Practical Approaches to Reducing FLW in Manufacturing

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Outline

• About Provision Coalition
• FLW Initiatives
  – FLW Challenges and Opportunities
• Practical Solutions
  – Approaches
• Summary & next steps
PROVISION COALITION
About Provision Coalition

• Delivering expert resources & programs to make food sustainably
  – Sustainable Management System
  – Value Chain Collaboration
  – Knowledge Transfer & Outreach
Provision’s Food Loss + Waste Initiatives
ISSUES IN THE FOOD AND BEVERAGE INDUSTRY

Pesticides
Food Safety
Food security
Biodiversity
Pollution
Labor issues
Traceability

Pollution - chemicals/pesticides
Soil degradation
Long term raw material supply
Food security
Human rights
Poverty
Child labor
Worker health/safety
Biodiversity

Food Safety/
Contamination
Traceability
Fraudulent materials
Obesity
Nutrition

Health
Allergies
Responsible marketing
Alcohol abuse
Advertising to children
Food waste
Packaging Waste
Recycling
Transport ("food miles")

Sustainable agriculture
Prices/Farmers income
Animal welfare
Water security
Sustainable aquaculture
Power/equity of trading relationships
Slavery
Traceability
Food waste

Human rights
Work conditions
Corruption/Bribery
Animal welfare
Food waste
Traceability

Eco-efficiency/Energy
Food and water security
Food safety/Contamination
Traceability
Emissions (air and water)
Packaging waste /Recycling
Health and safety of employees
Diversity
Long term raw material supply

Corruption/bribery
Quality
Food safety
Traceability
Food/Packaging waste
Recycling
Transport ("food miles")

DIAGRAM 3: ISSUES IN THE FOOD AND BEVERAGE INDUSTRY

Research: Mapping Food Waste Challenge

• Understand food waste in Canadian F&B industry
  ▪ What is food waste?
  ▪ How big is the food waste problem?
  ▪ Where does food waste occur and why?
  ▪ How can the problem be tackled?
Distribution of Food Waste Throughout the Value Chain (Farm to Fork)

- Farm: 47%
- Packaging/Processing: 20%
- Transportation/Distribution: 10%
- Retailing: 9%
- Food service: 4%
- Households: 10%

Source: Gooch et al. (2014)
# What Are the Hot Spots for Food Waste?

<table>
<thead>
<tr>
<th>Farm</th>
<th>Packaging &amp; Processing</th>
<th>Wholesale Distribution</th>
<th>Retailing</th>
<th>Food Service</th>
<th>Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop/ livestock production</td>
<td>Post-harvest</td>
<td>Fruits &amp; Vegs</td>
<td>Grain Products</td>
<td>Fruits &amp; Vegs</td>
<td>N.A.</td>
</tr>
<tr>
<td>Fruits &amp; Vegs</td>
<td>Fruits &amp; Vegs</td>
<td>Grain Products</td>
<td>Fruits &amp; Vegs</td>
<td>Fruits &amp; Vegs</td>
<td>N.A.</td>
</tr>
<tr>
<td>Seafood</td>
<td>Meat</td>
<td>Seafood</td>
<td>Seafood</td>
<td>Seafood</td>
<td>Meats &amp; Seafood</td>
</tr>
<tr>
<td>Grain Products</td>
<td>Meat</td>
<td>Meat</td>
<td>Meat</td>
<td>Meat</td>
<td>Grain Products</td>
</tr>
<tr>
<td>Dairy Products</td>
<td>Dairy Products</td>
<td>Bakery &amp; Deli</td>
<td>Dairy Products</td>
<td>Dairy Products</td>
<td></td>
</tr>
<tr>
<td>Beverages</td>
<td>Beverages</td>
<td>Ready-Made Food</td>
<td>Beverages</td>
<td>Beverages</td>
<td></td>
</tr>
</tbody>
</table>
What Are Root Causes of FLW?

