Smithfield Foods

Going beyond diversion saves 3.8 million protein servings!

Food Loss and Waste Measurement Case Study

As part of its industry leading sustainability program, Smithfield Foods strives to maximize the social, environmental and economic value of food. To do so, the company is committed to reducing food loss and waste. At its facility in Junction City, Kansas, a process-level prevention assessment with Enviro-Stewards identified and implemented measures that have reduced food loss to rendering by 30% and retained 3.8 million protein servings (943,400 lbs.) per year in the food supply chain.

Organization

Headquartered in Smithfield, Virginia, since 1936, Smithfield Foods is an American food company with agricultural roots and a global reach. Its 40,000 employees in the United States are dedicated to producing "Good food. Responsibly.®" and have made Smithfield one of the world's leading vertically integrated protein companies. The company has pioneered sustainability standards for more than two decades, including many industry firsts, such as its ambitious commitment to cut its carbon impact by 25 percent by 2025. Smithfield's portfolio includes high-quality iconic brands, such as Smithfield®, Eckrich®, and Nathan's Famous®, among many others. Smithfield's environmental achievements were recognized with a 2020 Most Valuable Pollution Prevention (MVP2) award, which is presented by the National Pollution Prevention Roundtable (NPPR) to celebrate the successes of innovators in the areas of pollution prevention and sustainability.

Introduction

Smithfield recognizes its leadership role in sustainably feeding the world and is committed to implementing efforts to solve the biggest issues facing society and the planet—of which food waste is a significant one.

What was measured?

A food loss and waste (FLW) prevention assessment was conducted at Smithfield's Junction City, Kansas, processing facility (the facility), which produces sausage.

The assessment team measured FLW in the facility's raw processing and packaging areas.

How was it measured?

Food losses identified in the raw processing and packaging operations were collected and weighed. Based on operating hours, procedures, and potential avoidable losses, annual estimated savings and payback periods were calculated.

What were the outcomes?

Since 2017, food loss prevention has reduced the amount of material lost to rendering (per unit of production) by 30%. This has saved 943,400 lbs (428,000 kg) of food per year, valued at $615,000. This represents a savings of 2,400 tonnes/year of embedded greenhouse gas emissions and 3.8 million servings of protein per year.

The highest societal, environmental, and economic values of food are realized when it is consumed by people. Hence, preventing food waste at-source retains the social, environmental and economic value embedded in that food. This approach is in alignment with the USEPA's Food Recovery Hierarchy, which places prevention/source reduction (of food waste) as the most preferred option.[1]

As such, Smithfield has elected to participate in Champion 12.3's 10x20x30 initiative, which sets a target to reduce FLW sent to destinations other than animal feed and bioprocessing by 50%, measure baselines and progress, and take action to reduce the baseline values.[2]

1) <https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy>
2) Champions 21.3: 10x20x30. Retrieved January 8, 2021, from https://champions123.org/10-20-30

The Junction City facility already diverts more than 99% of their food waste to bioprocessing so they set a voluntary stretch goal to also reduce food loss to bioprocessing by 50%! To meet this goal, the facility retained Enviro-Stewards to conduct a FLW prevention assessment with facility staff.

Setting the Scope

The Commission for Environmental Cooperation's guidance module for measuring FLW in processing and manufacturing was employed at the Junction City facility to measure food waste.[3]

The facility is divided into two major areas: Raw and Packaging. As the name implies, the raw side is where raw ingredients are mixed and processed, and packaging is where the final product is cut to size and packaged for distribution to customers. The FLW project team conducted the on-site phase of the assessment. Its first step was to conduct detailed site walks of the raw and packaging sides to ob-serve the various processes, discuss procedures with operations staff, and note points of food loss during production, changeover, sanitation, and other activities. Once the major food loss sources were identified, the team then measured the losses to quantify them.

The next step of the first phase was to analyze the collected data to estimate annual losses (weight and dollar amount). Opportunities to reduce or eliminate the FLW sources were then identified using root cause analysis, including the potential reduction quantity associated with each opportunity. The team discussed the findings to vet the technical feasibility of the recommended measures, which ul-timately produced a list of technically viable FLW reduction opportunities and associated quantity reductions. The economic viability of the vetted measures was then calculated to estimate the dollar savings, cost to implement, and payback period. The results of the assessment, including the list of FLW reductions and associated economic analysis, were presented in an assessment report.

