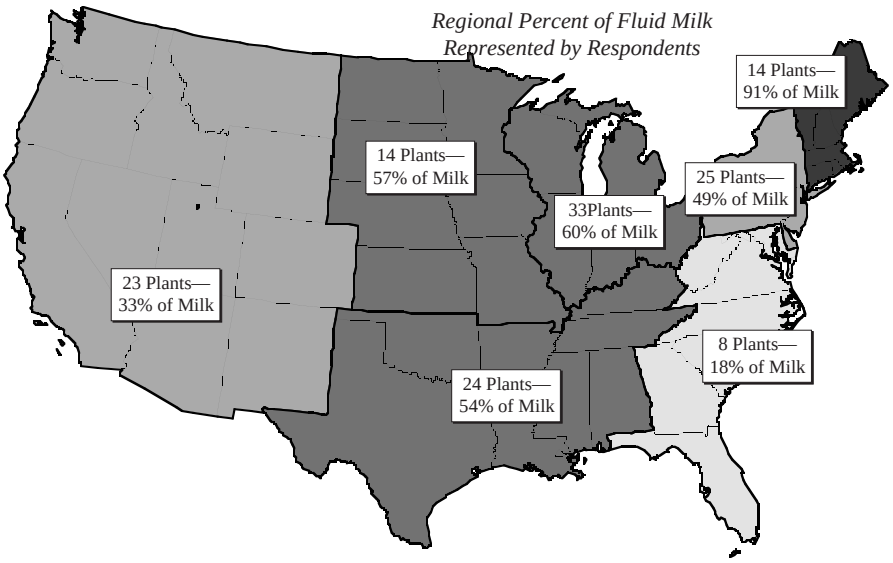
May 1996 R.B. 96-05

The Magnitude of and Factors Influencing Product Losses in 141 Fluid Milk Plants in the United States



by
Mark W. Stephenson, Richard D. Aplin, Eric M. Erba, and Jay M. Mattison

A Publication of the
Cornell Program on Dairy Markets and Policy

Department of Agricultural, Resource and Managerial Economics
Cornell University Agricultural Experiment Station
College of Agricultural and Life Sciences
Cornell University, Ithaca, New York 14853–7801

Preface

Mark W. Stephenson is a Senior Extension Associate, Richard D. Aplin is a Professor, Eric M. Erba is a PhD candidate, and Jay Mattison was a Research Support Specialist in the Department of Agricultural, Resource and Managerial Economics at Cornell University.

Acknowledgements

We are particularly grateful to the management personnel of the dairy companies who participated in the survey by supplying information on their firm's fluid milk and cream losses.

We also wish to thank the Market Administrators for a number of Federal Milk Marketing Orders, as well as the Administrator for the Western New York State marketing order and other individuals who helped by providing mailing lists of fluid milk processing and distribution plants in their markets.

Helpful comments were provided by Andrew Novakovic and Dave Barbano in the construction of the survey and review of the report. Rod Hawkes also provided useful suggestions to improve the report.

Finally, we also thank Tetra Pak, Inc. which generously provided funding for this research.

Additional copies of this publication can be requested from:

Wendy Barrett
Program on Dairy Markets and Policy
Cornell University
Warren Hall
Ithaca, NY 14853–7801

Report Summary

Conservatively estimated, the data from this survey represents 46 percent of the fluid milk in the United States. Using four categories of loss, the calculated average total shrink from farm to consumer is about 2 percent of volume. This translates to more than one billion pounds of milk on a annual basis for the United States from fluid plants alone. In 1993, it is estimated that $186 million were lost to total shrink from farm to retail in the beverage milk industry. This is equal to 1.6 percent of sales and equivalent to the median return over sales for fluid milk plants in that year.[1] Plant shrink and package milk returns are the largest categories of this loss and are about twice the volume of farm–to–plant shrink and stolen milk.

Among the factors considered, plant size and geographic location are often significant. Larger plants tend to have lower total shrink, farm–to–plant loss, package returns and stolen product on a percentage basis. Geographically, the important contrasts are north to south as opposed to east to west. Plants in the north tend to have less total loss and substantially lower package milk returns.

A primary focus of this study is package milk returns. The judgment of the respondents is that "out of date" products and "leakers" are the most common reasons for returns. Average shelf–life dating is about 14 days for HTST products in our sample. The majority of respondents indicate that an additional 5 days of shelf life would be very valuable although nearly 25 percent show that they have no desire to increase shelf–life dating. For cream products, "out of date" returns may be linked to plants located south of the 40th parallel and cooler automation. That is, low volume products tend to become lost in low technology coolers.

Survey participants rated dairy case management and customer receiving and storage facilities as being very important factors in explaining returned product. Related to the plant, packaging machine operators, the packaging equipment itself and packaging material were also important. With regard to product delivery, route person performance and vehicle refrigeration were ranked as the most likely causes of returned products.

From a list of items that may contribute to higher returns, respondents indicated that warmer weather was a problem regardless of geographic location. Smaller customers, specifically convenience and "Mom n' Pop" stores, were also cited as resulting in higher returns. Survey participants who rated smaller customers as a factor were consistent by also naming infrequent delivery as a reason for returns.

---

[1]*Milk Facts*, Milk Industry Foundation, 1995, from Dun & Bradstreet, Industry Norms and Key Business Ratios, 1989-1994.

The Magnitude of and Factors Influencing Product Losses in 141 Fluid Milk Plants in the United States

by Mark W. Stephenson, Richard D. Aplin, Eric M. Erba, and Jay M. Mattison

Background Information

In 1994, fluid milk sales had a value of more than $17 billion at the wholesale level.[1] In that same year, the total volume of packaged fluid milk and cream exceeded 55 billion pounds and accounted for more than 39 percent of the commercial disappearance of milk in the United States.[2] By value per hundredweight (cwt) and by total proportion of raw milk use, fluid milk represents the largest portion of income per cwt to dairy farmers nationally.

Raw milk enters a closed system in which milk is transfered from bulk tanks on farms to milk trucks and eventually to receiving tanks at fluid milk processing plants. After pasturization, the product is packaged and distributed to retail outlets. At any point after production, milk may be "lost." That is, less milk arrives at retail outlets than the volume picked up from the farm. In particular the losses, or shrink, that result between milk plants and the consumer is a major concern to the dairy industry. Limited data are available on product losses. In this vein, and with industry support, the Cornell Program on Dairy Markets and Policy group conducted a survey to determine the scope and magnitude of fluid milk and cream returns.

Objectives

The research reported herein is part of a study of the fluid milk processing and distribution industry. The overall project has three major objectives:

1. To analyze the magnitude and causes of beverage milk and cream returns.
2. To estimate the costs of processing and distribution of fluid milk products, and to determine the factors that cause these costs to vary.
3. To review the present structure of the fluid milk sector and ascertain current marketing practices.

This report addresses the *first objective* and deals specifically with the magnitude of fluid milk and cream losses—shrinkage and route returns—as well as the factors causing differences between plants in the study. Work on the other two objectives is underway.

Methodology

A survey instrument was developed to determine the magnitude of fluid milk and cream losses including route returns of packaged milk. The survey also sought plant managers' judgments as to factors or conditions contributing to packaged fluid product returns. A copy of the survey instrument is presented in the Appendix along with a summary of percent response by category. The survey questions

---

[1] *Milk Facts.* Milk Industry Foundation, 1995, from U.S. Department of Commerce data.