• Human behaviour and incentives behind it
• Time-limited biological reality of food
• Limitations of technology or lack of advanced technology, equipment, packaging, etc.
• Risk perception and risk avoidance
• Intended consequences of regulation
Why is FLW Not a High Priority for All Businesses?

- Not aware of the extent of food waste
- Fail to connect the dots – tie food waste to costs and profitability
- Believe it is cheaper to dispose of food waste than to manage in a way that drives reduction, re-use or recycling
- Do not understand that change is possible
FLW Challenges and Opportunities

• Awareness of a problem
  – $6 Billion waste occurring from manufacturing in Canada

• Access to innovative technology

• Ability to quantify and track progress
  – No data

• Mindset shift
  – Managing change
Food Waste Stakeholders Collaborative
Solutions Focused Research

- Innovation & Technology Opportunities
- Industry Best Practices
• April 12, 2017
• Mississauga Convention Centre, Toronto
• Linking solutions to food waste reduction
Food Waste Working Group

INCREASE
PROFITABILITY &
COMPETITIVENESS

REDUCE
ENVIRONMENTAL
FOOTPRINT &
BUSINESS RISKS
Practical Solutions
“Every food and beverage manufacturer should be aware of (the SMS) and leverage it to save money and become better stewards of our environment.”
### Input Data from Bills

**Stage 1a. Quantifying Food Waste - Input Screen**

**Method 1. Quantifying Avoidable Food Waste Using Available Waste Disposal and Diversion Data**

<table>
<thead>
<tr>
<th>Description</th>
<th>Months</th>
<th>Tonnes</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many tonnes of waste was directed to landfill? From your bills or waste audit data enter the number of months they represent and tonnes of waste.</td>
<td>7</td>
<td>100</td>
<td>171.4 tonnes/year</td>
</tr>
<tr>
<td>What was the cost of landfilling during the same period? From your bills or waste audit data enter the number of months they represent and disposal cost of waste.</td>
<td>7</td>
<td>5000</td>
<td>$8571/year</td>
</tr>
<tr>
<td>What per-cent of the waste directed to landfill is food waste? Estimate using your best judgment. (default 50%)</td>
<td>35</td>
<td></td>
<td>60 tonnes/year</td>
</tr>
<tr>
<td>How many tonnes of food waste was diverted to any non-disposal options (e.g. composting, anaerobic digestion, animal feed)? From your bills or waste audit data enter the number of months they represent and tonnes of food waste.</td>
<td>12</td>
<td>10</td>
<td>10.0 tonnes/year</td>
</tr>
<tr>
<td>What was the cost of diversion during the same period? From your bills or waste audit data enter the number of months they represent and diversion cost of waste.</td>
<td>12</td>
<td></td>
<td>$100/year</td>
</tr>
</tbody>
</table>

**Total Annual Tonnes of Food Waste**

- **Total Annual Cost to Manage Food Waste (Disposal and Diversion)**
  - 70 tonnes/year
  - $3100/year
Stage 1b Method 1. Quantifying Food Waste - Output Screen

Output with Data from Bills

Quantity of Food Waste Report

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Quantity of Food Waste</td>
<td>70 tonnes/yr</td>
</tr>
<tr>
<td>Estimated % Avoidable Food Waste in Waste Stream</td>
<td>39 %</td>
</tr>
<tr>
<td>Disposal Cost</td>
<td>$3,100/yr</td>
</tr>
<tr>
<td>Diversion Cost</td>
<td>$44/tonne</td>
</tr>
<tr>
<td>Average value of finished product</td>
<td>$1.00/kg</td>
</tr>
<tr>
<td>Average value of ingredient mixture</td>
<td>$0.50/kg</td>
</tr>
<tr>
<td>Operating days per year</td>
<td>250 days</td>
</tr>
<tr>
<td>Value of Food Waste (i.e. Product) Lost</td>
<td>$52,500/yr</td>
</tr>
</tbody>
</table>

This gives you a rough estimate of the amount and dollar value of food waste generated at your facility.

