

Mushroom Cold-Chain Study



Prepared by:



WILLARD BISHOP

September 2007

Table of Contents

	Page
▶ Situation	1
▶ Scope & Approach	2
▶ Test Leg 1: Control	
▶ Test Leg 2: Care & Culling Best Practices	
▶ Test Leg 3: Sell-by Date Label	
▶ Test Leg 4: Fresh-Check Indicator Label	
▶ Test Leg 5: Combination	
▶ Consumer Intercepts	
▶ Executive Summary of Results	5
▶ Specific Test Results	6
▶ Implications	13
▶ Recommendations	14
▶ Next Steps	15

Situation

Consumers at retail often delay or don't purchase mushrooms at all because of the poor quality of mushrooms at the shelf. Due to the poor quality, mushroom sales are not being optimized, and shrink levels are too high. Previous industry research indicated that the quality issues stem from poor cold-chain management and in fact, most of the cold-chain management issues take place in-store. There are two ways that poor cold-chain management impacts mushroom sales:

- ▶ **Direct Impact on Shrink, Retail Economics:** Retailers routinely throw out 11%-20% of mushroom products; inadequate handling practices cause much of the loss.
- ▶ **Indirect Impact on Consumer Demand:** Shelf life is sub-optimal, and even modest browning will reduce the likelihood of a consumer purchase.

In 2004, Willard Bishop identified the primary causes of the cold-chain management issues at retail, which included:

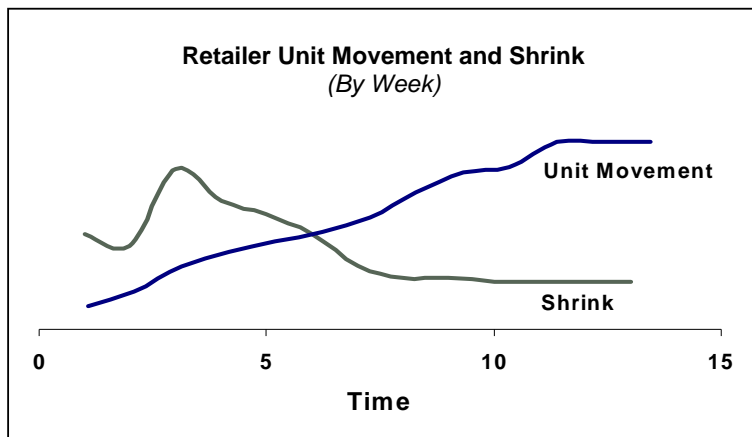
- ▶ Temperatures both at the shelf and at promotion displays were too high.
- ▶ In-store handling practices reflected a lack of awareness of mushroom perishability.
- ▶ Culling and presentation practices resulted in unappealing mushrooms at the shelf.

The outcome of the 2004 work was the identification of a set of measurable, testable improvements which built on the existing base of knowledge and the business case for the mushroom industry to merchandise exceptional-looking mushrooms.

In 2005, the Mushroom Council felt that the time was right to field-test the specific improvement methods identified in 2004 and measure the impact on demand and shrink levels by both implementing care and culling best practices and merchandising exceptional-looking mushrooms at retail as well as applying on-package labels that included a direct message to the consumer.

The Mushroom Council retained Willard Bishop, a highly recognized organization, to help execute the Cold-Chain study across 30 grocery stores, document the demand and shrink results as well as the impact of the improvements on retailers and consumers, and then communicate the results to the industry.

Willard Bishop's hypothesis for the Cold-Chain study was that the field tests at retail would improve demand for mushrooms while reducing shrink levels over time.



For Illustration Purposes Only

Scope & Approach

Willard Bishop partnered with a major mushroom grower/shipper, a sophisticated grocery retailer located in the Midwest, TEMPTIME, and the Park City Group to measure the impact on demand and shrink levels by implementing the aforementioned improvement methods. Willard Bishop designed a five-legged test, with six stores per test leg. Test stores were chosen by the retail chains produce management. The packaged 8-oz., whole white mushroom was the specific SKU tested in-store.

Instore Test Design

Test Leg 1: Control

The objective of the Control test leg was to provide a baseline for mushroom demand and shrink level performance. Conditions in the control stores remained normal and unchanged throughout the duration of the test.