[2] Dairy Market Statistics, 1992 Annual Summary, USDA.

were divided into sections requesting data on processing volume, shrink, shelf–life dating, reasons for returns, and factors and conditions affecting returns.

Geographic regions were selected for participation in the survey according to population centers and discussions with industry contacts and Federal and State Milk Market Administrators. The selected regions included as many of the significant fluid milk consumption areas as possible. A mailing list of fluid milk processing and distribution plants was developed with assistance from Federal Milk Market Administrators. State order plants from western New York and California were included in the sample. In addition, several multi–plant dairy processors were solicited for information. Corporate management obtained surveys and requested participation from their plants regardless of the geographic region or federal milk order.

The survey instrument was mailed to 282 plant contacts in February 1994. Each plant received a cover letter of introduction regarding the study and two survey forms, in the event that the company had more than one fluid milk processing plant. The initial mailing resulted in 98 responses.

In March 1994, a second mailing was made to the initial non–respondents. A cover letter and one survey form were sent. The follow–up mailing resulted in 45 additional responses. The multi–plant dairy operations returned a total of 41 surveys. In total, 148 responses were received by the end of the survey period with 141 usable responses after the initial edits. The 50% response is very satisfactory for a survey of this type. It is estimated that the participating plants represent approximately 46 percent of the fluid milk and cream processed in the United States

Results

Location and Size of Plants in the Survey

Figure 1 illustrates the number of plants and the percent of the total fluid milk volume that they represent by region. The geographic dispersion of responses confirms that major population centers and regional cross–sections of the country are represented in the study.

Plants were asked to identify their monthly volume based on the following six categories:

a. less than 5 million pounds
b. 5 to 9.9 million pounds
c. 10 to 14.9 million pounds
d. 15 to 19.9 million pounds
e. 20 to 30 million pounds
f. more than 30 million pounds

Using conservative mid–point estimates of the volumes reported in the survey, (i.e. 2.5 million for less than 5 million, 7.5 million for 5 to 9.99 million…and 30 million for greater than 30 million), approximately 2.1 billion pounds of fluid milk and cream per month are processed by the survey respondents. In 1993, a total of 54.9 billion pounds of fluid milk and cream, or about 4.6 billion pounds per month, was processed in the United States. Thus, the plants participating in the survey represent an estimated 46 percent of the fluid milk processed in the United States.

The percent of responses in each volume category is shown in Figure 2, and the distribution of responses weighted by the estimated volume is presented in Figure 3. Participation of plants of various sizes appears to be fairly balanced and representative.

Figure 1. Regional Number of Survey Plants and Percent of Fluid Milk Represented.

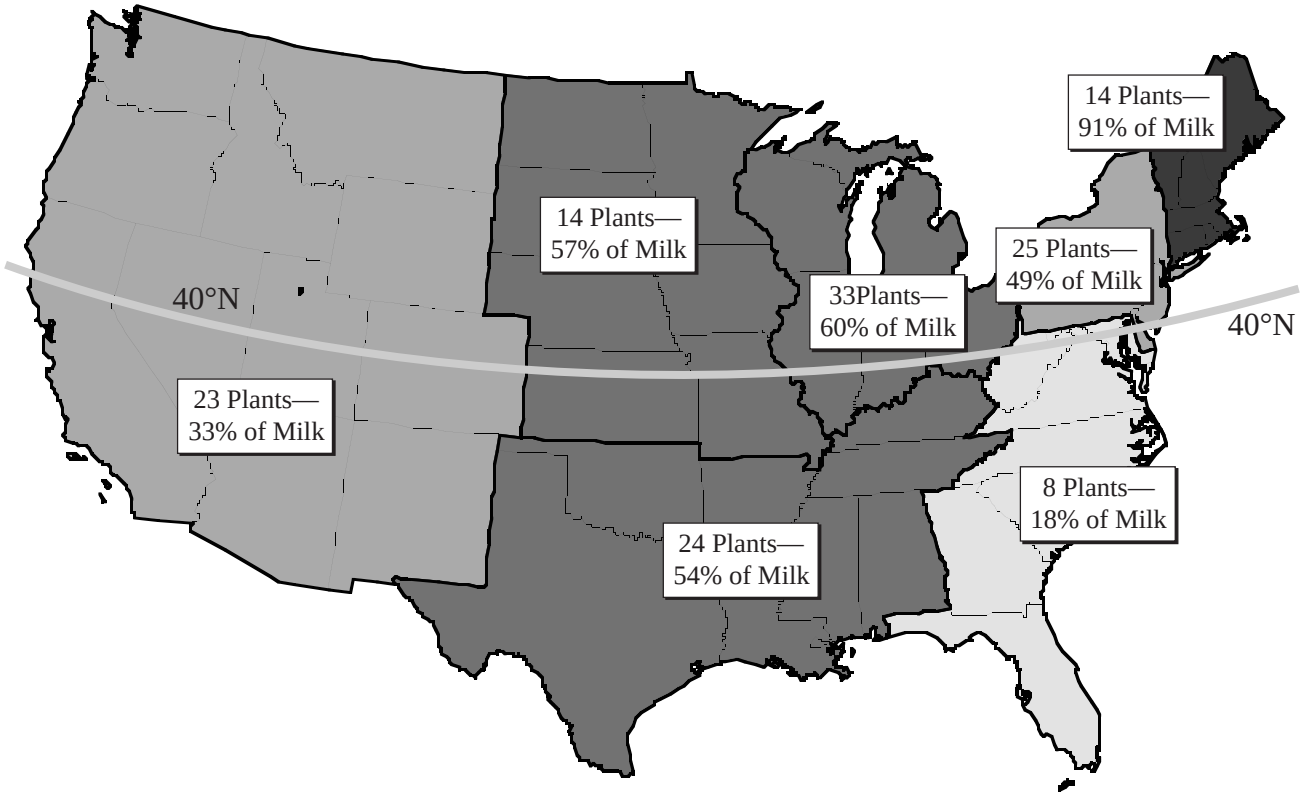


Figure 2. Percent of Respondents by Plant Size Category
(in pounds per month)**.**

