



Agriculture and  
Agri-Food Canada

Agriculture et  
Agroalimentaire Canada

Canada



# An Overview of Canadian Food Loss and Waste Estimates

*Presented at the Webinars and Speaker Series, Rural Development  
Institute, Brandon University*

*Ottawa, ON  
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## **Our Vision**

Driving innovation and ingenuity  
to build a world leading agricultural and food economy  
for the benefit of all Canadians.

## **Our Mission**


Agriculture and Agri-Food Canada provides leadership  
in the growth and development of a competitive, innovative  
and sustainable Canadian agriculture and agri-food sector.

# Outline


- An introduction
  - Why bother?
  - the reasons for food loss and waste creation in the food chain
- AAFC's technical work
  - reducing food losses in the early stages of the food system
  - quantifying Canadian food losses in food waste data and comparing it with the U.S. data
- The impacts of food loss and waste
  - economic
  - environmental
- What do we do (policy)

# Where are the food loss and waste created?

Farm level: over-production, weather damage, pests/diseases, market conditions, deterioration, post-harvest handling and storage




Processing: input quality, machines, works, cold chain, market



Packaging, marketing and distribution



Retail: over-ordering, cold chain, price promotion, produce display design, differentiation



Households: preferences, labelling, buying too much, demographics

# Causes of food waste

- Behavior of supply chain actors
  - producing/purchasing more to account for shrinkage and other risks of loss
- Market failures and imperfect information
  - breakdown of supply chain coordination
- Cultural or behavioral practices
- Policy
  - farmers
  - processors
- Developed vs. developing countries
  - where food waste created
  - expenditure on food

# Food losses in the early stages of the food system

- In addition to losses during storage, Canadian scientists have looked at means to reduce food losses at earlier stages of the food system – production and harvest, where scientists research 4 categories:
  - i. Intrinsic characteristics of the product that improves resiliency
  - ii. Practices employed in the field and post-harvest
  - iii. Additives that inhibit ripening and decay
  - iv. Technology use
- Research related to losses in grains focuses primarily on the first, second and fourth of these categories

# Use of Cost-Effective Technology to reduce Food losses in the early stages of the food system

- Some technologies can dramatically reduce food losses and waste and can be quite cost-effective
  - Use of instruments to detect insects, moulds and mycotoxins (traps, odour detection)
  - Weather-tight bins to keep grain dry
  - Aeration after harvest to dry and cool grains
  - Use of “sensor arrays” to identify specific sources of spoilage (Temperature and moisture sensors will soon be developed as well as nanosensors for odours)

# AAFC and food losses in the early stages of the food system

- At Agriculture and Agri-Food Canada (AAFC), funding programs are available to support collaborations between AAFC scientists, other public agencies and the private sector
- For example, industry-based organizations, like the Canola Council and Western Grains Research Foundation can partner with universities and AAFC to research topics that will lend to reduction of losses and waste
- This approach can be effective in meeting industry goals by capitalizing on the strengths within each sector

# Defining FLW is difficult due to the different activities that lead to it and the various ways that it can be measured and reported

- Generally speaking food losses happen at earlier stages of the FSC, as most of the reduction in supply is due to loss or spoilage that reduces marketable volume or is unfit for consumption.
- At later stages in the FSC, mainly retail and consumer stages, behavioral issues are more often the cause of food waste.
- In order to take action on food waste it is first necessary to identify how much and where wastage occurs. However, the numerous definitions for and causes of food wastage can be barriers to collecting meaningful statistics

## Food waste is associated with a wide array of definitions

*Post-harvest loss* occurs between harvest/storage and marketing; this includes any resulting drop in quantity or quality rendering a portion of that food unfit for human consumption (Grolleaud, 2002).

*Food loss* – “*food once usable, then discarded*” (Gallo, 1980); “*a subset of post-harvest losses that represents the part of the edible share of food that is available for consumption at either the retail or consumer levels but is not consumed*” (Hodges et al, 2011); or “*a subset of post-harvest loss, it is the amount of edible food available for consumption but not consumed*” (Buzby et al, 2012); “*a decrease in edible food mass throughout the part of the supply chain that specifically leads to edible food for human consumption*” (FAO,2011).

*Food waste* – “*wholesome edible material intended for human consumption, arising at any point in the FSC, that is instead discarded, lost, degraded or consumed by pests*” and/or that which is “*intentionally fed to animals or is a byproduct of food processing diverted away from human food*”, (Parfitt, et al 2010). “*A subset of food loss, is when edible food is not consumed due to human action or inaction and can arise from decisions made by business, government or consumers in the farm to fork chain*” (Buzby et al 2012); “*exists if food intended for human consumption is not used for human consumption*” (Waarts, 2011).

