Toward More Sustainable Packaged Food

More Sustainable Packaging and Less Food Waste

Fall 2019

CREATED FOR

DESAUTELS McGill

MCCHE McGill Centre for the Convergence of Health and Economics

CTAQ CONSEIL DE LA TRANSFORMATION ALIMENTAIRE DU QUÉBEC

PRESENTED BY
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PACKAGING TECHNOLOGY AND RESEARCH LLC.

CREATED BY PTR www.PackagingTechnologyAndResearch.com

Executive Summary

ABOUT THIS PRESENTATION

30 min discussion on drivers and the role for more sustainable packaging to reduce food waste

1. More Sustainable Packaged Food
2. Drivers for More Sustainable Packaging
3. Drivers and Solutions for Less Food Waste
4. Direction

About PTR | Actionable innovation to reduce food waste with sustainable packaging solutions

Approach

The future of more innovative food packaging is **complex, enchanting, and promising**

Numerous choices result in catharsis and focus is needed

Innovation requires a **business case**

A rational, defensible, and achievable strategy is needed

Gaps can be found

Technology can be used to **enable better alignment between consumer needs and market delivery**

Value chain connections **build in agility** for future

Hesitancy can be reduced with **more levers to drive switching**

About PTR | Dr. Claire Sand - Owner

PACKAGING Technology & Research

Focused compelling food packaging expertise

Dr. Claire Sand is a Global Packaging Leader with 30+ years of broad experience in the food science and packaging spectrum. *Sand leads food packaging efforts involving packaging solutions to food waste and more sustainable packaging, as well as provides compelling technology business cases and implementation roadmaps for innovative technologies. Dr. Sand is Owner and Founder of Packaging Technology and Research, LLC., and Adjunct Professor, and holds a doctorate in Food Science and Nutrition from the University of Minnesota and MS and BS in Packaging from Michigan State University.*

- CalPoly Adjunct professor
- Michigan State University Adjunct professor
- University of Minnesota Adjunct professor
- IFT Fellow and monthly Packaging columnist for Food Technology magazine
- IUFoST Global Food Packaging Curricula Head
- Journal of Food Science Reviewer
- PAC Consortium on Food Waste CoChair
- Packaging Science and Technology Editorial Board
- Phi Tau Sigma Strategic Relations & Affairs Chair
- Author
- Category Manager
- Principal
- Technical Business Manager
- Packaging – Gerber Baby Food

"I am passionate about leading efforts to reduce climate change by preventing food waste with more sustainable packaging."

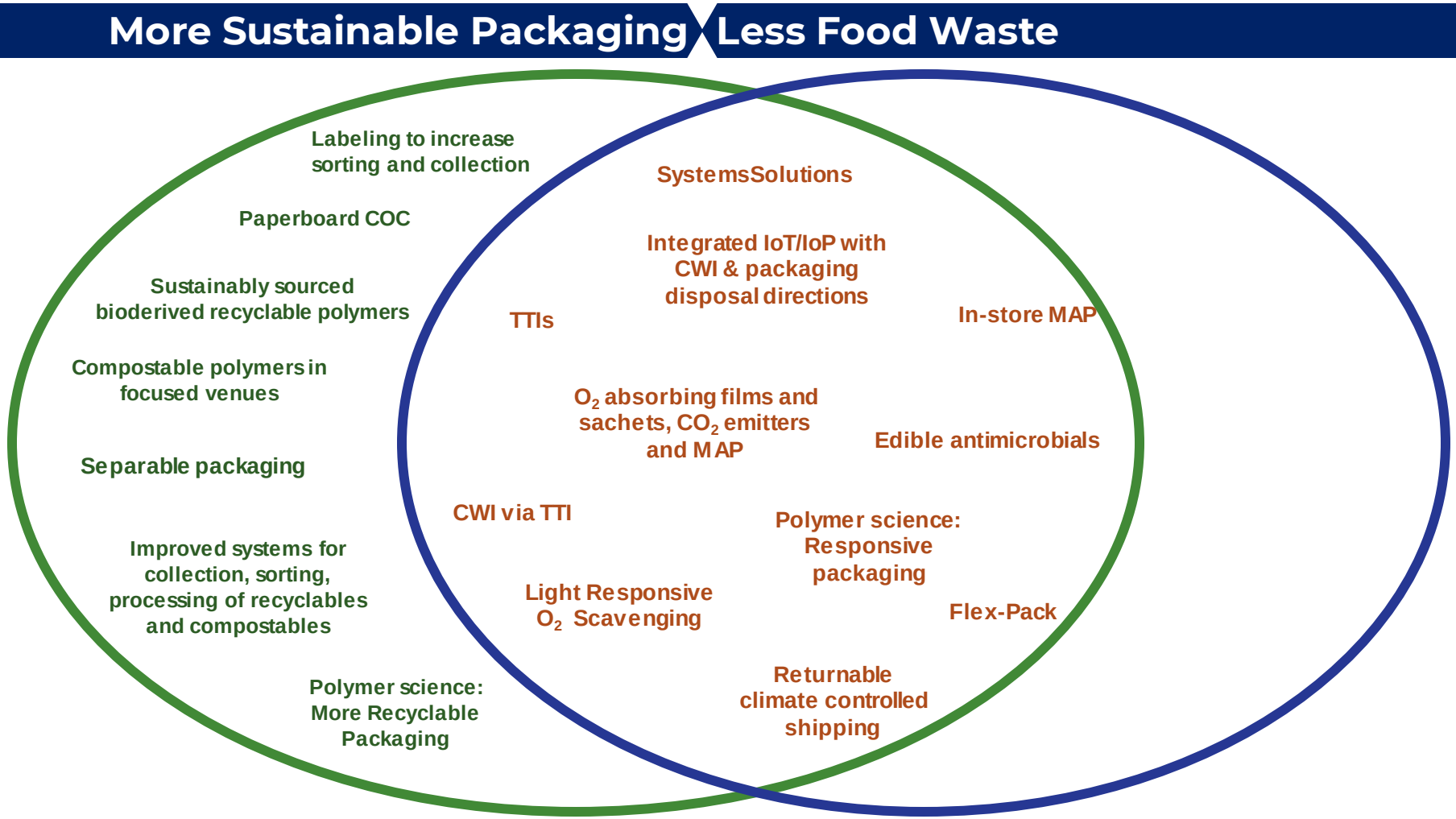
- *Solutions using Strategy and Science*
- *Learn from PTR with presentations and articles at* http://www.packagingtechnologyandresearch.com/thought-leadership.html

1

Consumer/Market Drivers and Direction for More Sustainable Packaged Food

More Sustainable Packaged Food

More Sustainable Packaged Food = Least Food Waste with the Most Sustainable Packaging



Defining Sustainability

The food industry is not considered wholly sustainable now

the development that meets the needs of the present without compromising the ability of future generations to meet their own needs

Brundtland Report UN (1987)

*Consumer Behavior T*heory can Guide

Consumers want a more sustainable food supply

Value-action gap	**Metamotivation**	**Barriers to Sustainable Behaviors**
Theory of Reasoned Action & Theory of Planned Behavior	**Spillover Effect**	**Social Desirability Bias**

