



THE BENEFITS OF MONITORING WASTE (SHRINK) GO WELL BEYOND REDUCING COSTS

CASE STUDY

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Preface

Retailers benefit from implementing systems that increase the effectiveness and efficiency of their operations, which, in turn, creates added value for consumers. The result: reduced waste (referred to by retailers as “shrink”), reduced costs, increased sales and higher margins/profitability. The ability to predict and deliver consistently high quality products enables retailers to differentiate themselves in an increasingly competitive market, defined by unprecedented consumer demand for freshness, convenience, taste and excitement. The revenue lost from discounting products – to sell them at a lower price when they become blemished, but before they are of a quality that is entirely unacceptable to consumers – can also be considered waste.

Retailing is a high volume, low margin business. Slim margins mean that retailers have to sell many items (perhaps 10 or more) to simply break even on every item that is lost.¹ Consistent, predictable quality is therefore critical to enabling retailers and their vendors to remain profitable. As part of the Ontario Produce Marketing Association’s (OPMA) food waste reduction initiative, Value Chain Management International (VCMi) worked with the Apple Factory to implement monitoring and reporting systems tailored to their needs. Daily management tools established during the project are enabling Apple Factory to capture value by driving reductions in shrink. The same tools are also enabling Apple Factory to identify new market opportunities and compare the effectiveness of new merchandizing practices.

Key Finding

By using straightforward process improvement tools and publicly available online software, Apple Factory is able to target a \$32,000 reduction in annual shrink, plus associated costs, while simultaneously improving merchandizing arrangements and sales.

¹ See [VCMi 2014](#) report for details on the rationale behind this statement

Apple Factory

Produce is a destination department, with many consumers basing their store of choice on quality and service at a fair price – not the lowest price. Located in Brampton, Ontario, the Apple Factory (AF) is an independent grocery store, which engages consumers by having created an entertaining and satisfying shopping experience for the whole family. AF's points of differentiation include merchandizing the highest quality produce year-round, while providing excellent customer service for adults and a theatre for children. "The Jamboree" includes a fruit and vegetable themed puppet band, country-style displays, home-made pies sold by the thousands, and a farm animal zoo.



The assortment of produce carried by AF and the relative popularity of certain items differs by season.

- December/January to May — foreign grown produce represents the majority of sales. Items grown offshore account for the majority of sales, particularly in perishable items (e.g. fruit).
- May to August/September — soft Ontario grown produce are popular among consumers, including asparagus, berries, stone fruit, sweetcorn and new potatoes.
- August/September to December/January — the season for hard and high weight/volume Ontario grown products, including apples, squash, cabbage, onions, parsnips and main crop potatoes.

The produce assortment and the format in which they are sold (including prepacked or loose, pack size/weight, and whether priced by weight or unit) differ between seasons. The optimal location of items within the store also differs by season. Challenges associated with particular items also differ by season. For example, while sweetcorn is available all year, consumers are drawn to the experience of shucking locally grown cobs of corn in summer. However, compared to prepackaged corn, the shelf life of fresh sweetcorn is relatively short; and the succulent taste associated with local sweetcorn begins deteriorating shortly after harvest. Costs incurred from selling local sweetcorn (e.g. disposing of husks from the instore shucking of cobs) can be significant.

Year-round challenges include the quality of berries received from the Toronto Food Terminal. For example, on occasion, sixty percent or more of strawberries are culled, due to poor quality – never reaching the retail shelf. The shelf life of hardier crops, such as potatoes, can be as short as four days, due to greening or other deterioration when not chilled.

The above examples illustrate why proactively managing quality and supply to minimize costs and optimize sales is critical to success. While some produce, not of sufficient quality to sell fresh, is used by other departments (e.g. in the production of entrees and pies, or sold frozen as kits for making home-made preserves), there is a limit to the volume and types of fruits and vegetables that can be diverted to alternative uses.

Current Information Systems

Retailers typically have lots of data at their disposal. However, this data may not be aligned with the information that they need; it may be inaccurate or out of context. Too much data and information can limit a managers' ability to make informed decisions and monitor the impact of their decisions on business performance. The most valuable information is produced by continuous measurable data (CMD). CMD enables managers to control the root causes of issues impacting their business, and implement continual improvement programs in ways that are not otherwise possible.

