw milk is based on a comparison of California in 1997 to Vermont in 2013. In addition to the passage of time, differences in raw milk polices and safety trends within these states, then and now, have influenced these frequencies. For example, in Vermont the policy focuses on providing on-farm sales, including requiring the seller to keep detailed records of consumers and providing signage concerning the risks of raw milk consumption; in California, the Milk and Milk Products Act of 1947 requires that milk be tested for pathogens, but allows for the sale of raw milk in retail outlets. These policy differences may have impacts on consumer behaviors. The Vermont population is not reflective of the U.S. population overall, and therefore future research should quantify the prevalence of raw milk consumption in the U.S. more generally and explore the influence of raw milk policy on food protection trends.

This study is also valuable in that it identified raw milk consumers' primary source and channel of information. This information is important because it reveals potential avenues to disseminate public health and safety messages about raw milk. Most respondents in our study receive their information within social networks using individual-to-individual discussions. Despite efforts to educate the public on potential health risks related to raw milk, many individuals who consume raw milk are not consulting medical professionals or public health organizations for their primary information on unpasteurized milk. This finding parallels the assumptions of Diffusion Theory *(8)*, which suggests that information is disseminated more frequently and with greater influence within homophilous, interpersonal relationships than via mass communication channels. In short, homophily, similarity among individuals, increases the frequency of interaction and communication.

In response to the CDC's call for further research on methods of disseminating health information regarding raw milk more effectively *(5)*, our findings suggest that efforts to disseminate information on raw milk would be more successful if interpersonal channels were included in addition to point-of-sale signage and the CDC Web site. Specifically, our research indicates that the raw milk producers should be involved. As unpasteurized milk cannot be sold in stores in Vermont, information concerning the associated health risks must be provided by the farmers at the point of sale. In addition to basic signage, farmers could be encouraged to discuss health and safety issues with raw milk consumers. Agricultural extension and public health workers could provide training for producers on how to talk to consumers about raw milk and food safety issues.

It would be valuable for future research to test the effectiveness of diffusing food safety messages related to raw milk using social networks versus traditional media. Scholars might ask, what messages are exchanged in informal discussions between consumers and farmers? What variables do consumers use to evaluate the information exchanged in these conversations? and How do consumers make sense of divergent recommendations regarding raw milk?

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Appendix 1

Raw Milk Survey Questions

Question 1) Raw milk is milk that has not been pasteurized and cannot be sold in stores. In the past year, did you or a member of your household purchase or obtain raw milk?

Question 2) Why did you or a member of your household purchase or obtain raw milk?

Question 3) Why didn't you or a member of your household purchase or obtain raw milk?

Question 4) In the past month, how much raw milk did you or a member of your household purchase or obtain?

Question 5) What's been your (or a household member's) primary source of information about raw milk?

a. Dairy farmers or producers;
b. Family, friends or co-workers;
c. Doctors or medical professionals;
d. Government officials (e.g., Health Department, Center of Disease Control);
e. Other (Specify);
f. Don't know;
g. Refused.

Question 6) What's been your (or a household member's) primary channel of information about raw milk?

a. Individual, person-to-person discussion;
b. Lecture or conference presentations;
c. Online resources, such as blogs, websites or emailed newsletters;
d. Printed resources, such as books or newspapers;
e. Broadcast resources, such as television or radio;
f. Other (Specify);
g. Don't know;
h. Refused.

In Memory

Lloyd Luedecke

We extend our deepest sympathy to the family of Lloyd Luedecke who recently passed away. Mr. Luedecke was a member of the Association since 1962. IAFP will always have sincere gratitude for his contribution to the Association and the profession.