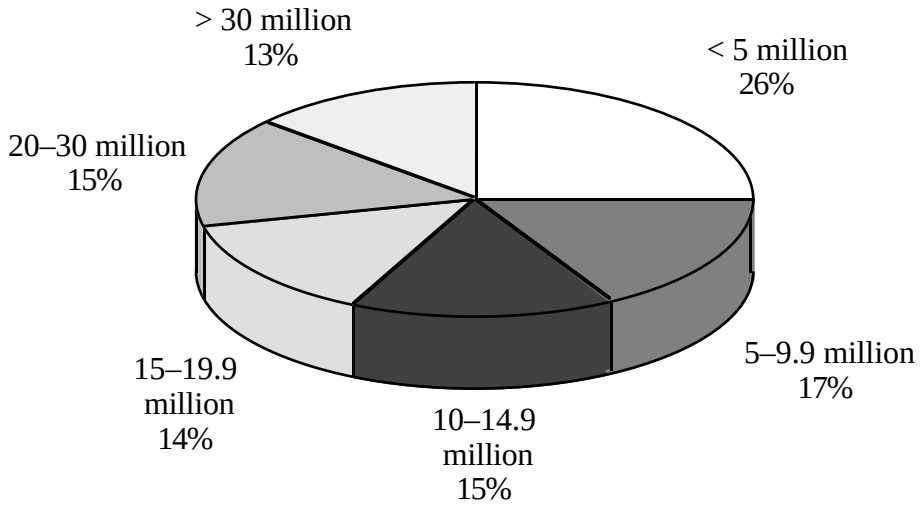
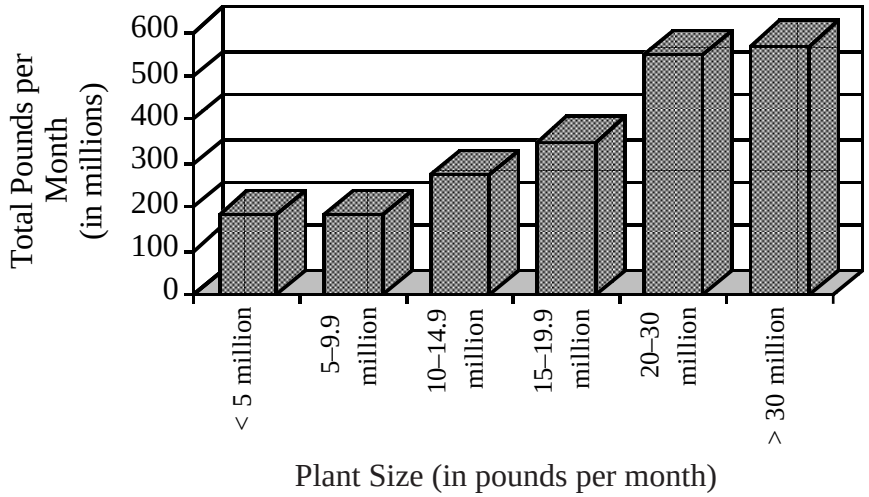


Figure 3. Total Volume of Milk Represented by Plant Size Category.



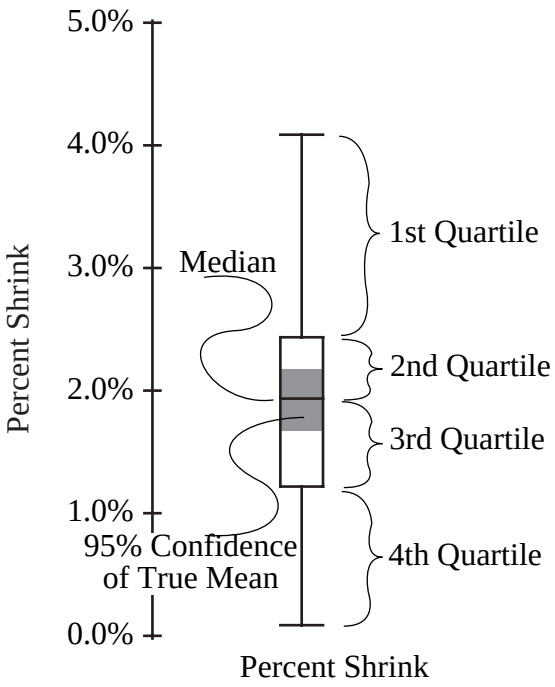
Presentation of Data—Boxplots

Throughout the report, boxplots are used to present the range and dispersion of the responses. They break down the information collected into quartiles (25 percent of all data collected falls into each quartile). The center "box", containing the 2nd and 3rd quartiles, outlines the middle 50 percent of the observations. The line within the box displays the median value of the data; half of the observations lie above the median and half below. For example, Figure 4 indicates that the median value of total plant shrink is 1.95 percent.

The gray–shaded box within the center box displays a 95 percent confidence interval for the population average, also known as the true mean. From the data collected in the survey, we can say with 95 percent confidence that the true mean for total plant shrink lies between 1.7 and 2.2 percent of all milk processed. The sample mean, calculated from the survey data, is the best estimate of the true mean. For total plant shrink, the sample mean, or average, is 1.98%.

The true mean may be distinguished from the sample mean by use of an example. If *all* fluid milk plants in the United States were surveyed, the true mean for total shrink would be known with certainty. However, the survey only polled a fraction of the population. Because only a fraction of all plants were surveyed, the true mean is not known with certainty.

Figure 4. Total Shrink Reported.



Average = 1.98
1st Quartile range > 2.5
4th quartile range < 1.2

If a plant's shrink value is above the gray–shaded box, then there is a very high probability that the plant's shrink is greater than average. Conversely, if a plant's shrink is below the gray–shaded box, there is a very high probability that the plant's shrink is less than the national average. A plant may want to focus on the problem of excessive losses if they find their total shrink values in the first quartile (greater than 2.5%).

Fluid Milk and Cream Losses and Shrink

There are many opportunities to lose product on the way from the farm to the consumer. In this study we requested information on four categories of shrink: farm–to–plant, plant and cooler, packaged milk route returns, and stolen or "mysteriously missing" milk. Although a few plants reported zero losses for some of these categories, most manufacturers reported values for all four categories of loss. If a plant reported a zero value, it was not counted in the calculation of the mean.

Farm–to–Plant Shrink

The farm–to–plant shrink must ultimately be accounted for by the Market Administrators' office. Those plants reporting no farm–to–plant shrink are assumed to be purchasing raw milk from a cooperative organization. The processor is responsible for only the milk metered at the plant in these arrangements. In other words, although farm–to–plant losses still occur, the plant does not account for them.

Plant and Cooler Shrink

The plant and cooler shrink represents the losses incurred from the receiving area of the processing operation through the cooler/loadout area. It is comprised of spilled milk and product, manufacturing flaws and loss of ingredient from adhesion to equipment surfaces.

Packaged Milk Route Returns

This loss is the physical returns from products that have package or quality defects. Who or what caused the damage is not a consideration, only that the product is not able to complete the retail sales cycle. Retailers are typically issued credits for the returned products. Some processors and state regulators do not allow any returns or credits once the product is out of the control of the processor/distributor. In these situations, the plants report zero shrink; the responsibility for the shrink belongs to another entity (e.g., the retail stores).

Stolen or "Mysteriously Missing"