Knowing what to measure, along with when and how to measure, and how to report the resulting information in a form that can be acted upon, is critical to success. Only a few key performance indicators (KPIs) may need to be monitored closely to create valuable CMD.

Not possessing the financial or technological resources available to a larger retailer meant that AF needed a cost-effective straightforward means of balancing supply with demand, and managing operations. This would be achieved by tracking shrink to produce insights that would enable its root cause(s) – whether in the store or along the supply chain – to be proactively controlled. In so doing, the envisioned processes would form the foundation of a continual improvement program that could be replicated across other departments and the entire store.

Prior to the OPMA initiative, AF's employees tracked shrink by manually recording culled product on a printed ledger (Figure 1). Ledgers are straightforward, though of limited value for enabling informed management decisions. While manually recording shrink in a ledger is cheap, it has hidden costs. Translating manual ledgers into meaningful operational and financial reports is labour intensive – involving double or triple handling, as individual lines are transcribed into Excel or totalled up on a calculator. Capturing the CMD required to implement a continuous improvement initiative is essentially impossible using a ledger. Ledger-based systems are also prone to error.

Figure 1: Shrink Ledger Form

Please start new sheet on 1st of the month. Hand in at end of month.

Description	Weight	Price/lb	Retail divided by Total Amount
2 lb onion	1 unit	1.29	1.29
Spinach	1 unit	4.99	4.99
Slice port mushroom	3 units	3.49	
Portobello mushroom	1 unit	0.79	0.79
Green Onions	2.35 lbs	5.99	
Red Onions	4.31 lbs	3.99	
Garlic Onions	1.34 lbs	2.99	
Zucchini	1.45 lbs	1.29	
Whole port mushroom	0.17 lbs	5.69	
Plum's	3.03 lbs	3.99	
Nectarines	2.51 lbs	3.59	
Green Peppers	2.04 lbs	1.49	
Rainbow Peper	1 unit	4.99	4.99
Cucumbers	5 units	1.79	
Large sizes	1.25 lbs	2.29	
mini cucumbers	1 unit	3.99	3.99
cauliflower	1 unit	5.99	5.99
Carrot/Garlic chente	1 unit	2.79	2.79
Asparagus	1 unit	2.99	2.99
Kiwi	7 units	0.69	
Kiwi	6 units	0.69	
Lime	1 unit	0.59	0.59
Produced Lemons	4 units	4.79	4.79
Pasadena balls	2 units	2.29	
B. Head Squash	2.46 lbs	0.99	
Pasadena Squash	2.46 lbs	0.99	
B. Head Peppers	2.51		

Improved Monitoring of Shrink

Designing an improved shrink monitoring system with two steps:

1. Quantifying the extent of undesirable effects associated with AF's current systems.
2. Targeting improvements in performance.

Based on wholesale value, a target of reducing shrink in the produce department by \$32,000 in the first year was considered feasible. This figure did not include associated costs. The processes followed by AF – from order planning to products leaving the store as a sale or shrink – were then mapped. Potential causes of produce shrink experienced by AF were then explored.

Shown below in Figure 2 is the process map completed with the Store Manager (Jim Hurt), the Produce Department Manager (Dan Medeiros), and the Assistant Produce Department Manager (Nathan Sloski). Those process steps where issues arose that produced a discrepancy between current and desired performance, therefore representing an opportunity to improve performance, are identified by letters taken from the acronym TIM WOOD. Described in Table 1, each letter of the acronym TIM WOOD represents a problem that Jim, Dan or Nathan believed to be impacting how well a specific process was being performed.