Consumers Driven to Sustainability Differently

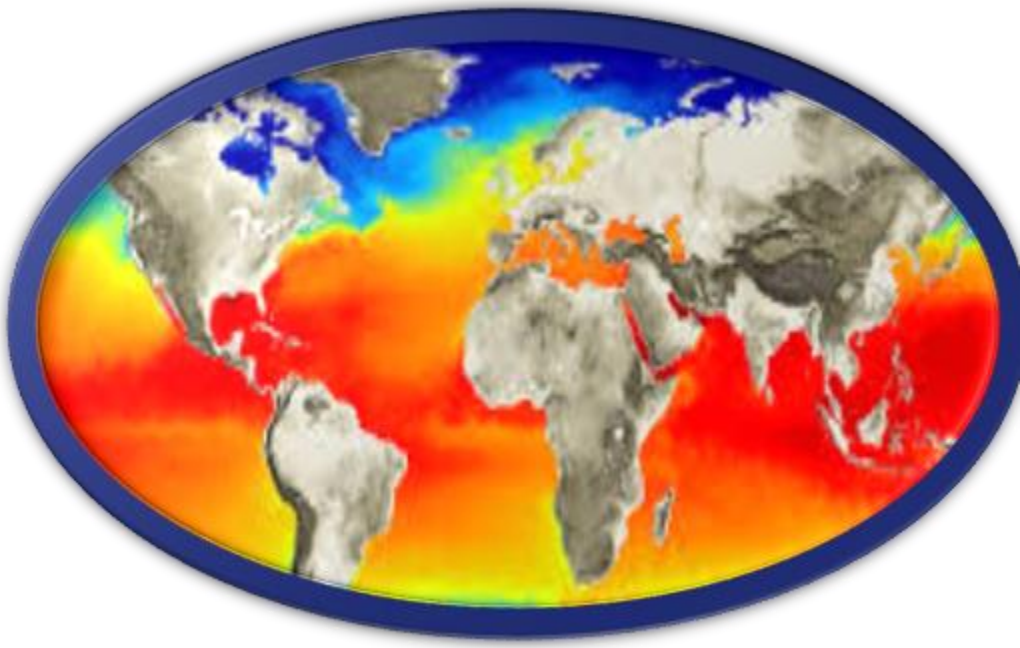
Many drivers with many solutions

Demographics

Norms and Values

income

Country of Origin

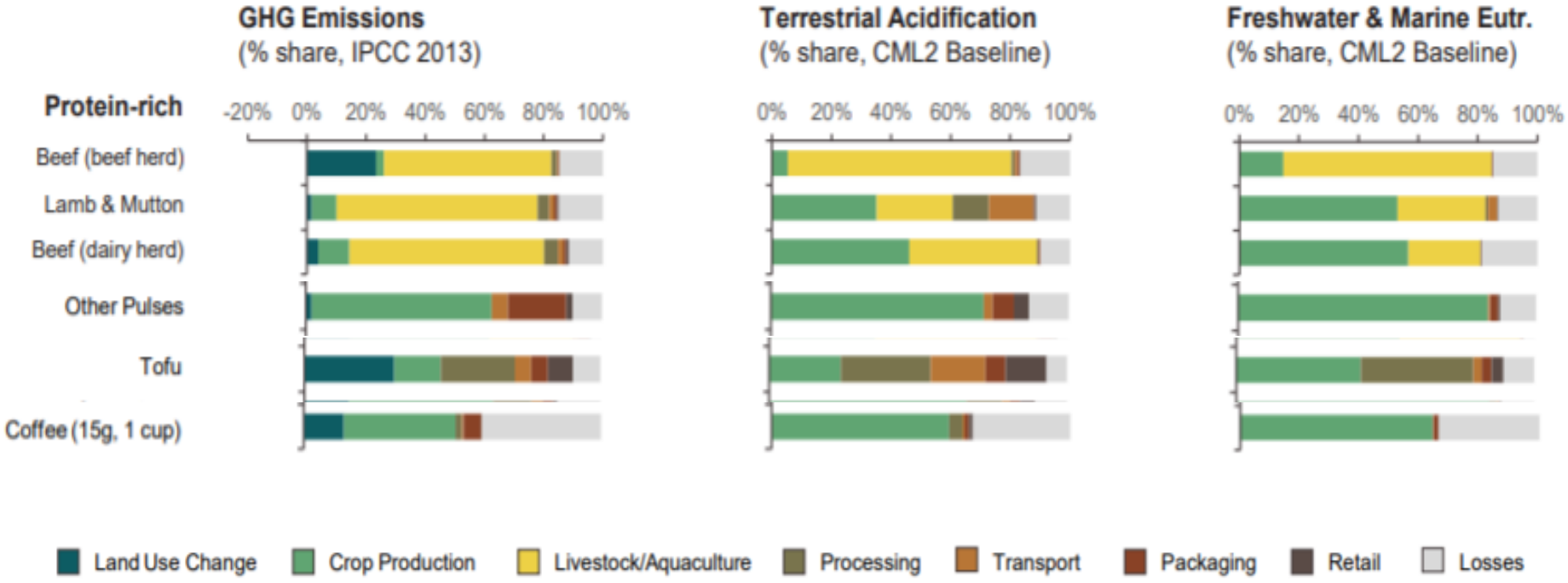


Individual Consumer Views on Sustainability

Consumers Driven to Sustainability Differently

More Sustainable Packaged Food

Impact on the environment is complex



Poore and Nemecek, 2018

2

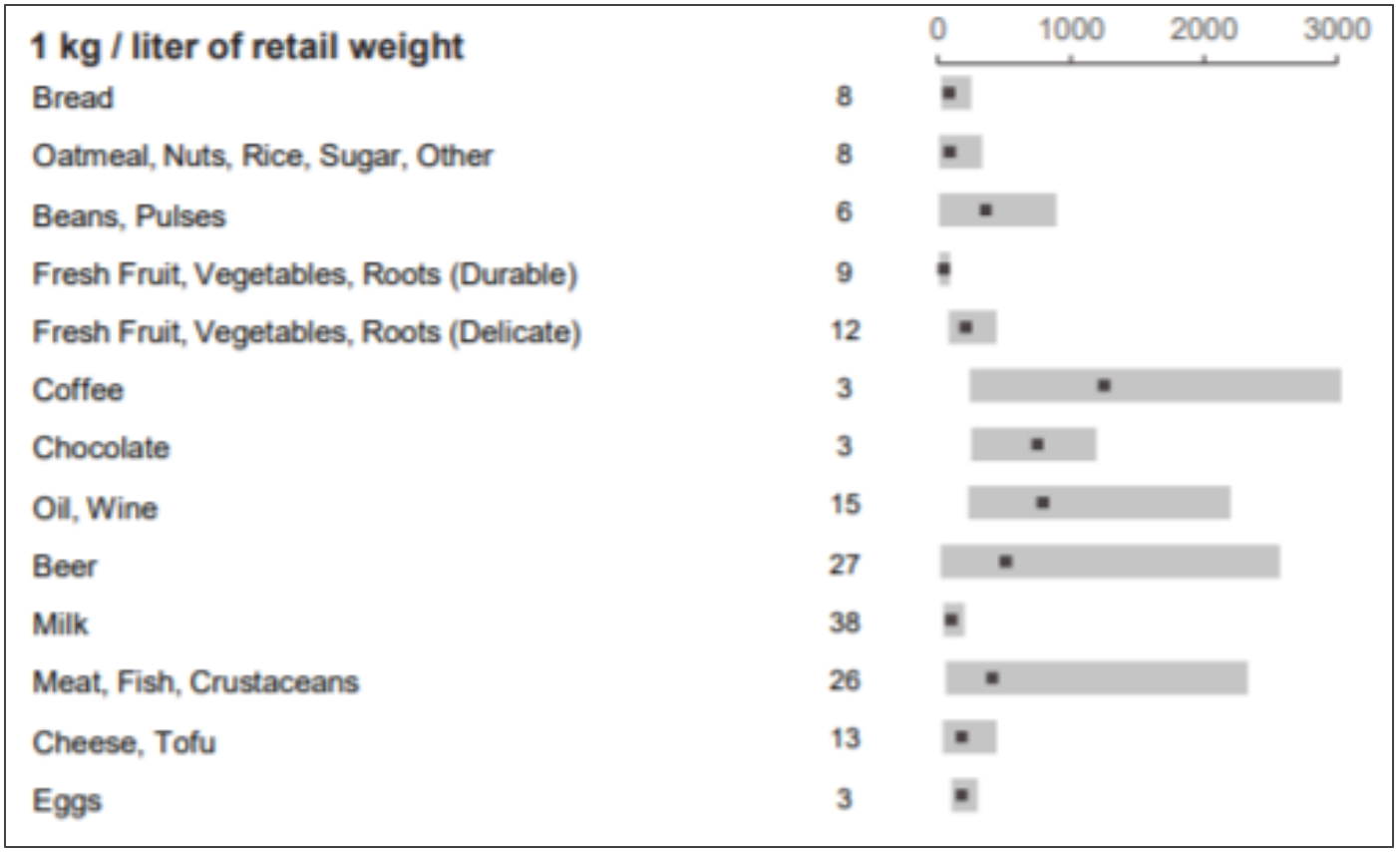
Consumer/Market Drivers and Direction for More Sustainable Packaged Food