During the assessment, a proof-of-concept demonstration was conducted by placing a sanitized stain-less-steel table at a specific point of loss. For the shift studied, measured losses were substantially lower than losses during preceding (baseline) shifts.

The facility immediately began implementing several of the identified and quantified loss prevention measures. All FLW from the packaging lines was separated and deposited in specific combos and weighed. Although this did not immediately reduce FLW, it did enable more refined data sets that more clearly indicated the origin of the loss. A grinder was also relocated and gaps throughout the raw processor machines were closed to eliminate waste falling to the floor in this area. Additionally, the facility reviewed the processing and cleaning standard operating procedures (SOPs) with their raw-side production team to reduce losses.

Image 1. Example of food waste to be measured.

FLW Measurement Methods

The following key measurement methods were used during the Junction City facility's FLW assessment:

Direct measurement

- Wasted food, such as food that had fallen on the floor or food waste generated through cleaning procedures, was collected by the project team and weighed on scales.
- The collected weights were further categorized by waste type, sampling time and duration, and the location and/or process.

Waste Composition Analysis

- Waste collection receptacles were investigated to identify and measure (using weigh scales) any food waste that was discarded into the receptacles.
- The food waste data was categorized by location, sampling time, type of waste, and location/process.

Records

- Production records, procedures, shipping, operating hours, etc., were used to estimate annual waste quantities, based on the collected and weighed food loss quantities determined from direct measurement and waste composition analysis.
- Historic waste records were also compared against the FLW estimates from the on-site measurements to verify the project findings.
- Where possible, measurements were taken at-source as the process was operating and the waste was being generated.

3) Commission for Environmental Cooperation (2019): CEC. 2019. Why and How to Measure Food Loss and Waste: A Practical Guide. Montreal, Canada: Commission for Environmental Cooperation. 60 pp.

For example, during product pushes during end of production, line transfers, and species changeovers on the raw side, the waste being expelled was captured in real-time in a plastic pail and weighed. This method was selected to ensure accurate data capture, as the person doing the collecting could ensure that the entirety of the expelled waste was collected. Additionally, it allowed the team member to collect only the portion of the waste that would be viable for rework.

As an example, the team captured the FLW falling off the raw processing machinery, either in the guard gaps or between the grinder and the collection totes. Every hour during the raw meat grinding process, the team would return to the area where ground meat was falling to floor and would collect it with a sanitation shovel and immediately weigh it. Furthermore, based on conversations with operators, it was validated that the waste volume captured was typical (i.e., not an anomalous one-time event). The frequency of the changeover, end-of-production cleaning, etc., were then used to extrapolate the measurements to annual quantities.

Another example of direct measurement was on the natural casings product line. It was observed that a significant amount of natural casing material dropped to the floor during the process of cutting the natural casing from the brine-hanging equipment as it exited the brining tunnel. Direct measurements of natural casings lost to floor were captured using two methods: 1) by collecting the fallen product over a known production period and weighing it, and 2) by placing a large catch tote and stainless-steel table to catch dropped product over a known production period. The totes were then weighed at the end of the production shift, producing highly accurate loss values with minimal resources. If desired, tracking the future amount of loss is possible if a tote is retained for collecting the loss in this area and then weighed to trend daily loss values.

Major Findings (current savings as of December 2020)

- Since 2017, food loss prevention has reduced the amount of material lost to rendering (per unit of production) by 30%.
- This has saved 943,400 lbs (428,000 kg) of food per year, valued at $615,000.
- The implemented measures are also avoiding the loss of 2,400 metric tonnes of (embedded) GHG emissions and preserving 3.8 million protein servings per year in the food supply.

Summary of Major Conservation Opportunities

- Recovering additional product at the end of production runs (prior to sanitation)
- Reducing grinder losses through process equipment and conveyor modifications
- Installing catch tables at specific points of loss

"Food Loss and Waste (FLW) is an important issue in the United States and worldwide. At Smithfield, we take this issue seriously and strive to minimize FLW every day. We've made great strides over the past few years at our Junction City facility and intend to use the lessons learned there to further reduce FLW at all Smithfield manufacturing facilities. This is all a part of producing good food responsibly."

- John Meyer - Senior Director, Environmental Affairs

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