Figure 2: Apple Factory Process Map

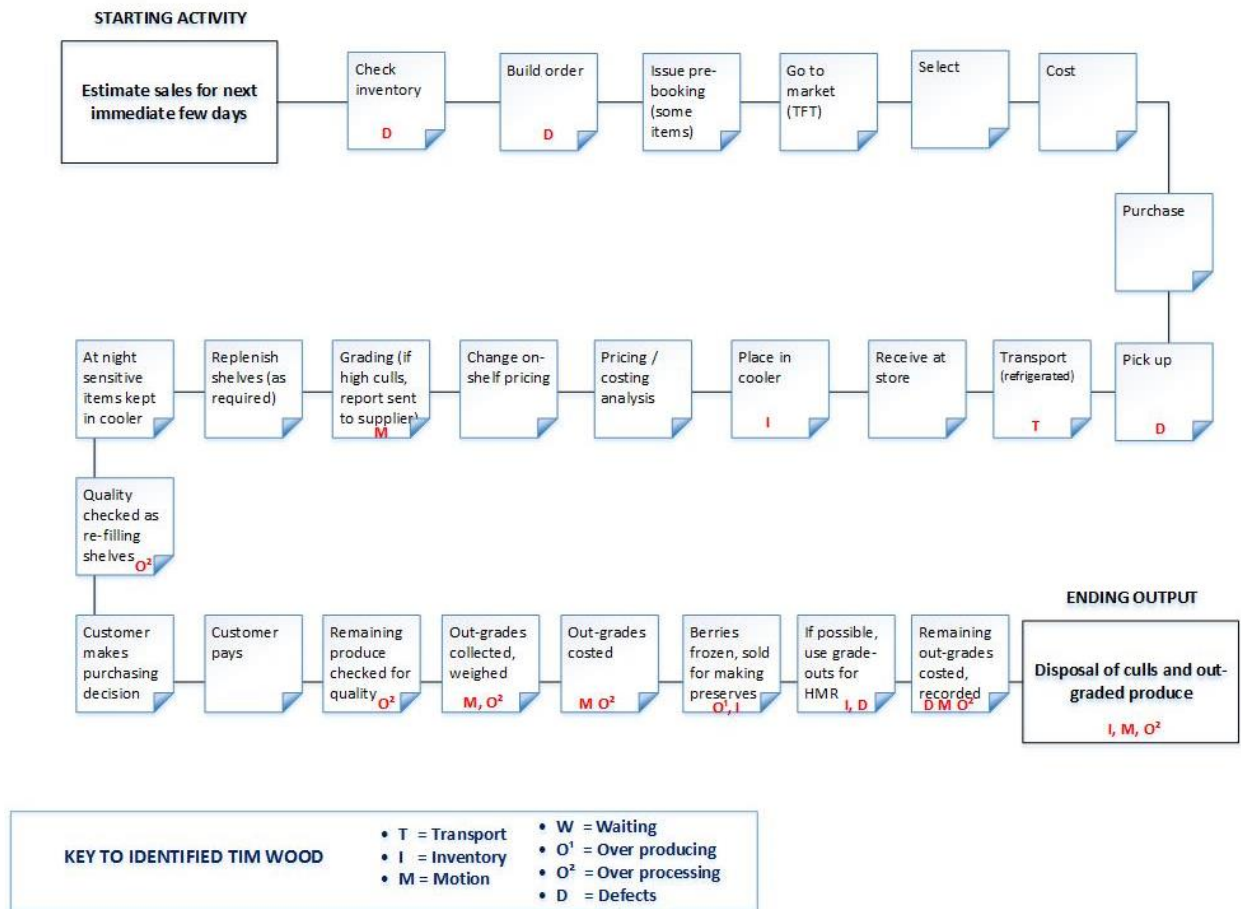


Table 1: TIM WOOD Explained

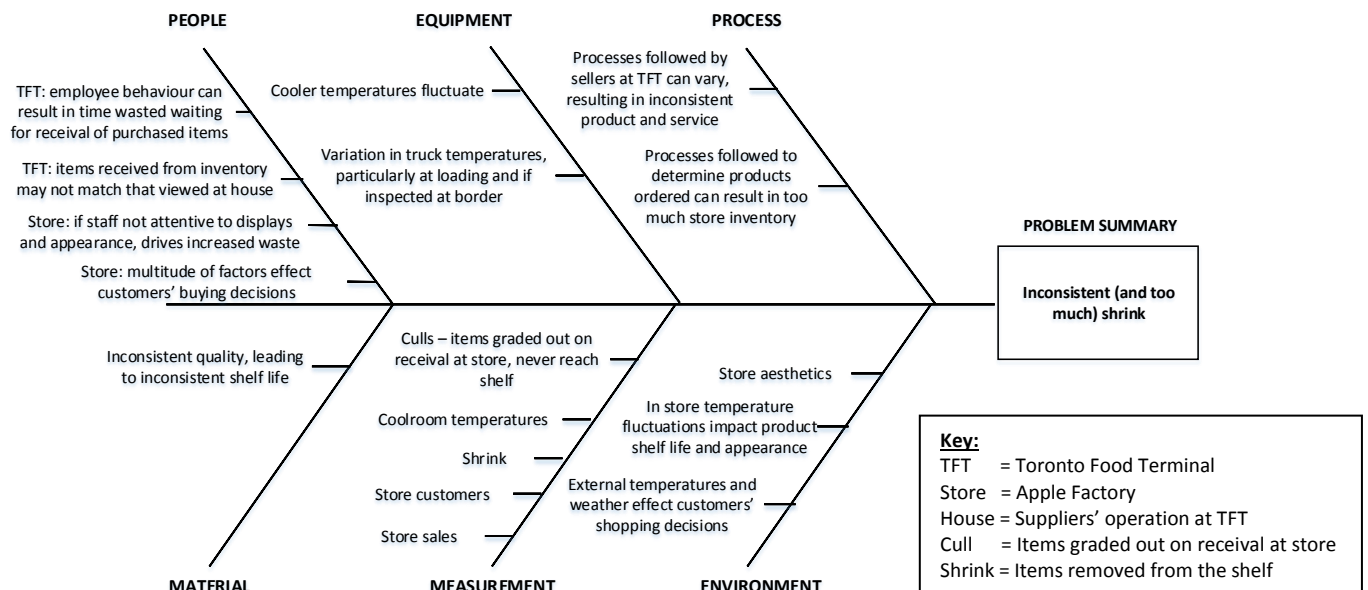
Acronym Letter	Issue Impacting the Effectiveness or Efficiency with Which a Process Is Performed
T	Unnecessary T ransportation, within the facility of external to the facility
I	Unnecessary I nventory, perhaps required to buffer against defects or shrink
M	Unnecessary M otion or M ovement of people, or equipment
W	Unnecessary W aiting or delays
O¹	O ver Producing, making or producing more than required. Leads to inventory (I)
O²	O ver Processing, making it better than needs be or doing something unnecessarily
D	D efects of any kind

The presence of TIM WOOD represents an opportunity to improve performance. A series of small improvements can, cumulatively, have a sizeable impact on overall business performance. The story which emerges from the process map is that a lack of clarity surrounding shrink and its root cause negatively impacted buying decisions. This lack of clarity – stemming from a labour intensive and error-prone approach to reporting shrink – could result in too much inventory. Difficulty matching

supply and demand increased the likelihood of products having to be graded, with culled produce never reaching the shelf, or being stored for longer than expected — resulting in rapid deterioration on the shelf and discounting. For highly perishable products, such as strawberries, up to 75 per cent of what arrives at the store might never reach consumers. This level of culling creates availability issues and reduced sales; it also creates costs that cannot be recouped.

Having identified the need for a more effective shrink reporting system, attention now moved to identifying the information required for AF’s team to address the root causes of current inefficiencies. This would enable a decision to be made on what information was “crucial” versus “nice to have” or would simply become noise. Shown below in Figure 3 is the cause and effect diagram developed with Jim, Dan and Nathan.