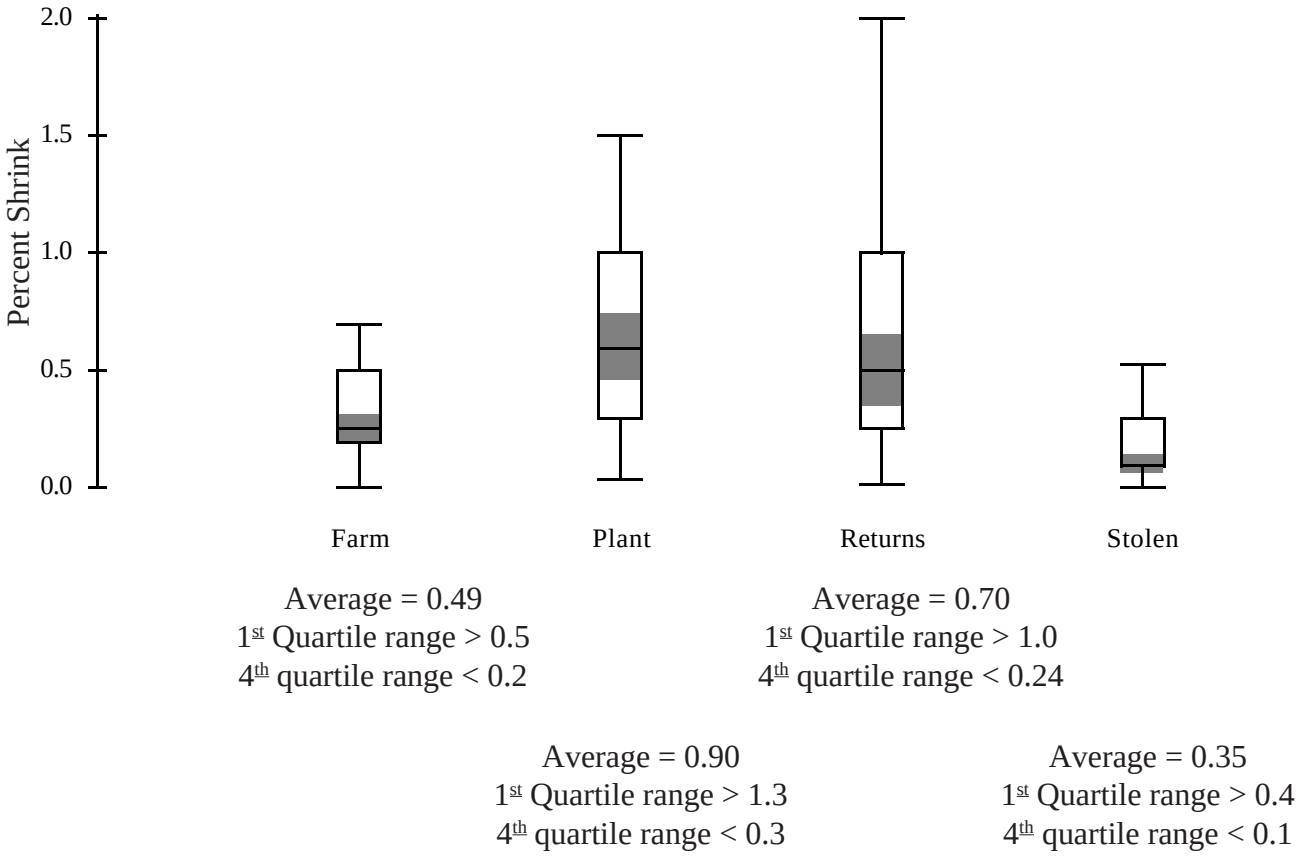
The volume of product that leaves the filling area and enters the cooler inventory is generally known with a high degree of certainty. The discrepancy between this inventory and what is known to be received at a retail store is referred to as stolen or "mysteriously missing." On average it is a relatively small category of total shrink, but in four of the survey plants the value was reported to be as high as 2 percent of plant volume.

The total shrink was both reported in the survey and also calculated as the sum of the four categories of loss. As shown in Figure 4 on page 4, total losses range from well under 1 percent to more than 4

percent. At the survey average of about 2 percent, estimates of 1993 milk losses resulting from shrink exceed one billion pounds in the fluid industry alone.

Not all categories of shrink contribute equally to the total. The survey responses indicate that plant shrink and package milk returns generally are much larger than farm–to–plant losses or stolen milk (Figure 5). This addresses the magnitude of the loss from package returns, but the survey further considers factors contributing to observed differences in those losses between plants.

Figure 5. Categories of Plant Shrink.



Most categories of loss are statistically related to plant size with the largest plants having the smallest percentage of shrink in all categories. However, plant and cooler shrink is not correlated with plant size, indicating that larger firms are more effective in reducing farm–to–plant losses, stolen milk and route returns.

Geographic location is a relevant factor in determining package return losses. The further south a plant is located, the higher the route returns. This phenomenon may be explained by the warmer climate in the southern United States. Table 1 shows average shrink by category for smaller plants processing less than 15 million pounds per month versus larger plants that process more than 15 million pounds per

month. Also shown are shrink averages for plants north of 40° latitude versus plants south of 40° latitude (see Figure 1 map for location of the 40° latitude line.)

Table 1. Comparison of Average Shrink in Plants of Different Size and Location.
Italicized values indicate a statistically significant difference. [3]

	Plant Size		Plant Location	
Source of Shrink	less than 15 million lbs/month	more than 15 million lbs/month	north of 40º latitude	south of 40º latitude
Total loss	*2.18%*	*1.70%*	*1.51%*	*2.51%*
Farm-to-plant loss	*0.59%*	*0.35%*	0.43%	0.58%
Plant loss	0.93%	0.88%	0.76%	1.07%
Package returns	*0.81%*	*0.50%*	*0.52%*	*0.97%*
Stolen product	*0.46%*	*0.18%*	0.32%	0.34%

Shelf–Life Dating

Shelf–life dating may be a critical factor in fluid milk returns. In many areas, shelf–life dating of high–temperature short–time (HTST) milk products seems to be more related to regulatory influence than product quality limitations. Rotating products and moving them on a first in–first out basis can be problematic with as many as 200 stock keeping units (SKUs) in the cooler at any one time.[4] Older product that has been "misplaced" in the cooler for a few days is more subject to returns from retail stores for out–of–date reasons.

An average shelf life of 14 days was calculated on HTST white milk products, whereas the shelf–life dating for Ultra High Temperature (UHT) products, averaged 44 days.[5] The wide confidence interval (gray shaded box) in Figure 6 shows that there is a much greater variation in the shelf–life dating of the UHT products. Fifty percent of the responses for HTST fall between 13 and 15 days, while 50 percent of the UHT responses fall between 30 and 60 days. Actual shelf–life dating was not correlated with plant size or a north/south geographic location.

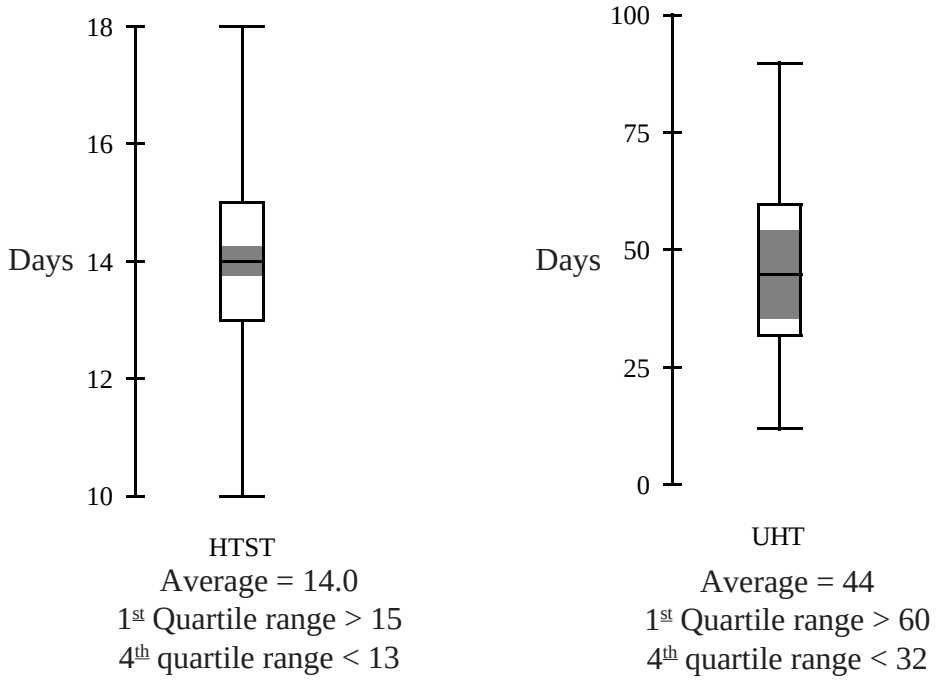
---

[3] There should be a distinction made between statistical difference and practical difference. Although most of these statistical differences are also large (i.e. practical) they need not be both. For example, the plant size comparison for total loss is not as dramatic as the nearly two fold difference between north and south in package milk returns.