Drivers for More Sustainable Packaging

Packaging Impacts the Environment

More Sustainable Packaging

The impact of packaging varies by product and package types



GHG emissions for different post-farm processes, pack types, and retail types

Incentives Guide Consumer Behavior

More Sustainable Packaging

USA-66%

EU-35%

of recyclable packaging is not recycled

- Consumers are economically motivated
- Incenting recycling works
  - Bottle bill states had higher recycling rates
  - Incentive states did not have a higher WTP for bottles
- Tradeoffs are made with other behaviors they consider sustainable
- Elasticity
  - Price
  - Time

WTP Driven by Package Design

More Sustainable Packaging

Package design communicates sustainability to consumers

- Graphics, materials, verbal text, and colors do not communicate well individually to consumers on sustainability
  - ”Eco-friendly” claims, green leaf symbols
  - Use of only green without claims affected efficacy perception
- Consumers WTP is lowest for more sustainable packaging when flavor is poor and price is higher
- There is an opportunity to connect sustainable packaging to low-income populations

WTP Driven by Material Changes

WTP is highest for material properties consumers consider sustainable

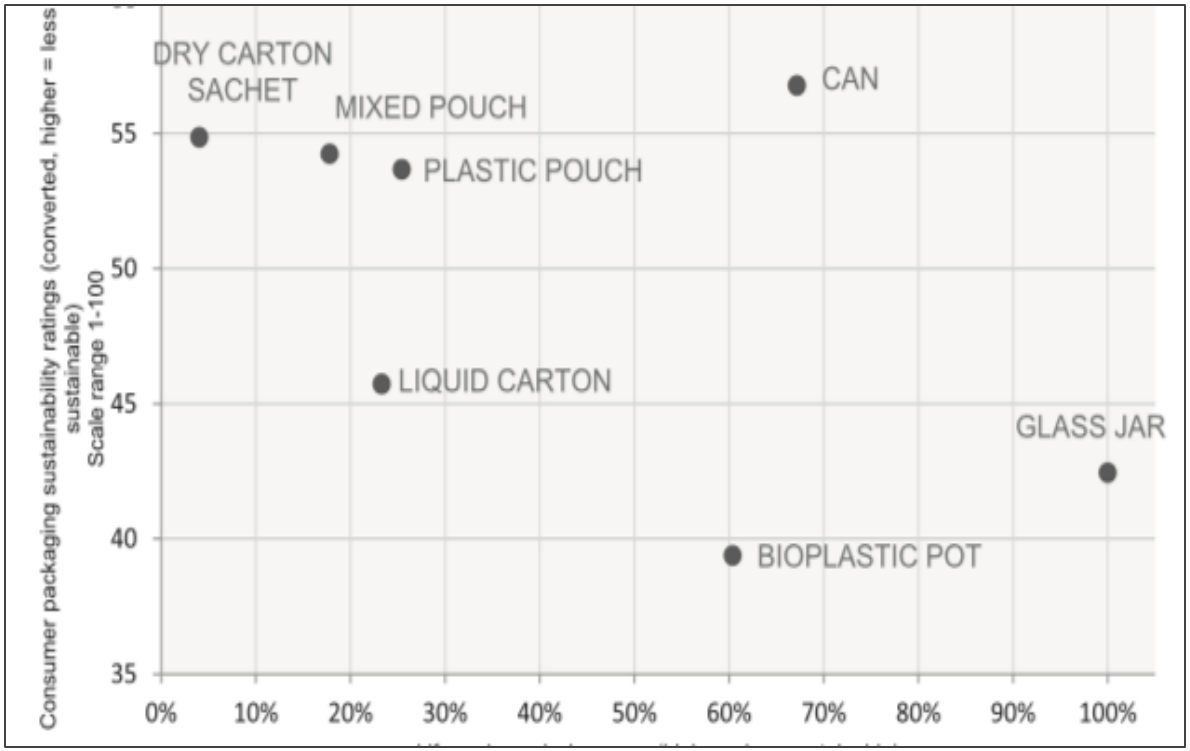
Consumer rank was:

1. Degradable bioplastic
2. Glass
3. Liquid carton
4. Plastic pouch
5. Mixed pouch
6. Dry Carton sachet
7. Aluminum can

Education works

Factual LCA rank is:

1. Dry carton sachet
2. Aluminum can
3. Plastic pouch
4. Mixed pouch
5. Liquid carton
6. Degradable Bioplastic
7. Glass jar



Steenis et al, 2017

Over 300 Definitions

Industry does not enable Consumer clarity

- Definition by SPA
  - Effective, Efficient, Cyclic, Clean

- Definition by SPC
  - Beneficial, safe & healthy
  - Market criteria, performance, cost
  - Processing and transportation via renewable energy
  - Healthy materials
  - Material and energy optimization
  - Recovery/use in closed loop cycles

3

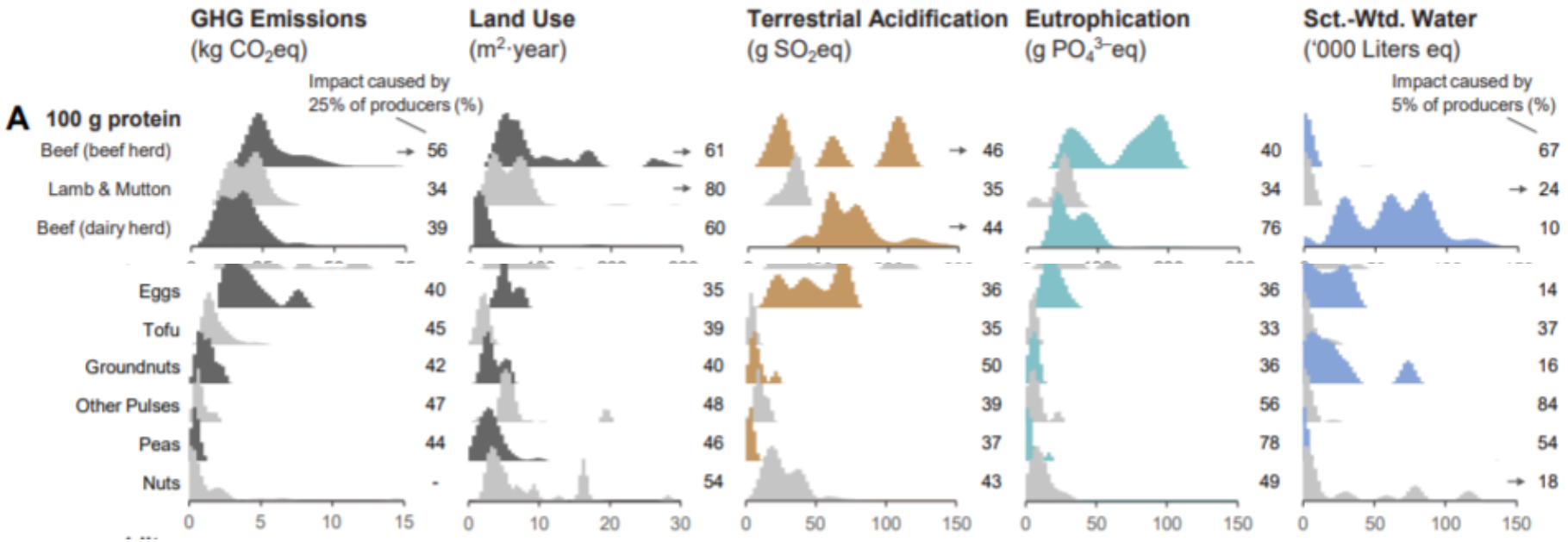
Consumer/Market Drivers and Direction for More Sustainable Packaged Food