*Food wastage* – includes both food loss and food waste (FAO, 2014). Some organizations include food directed to non-food uses - animal feed and bioenergy. Some definitions consider over consumption of calories as food waste (OECD, 2014; Parfitt et al, 2010).



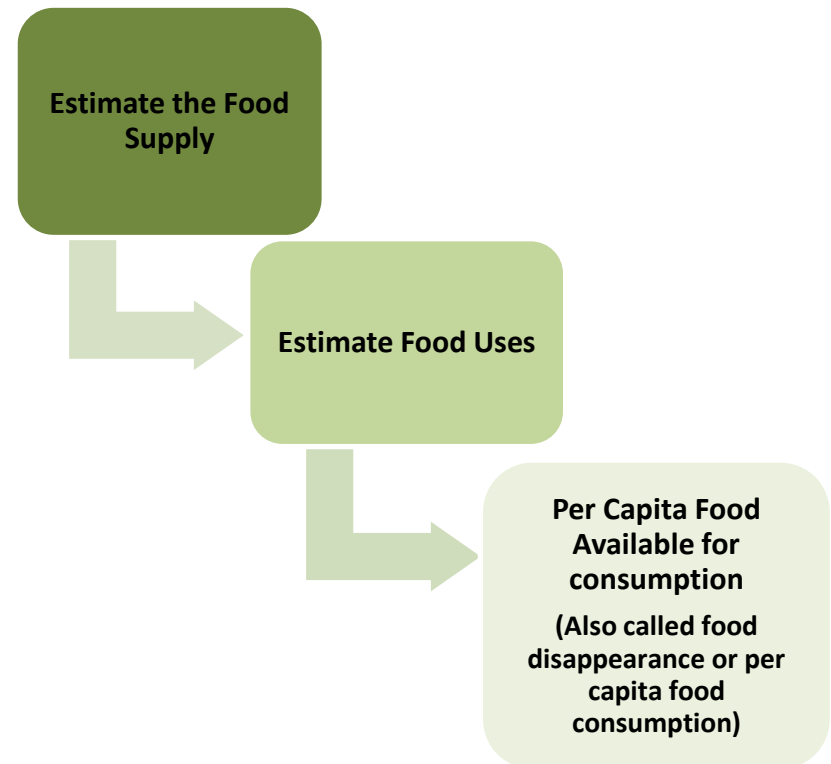
# Quantifying FLW in Canada can be done at the retail and consumer levels using data from Statistics Canada

- The basic data needed to estimate consumer food waste, food balance sheets, have been published by Statistics Canada for decades
  - The program has evolved from basic per capita food availability estimates published in the 1950`s to complete supply-disposition tables dating back to 1960
- Up until the mid 1990`s the Agency was publishing per capita food consumption for over 100 commodities. However, user interest lead to several important improvements to the data
  - In the early 2000`s this was expanded to include published data on nutrient content as well as *loss adjusted per capita food availability*
- In 2009, the program was restructured, but publishing the core data including loss adjusted food availability continued due to demand from stakeholders

# This is a two step process that begins with deriving food available for consumption

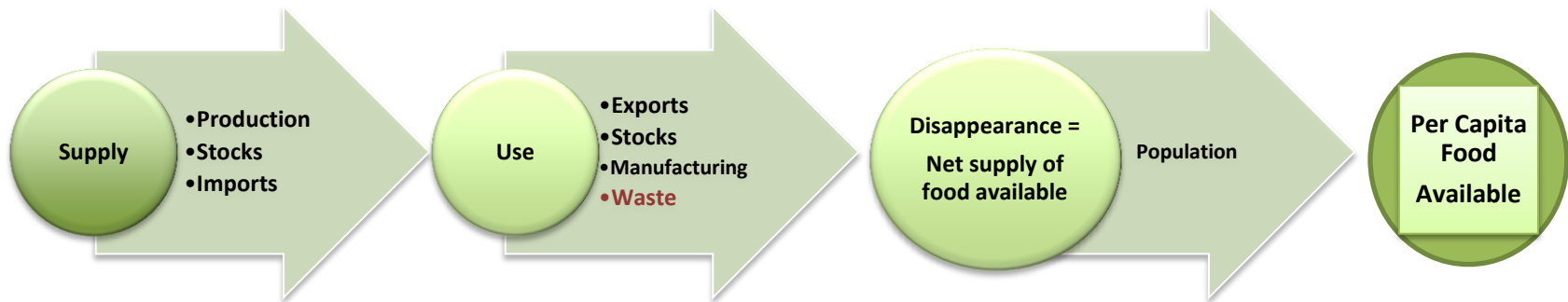
- The first step is to derive the amount (per capita) of food available estimates, using supply-disposition methodology
- Canadian data are compiled based on the FAO's food balance sheets
- Supply components are summed for each commodity, then all known uses other than consumption are subtracted
- This leaves food disappearance as a residual – or what is also called food consumption or food available for consumption