[4] A stock keeping unit is identified for each different product (whole milk, 2%, etc.), package size (quart, gallon, etc.), package type (plastic, paperboard, etc.) and label (most processors sell milk under several different brand identities).

[5] Only about 15 percent of the respondents are involved in UHT processing or distribution.

Figure 6. Shelf–Life Dating on HTST and UHT products.



Differences in Shelf–Life Dating by Container or Customer

Fluid milk processors were questioned about any differences in the shelf–life dating between paperboard and plastic containers or between different customers. Nearly all responses indicated there were no differences in either comparison. Only 3.5 percent of processors reported different dating of paperboard and plastic while 11 percent reported differences in dating among their accounts. If different dating does occur, it is usually for institutional customers (i.e. hospitals, skilled care facilities etc.).

Extended Shelf–life

Survey participants were asked about increasing the shelf–life on their HTST products. One question sought to determine the value of extending shelf–life dating by five days, ignoring regulatory permissibility. A scale of 1 to 5 was used with 1 indicating no value and 5 indicating very valuable. Of the responses, 56.7 percent felt that five additional days would be very valuable, while only 5.7 percent felt that it would be of no value. Figure 7 illustrates the distribution of opinions on the importance and value of having an additional five days of shelf–life on HTST products. Even though there are no differences in current code dating between plants of differenct sizes, differences in response to this question are evident. Nearly two–thirds of the plants that process less than 15 million pounds per month said that an additional five days of shelf–life would be very valuable while larger plants were less consistent in their answer with only about 43 percent responding that the additional shelf–life would be very valuable.

A second question asked, “at what point would an additional day of shelf life on HTST products be of no practical value?” Presumably, there is a tradeoff between storage life and the ability to warehouse large quantities of bulky, high volume products. Figure 8 shows a fairly uniform desire to

have 17 to 18 days of shelf–life. This corresponds quite well with the average response of 14 days of current dating and the high value placed on an additional 5 days of shelf life. However, when each plant's actual shelf–life dating was subtracted from its optimal dating, a somewhat different picture is obtained. While the most frequent response was to increase shelf life by 5 days, it can be seen in Figure 9 that nearly 25 percent of the plants have no desire to increase their shelf–life dating.

Figure 7. Value of an Extra Five Days of Self–Life Dating on HTST products.

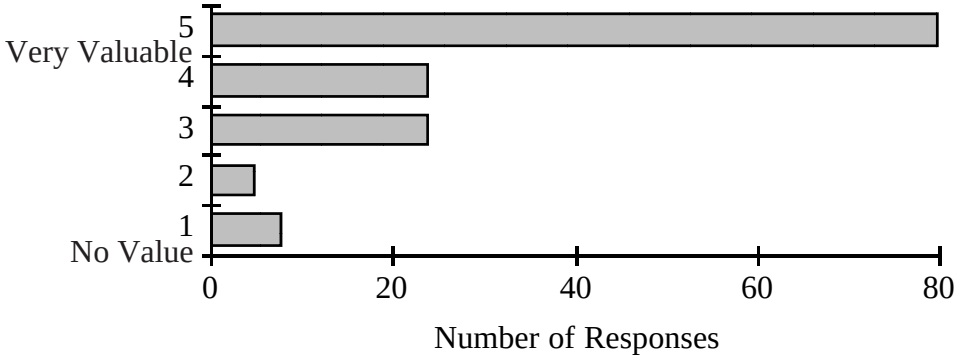
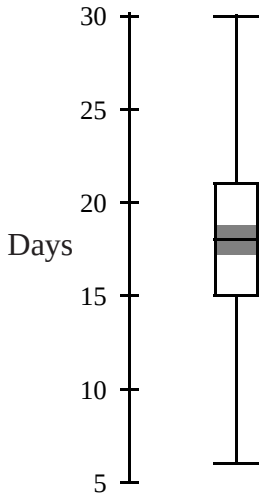
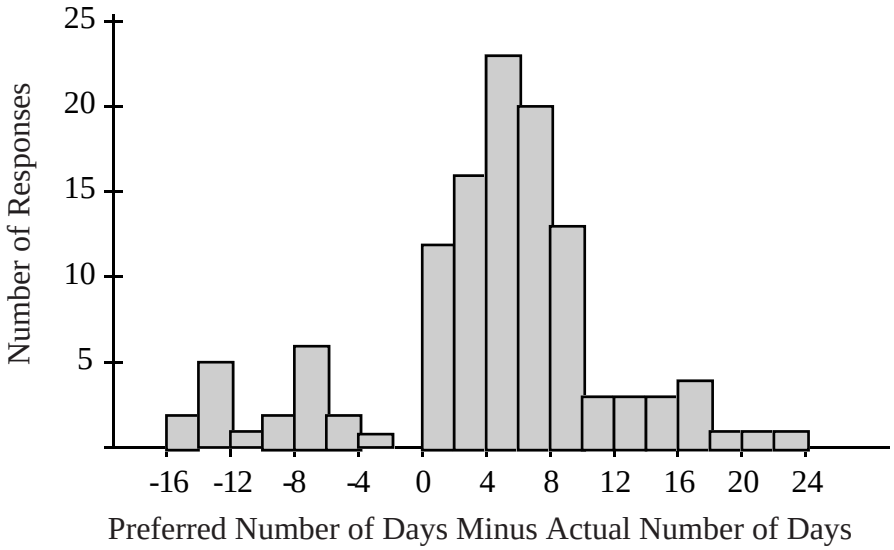


Figure 8. Preferred Days of Shelf–Life Dating.



Average = 17
1st Quartile range > 21
4th quartile range < 15

Figure 9. Difference Between Preferred and Actual Number of Days of Shelf–Life Dating.[6]



Fluid Milk and Cream Route Returns

Survey respondents were asked to rank the reasons for fluid milk and cream returns. Class I (fluid milk) and class II (fluid cream) reasons were ranked separately. Table 2 shows the ranked reasons from highest to lowest response. Although there is a clear calculated ranking, Figures 10 and 11 illustrate that some reasons are not statistically different from others, as indicated by the overlapping gray-shaded confidence intervals. For example, with fluid milk returns "out of date" and "leakers" are the most important reasons, followed by "package damage," "product quality" and "other causes." With cream products, "out of date" and "package damage" are more important problems than "product quality" and "other causes." For example, it is not possible to conclude that "out of date" is more important than "leakers." Product quality is ranked consistently near the bottom, suggesting that processors believe that they are putting out a good product but external forces are creating a large proportion of the returns. There are no statistically different reasons between plants of different size for fluid milk or cream product returns. However, the further south a plant was located, the more frequently "out of date" returns were cited as a problem for cream products.