Test Leg 2: Care and Culling Best Practices

The objective of the Care and Culling Best Practices test leg was to measure the impact on demand and shrink levels from routinely practicing care and culling best practices and merchandising exceptional-looking mushrooms at retail. The approach to merchandising exceptional-looking mushrooms included fully implementing exceptional cold-chain management and other mushroom handling practices from grower/shipper right through to the point of sale.

Store personnel received training and a one-page document outlining the following best practices:

- ▶ Receiving: Pallets should be either merchandised or placed in a cooler as soon as possible. Do not allow mushrooms to warm.
- ▶ Back Room:
 - ▶ Do not store mushrooms near the door.
 - ▶ Do not store mushrooms in front of or below fans.
 - ▶ Do not leave mushrooms in a warm room.
 - ▶ Keep the floors dry.
 - ▶ Store mushrooms in a cool dry spot closest to the bottom of the cooler.
- ▶ Display:
 - ▶ Merchandise only exceptional looking mushrooms.
 - ▶ Avoid blocking air flow to the display.
 - ▶ Do not expose mushrooms to misters.

Scope & Approach

- Ensure temperature settings are at 34 degrees (this is optimal).
 - Keep mushrooms separate from odors (example: sliced onions).
 - Do not stack mushroom packages more than two or three high.
 - Poor quality mushrooms should be promptly removed from display and discarded.
 - Rotate product for first-in/first-out freshness.
 - Tighten and completely rotate mushroom inventory more frequently in the summer months.
- Replenishment: Practice “first to stock.”

In addition, the grower/shipper performed weekly audits at each of the six Care and Culling Best Practices test stores. The process for executing the weekly audits included using a temperature gun to measure the temperature at the shelf and taking digital photos of the mushrooms at the shelf.

Test Leg 3: Sell-by Date Label

The objective of the Sell-By Date Label test leg was to measure the impact on demand and shrink levels from applying a Sell-By Date label to the retail package. The Sell-By Date label was hand applied to tills of the 8 oz., whole white mushrooms at the farm during the packing process. The Sell-By date was determined by adding eight days to the date the mushrooms were harvested.



Test Leg 4: Fresh-Check Indicator Label

The objective of the Fresh-Check Indicator test leg was to measure the impact on demand and shrink levels from applying a Fresh-Check Indicator label to the retail package. The Fresh-Check Indicator



label, provided by TEMPTIME, was hand applied to the individual tills of 8 oz., whole white mushrooms at the farm during the packing process. The center of the Fresh-Check Indicator label signals the amount of freshness still remaining to the consumer by turning dark as time passes and temperature abuse occurs. Fresh-Check Indicator data was collected at five points throughout the cold-chain to determine the percent of shelf life remaining at each point. Both farm personnel and store personnel utilized a tool called a densitometer to measure the amount of freshness still remaining on all 8 oz. whole white

mushroom shipments shipped and received throughout the course of the 19-week test. The baseline used for shelf life was ten days.

Scope & Approach

Test Leg 5: Combination

The objective of the combination test leg was to measure the impact on demand and shrink levels from implementing care culling best practices, a Sell-By Date label, and a Fresh-Check Indicator label simultaneously. Willard Bishop's hypothesis was that combining care culling best practices and the labels could result in an exponential increase in units sold; however, the combination test leg wasn't fully implemented at retail.

Instore Communication:

The communication strategy for the tests involved securing a 5x7 sign at the point of sale (POS) throughout the duration of the test. The POS signage indicated that was "new" and what the value proposition was to the consumer.

Data Analysis Methodology:

Retail performance was the key quantitative measure—specifically unit movement and shrink.

Test store movement and shrink data was indexed against the average of a 16-week baseline period from one year ago. The data was further adjusted by netting out the incremental changes from control test stores. Values are based on a rolling three-week average and do not include weeks where 8 oz. whole whites or 16 oz. whole whites were on promotion.

Consumer Intercepts

In conjunction with the study Willard Bishop surveyed consumers in-store regarding their purchase habits and preferences. 450 consumers were surveyed in-store prior to the start of the test; 110 of the same consumers also participated in a post-implementation survey.