Figure 3: Cause and Effect (Fishbone) Diagram



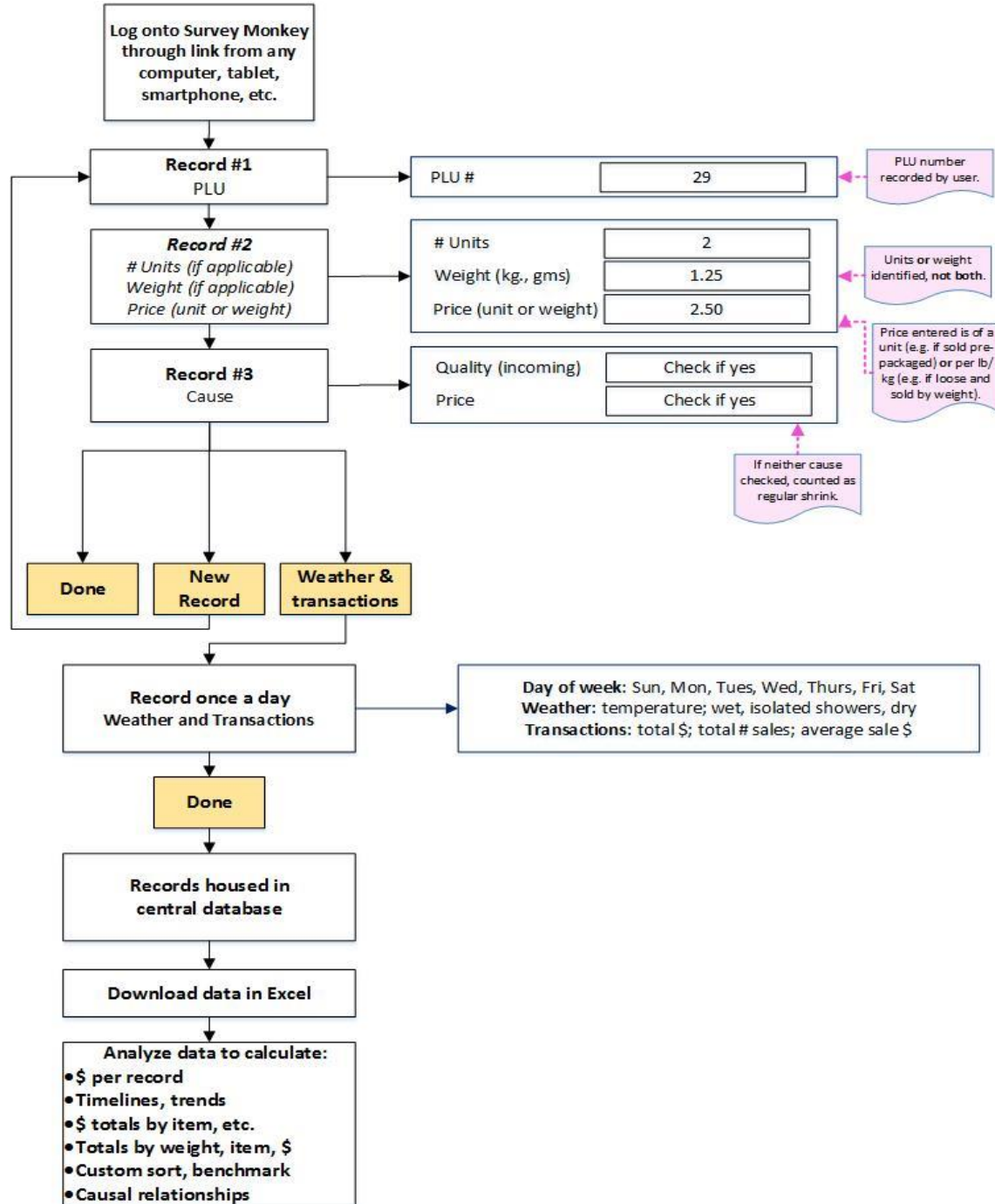
The cause and effect analysis identified that:

1. Only a small number of factors need to be tracked on each occasion shrink is recorded. If date and time of entry is automatically recorded, even fewer items need to be entered by the user.
2. To enable possible immediate relationships between causes and effects to be readily monitored and controls to be put in place, some key factors that can regularly though indirectly lead to shrink (e.g. weather, number of purchases and sales) need to be captured in the same data set. However, these only need to be recorded once daily.
3. So long as recorded information on who supplied “x” product on “y” date and fluctuations in cooler temperature, staff rosters, etc., exist, this does not need to be included in the shrink reporting system. If unusually high levels of shrink occur and their cause(s) is not immediately observable, this information can be sought out for a given timeframe — enabling a deeper dive to identify potential causes and develop solutions.

System Development

With limited resources, a cost-effective process needed to be developed to enable AF's shrink and contributing factors to be monitored and measured in a way that produced accurate CMD. Shown below in Figure 4 is the system architecture developed in consultation with the AF team.