Table 2. Ranked Reasons for Packaged Milk Route Returns.

Rank	Fluid Milk	Cream
Biggest Problem	Out of date	Out of date
.	Leakers	Out of condition—package damage
.	Out of condition—package damage	Leakers
.	Other causes	Out of condition—product quality
Least Problem	Out of condition—product quality	Other causes

[6] Some plants indicated that shelf–life dating beyond five days is of no value to them. If these same plants already had a code date of fourteen days, then the difference would be a negative nine days, i.e., nine more days than what they reported as being valuable to them.

Figure 10. Fluid Milk Returns—Ranked by Reasons.

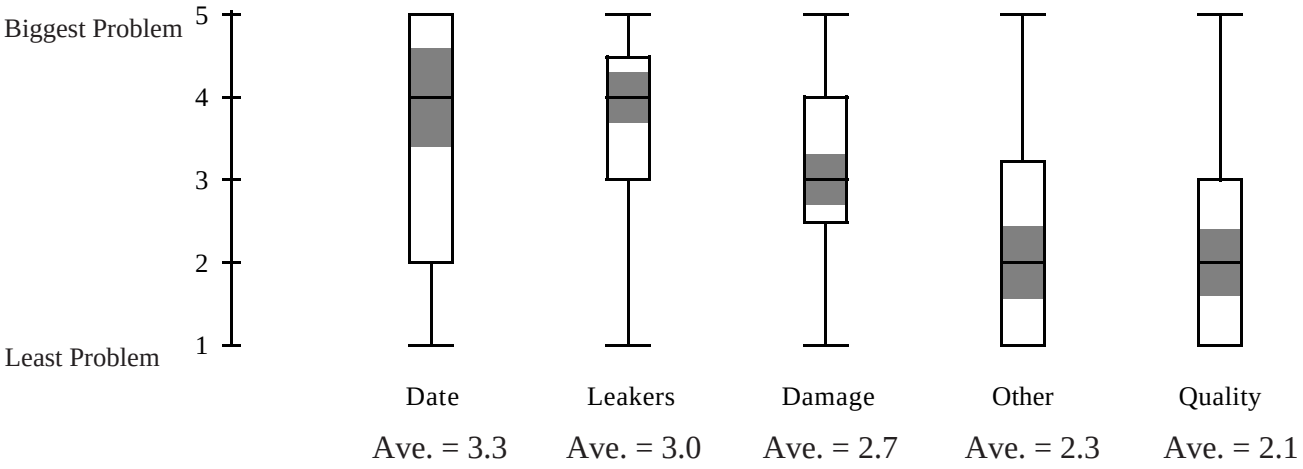
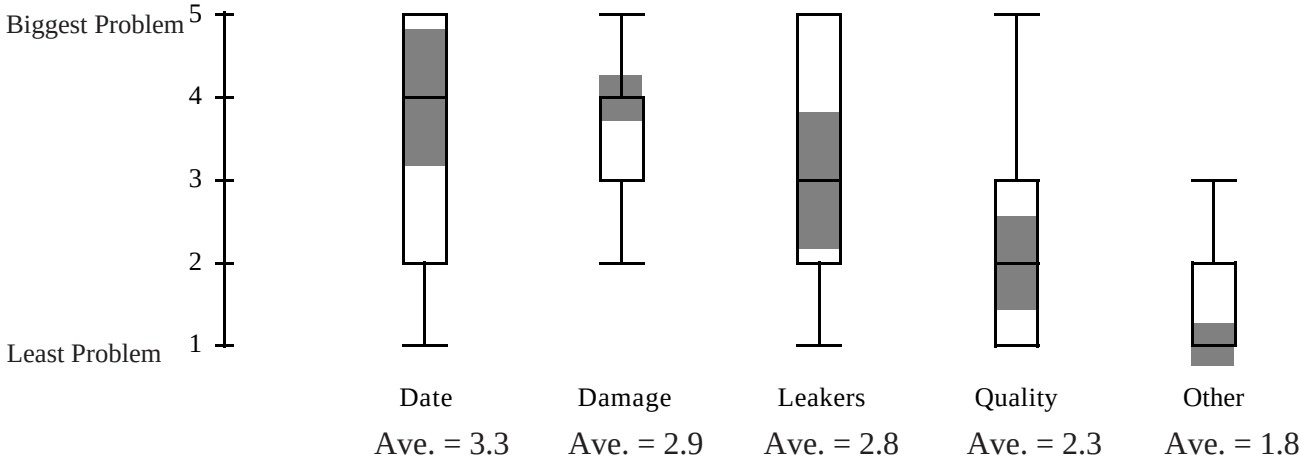


Figure 11. Cream Product Returns—Ranked by Reasons.



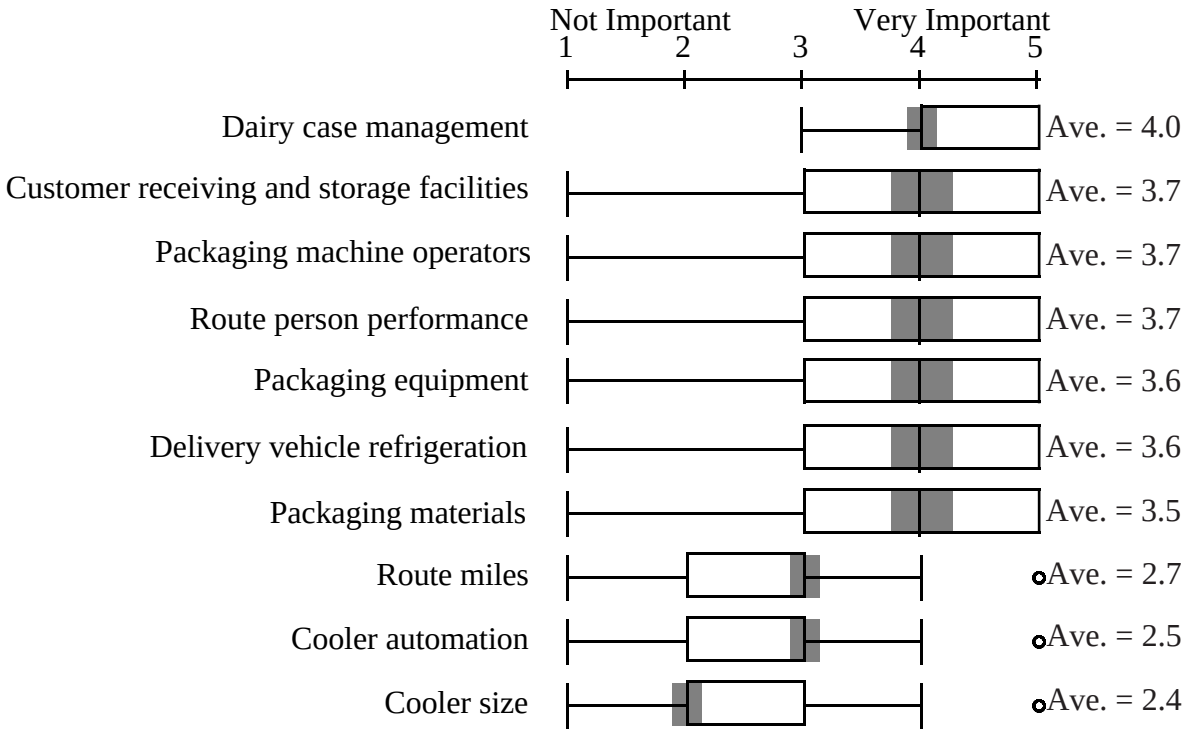
Factors Causing Fluid Milk and Cream Returns

Survey respondents were asked to render their judgment as to the importance of several factors in causing packaged fluid milk and cream returns. Figure 12 on the following page shows the ranked responses from the survey.