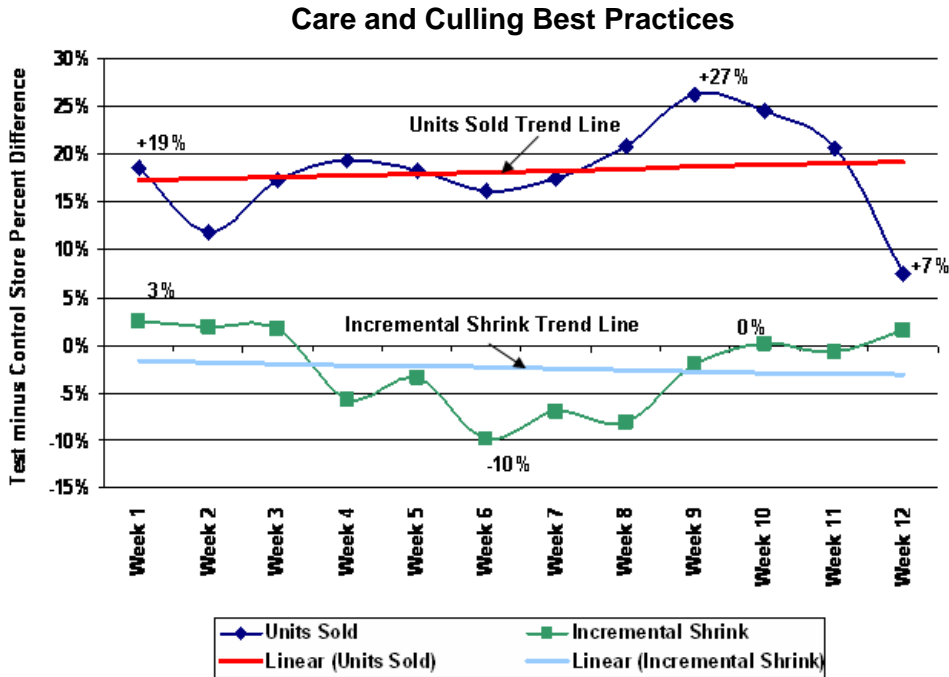
Executive Summary of Results

- ▶ Merchandising better-looking mushrooms can increase unit sales by 18%, reduce shrink, AND improve the quality image of the store.
- ▶ Consumers are both discriminating and educable when it comes to purchasing fresh mushrooms at retail, they are aware of and make purchase decisions based on the appearance of mushrooms.
- ▶ Fresh mushrooms play an important role in retailer efforts to differentiate themselves with produce because they have a “halo” effect on the quality image of the total store.
- ▶ Retailers are failing to consistently follow care and culling best practices, resulting in mushrooms at the shelf which visually do not appear fresh.
- ▶ In addition to not consistently following care and culling best practices, other factors contribute to retailers merchandising mushrooms which do not appear fresh:
 - ▶ Distribution center receives mushrooms which already show signs of browning and/or bruising.
 - ▶ Conditions during transport from distribution center to store are not ideal for mushrooms.
 - ▶ Outdated or ill-functioning equipment at the store.
 - ▶ Shelf temperatures at the store are too high.
 - ▶ Inaccurate ordering/inventory planning in conjunction with store promotions.
 - ▶ Produce managers hesitate to pull and toss poor-quality mushrooms due to shrink targets which may be too low.

Specific Test Results

Care and Culling Best Practices

The results from the Care and Culling test show that there is no substitute for great-looking mushrooms. The Units Sold Trend Line shows that demand improved by 18% throughout the course of the Care and Culling Best Practices test and did so at an increasing rate.



The test also revealed that temperatures were routinely above the 34° threshold in three of the six test stores. Over the course of the 19-week test, average temperatures at the shelf ranged from nearly 38° to approximately 51°.

Shelf Temperature Audit

Store #	Cold Chain Test Leg	Average Shelf Temperature
1	Leg 2: Care & Culling Best Practices	37.7
2	Leg 2: Care & Culling Best Practices	40.2
3	Leg 2: Care & Culling Best Practices	41.5
4	Leg 2: Care & Culling Best Practices	44.1
5	Leg 2: Care & Culling Best Practices	44.9
6	Leg 2: Care & Culling Best Practices	51.2

