CASE STUDY

Tackling Root Causes of Food Loss in the Potato Supply Chain

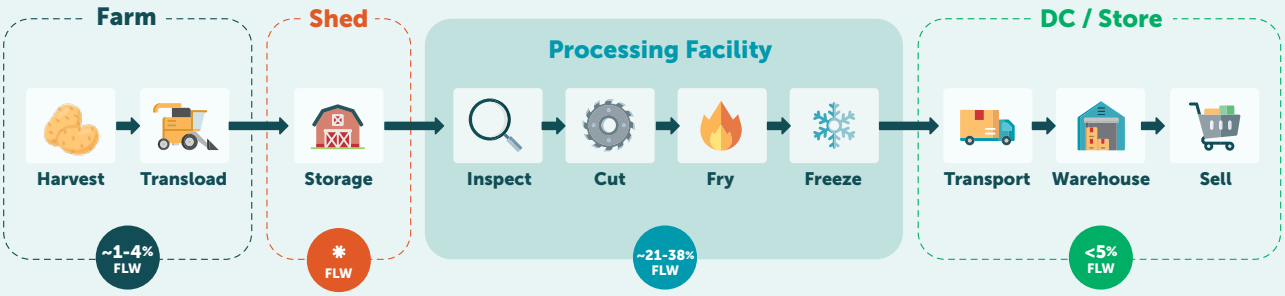
PACIFIC COAST Food Waste Commitment

Winter 2024

Executive Summary

In 2023, the Pacific Coast Food Waste Commitment (PCFWC) commissioned a study of food loss and waste (FLW) in the frozen potato supply chain with Lamb Weston to identify waste hotspots and opportunities to retain more edible products in the human food chain. **The study found that frozen potato loss rates are highest at the processing facility stage (21%-38%)**.

Frozen Potato Supply Chain with Food Loss and Waste Rates



% FLW is the percentage of food loss and waste that occurs out of the total food cultivated or received at each point in the supply chain. In this report, FLW includes any potatoes not delivered for human consumption.

* = unable to obtain data for Shed stage.

The initial Frozen Potato Supply Chain assessment found 21% to 38% of potatoes are lost from the food supply at the processing facility stage (link of the chain). This latest assessment explored opportunities to reduce losses at the processing facility level.

In this subsequent case study, Lamb Weston worked alongside PCFWC and Enviro-Stewards to conduct a deeper dive analysis of its processing facilities to identify where the loss was occurring, why, and potential solutions to prevent or find higher value uses for these losses. Enviro-Stewards' root-cause-based conservation approach (who, what, why, where, and when) was applied to the waste auditing process to prioritize potential solutions. Enviro-Stewards identified nine conservation measures that could collectively save up to 25.6 million more pounds per year of potatoes in the human food supply chain. This case study highlights potential solutions across three categories: Quick Wins, Strategic Measures, and Upcycling Opportunities.

Socially and environmentally, together these measures would:

- Retain 16.8 million meal equivalents per year in the food supply;
- Avoid wasted generation of 4,600 tonnes per year of upstream greenhouse gas (GHG) emissions; and
- Avoid losing the output of approximately 282 acres of agriculture (which benefits biodiversity by reducing pressure to convert additional land to agriculture).

To encourage and assist other facilities in reducing loss in their operations, this case study outlines a root-cause-based conservation approach and details three of the prioritized solutions for Lamb Weston.

Background and Approach

Lamb Weston partnered with the consultancy group Enviro-Stewards to utilize a holistic root-cause-based approach to identify impactful food loss prevention opportunities and develop their associated business cases for implementation.

The five components of Enviro-Stewards' root-cause-based approach are as follows:

- **Who:** Identify and involve stakeholders who manage the facility processes and procedures that are likely to see opportunities for improvement. Involve stakeholders in the kickoff, progress, and final meeting.
- **What:** Identify and quantify what the problems are and where in the facility food is being lost from the production process. Chart the results to find the most significant contributors.
- **Why:** Explore the root cause or causes to understand how they contribute to food loss.
- **Where:** Determine where the focus will be placed. Conceive measures to address root causes and review them with stakeholders. Prioritize measures based on the potential economic, environmental, and social benefits.
- **When:** Complete conceptual designs, cost estimates, and payback analysis on a timeline and sequence based on facility objectives, available resources, and potential impact.