There are a number of statistically valid and interesting relationships presented in Figure 12. Although there are no significant correlations between any of the factors and geographic location or plant size, there are several consistencies between other questions on the survey. For example, those respondents indicating "leakers" as a major cause of returns also cited packaging materials as an important factor. Processors who responded that out of condition from product quality was an issue also indicated dairy case management as an important explanatory variable. Similarly, dairy case management was cited as an important factor for those ranking package damage as a reason for returns. The most highly ranked reason for fluid milk returns—out of date—was not explained statistically by any of the

factors evaluated. For cream products, there is a strong correlation between a highly ranked out of date response and a low importance placed on cooler automation. This may indicate that lower volume products, like cream, are not as likely to be "lost" in a more highly automated cooler.

Figure 12. Factors Causing Fluid Milk and Cream Returns—Ranked by Importance.



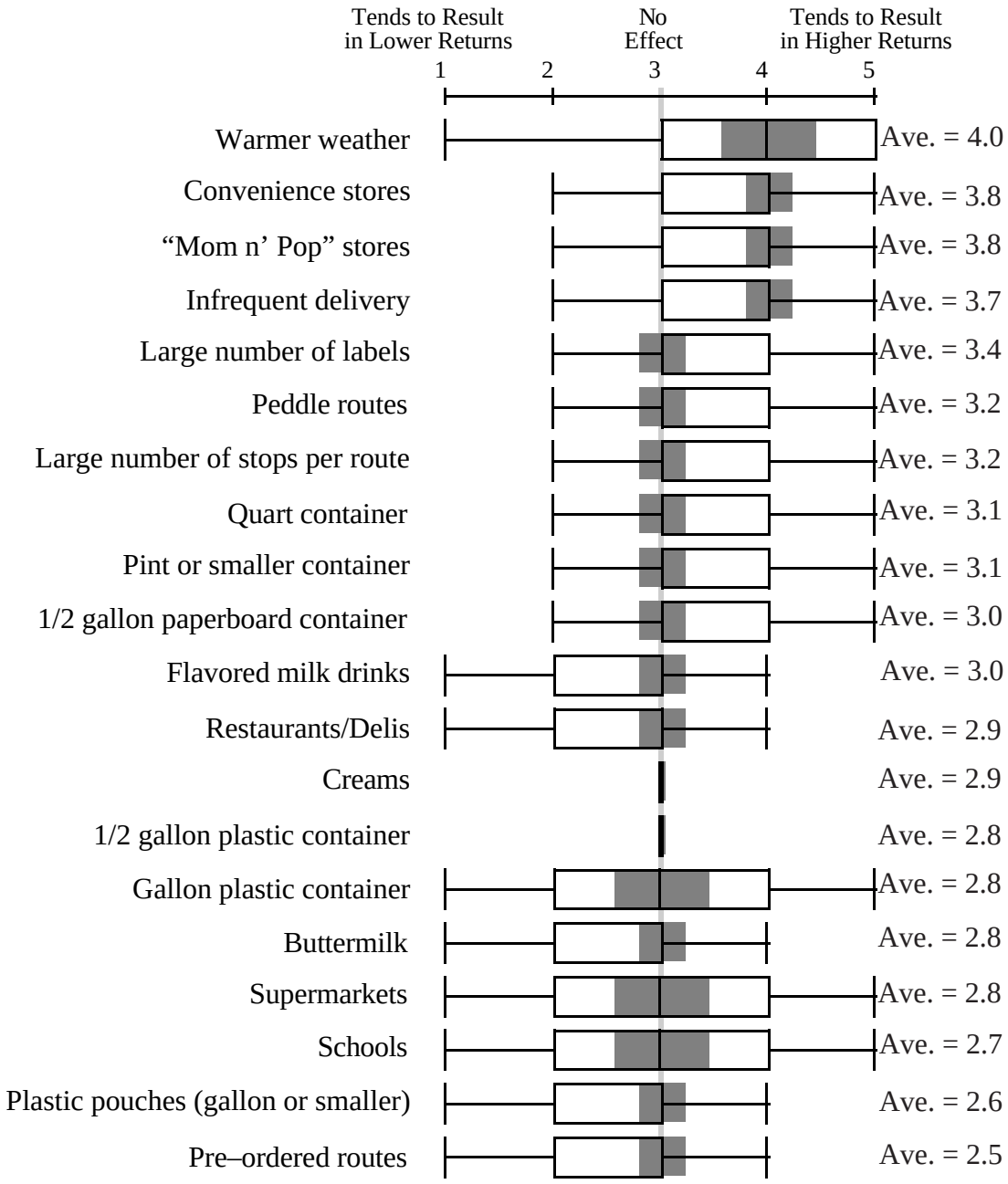
Items Related to Product Returns

To assess whether a list of possible factors tended to result in higher or lower returns, survey participants were asked to rate the importance of several factors. Figure 13 shows the ranked responses. Only four of these items—warmer weather, convenience stores, "Mom 'n Pop" stores, and infrequent delivery—tend toward higher returns. All other items are judged to have no effect.

There are no geographic differences to the responses shown in Figure 13. A warm weather response would be expected to be correlated with southern plants, but it appears as though warm temperatures, when they occur, are a problem for products in both the northern and southern United States.

There are few items in Figure 13 that are related to plant size. One of the items that stands out is that plants of all sizes modestly agree that supermarket accounts tend to result in lower returns. However, the large plants, on average, view supermarket accounts more favorably in this regard than small plants. In addition, all plant sizes modestly agree that peddle routes tend to result in higher returns, and once again, large plants are more consistent in their opinion than small plants.

Figure 13. Items Related to Product Returns—Ranked by Importance.



Other items listed in Figure 13 are linked to reasons for returns. Buttermilk is not consistently ranked by respondents as tending toward higher returns, but it is associated with leakers as a reason for the returns that occur. When looking at loss of product quality as a reason for returns, the survey shows that schools and flavored milk drinks tend to result in higher rates of return.

Appendix

The appendix contains a copy of the questionnaire that was mailed to 282 fluid milk plants throughout the United States. Values in the shaded boxes of the questionnaire are summaries of the returned surveys. The table below describes the values in those shaded boxes for each question.

Question

1. Not applicable
2. Percent of plants responding to choices ***a…f***
3. Average value of responses

4 a. Average value of responses

b. Percent of plants responding to choices ***YES…NO***

c. Percent of plants responding to choices ***YES…NO***

d. Percent of plants responding to choices ***1…5***

e. Average value of responses

5. Average value of ranking ***1…5***
6. Percent of plants responding to choices ***1…5***
7. Percent of plants responding to choices ***1…5***
8. Not applicable
9. Not applicable

Packaged Fluid Milk and Fluid cream Returns Survey—1994
Conducted by the Program on Dairy Markets and Policy—Cornell University

The purpose of this confidential survey is to characterize the extent of packaged fluid milk and fluid cream returns and opinions relating to these returns. Your answers are important to provide direction for fluid milk processing and research in the dairy industry.