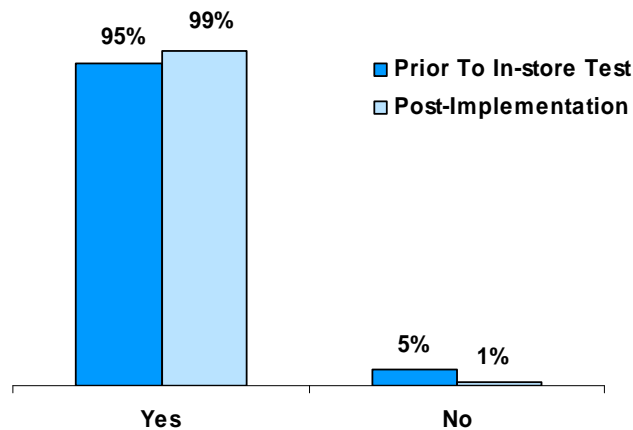
■ Within Range
■ Accelerated Loss
■ Significant Loss

Specific Test Results

Consumer intercept surveys yielded the following results:

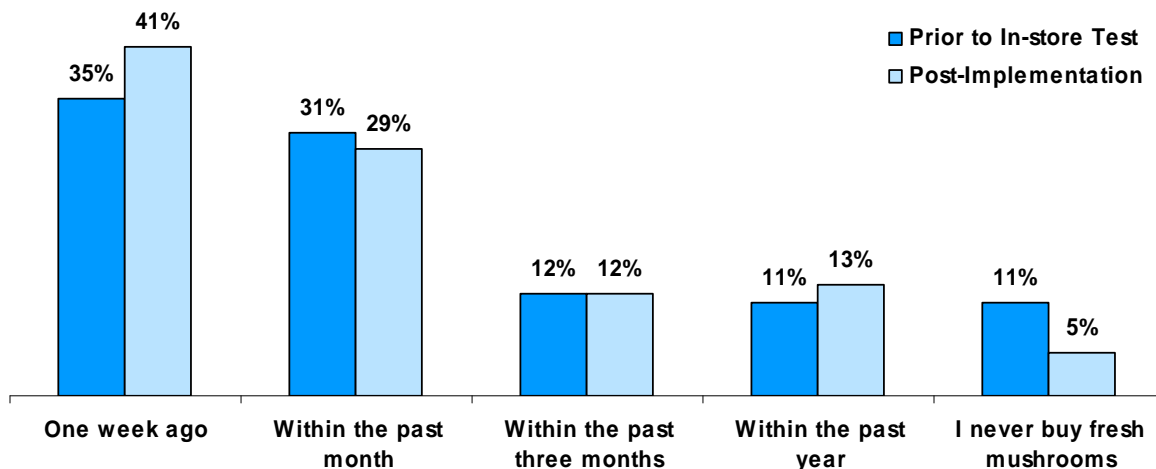
- ▶ **Consumers are increasingly planning shopping trips to the Produce Department.** Consumers were asked if they planned on purchasing any Produce or other fresh items from the Produce Department on their shopping trip. Prior to the start of the test 95% of consumers stated that they planned to purchase fresh items from the Produce Department during their current shopping trip. 99% of the consumers surveyed post implementation of the test stated that they had planned to purchase fresh items in Produce.

Consumer Purchase Intent in Produce



- ▶ **Better-looking mushrooms on the shelf can lead to more frequent purchasing.** Consumers were asked when, if ever, was the last time they had purchased fresh mushrooms. Prior to the start of the test 35% of consumers stated that they had purchased mushrooms within the past week. 41% of consumers surveyed post implementation of the test stated that they had purchased mushrooms within the past week.

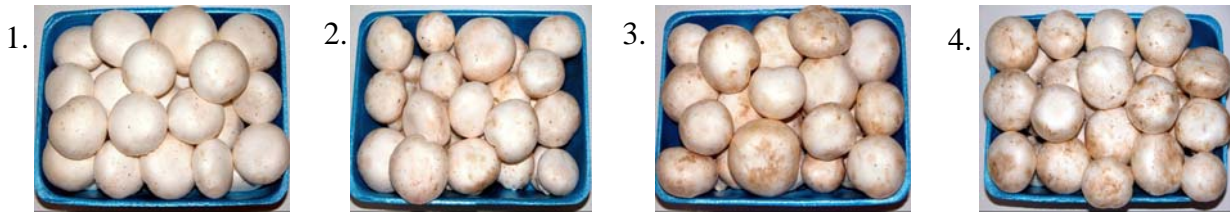
Mushroom Quality and Purchase Frequency



Specific Test Results

▶ **The tests heightened consumer awareness of mushroom freshness and quality.**

Consumers were asked how they would rate the quality of mushrooms in the store relative to a visual graphic. Prior to the test, 94% of consumers stated that the mushrooms in the store looked either exceptional or sellable based on the visual chart that they were shown. Eight-four percent of consumers surveyed post implementation of the test stated that the mushrooms in the store looked either exceptional or sellable based on the graphic that they were shown.