If you want to develop a more refined estimate we suggest that you undertake a food waste audit.

GO TO FOOD WASTE AUDIT
Input Audit Data

Tell us about your facility

List up to five significant processes/procedures that generate avoidable food waste.

<table>
<thead>
<tr>
<th>Step</th>
<th>Task</th>
<th>Processing Step</th>
<th>Cumulative Processing</th>
<th>Avoidable Food Waste</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Ingredient Recipe</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>Mixing</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Step 3</td>
<td>Packaging</td>
<td>100</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Step 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

How many days does your facility operate per year? (default is 250 days)

250

% / Kg
<table>
<thead>
<tr>
<th>Description of process</th>
<th>Ingredient Recipe</th>
<th>Mixing</th>
<th>Packaging</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of processing completed</td>
<td>0 %</td>
<td>50 %</td>
<td>100 %</td>
<td>0 %</td>
<td></td>
</tr>
<tr>
<td>Estimate % of food waste generated along each processing stage</td>
<td>25 %</td>
<td>50 %</td>
<td>25 %</td>
<td>0 %</td>
<td></td>
</tr>
<tr>
<td>Potentially avoidable loss (kg/day)</td>
<td>80</td>
<td>120</td>
<td>60</td>
<td>0</td>
<td>240</td>
</tr>
<tr>
<td>Annual Quantity Avoidable Food Waste Lost (tonnes/yr)</td>
<td>15.00</td>
<td>30.00</td>
<td>15.00</td>
<td>0.00</td>
<td>60</td>
</tr>
<tr>
<td>Disposal and Diversion cost ($/yr)</td>
<td>$2,500</td>
<td>$5,000</td>
<td>$2,500</td>
<td>$0</td>
<td>$10,000</td>
</tr>
<tr>
<td>Product value ($/kg)</td>
<td>$1.00</td>
<td>$1.50</td>
<td>$2.00</td>
<td>$1.00</td>
<td></td>
</tr>
<tr>
<td>Value of Affordable Food Waste (i.e., Product) Lost ($/yr)</td>
<td>$15,000</td>
<td>$45,000</td>
<td>$30,000</td>
<td>$0</td>
<td>$90,000</td>
</tr>
<tr>
<td>Subtotal of avoidable Food Waste Cost/Opportunity ($/yr)</td>
<td><strong>$17,500</strong></td>
<td><strong>$50,000</strong></td>
<td><strong>$32,500</strong></td>
<td>$0</td>
<td><strong>$100,000</strong></td>
</tr>
</tbody>
</table>

% and Annual Dollar Value of Avoidable Food Waste

% and Annual Dollar Value of Avoidable Food Waste

Output with Audit Data
Root Cause Identification

You have identified steps along the process where food is wasted which is presented here. You can select from one up to all of the process steps to complete the 5 Whys on. See examples of potential root causes in the right column of this page.

You may have to ask "Why" once or all five times until the root cause is identified. As well, there may be only one root cause but if more, you can select up to three root causes per process step.

Before you start, we encourage you to speak with different departments within your organization to help identify root causes. To assist you with identifying potential root causes, refer to the side bar.

Process Step 1 - Root Cause Identification

Ingredient Recipe

Why 1
Why did food waste occur?
Container required is larger than measurement needed, extra cannot be used.

Why 2
Why did answer 1 happen?

Why 3
Why did answer 2 happen?

Why 4
Why did answer 3 happen?

Why 5
Why did answer 4 happen?