**Food balance sheets generally draw upon three main sources of administrative and survey data**



# A significant volume of administrative data is needed before food loss and waste can be estimated

- Per capita food available is first estimated using a set of detailed calculations for each food commodity:

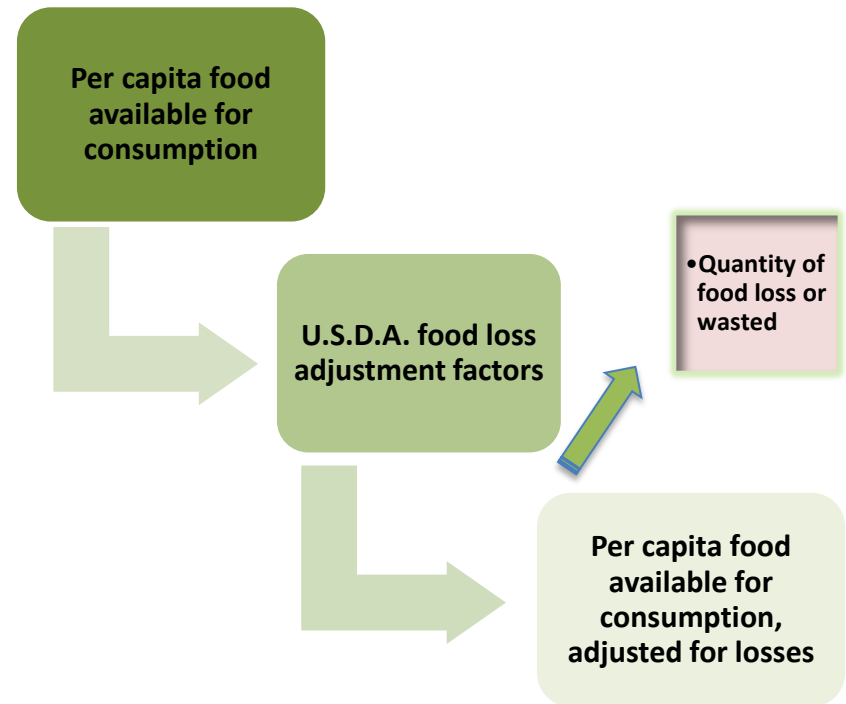


- While this method includes a series on waste, in this context waste reflects losses in storage or transportation.
- In contrast, the U.S. food supply disposition calculations measure losses by applying the factors between the primary and retail levels

# Canada then incorporates data from the USDA to adjust food availability for losses and waste...

- The application of loss factors is the second step, which involves making adjustments to estimate “food consumed” more accurately
- These adjustments, obtained from data developed by the USDA, account for losses at the retail and consumer levels, including institutions, restaurants and households. The factors account for losses and waste from storage, in the preparation of food and from the plate.

**Adjustment factors are incorporated to improve the derived food disappearance estimates by accounting for losses and waste**