Figure 4: Operations Monitoring Architecture



The monitoring system enabled by the above architecture provides greater insights than the recording of shrink and identification of causal factors in a ledger. It enables retailers to accurately compare the effectiveness of merchandizing practices and its impact on profitability. It also enables retailers to monitor suppliers' performance, and accurately identify the impact of causal relationship associated with factors relating to within and outside of the store. An example of this is the effect that year, day of the week, pack size, price charged or weather has on the sale of Honey Crisp versus Granny Smith apples. The long-term value of implementing an effective shrink reporting system is therefore considerable.

To enable access by multiple users from multiple locations and departments, Survey Monkey² was chosen as the vehicle to implement the shrink recording system.³ Depending on the desired functionalities, the cost of Survey Monkey ranges from free to a few hundred dollars annually. All entries are automatically individually timed and date stamped. Records are password protected and therefore confidential. Summaries of recorded data are available online at anytime from anywhere, via internet connection. Additional benefits provided by Survey Monkey include that all of the data is held in a central cloud-based database, which can be downloaded in Excel. This can be analyzed without any manipulation required, or transferred to a more sophisticated analytical software, such as Minitab — enabling the impact of multiple causal relationships to be compared simultaneously.

Analysis

To protect AF's confidentiality, the results presented below include representative data. The process of analysis and reporting is described accurately. Shown below are a selection of shrink reports produced on three items: apples, head lettuce and romaine lettuce. Each report details the total shrink that occurred in a given period, presented in weight (lbs) or number of units (count). The remedial actions taken to address the root causes of shrink are then presented. These actions include changing merchandizing mechanics, the impact of which is monitored over time, using the shrink reporting system. The person responsible for each action's implementation is also identified. The final report categorizes the total number of reported shrink incidents by root cause.

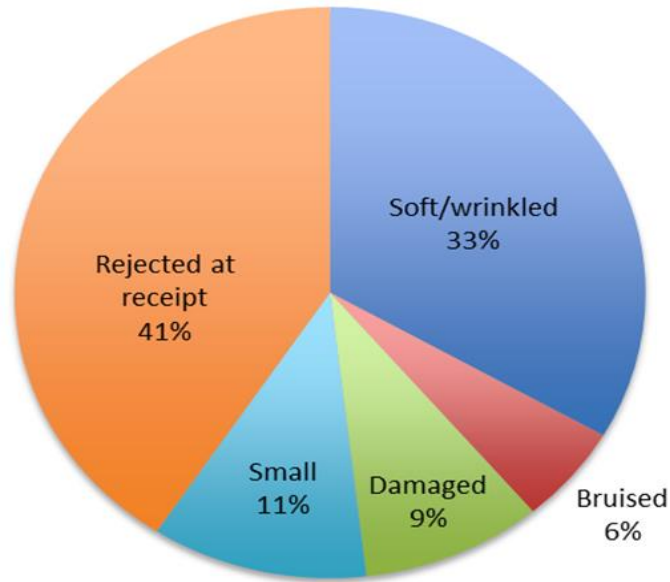
The analysis of CMD produced in Excel by the shrink reporting system enables correlations to be identified between multiple factors. The statistical occurrence of issues and their financial impact can also be quantified. Correlations between SKUs, day of the week, time of day, where issues arise (e.g. on receipt at store vs. on the shelf), why shrink occurred, and source (e.g. a specific house operating at the Toronto Food Terminal vs. a local grower supplying direct) can be quantified.

² <https://www.surveymonkey.net/>

³ Alternative options include recording data directly into Excel using a central device, or online software, such as Google Forms, Microsoft Surveys and Typeform.

Presented below is an aggregated analysis of apples. The comparative performance of specific varieties is not shown. All of the apples included in this analysis are sold in bulk, by weight.