Please:

(1) indicate your answers to the questions by filling in the blank, circling, etc…
(2) add your comments as you wish. These are important to the overall project and will be summarized and remain confidential.
(3) return completed survey to Cornell Dairy Markets and Policy in the enclosed postage paid envelope or by FAX (607.255.9984) before April 15, 1994.
(4) contact either Dick Aplin (607.255.3068) or Jay Mattison (607.255.1578) if you have any questions.

1. What is the plant location ZIP CODE? _____

2. What is the approximate volume of fluid milk (Class I) plus fluid cream (Class II) products packaged in your plant per month? (circle one)

a.	less than 5 million pounds	25.2%	
b.	5 to 9.9 million pounds	16.8%	
c.	10 to 14.9 million pounds	15.4%	
d.	15 to 19.9 million pounds	13.9%	
e.	20 to 30 million pounds	15.4%	
f.	more than 30 million pounds	13.3%	

3. Please indicate the percent of each type of loss or shrinkage for your Class I plus Class II fluid product business during the last twelve months. Please give answer to the nearest tenth of a percent (i.e. 0.8%).

Farm–to–plant loss or shrink	0.49 %
Plant and Cooler loss or shrink	0.90 %
Packaged milk route returns	0.70 %
Stolen or "Mysteriously Missing"	0.35 %
Total loss or shrink	1.98 %

4 a. How many days is the shelf–life dating on your white milk HTST products? ave. 14 days

How many days is the shelf–life dating on your UHT milk products? ave. 44 days

b. Do you have different shelf–life dating on your paperboard compared to plastic containers?

YES	NO
3%	97%

If yes, please explain:

c. Do you have different shelf–life dating for various types of customers? (eg. retail grocery vs. schools)

YES	NO
11%	89%

If yes, please explain:

d. Without considering regulation, would being able to extend shelf life five (5) days on your HTST products be valuable to you? Please circle answer using 5=very valuable through 1=no value.

5	4	3	2	1
57%	17%	17%	3%	6%

e. At what point (i.e. number of days) would an additional day of shelf–life on your HTST products be of NO practical value? ave. 17 total days from date of packaging

NOTE: The remaining questions deal with packaged fluid milk and cream route returns only—not farm–to–plant or processing plant/cooler losses and shrink.

5. Please rank from the highest (5) to lowest (1) the volume of returns for the following reasons:

Causes	Fluid Milk (Class I) Rank	Fluid Cream (Class II) Rank
"Leakers"	ave. 3.0	ave. 2.8
Out of Condition—Product Quality	ave. 2.1	ave. 2.3
Out of Condition—Package Damage	ave. 2.7	ave. 2.9
Out of date	ave. 3.3	ave. 3.3
Other (list causes)	ave. 2.3	ave. 1.8

6. Please indicate your judgement as to the importance of the following factors in causing packaged fluid milk and fluid cream returns. Please elaborate in the comment section if you have indicated a 4 or 5 (Very Important) for the importance of that factor. (Example: Machine operators—maladjusted equipment.)

	Very Important< ---------- >Not Important				
	5	4	3	2	1
a) Packaging materials	28%	23%	32%	9%	8%
b) Packaging machine operators	33%	28%	21%	13%	5%
c) Packaging equipment itself	31%	26%	25%	12%	6%
d) Cooler size	24%	29%	32%	9%	6%
e) Cooler automation	25%	20%	38%	11%	6%
f) Number of miles traveled on a route	17%	22%	39%	14%	8%
g) Delivery vehicle refrigeration	34%	22%	23%	11%	10%
h) Quality of route person performance	30%	30%	26%	9%	5%
i) Customer receive, storage & handling facilities	27%	37%	24%	6%	6%
j) Quality of store dairy case management	34%	44%	16%	2%	4%
k) Other					

7. Please indicate your judgement as to the effect of the following factors on your plant's route returns.

	Tends to Result in Higher Returns< 5	4	3	2	Tends to Result >in Lower Returns 1
a) Warmer weather	29%	46%	23%	1%	1%
b) Flavored milk drinks	2%	21%	57%	14%	6%
c) Buttermilk	2%	14%	55%	20%	9%
d) Creams	2%	19%	53%	17%	9%
e) Plastic pouches (gallon or smaller)	3%	7%	56%	20%	14%
f) Gallon plastic container	5%	17%	43%	24%	11%
g) $^1/_2$ gallon plastic container	4%	14%	49%	26%	7%
h) $^1/_2$ gallon paperboard container	1%	29%	50%	15%	5%
i) Quart container	4%	29%	50%	14%	3%
j) Pint or smaller container	2%	31%	50%	10%	7%
k) Supermarkets	6%	19%	33%	32%	10%
l) "Mom n' Pop" stores	19%	50%	24%	5%	2%
m)Convenience stores	16%	56%	23%	3%	2%
n) Restaurants/Delis	4%	20%	48%	18%	10%
o) Schools	8%	20%	27%	22%	23%
p) Large number of labels	9%	41%	37%	7%	6%
q) Pre–ordered routes	5%	11%	38%	28%	18%
r) Peddle routes	13%	29%	39%	12%	7%
s) Large number of stops per route	7%	28%	52%	6%	7%
t) Infrequent delivery (1 or 2 days/week)	16%	47%	30%	4%	3%

8. What general comments do you wish to make about packaged fluid milk returns?

9. This survey was completed by: (company position(s), not individual's name) _____

Thank you for your cooperation. Your participation is IMPORTANT!

OTHER AGRICULTURAL, RESOURCE, AND MANAGERIAL ECONOMICS RESEARCH BULLETINS

ORDER NO.	TITLE	AUTHOR(S)
R.B. 95-03	Dairy Farm Management Business Summary New York State 1994	Stuart F. Smith Wayne A.Knoblauch Linda D. Putnam
R.B. 95-04	Impact of Generic Fluid Milk Advertising on Whole, Lowfat, and Skim Milk Demand	Harry M. Kaiser J. Carlos Reberte
R.B. 95-05	Mexico's Dairy Sector in the 1990s: A Descriptive Analysis	Charles F. Nicholson
R.B. 95-06	The Bioeconomics of Regulating Nitrates in Groundwater from Agricultural Production Through Taxes, Quantity Restrictions, and Pollution Permits	Arthur C. Thomas Richard N. Boisvert
R.B. 96-01	Generic Advertising Wearout: The Case of the New York City Fluid Milk Campaign	Carlos Reberte Harry Kaiser John Lenz Olan Forker
R.B. 96-02	Proceedings of the Annual Meeting S-216 Regional Project - Food Demand and Consumption Behavior	Christine K. Ranney (ed.)
R.B. 96-03	Annotated Bibliography of Generic Commodity Promotion Research (revised)	Jennifer Ferrero Leen Boon Harry M. Kaiser Olan D. Forker
R.B. 96-04	Commodity Promotion Economics: A Symposium in Honor of Olan Forker's Retirement	Jennifer Ferrero Harry M. Kaiser (eds.)

These publications should be requested from:

Publications Office
Cornell University
Warren Hall
Ithaca, NY 14853