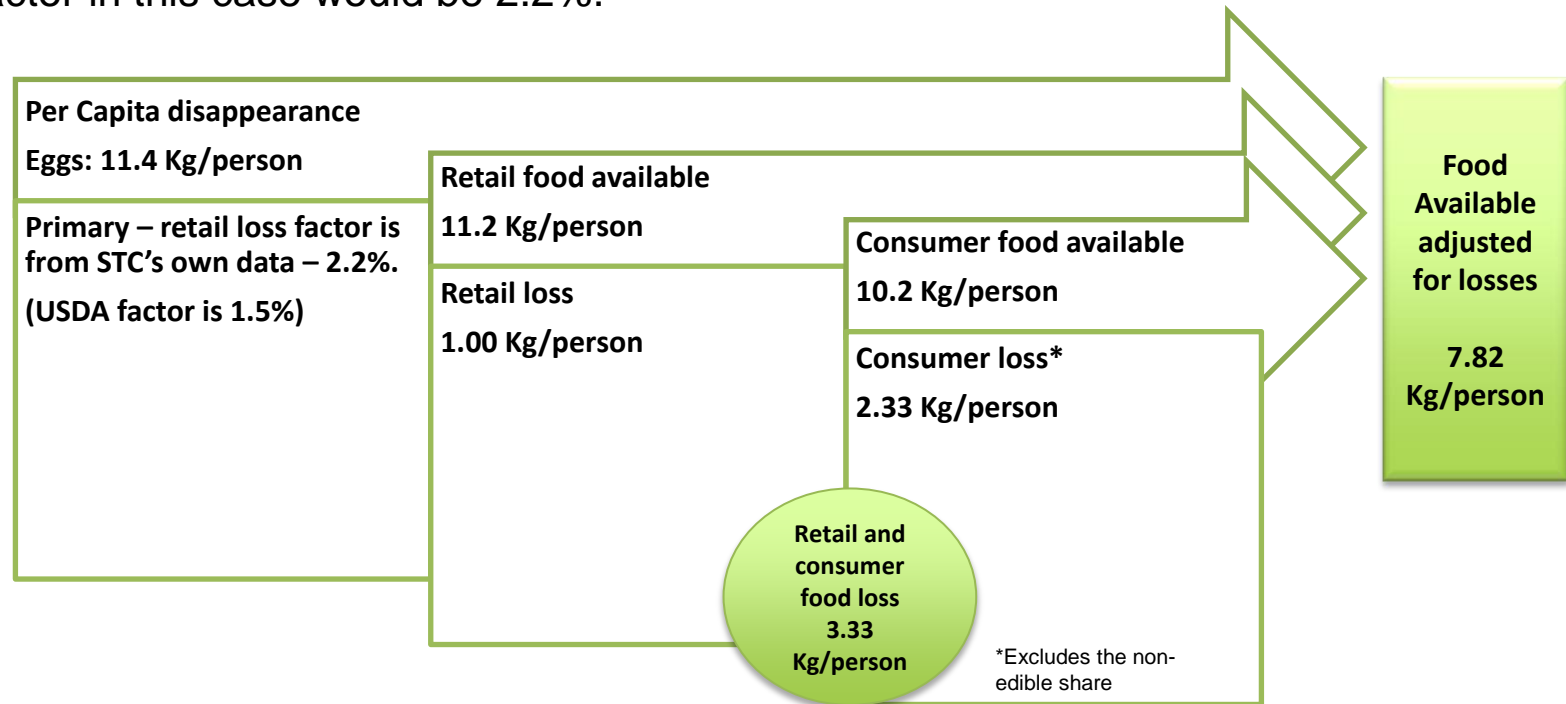
# In addition to the traditional food supply balance sheets, these efforts have generated additional datasets on FLW for the consumer and retail levels

- The original intent of using waste factors was to better estimate “food consumed”
  - In the early 2000’s STC and AAFC worked with the ERS-USDA to adopt estimates for waste adjusted food availability data
- In an effort to arrive at a more accurate estimate of food consumption, the food loss and waste estimates themselves are now an additional set of data that can be used to evaluate trends in the food supply



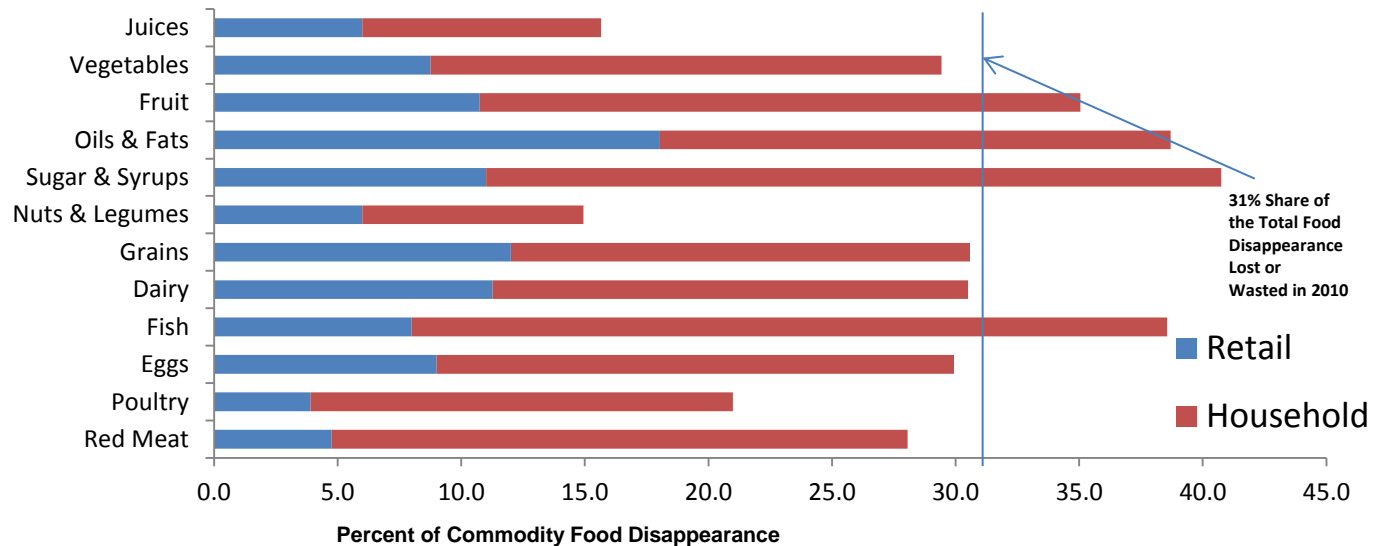
# Estimating FLW in the upstream parts of the food value chain using Canadian commodity balance sheets and U.S. food loss adjustment factors

- Eggs are one example of how net supply of food available already reflects primary to retail losses. The Canadian estimate of 1.5% represents data on leaker and reject eggs, available from administrative sources and included in the S&D for eggs. The US factor in this case would be 2.2%.