Drivers and Solutions for Less Food Waste

Consumers cannot see many Drivers to Reduce Food Waste

Less Food Waste

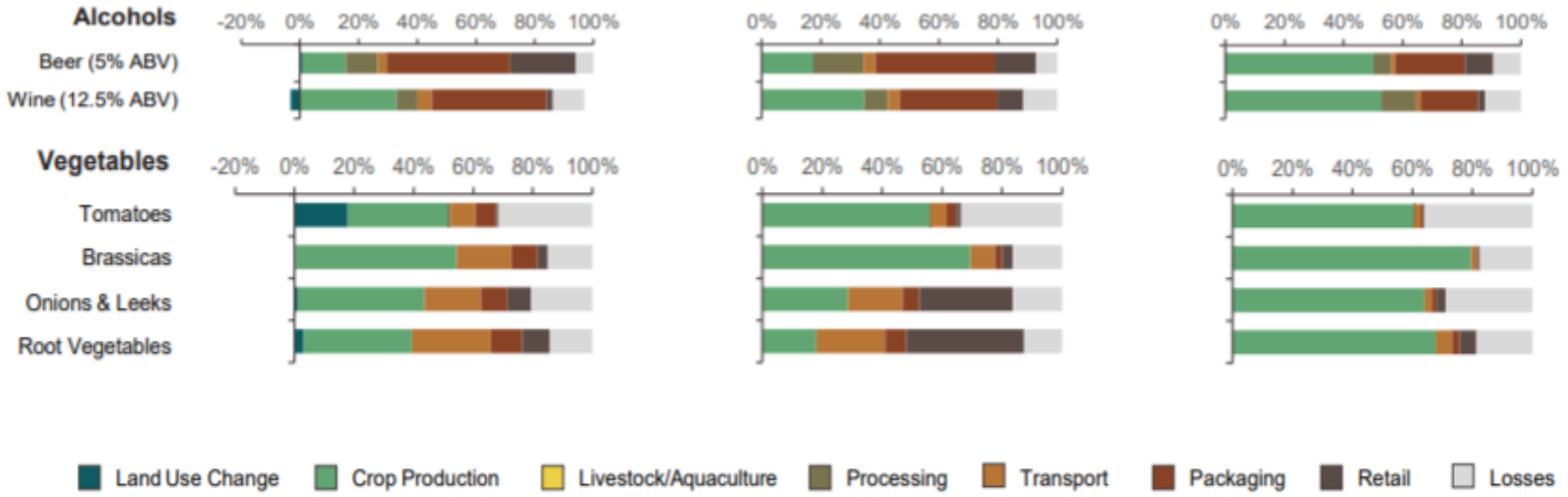
Consumers not directly impacted by environment they cannot see



Consumers have Strong Connections to Environment

Less Food Waste

- Connection to the impact of food & packaging on the environment is strong
- Consumers need information to drive their decision making
- Now it is smoke and mirrors in food as well as packaging



Poore and Nemecek, 2018

Nutrient Waste During Processing Connects to the Value of Food that is Wasted

Less Food Waste

Food waste is higher for canned kidney beans than raw kidney beans

Kidney Bean food waste from farm to consumer was determined as:

- 32.4% for raw Kidney Beans
- 33.8% for canned Kidney Beans

<u>For canned and dry Kidney Beans:</u>

- 12% loss in agricultural production (USDA-ERS, 2010)
- 5% loss in processing and packaging (USDA-ERS, 2010)

<u>For dry beans:</u>

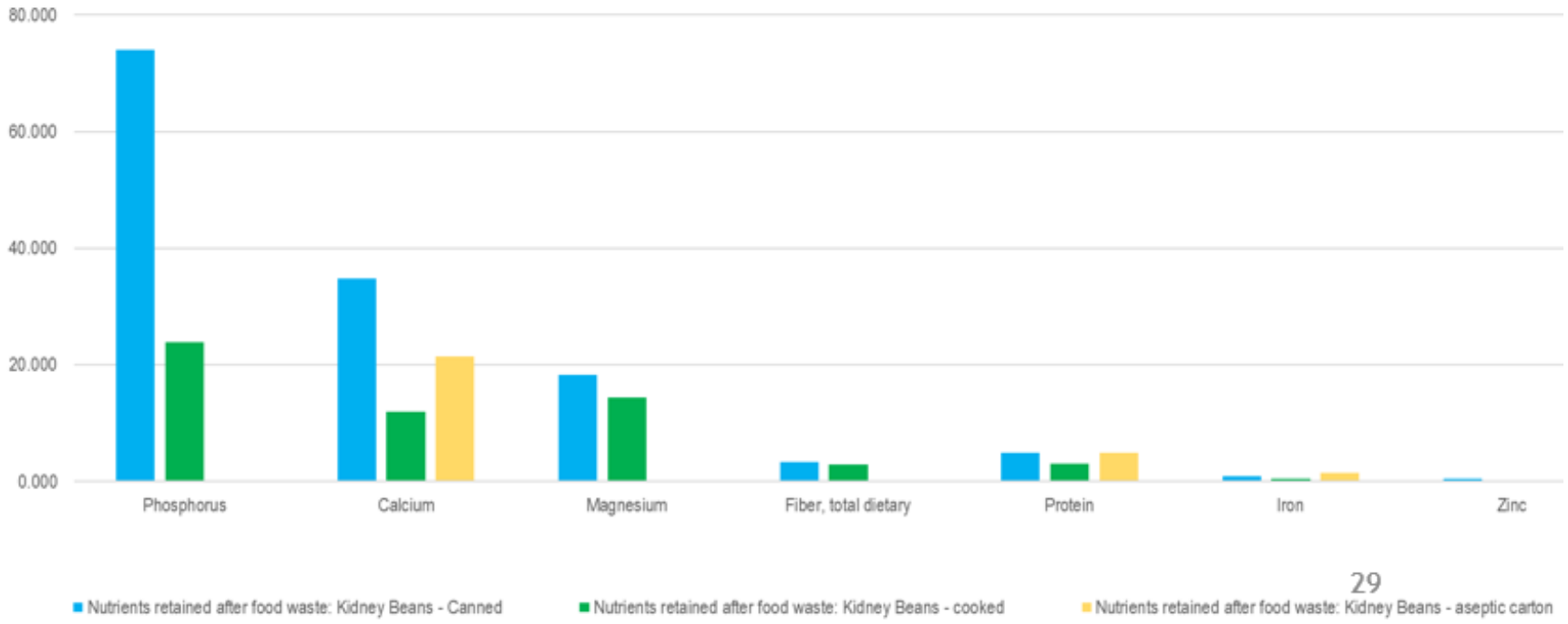
- 6% distribution and retail (USDA-ERS, 2010)
- 14% consumption (Defra, 2010; Quested and Johnson, 2009)