▶ **White mushrooms with some browning may not have much shelf life remaining but they are great for cooking tonight.**

Consumers were asked how soon they would need to use mushrooms with significant browning and how would they use them. Most consumers stated that they would need to use the mushrooms within one to two days. Usage ideas for mushrooms with significant browning included the following:

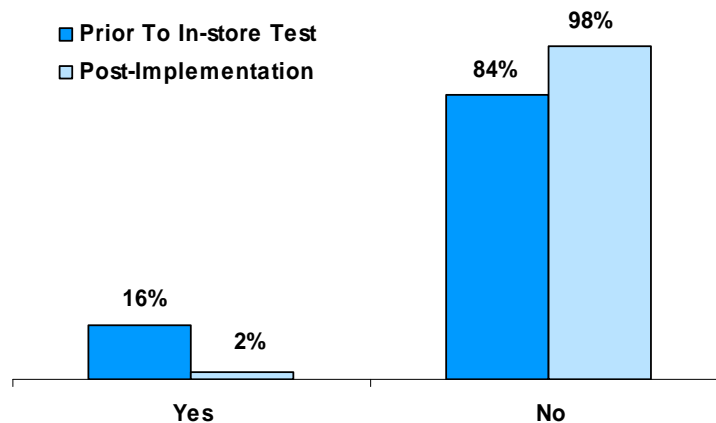
- ▶ *“I would add them to an Alfredo sauce or ravioli.”*
- ▶ *“I would use them for making beef stroganoff.”*
- ▶ *“I would sauté them in garlic and butter.”*
- ▶ *“I would cook them with my steak.”*
- ▶ *“I would add them to spaghetti sauce.”*
- ▶ *“I would add them to a soup.”*
- ▶ *“I would use them in an omelet.”*
- ▶ *“I would stir fry them with vegetables.”*
- ▶ *“I would cook them and then put them on a pizza.”*
- ▶ *“I would make gravy with them.”*
- ▶ *“I would use them in a chicken casserole dish.”*

Specific Test Results

► **Consumers became more discriminating when purchasing fresh mushrooms.**

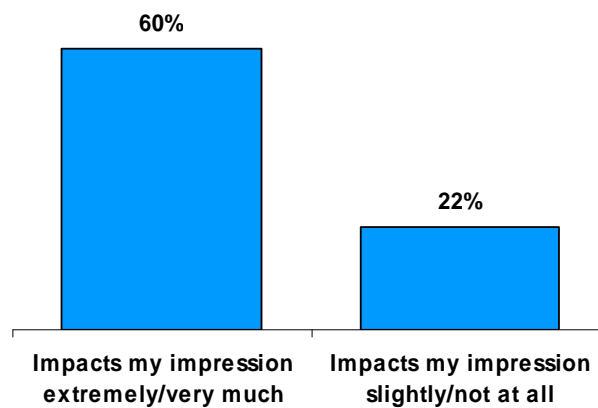
Consumers were asked if they would consider purchasing mushrooms which no longer appeared fresh relative to a visual graphic. Prior to the test, 16 % of consumers stated that they would consider purchasing the white mushrooms in the graphic. However, only 2% of consumers surveyed after the test was implemented stated that they would consider purchasing the white mushrooms based on the graphic they were shown.

The Impact of Mushroom Quality on Purchase Activity



► **Mushrooms have an important role to play in retailer's efforts to differentiate themselves with produce.** Consumers were asked if the quality and freshness of the mushrooms in the Produce Department impacted their impression of the quality image of the Produce in general at the store and, in turn, the quality image of the store. By nearly 3 to 1 consumers identified mushrooms as a category that has a “halo effect” on the total store.