At the end of this approach, Lamb Weston had an array of opportunities identified. The solutions could be grouped into three main categories:

- **Quick Wins:** Solutions that are easier to identify and implement.
- **Strategic Measures:** Solutions that require investment of additional resources but have large impact.
- **Upcycling Opportunities:** Solutions that result in new products from surplus food.

Solutions

Quick Wins

All identified Quick Win solutions have the potential to keep up to 1.4 million pounds of potatoes per year in the human food supply chain.

Quick Wins are small, achievable, and visible measures that are relatively inexpensive and easy to implement. They can often be found by walking a facility to observe where good food unintentionally leaves the production process. It can also be insightful to ask sanitation staff where they consistently need to clean up lost product.

Opportunity: Potato Cutter Jams

When a potato cutter jams, an automated flap closes to halt the flow of potatoes into the cutter. However, potatoes are still entering the far end of the belt, causing them to eventually back up to the point of overflow onto the floor. Potatoes that reach the floor are unable to enter the supply chain for human consumption, qualifying them as food loss.

Quick Win Example: Potato Processing Belt. Photo Credit: Lamb Weston

Pro Tip: Often, when food escapes a process, it becomes a hassle for someone. Ask facility staff about their "pet peeves" to uncover new opportunities to reduce losses and what can be done to improve them, then document those suggestions. This empowers the workforce.

Solution

Adding an additional automated flap at a critical juncture of the belt could route potatoes into an alternate cutting machine when one line gets jammed. This would avoid potatoes piling up and overflowing onto the floor, at which point they can no longer be used.

Projected Savings

The implementation of this specific Quick Win measure would save approximately $140,000 per year with a simple payback period of less than one year. It would also:

- Save 1.2 million pounds of potatoes per year, equivalent to the output of 13 acres of agriculture;
- Retain the equivalent of 560,000 meals per year in the human food supply; and
- Avoid the wasted generation of 150 tonnes per year of Scope 3 GHG emissions already produced during the process of growing the potatoes.

Strategic Measures

All identified Strategic Measures have the potential to keep up to 11.6 million pounds of potatoes per year in the human food supply chain.

Substantially reducing food loss requires identification of Strategic Measures. A few root causes are typically responsible for most of the losses. Consider the Pareto Principle: 20% of the issues typically cause 80% of the problems. Therefore, it is advisable to complete process-level measurements and prepare a food loss balance. More significant contributors to total food loss are then examined in greater detail to identify underlying root causes and potential remedies. Those remedies are then discussed with relevant stakeholders to secure broad consensus on the Strategic Measures and how they could be implemented.

A food loss balance or mass balance measurement infers food loss and waste levels by comparing inputs (e.g., products entering a grocery store) with outputs (e.g., products sold to customers) along with changes in standing stock levels. At its most basic, this method estimates FLW by subtracting the outputs from the inputs, with the difference being considered the amount of FLW.