<u>For canned beans:</u>

- 6% distribution and retail (USDA-ERS, 2010)
- 15.8% consumption (Defra, 2010; Quested and Johnson, 2009)

Nutrient Waste is Relevant to Consumers

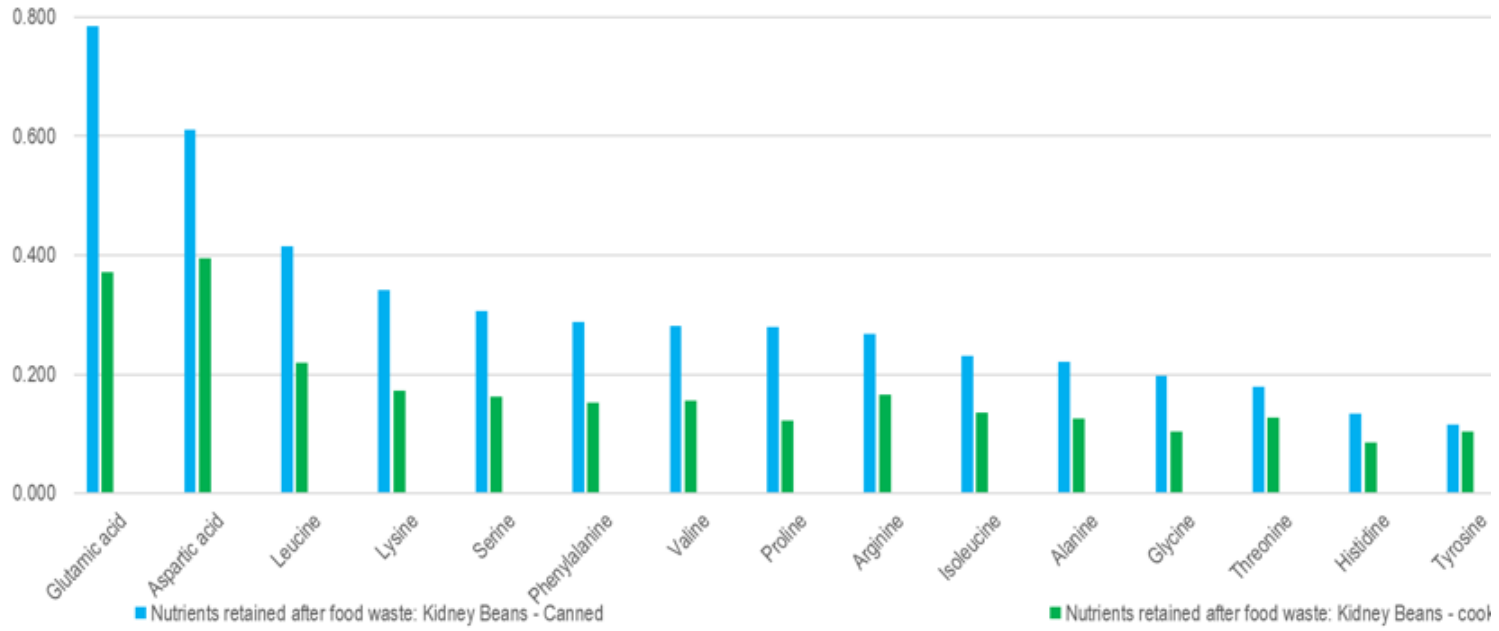
Less Food Waste



Canned kidney beans retain more nutrients when food and nutrient waste are combined

Nutrient Waste is Relevant to Consumers

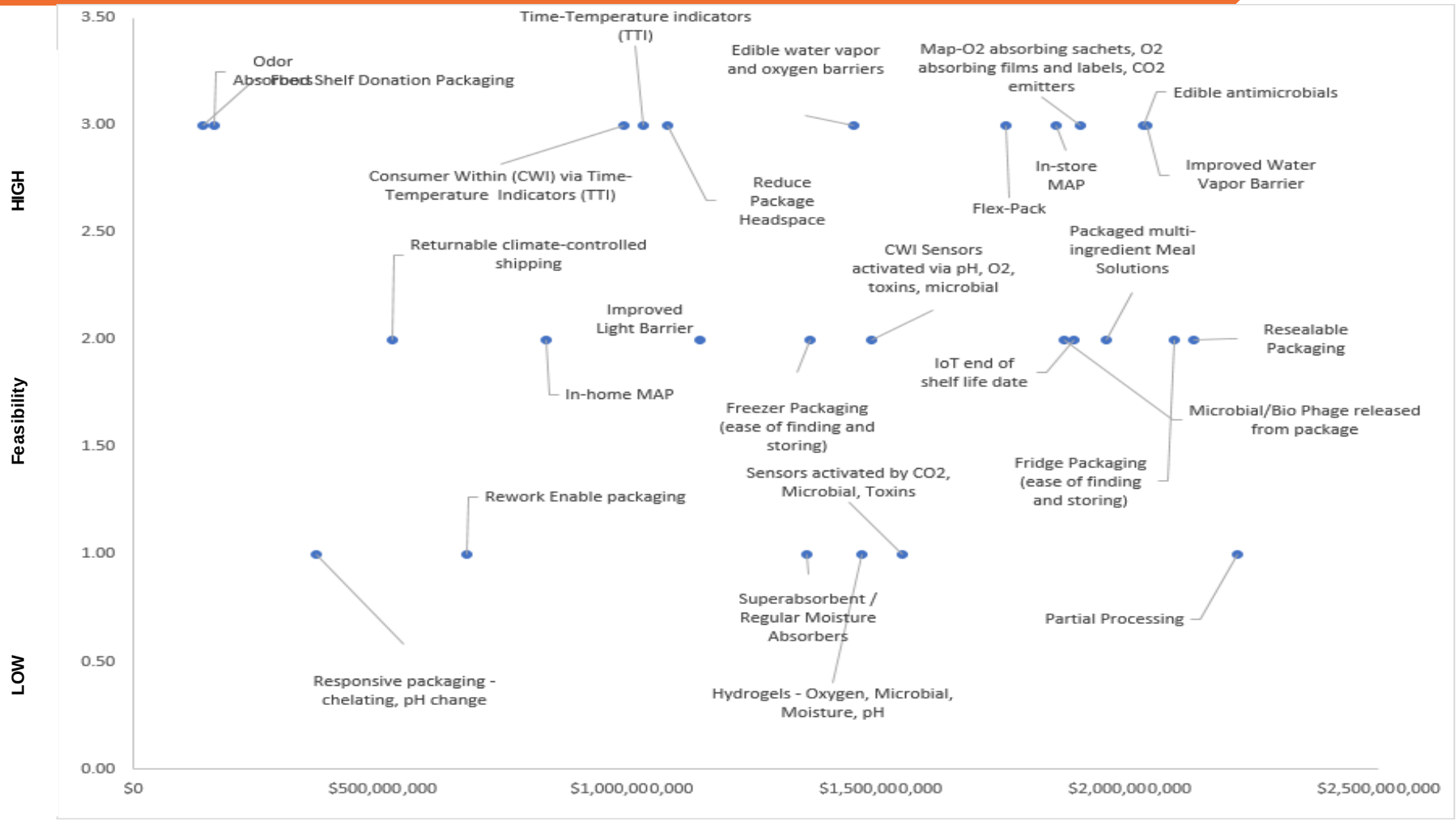
Less Food Waste



Canned kidney beans retain more nutrients when food and nutrient waste are combined