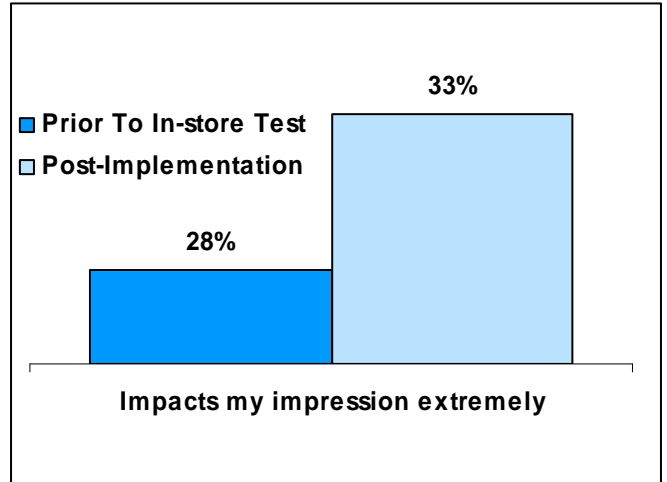
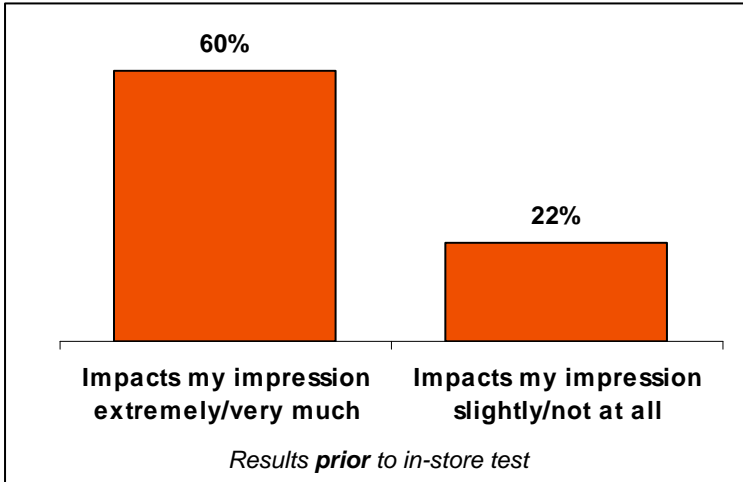
The Halo Effect of Mushrooms



Specific Test Results

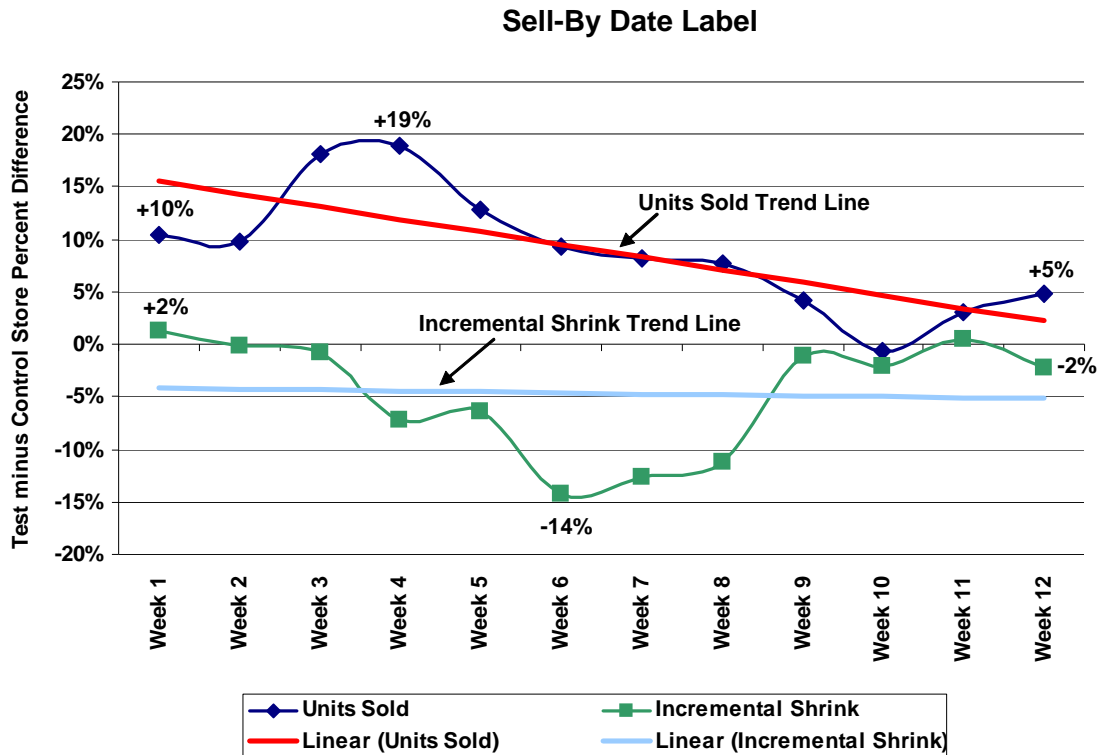
Also, the strength of their feelings intensified during the test.