Source

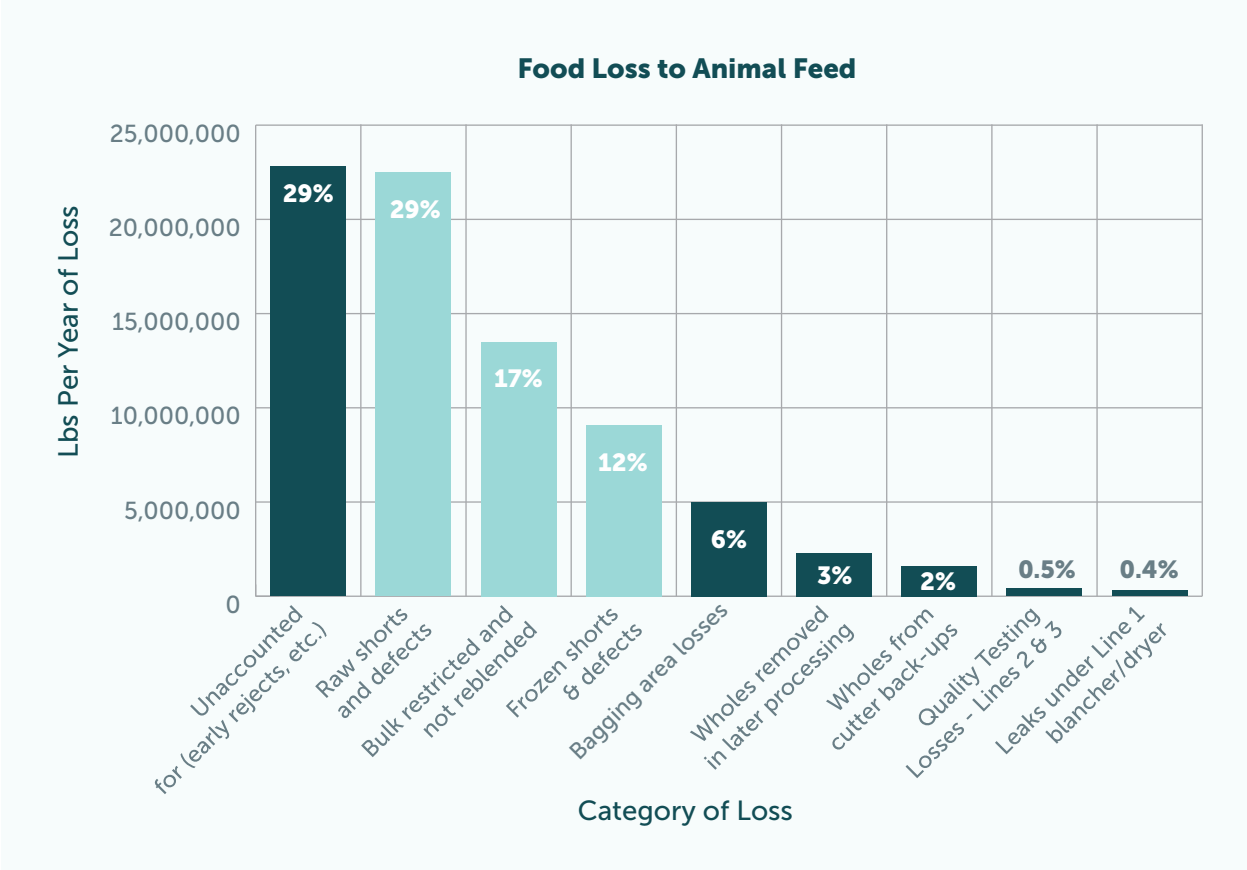
Opportunity: Rework of Shorts and Slivers

A single issue—shorts and slivers—accounts for one-third of all food loss. When potatoes are cut into fries or other shapes, a significant quantity becomes too short (shorts) or too thin (slivers). In addition, a portion of the fries break during further processing steps (blanching, frying, & freezing). These shorts and slivers are sent to feed animals.

The shorts and slivers contribute to three categories of loss that collectively account for 58% of total losses (shown in Chart 1 on the next page). If too large a proportion of shorts and slivers find their way into a final product, the entire product is classified as “restricted,” or not suitable for sale as-is. Measures are currently in place to remove shorts and slivers prior to packaging, and a portion of restricted product gets reworked and packaged for sale.

Even so, restricted products are still one of the largest contributors to food loss at Lamb Weston (17%). In addition, shorts and slivers removed at the raw and frozen stages of the process (prior to packaging), account for 29% and 12% of losses to animal feed, respectively.

Chart 1 | Food Loss Sent to Animal Feed



The three light blue bars in this chart indicate the categories of food loss contributed to by shorts and slivers.

Solution

Shorts and slivers that are removed before the par-fry process step can potentially be redirected to Lamb Weston's co-product line that produces tater puffs, hash browns, and other products that do not require specific length potatoes. By sending these shorts and slivers from the par-fry process to the co-product line, Lamb Weston can reduce restricted product volumes—utilizing a greater share of their potatoes in the products they sell and reducing the amount they lose or send to animal feed.