Results – Snapshot of Total Food Waste Reduction as a function of Feasibility

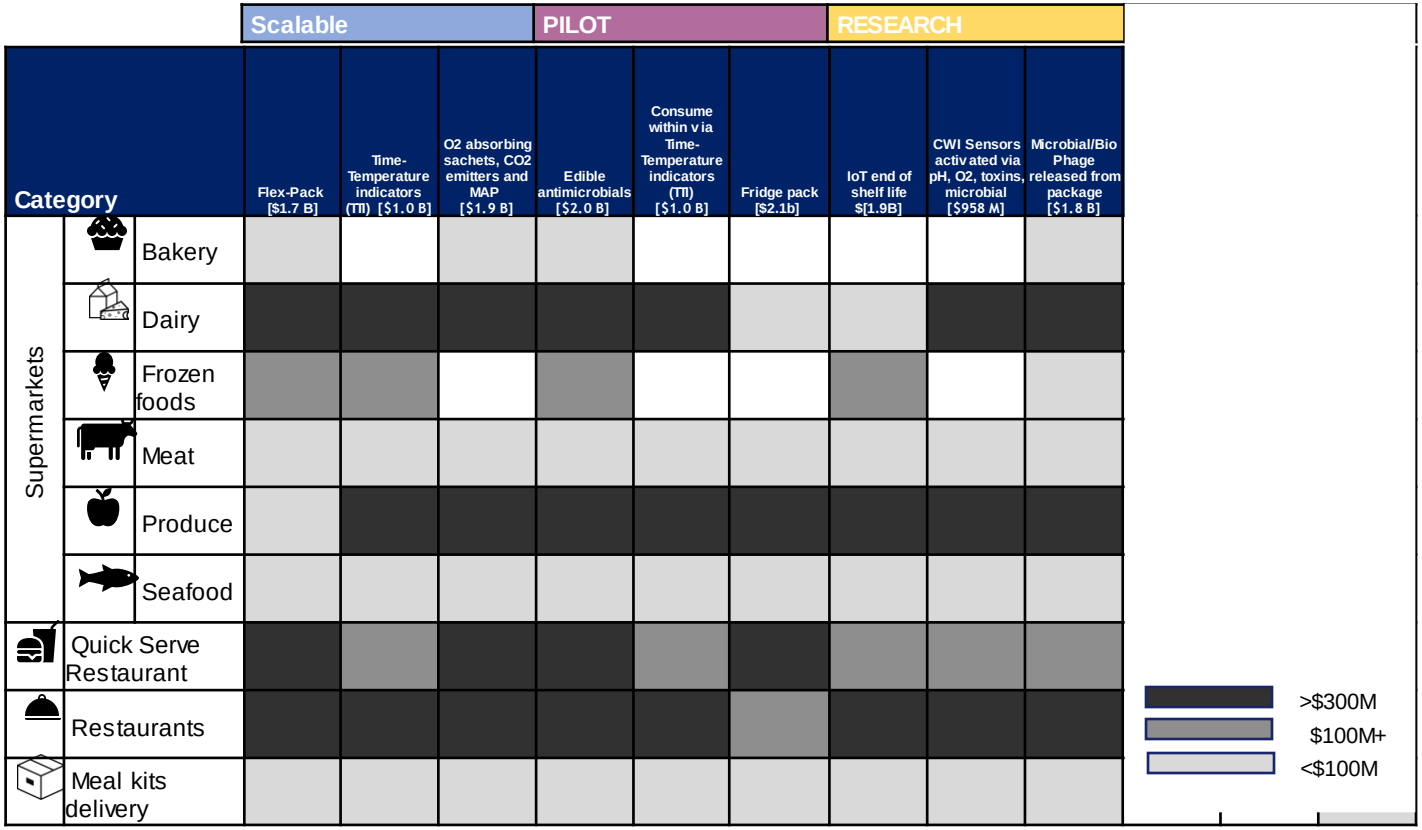
Path Forward



$0 Food Waste Dollars Saved $3billion

Results – Impact of Package Solutions

Reduce Food Waste



Scalable Packaging Solutions to Food Waste

Reduce Food Waste

Scalable Solutions	Reduced Food Waste for Consumers	Reduced Food Waste for Supermarket	Reduced Food Waste for Restaurant	Total Reduced Food Waste	Total feasability to Reduce more Food Waste
Resealable Packaging	$1,095,133,320	$450,491,688	$581,538,462	$2,127,163,470	
Improved Water Vapor Barrier	$1,034,162,554	$418,952,475	$581,538,462	$2,034,653,490	
Map-O2 absorbing sachets, O2 absorbing films and labels, CO2 emitters	$884,293,744	$433,883,841	$581,538,462	$1,899,716,046	
Flex-Pack	$896,359,617	$273,467,945	$581,538,462	$1,751,366,023	
Edible water vapor and oxygen barriers	$446,254,803	$419,899,801	$581,538,462	$1,447,693,066	
Improved Light Barrier	$366,241,082	$188,140,852	$581,538,462	$1,135,920,396	
Reduce Package Headspace	$887,174,809	$185,792,449	$0	$1,072,967,258	
Time-Temperature indicators (TTI)	$219,276,551	$224,021,084	$581,538,462	$1,024,836,096	
Odor Absorbers	$100,696,804	$60,808,515	$0	$161,505,319	

Low total feasability in reducing more food waste	
Medium total feasability in reducing more food waste	
High total feasability in reducing more food waste	

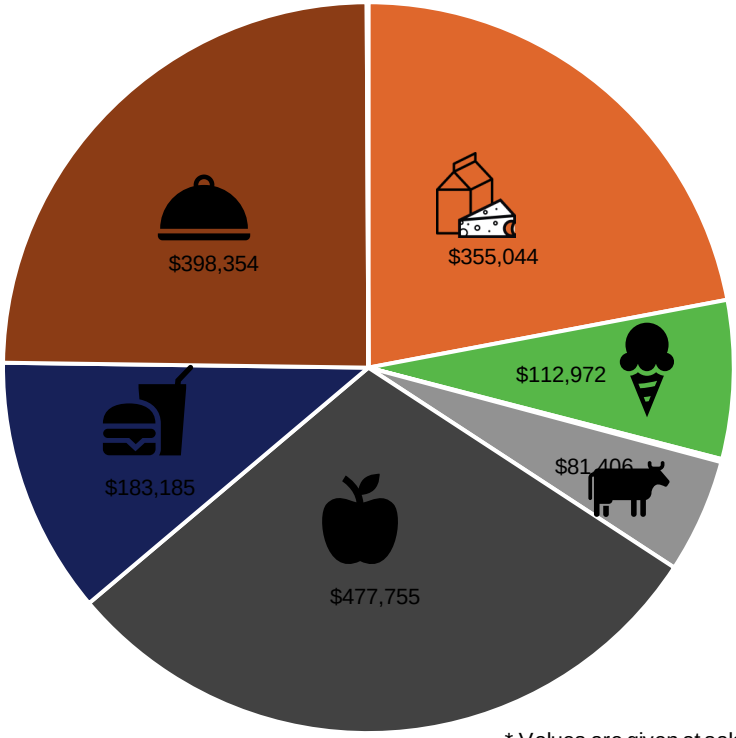
TTIs

Reduce Food Waste

BUSINESS CASE – **SCALABLE**

TTIs

- Degradative food reactions are a function of both time and temperature and provide an accurate depiction of product safety and quality to decrease food waste
- TTIs provide direction for sale at retail as well as for consumption after purchase by consumers with minimal environmental impact