Root Cause(s)
Food safety issues or select ---Select---

View potential root causes for food/beverage waste in processing and packaging

Root causes of food waste

- Unintended consequences of regulation
- Risk perception and risk avoidance among businesses and consumers
- Human behaviour (consumers, employees, managers)
- Time-limited biological reality of food
- Limitations of technology or lack of advanced technology, equipment, packaging, etc.
## Evaluating Solutions

View potential solutions to root causes of food waste

### Process Step 1

**Ingredient Recipe**

<table>
<thead>
<tr>
<th>Root Cause(s)</th>
<th>Possible Solution(s)</th>
<th>Estimated Capital Budget</th>
<th>Estimated Operating Annual Budget</th>
<th>What are the potential benefits to this solution?</th>
<th>What are the potential challenges to this solution?</th>
<th>When can this solution be implemented?</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 Food safety issues</td>
<td>Refrigeration closer</td>
<td>5000.00</td>
<td>0.00</td>
<td>Reduced Ingredient</td>
<td>Space and budget</td>
<td>Short-term 0-1 years</td>
<td>Medium</td>
</tr>
</tbody>
</table>

### Process Step 2

**Mixing**

<table>
<thead>
<tr>
<th>Root Cause(s)</th>
<th>Possible Solution(s)</th>
<th>Estimated Capital Budget</th>
<th>Estimated Operating Annual Budget</th>
<th>What are the potential benefits to this solution?</th>
<th>What are the potential challenges to this solution?</th>
<th>When can this solution be implemented?</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 2 Poor machine set up</td>
<td>Training on equipment</td>
<td>0.00</td>
<td>3000.00</td>
<td>Better training on equ</td>
<td>Staff turnover and train</td>
<td>Short-term 0-1 years</td>
<td>High</td>
</tr>
</tbody>
</table>

### Process Step 3

**Packaging**

<table>
<thead>
<tr>
<th>Root Cause(s)</th>
<th>Possible Solution(s)</th>
<th>Estimated Capital Budget</th>
<th>Estimated Operating Annual Budget</th>
<th>What are the potential benefits to this solution?</th>
<th>What are the potential challenges to this solution?</th>
<th>When can this solution be implemented?</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 3 Poor machine set up</td>
<td>Change the operating</td>
<td>2000.00</td>
<td>4000.00</td>
<td>Reduce poor packag</td>
<td>Orders will take long</td>
<td>Short-term 0-1 years</td>
<td>Low</td>
</tr>
</tbody>
</table>
Solutions Report

Stage 3b. Selection and Evaluation of Possible Solutions - output screen

Summary of possible solutions to root cause issues of food waste that can be printed and distributed for discussion to help with developing the implementation plan.

Possible Solutions Report

<table>
<thead>
<tr>
<th>Step No.</th>
<th>Process Description</th>
<th>Root Cause Description</th>
<th>Possible Solution(s)</th>
<th>Estimated Capital Budget</th>
<th>Estimated Annual Operating Budget</th>
<th>Short Term</th>
<th>Mid Term 1-5 Yr</th>
<th>Long Term &gt;5 Yr</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ingredient Recipe</td>
<td>Food safety issues</td>
<td>Refrigeration closer to work area</td>
<td>5000.00</td>
<td>0.00</td>
<td>X</td>
<td></td>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td>2</td>
<td>Mixing</td>
<td>Poor machine set up</td>
<td>Training on equipment</td>
<td>0.00</td>
<td>3000.00</td>
<td>X</td>
<td></td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>Packaging</td>
<td>Poor machine set up</td>
<td>Change the operating speed of the packaging machinery</td>
<td>2000.00</td>
<td>4000.00</td>
<td>X</td>
<td></td>
<td></td>
<td>Low</td>
</tr>
</tbody>
</table>
Food Waste Reduction and Practices Toolkit

To start using the framework simply select the question that represents the stage your company is at.

Pilot Partners
FLW Toolkit – Version 2.0

• Version 2.0 planned to include:
  – Summary report download
  – Ability to work with more than 5 processes
  – ROI calculations
  – Inclusion energy, water & carbon calculations
Summary & Next Steps

• Enhancing toolkit
  – Quantification of reductions over time
    • Linking innovation to results
  – Ability to aggregate industry results to demonstrate progress

• Expanding reach with FLW Toolkit
  – Workshops on how to use toolkit

• R&D for Mindset Shift Tool

• Join us April 12th for Solutions Forum!