Projected Savings

This Strategic Measure would save approximately one million dollars per year of product. It would also:

- Save 11.6 million pounds of potatoes, equivalent to the output of 127 acres of agriculture;
- Retain the equivalent of 5.4 million meals in the human food supply; and
- Avoid the wasted generation of 1,476 tonnes per year of Scope 3 GHG emissions already produced during the process of growing the potatoes.

Upcycling Opportunities

The identified Upcycling Opportunity has the potential to keep up to 12.6 million pounds of potatoes per year in the human food supply chain.

Upcycling is when a company takes what would be a loss or surplus food and turns it into a new product for human consumption.

Opportunity

Due to product specifications, shorts and slivers from skin-on products cannot be reworked into formed products currently being made on co-product lines.

Solution

Explore partnering with other food processors who could potentially receive skin-on shorts and slivers as an input to their products. Upcycling companies are growing in number and can be found in a variety of directories including the Upcycled Food Association Member Directory.

Project Savings

The implementation of this Upcycling Opportunity would:

- Save 12.6 million pounds of potatoes per year, equivalent to the output of 138 acres of agriculture;
- Retain the equivalent of 5.87 million meals per year in the food supply; and
- Avoid the wasted generation of 1,600 tonnes per year of Scope 3 GHG emissions already produced in the process of growing the potatoes.

Pro tip: First maximize food recovery onsite as these tend to have the largest margins and operational control.

Next Steps

Lamb Weston is currently exploring implementation of Quick Win solutions and conducting further assessment of the Strategic Measures and Upcycling Opportunities. Specific fixes may not be transferable across organizations, but the aforementioned root-cause-based food loss prevention approach is transferable. Enviro-Stewards has used this approach with 50 food and beverage processors across Canada. The root-cause-based conservation approach (who, what, why, where, and when) identified food savings averaging $175,000 USD per year (per facility) with an average payback period of under one year.

Inspection and processing of potatoes.
Photo Credit: Lamb Weston

Acknowledgments

The PCFWC would like to thank Lamb Weston and Enviro-Stewards for their contributions to this case study.

About Lamb Weston
Lamb Weston is a leading supplier of frozen potato, sweet potato, appetizer and vegetable products to restaurants and retailers around the world. For more than 70 years, Lamb Weston has led the frozen potato industry in innovation, introducing inventive products for their customers.

About Enviro-Stewards
Enviro-Stewards is an engineering consulting firm whose mission is to cultivate resilient businesses and improve lives in extraordinary ways. They are committed to assisting corporations to significantly reduce their environmental impact, with a focus on comprehensive decarbonization strategies. They are a Best for the World classified B Corporation and the only Canadian company to win a Global SDG award. They help manufacturing facilities to reduce food loss & waste as well as conserving water and energy.

About the Pacific Coast Food Waste Commitment
The Pacific Coast Food Waste Commitment (PCFWC) arose out of the Pacific Coast Collaborative in 2016 and is an innovative public-private partnership made up of West Coast jurisdictions, U.S. food industry leaders, and nonprofit resource partners that together seek to eliminate food waste in the region by 50% by 2030. Learn more about the initiative and its members at pacificcoastcollaborative.org/food-waste.

About the U.S. Food Waste Pact
The U.S. Food Waste Pact is a national voluntary agreement to help food businesses accelerate progress toward their waste reduction targets. Led by national nonprofit partners ReFED and World Wildlife Fund, the U.S. Food Waste Pact is aligned around the global framework of "Target, Measure, Act" to help food businesses reduce waste within their operations.

Pacific Coast Food Waste Commitment Business Signatories

(As of Winter 2024)

Retailers

Albertsons
ALDI
Kroger
NEW SEASONS MARKET
PCC COMMUNITY MARKETS
Raley's
SPROUTS FARMERS MARKET
Walmart

Hospitality and Foodservice

aramark
COMPASS GROUP
sodexo

Manufacturers

Bob's Red Mill
FOOD NORTHWEST We Feed You
LambWeston SEEING POSSIBILITIES IN POTATOES

Distributors

ORGANICALLY GROWN co

Growers

Del Monte Quality

Resource Partners

Cascadia Policy Solutions ENVIRONMENT | CLIMATE | ENERGY
ReFED
wrap
WWF