* Values are given at sale in thousands

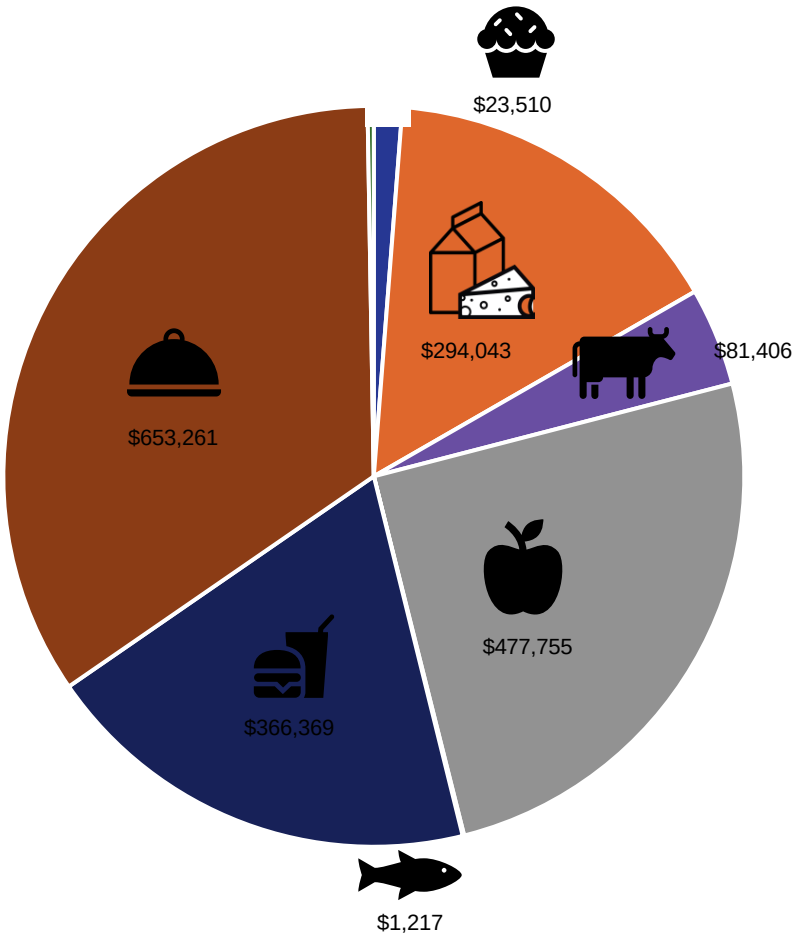
O2 Absorbing Sachets, CO2 Emitters and MAP

Reduce Food Waste

BUSINESS CASE - **SCALABLE**

O_2 absorbing sachets, CO_2 emitters and MAP

- Oxygen related spoilage is the primary cause of food spoilage
- Sachets are drop-in solutions to absorb O2, release CO_2, ethanol, ethylene that to decrease food waste with minimal environmental impact



* Values are given at sale in thousands

Pilot Packaging Solutions to Food Waste

Reduce Food Waste

Pilot Solutions	Reduced Food Waste for Consumers	Reduced Food Waste for Supermarket	Reduced Food Waste for Restaurant	Total Reduced Food Waste	Total feasability to Reduce more Food Waste
Fridge Packaging (ease of finding and storing)	$1,054,707,290	$454,202,956	$581,538,462	$2,090,448,708	
Edible antimicrobials	$969,781,136	$477,741,560	$581,538,462	$2,029,061,158	
Packaged multi-ingredient Meal Solutions	$916,805,691	$456,279,032	$581,538,462	$1,954,623,185	
In-store MAP	$837,405,046	$433,883,841	$581,538,462	$1,852,827,349	
Freezer Packaging (ease of finding and storing)	$720,152,591	$56,709,461	$581,538,462	$1,358,400,513	
Consumer Within (CWI) via Time-Temperature Indicators (TTI)	$315,089,591	$343,713,481	$326,630,769	$985,433,841	
Returnable climate-controlled shipping	$472,097,278	$46,406,998	$0	$518,504,276	
Food Shelf Donation Packaging	$83,701,725	$54,872,330	$0	$138,574,055	

Low total feasability in reducing more food waste	
Medium total feasability in reducing more food waste	
High total feasability in reducing more food waste	

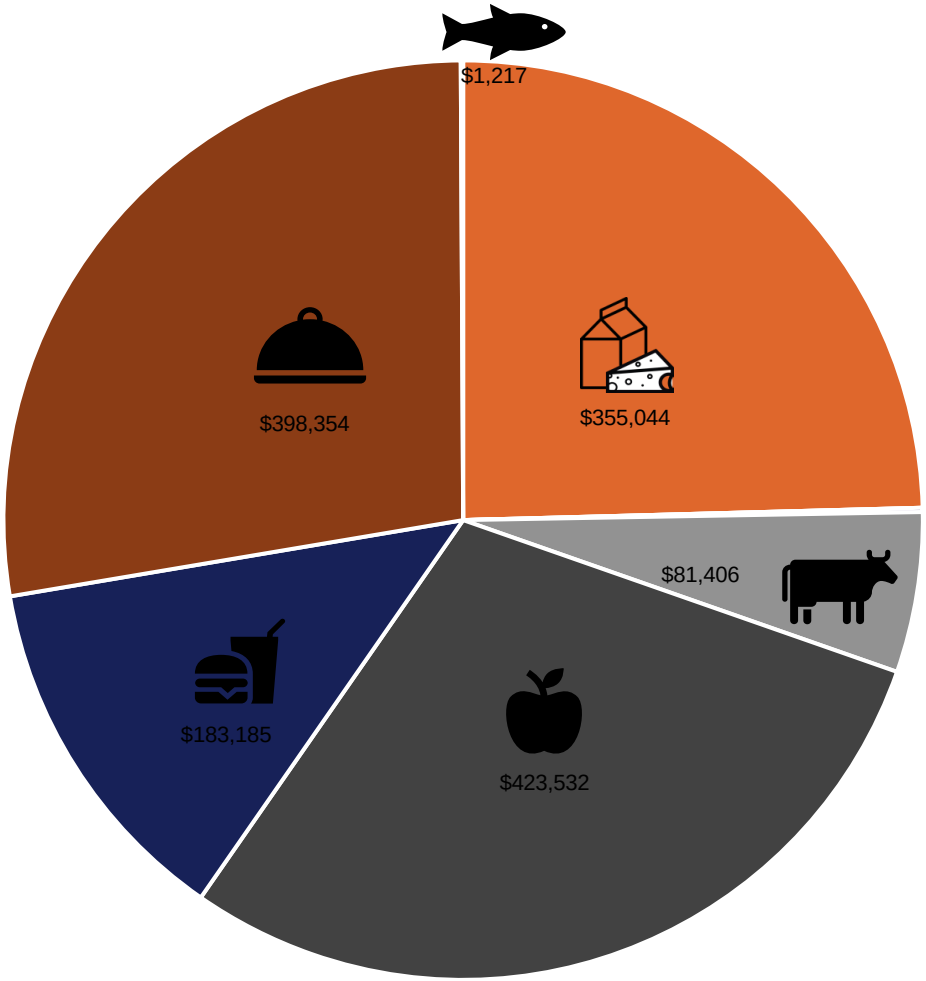
CWI via TTI

Reduce Food Waste

BUSINESS CASE – **PILOT**

CWI via TTI

- Most degradative food reactions are a function of both time and temperature and provide an accurate depiction of product safety and quality to decrease food waste
- CWI TTIs provide direction for the actual date of consumption after purchase by consumers with minimal environmental impact