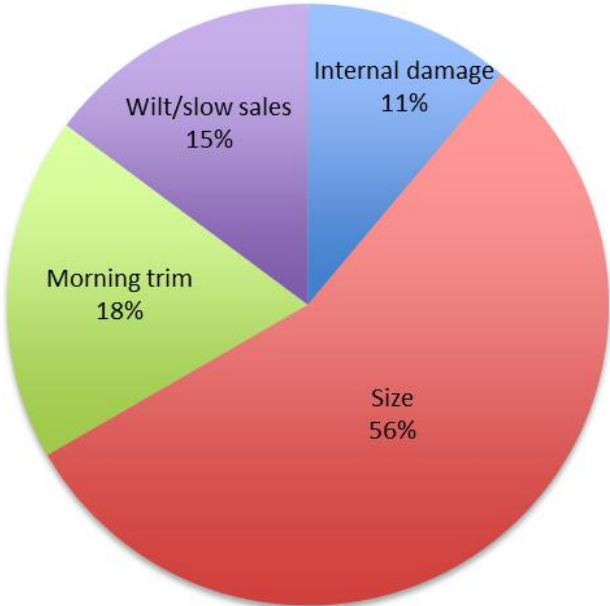
Apple Shrink - 54lbs



Reason for Shrink	Cause	Remedial Action	Owner
Below spec on receipt	Internal damage, size	As a recurring problem, place supplier on notice and submit credit claim	JH
Soft/wrinkled	Length of time on display	In most affected varieties, test the impact of changing size of display on shrink and sales	DM
Grading on receipt	Direct farm supply	Notify grower, submit credit claim	JH
Bruising on shelf	Handling by customers	None	N/A

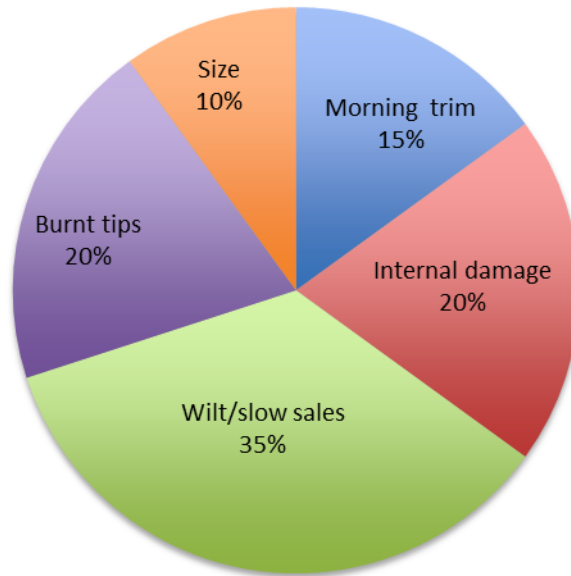
Varieties of lettuce sold individually in bulk (by the piece) are each identified by individual SKU numbers. Individual prepacked lettuce items (e.g. organic spring mix) also have specific SKU numbers. This enables reports on the comparative performance of specific lettuce SKUs, or an aggregated report on lettuce per se, to be produced to identify improvement opportunities. The following analysis is for iceberg and romaine lettuce sold individually on a price per piece basis.

Head Lettuce Shrink - Count = 27



Reason for Shrink	Cause	Remedial Action	Owner
Quality on receipt	Internal damage	Notify supplier and submit credit claim	JH
Size	Case miss-picked by supplier	As isolated incident, return to supplier and submit credit claim	DM
Quality on receipt	Blemishes	Reduce as twin pack, notify supplier when next purchasing	JH/NS
On-shelf quality	Morning trim	Test impact of modifying display size and arrangement on shrink and sales	DM/NS
Quality on receipt	Internal damage	Notify supplier and submit credit claim	JH
Wilting	Slow sales due to weather	Reduce size of display on overcast and wet days	DM/NS