# Nearly One-Third of Canada's Total Food Disappearance was Lost or Wasted at the Retail and Household Levels in 2010

**Retail and Household Food Loss and Waste as a Proportion of the Commodity Food Disappearance, Canada, 2010**



Source: AAFC calculations using Statistics Canada and USDA data. These calculations are based on the share of retail and household waste relative to the total disappearance of each commodity.

Food loss generally refers to unintended spills or spoilage that reduce production before it reaches a buyer or consumer. Food waste is generally associated with human behavior such as negligence or conscious decisions to discard food.

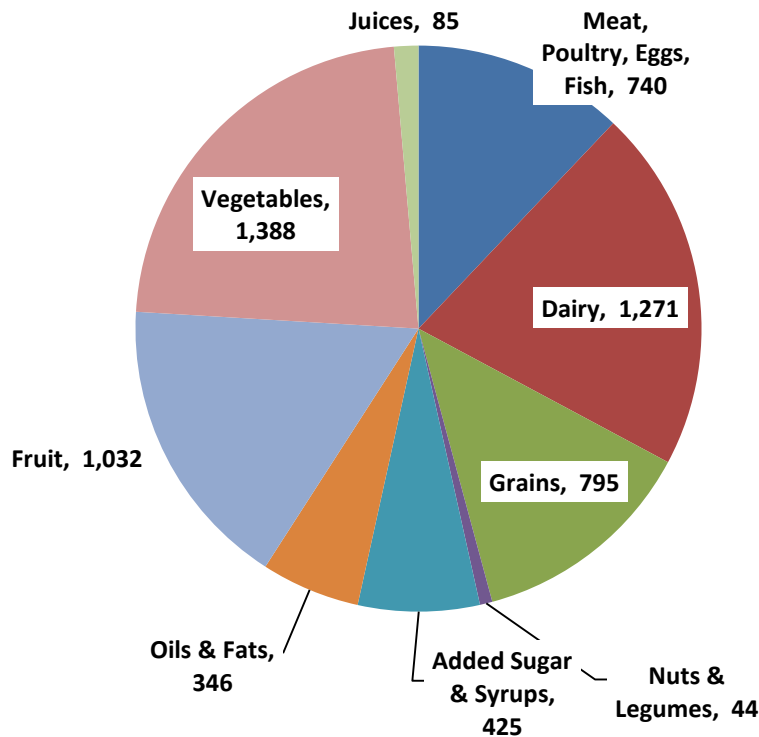
In Canada, 6 billion kilograms of food was lost or wasted at the household and retail levels, accounting for 31.0% of food disappearance.

Household food loss and waste accounted for 21.0% of the total food disappearance with retail accounting for the other 10.0%.

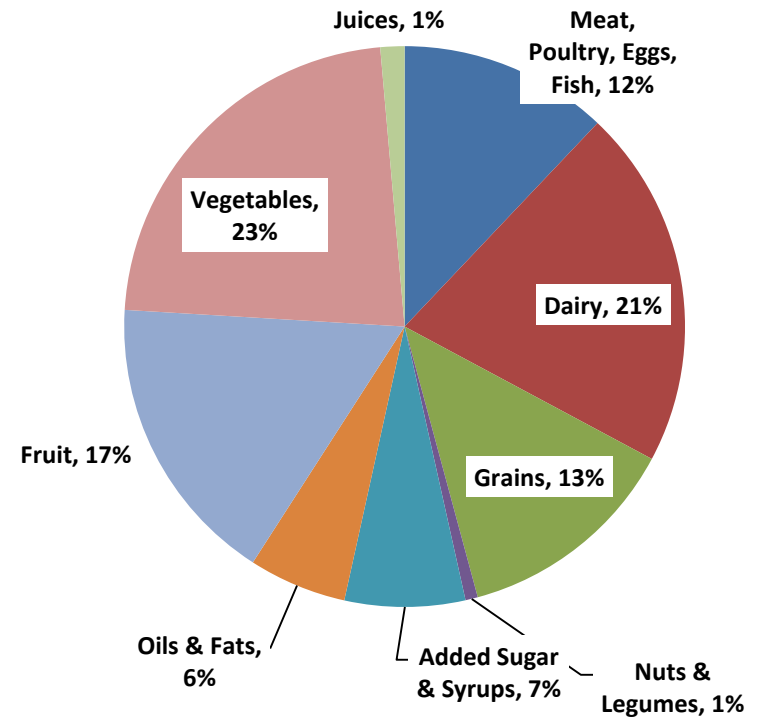
By commodity, food loss and waste as a proportion of the food disappearance in Canada was highest for added sugars and syrups at 41.0% and fish at 40.0% respectively, with the household level accounting for the greatest share.