The Halo Effect of Mushrooms



Sell-by Date Label

The Sell-By Date Label test had a positive effect on demand. The Units Sold Trend Line shows that while demand improved throughout the course of the Sell-By Date Label test, it did so at a decreasing rate.

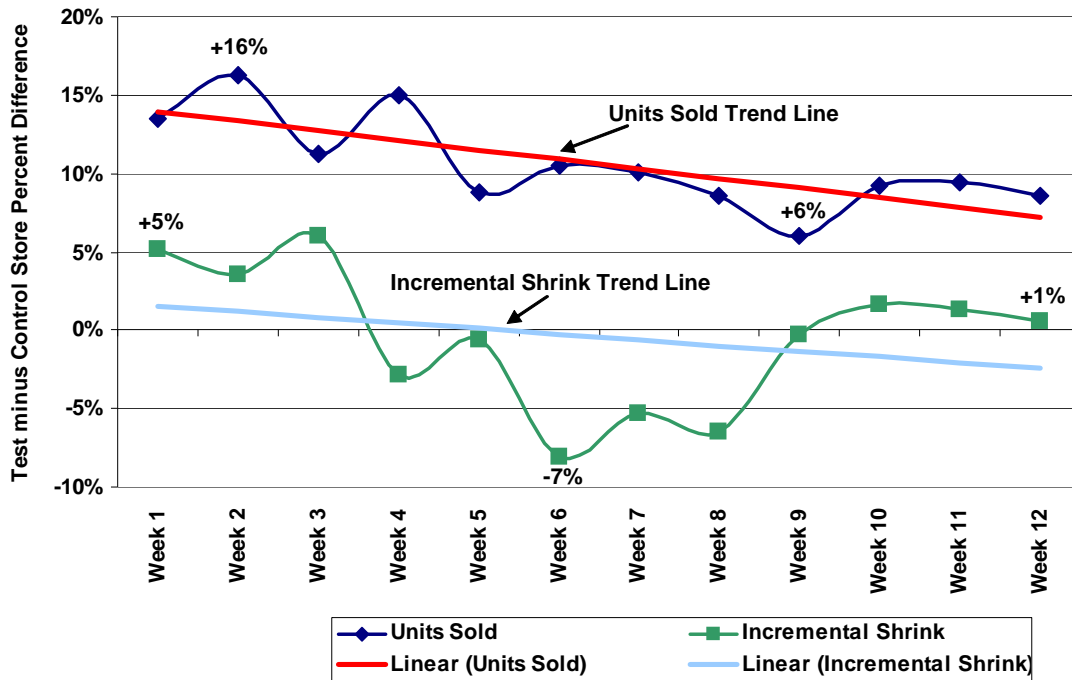


Specific Test Results

Fresh-Check Indicator Label

The Fresh-Check Indicator Label test had a positive effect on demand and shrink. As with the Sell-By Date Test, the Units Sold Trend Line shows that while demand improved throughout the course of the Fresh-Check Indicator test, it did so at a decreasing rate.

Fresh Check Indicator Label



The Fresh-Check Indicator data showed that the majority of product life is lost in route to the store and once mushrooms are merchandised at the shelf. Prior cold-chain research showed that 5.5 days were lost from Farm to Store Received versus the current 3.8 days (an improvement of 1.7 days).