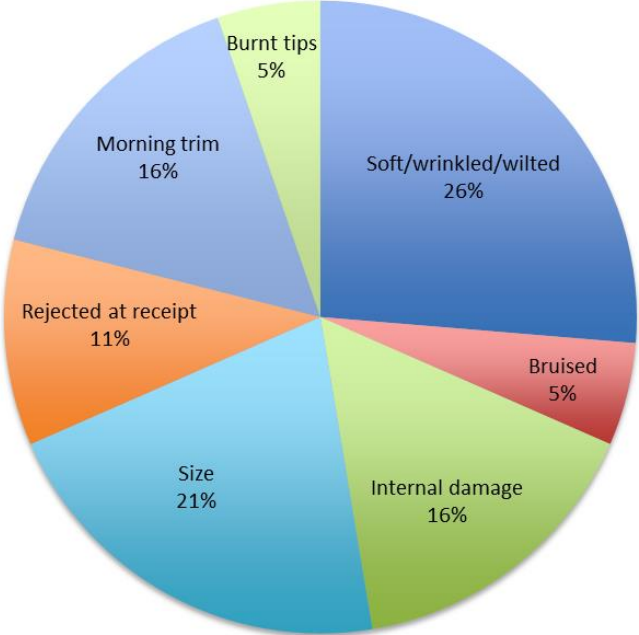
Romaine Lettuce Shrink - Count = 20



Reason for Shrink	Cause	Remedial Action	Owner
On-shelf quality	Morning trim	Test impact of modifying display size and arrangement on shrink and sales	DM/NS
Quality on receipt	Internal damage	Submit credit claim to supplier	JH
Size	Incorrectly graded and packed	Reduce as twin pack, notify supplier	JH/DM
Quality on receipt	Burnt tips	Notify supplier and submit credit claim	JH
Wilting	Slow sales due to weather	Reduce size of display on overcast and wet days, particularly on Monday, Tuesday and Wednesday.	DM/NS

Data used to produce the individual reports presented above was then aggregated to produce a comparative analysis of overall shrink by cause. In total, 19 incidences of shrink occurred during the period being reported. The results and their implications are described below.

Total Reported Incidents of Shrink = 19



As shown in the upper right quartile of the above pie chart, approximately one in four incidents of shrink is caused by the length of time the product is displayed (soft/wrinkled/wilted). Morning trim applies to items returned from overnight cooler storage and new items removed from cartons, both of which are “picked over” for aesthetic reasons.

Over half (53%) of shrink incidents relate to the quality of products received; this includes size (21%), internal damage (16%), rejected on receipt (11%) and burnt tips (5%). Items’ size, particularly for certain items sold in bulk, negatively impacts sales – resulting in shrink or the need to discount. Reasons why items are rejected on receipt include their failure to meet specifications that AF pre-agreed with suppliers ahead of purchasing an item; for example, products’ temperature raising food safety concerns or berries being overripe. Less obvious quality issues, such as burnt tips on lettuce, may only be identified when transferring items from the carton in which they were delivered to the retail shelf.

The effectiveness of merchandizing mechanics, including display size and positioning, can be tested to evaluate their impact on shrink and sales – particular on wet and overcast days, when lettuce sales were slow due to the influence of weather on consumers’ purchasing habits. The impact of weather on lettuce sales, resulting in shrink or the need to discount to encourage sales, is most discernible during the first half of the week (Monday to Wednesday).

Conclusions

The project is enabling AF to measurably improve the efficiency and effectiveness of its reporting systems, and is producing results that are being applied to other areas of their business. Where appropriate, letters from the acronym TIM WOOD are listed alongside the results achieved to date:

- Improving the accuracy, speed and cost of shrink monitoring practices (I, M, O², D);
- Enabling the building of more accurate orders and informed buying decisions (T, I, M, D);
- Identification of quick wins, along with immediate and longer-term opportunities to improve store performance (T, I, M, W, O¹, O², D); and
- Creation of IT capabilities, skills, tools and techniques that will be replicated across store departments and categories of food.

Method of Analysis

The study began with AF's staff participating in a food waste reduction workshop, hosted by OPMA and conducted by VCMI at the Toronto Food Terminal. During the workshop, targeted improvements and project scope were determined, along with the Process Map and Cause and Effect analysis presented earlier. Subsequent visits by VCMI to AF provided greater background on challenges and opportunities, which guided the recording system's design and overall architecture. Data produced by the system was analyzed as described above. Further testing of the system to reduce shrink and increase the effectiveness of merchandizing mechanics is ongoing.

AF's team members who participated in the study were:

- Jim Hurt – Store Manager/Produce Buyer
- Dan Medeiros – Produce Department Manager
- Nathan Sloski – Assistant Produce Department Manager

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