# In Canada, about 6 billion kilograms of food was lost or wasted in homes and at retail level in 2010

Canadian consumer and retail level food losses by commodity group, million kgs, 2010



Canadian consumer and retail level food losses by commodity group, percent, 2010

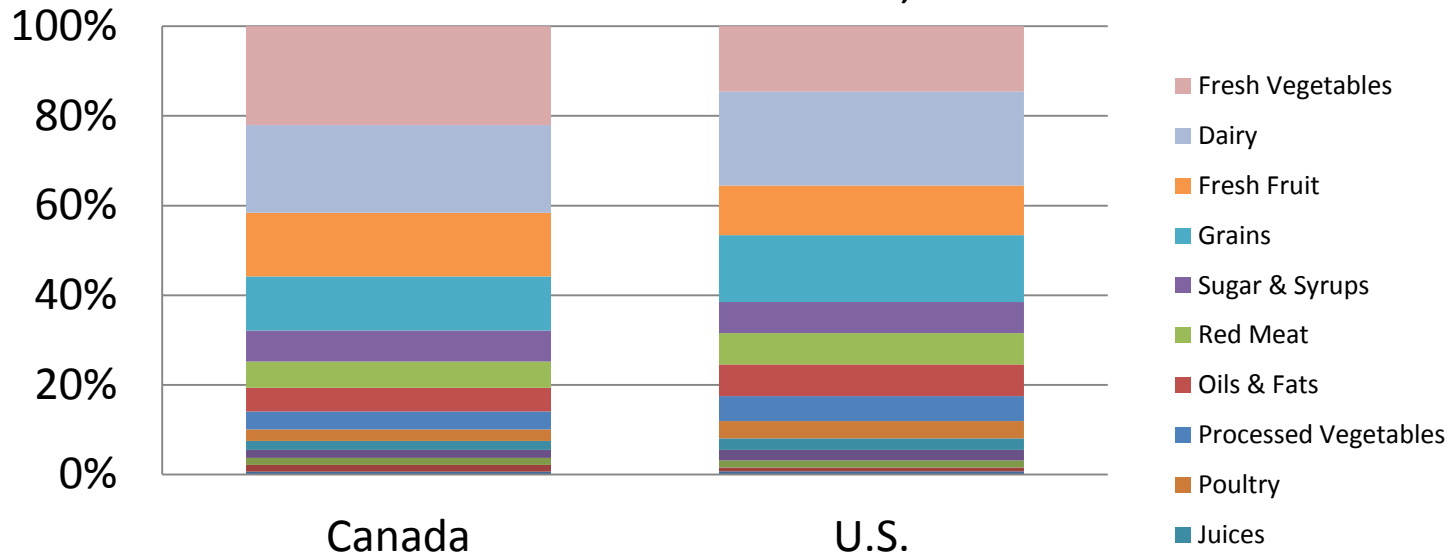


Source: AAFC calculations using Statistics Canada and USDA data. Statistics Canada source is food available for consumption by commodity and USDA source is Economic Research Service, Loss-Adjusted Food Availability (LAFA) data series .



# The Distribution of Total Food Loss and Waste from the Household and Retail Levels in Canada and the U.S. Varies by Commodity