Shelf Life Audit

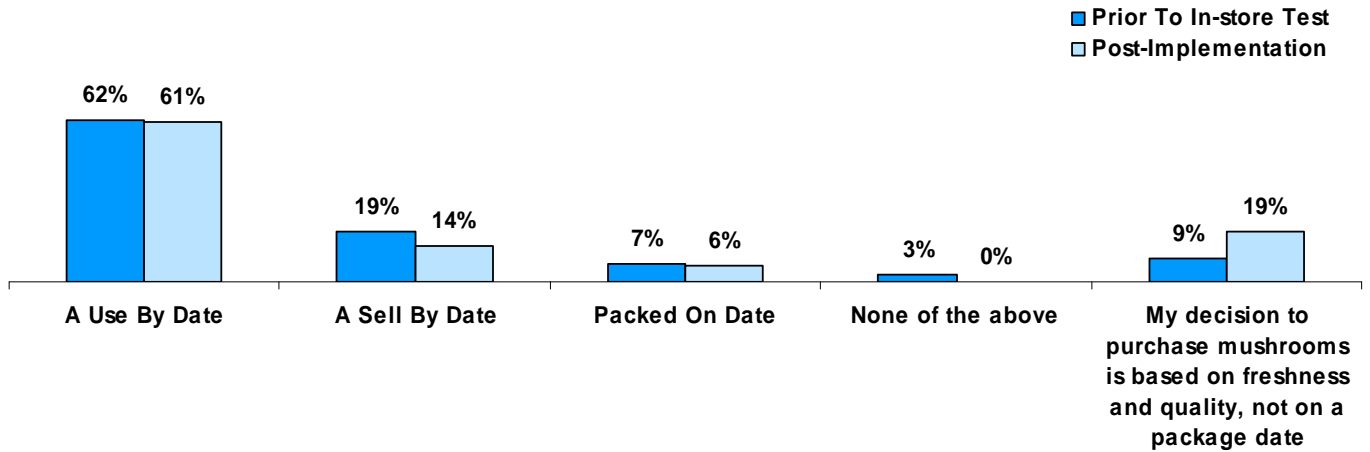
	Cold Chain Point	Life Lost	Total Life Lost	
	1 At the Farm	0.2 days	0.2 days	2%
	2 DC Received	0.8 days	1 days	10%
→	3 Store Received	2.8 days	3.8 days	38%
	4 At Shelf	0.7 days	4.5 days	45%
→	5 24-Hour Post at Shelf	2.4 days	6.9 days	69%

→ Represents the greatest opportunities for improvement

Specific Test Results

While retailers may request “Sell By” labels, shopper needs are best met with messaging directed at them. Consumers were asked which type of on-package code date, if any, would most impact their decisions to purchase mushrooms. Prior to the start of the test, 62% of consumers stated that they’d prefer an on-package, “use by” date code. Sixty-one percent of consumers surveyed post implementation of the test stated that they’d prefer an on-package, “use by” date code.

Consumer Preference on Code Dates



Implications

Suppliers and distribution center personnel should focus on consistently demonstrating excellence in cold-chain management and delivering the freshest mushrooms to retail. For retailers, the focus at retail should be on consistently following care and culling best practices. An on-package code date by itself is not sufficient. Lastly, enforcing care and culling best practices at retail will enhance the overall quality image of the total store.

Recommendations

Based on the study results of the study Willard Bishop recommends the following:

- ▶ Suppliers and retailers should implement a standardized cold-chain custody program whereby poor quality mushrooms can be identified and rejected at the distribution center and at the store.
- ▶ Suppliers should educate retail customers on the benefit of cold-chain management and should encourage the adoption of an on-package “use by” date code.
- ▶ Suppliers should educate retail customers on optimal shrink and collaborate to identify a specific shrink target based on the retail customer’s growth objectives, promotional strategy, and capability to handle and merchandise bulk mushrooms.
- ▶ The Mushroom Council should implement a “Best In Class” cold-chain management certification program for retailers.
- ▶ Suppliers and retailers should implement point-of-sale materials which tout quality improvements at the shelf so that retailers receive the credit they deserve from consumers for merchandising the freshest mushrooms.

Next Steps

Willard Bishop recommends the following next steps:

- ▶ Develop guidelines for a standardized cold-chain custody program including a policy for rejecting poor quality mushrooms at either the distribution center or at the store.
- ▶ Develop a program to educate retailers on care and culling best practices (including benefits) and the “use by” date code.
- ▶ Enhance sales materials to incorporate information around optimal shrink and identify specific shrink targets by retail customer.
- ▶ Develop a “Best-in-Class” cold-chain management certification program for retailers.
- ▶ Develop a framework for suppliers and retail customers to collaborate on the creation of point-of-sale materials to tout the improvements in the quality of mushrooms at the shelf.