**Retail and Household Food Loss and Waste by Commodity as a Proportion of Total Food Loss and Waste, 2010**



Source: AAFC calculations using Statistics Canada and USDA data

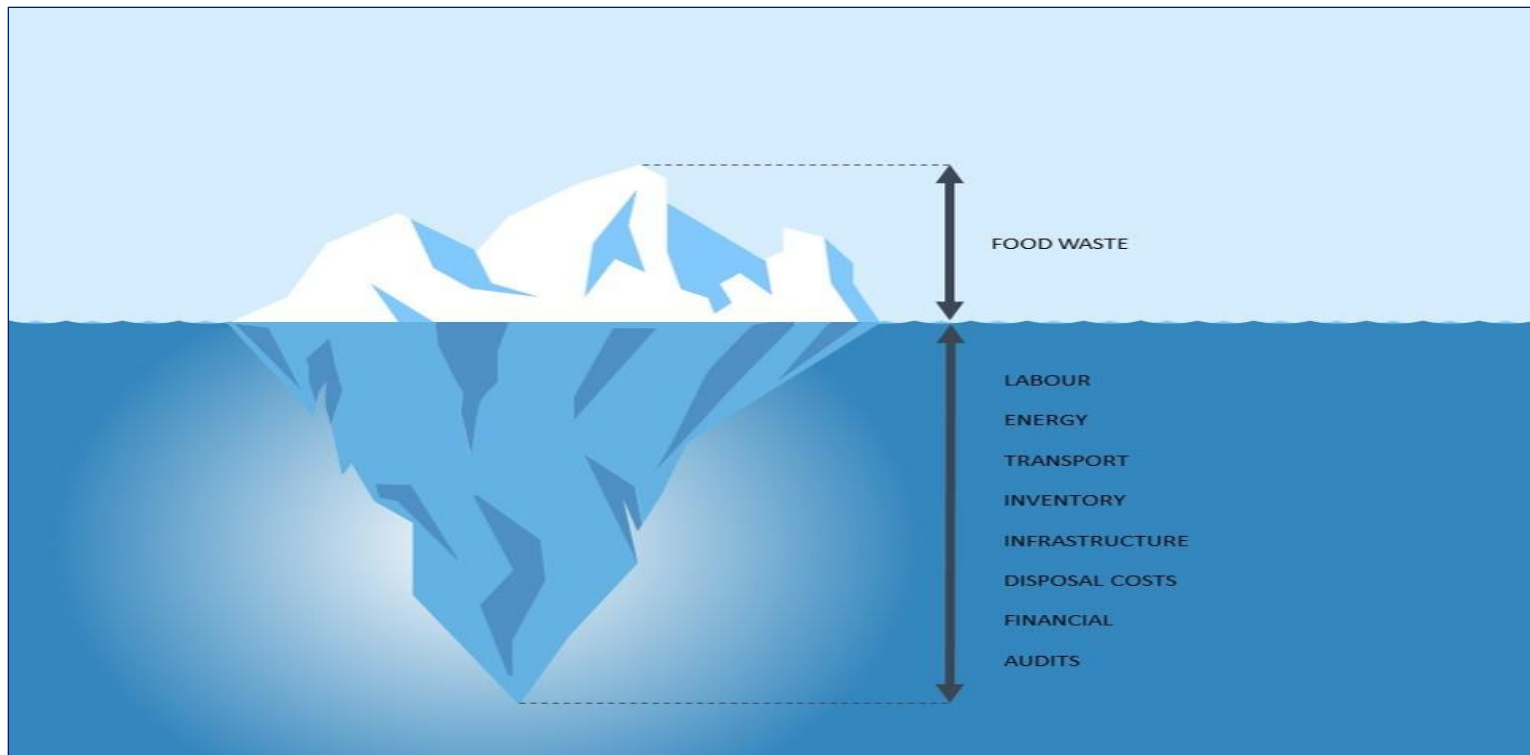
Of all food lost and wasted, 22% is attributable to fresh vegetables and this accounted for the highest share in Canada. In the U.S., fresh vegetables accounted for the third highest share at 14.5% in 2010.

Dairy products accounted for the highest share of all food lost and wasted in the U.S. at 21% in 2010. In Canada, it accounted for second-highest share of all food lost and wasted at 19.5% in 2010.

Fresh fruits, fresh vegetables and processed fruits are the only three products where the share of food loss and waste to total food loss and waste is higher in Canada than in the U.S. This may be partly explained by the significantly larger presence of fruits and vegetables in the Canadian food basket, compared to with the U.S. food basket.

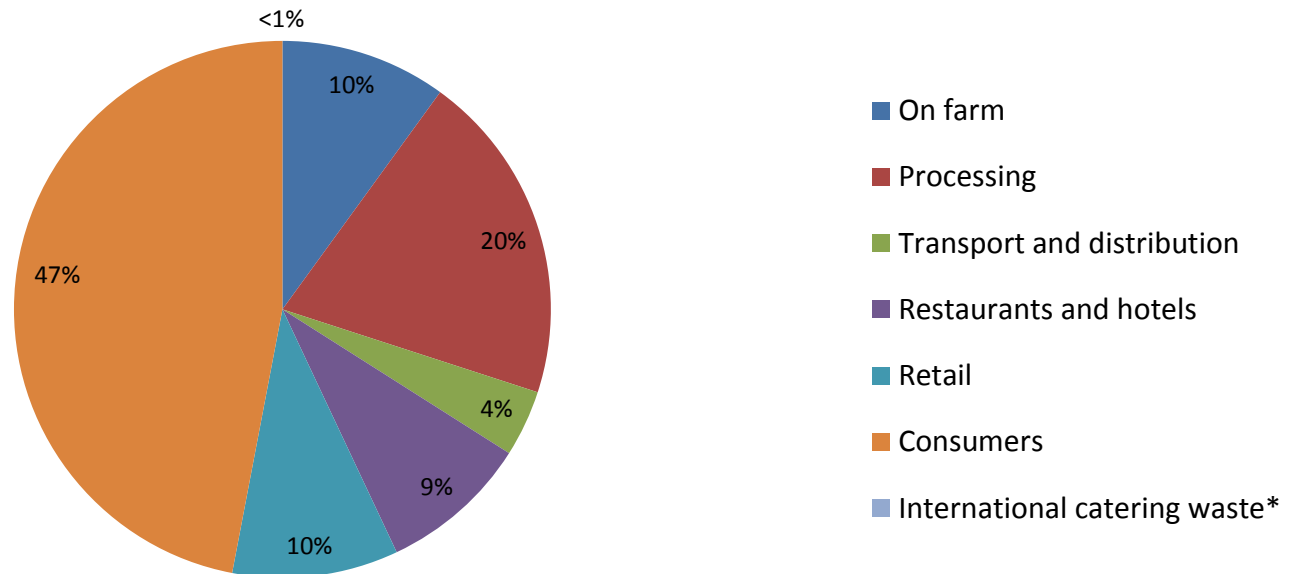
# The economic impacts of food wastage

- The economic impacts of food wastage
  - The cost of producing lost and wasted food
  - The value of lost and wasted food in Canada to various players
  - Do farmers benefit from wasting food?
  - The optimal food loss and waste reduction targets



# The Value of Canada's Annual Food Loss and Waste was Estimated at \$31 Billion in 2014.

Distribution of the Value of Food Lost or Wasted Throughout Canada's Food Value Chain



Source: ““\$27 Billion” Revisited the Cost of Canada's Annual Food Waste”, Value Chain Management Centre International, December 2014

\*The food waste produced by airlines, cruise ships, merchant ships, yachts, cross-border trains, and the military

The estimated total value of food loss and waste is \$31 billion in 2014.

The value of food loss and waste happening at the household level is estimated at \$14.5 billion and accounts for the highest share (47%) of the estimated value of food loss and waste in 2014. The value of food loss and waste at the processing stage is estimated at \$6.2 billion, and accounts for 20% of the estimated value of food loss and waste in 2014. The most recent estimate of the value of food loss and waste at the retail level was \$3 billion in 2010.

Measuring the amounts of food loss and waste as a proportion of the sale value of their industries' outputs, average food loss and waste is estimated at 5% on the farm, 10% during processing and/or packaging, 2% during transportation and distribution, and 10% at restaurants. Food loss and waste at these stages account for more than 50% (\$16.5 billion) of the estimated total value of food loss and waste.

By the  
**NUMBERS**

How Cargill is  
**COMBATING FOOD LOSS**  
and **FOOD WASTE**



**3.2B** DOLLARS  
INVESTED

BY CARGILL in assets and facilities in fiscal 2014 to help EFFICIENTLY MOVE FOOD from where it is grown and processed to where it is needed.



**10M** MEALS  
PROVIDED

annually by FareShare in the United Kingdom with food that would have otherwise been wasted. CARGILL has SUPPORTED FARESHARE since 2009, providing vital funds and volunteer support.



**1M** POUNDS OF  
SWEET CORN

provided to emergency HUNGER RELIEF organizations in 10 U.S. states via the Corn Rescue initiative for which CARGILL provides financial and logistical SUPPORT.



**ZERO** LANDFILL  
WASTE

produced by CARGILL'S Hazelton, Pennsylvania meat plant, where 1,500 TONS of food waste is now RENDERED into other products and unrecyclable plastics are used to GENERATE ENERGY.

**REDUCING** Food Loss and Food Waste:

**CONSERVES**

WATER, LAND and ENERGY used to produce FOOD.



**REDUCES**

EMISSIONS of METHANE – a powerful greenhouse gas – FROM LANDFILLS.



**LOWERS COSTS**

of food MANUFACTURING, RETAILING and FOOD SERVICE operations.



# Natural resources and FLW

- The FAO report
  - Carbon footprint
  - Water footprint
  - Land use
  - Biodiversity
- Impact of food wastage varies along the food supply chain
- Geographical differences
- Different food products have different impact (beef production)
- Natural resources savings from reduction of food wastage

# At AAFC: what do we do?

- Research and analysis
  - FLW included in “An Overview of the Canadian Agriculture and Agri-Food System” – to evaluate the economic, environmental and social costs – and try to assess the effectiveness of policies – need good data first; where are the data where are the gaps etc
  - Research in Science and Tech Branch
  - The food processing industry roundtable
- Supporting private sector –
  - The Value Chain Management Centre
- International collaborations
  - The United States Department of Agriculture
  - The Organisation for Economic Co-operation and Development
  - The World Resources Institute



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