* Values are given at sale in thousands

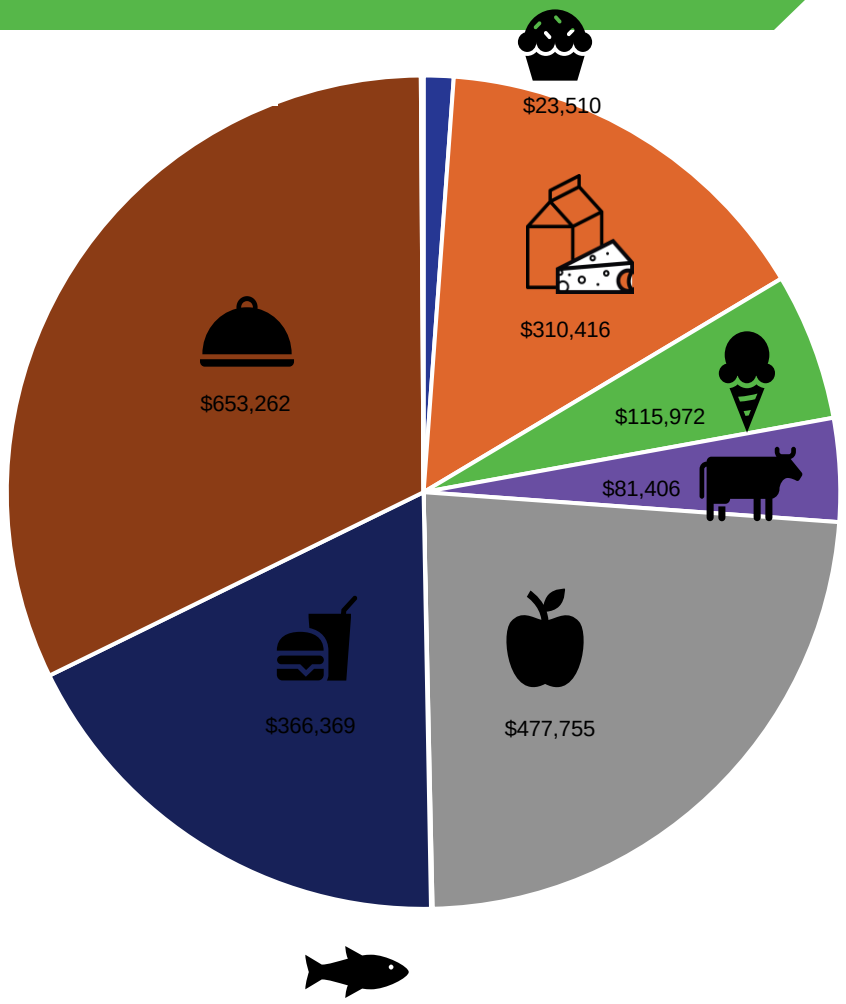
Edible Antimicrobials

Reduce Food Waste

BUSINESS CASE – **PILOT**

Edible Antimicrobials

- Microbial growth is a major food safety issue
- Edible (FDA & EU approved) antimicrobials can eliminate and keep microbial activity low extending the shelf life and making foods safer with less traditional packaging



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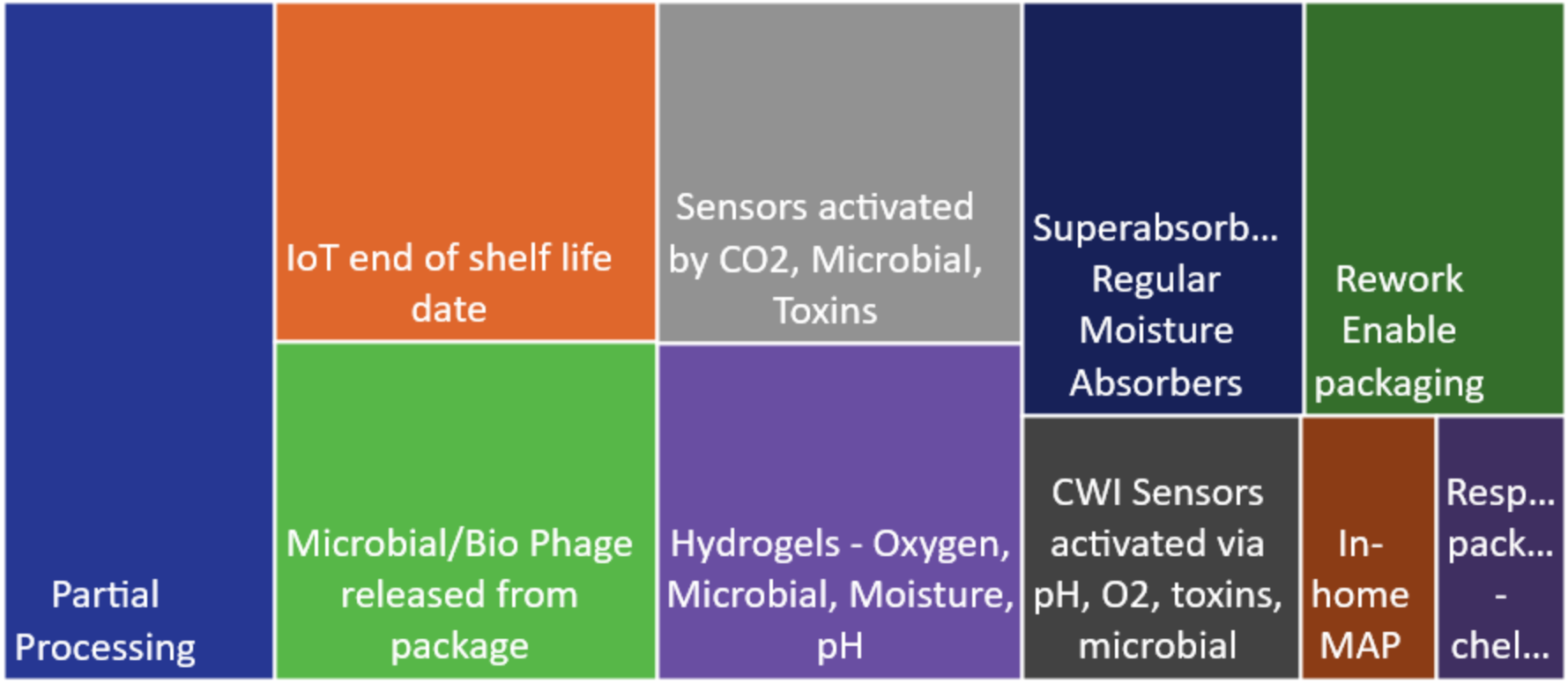
Substantial Research Investment–Packaging Solutions to Food Waste

Reduce Food Waste



Economic Drivers to Reduce Food Waste Differ

Differing drivers are due to economic imbalance

- Brand Owners
  - Have made major progress in economically driven food waste reduction from farm to retail
  - Have limited economic drivers reduce consumer-derived food waste
  - Gap in clear information filled by non-fact based misinformation

- Extending the value chain to Consumers who waste 30% of packaged food is needed
- Link to convenience and adding value of food waste reduction
  - Drivers on consumer sustainability
  - Drivers on Nutrient waste
  - WTP for less nutrient waste and less money lost on spoiled food
  - “Easy to empty” connects with consumers due to food waste reduction

4

Consumer/Market Drivers and Direction for More Sustainable Packaged Food

Direction

Direction-Consumers

Path Forward

- Engage with consumer meaningfully on sustainability
  - Buy-local
  - Flexitarian
  - Global impacts more clearly understood

- Realize that Consumers see packaging as a window into a Brand's positioning on sustainability

- Extend value chain beyond Retail to Consumers at Food Banks and Food Donations
  - Food waste from Retail to Food Banks is high

Direction-Leadership

Path Forward

- Leadership is needed for uniform assessment tools
  - LCAs on product and package

- Respect Consumer need for clear communication
  - Clarity drives change
    - Voluntary carbon-footprinting (UK) and How2Recycle labels, and EPR fees guide
    - Universal (nonculture-specific) to identify more sustainable packaging

- Employ value chain linked intelligent packaging
  - Decrease time and effort to recycle on consumer recycling rate

Direction-Leadership

Path Forward

- SystemsSolutions
  - Rethink who needs what shelf life
  - Urban vs Rural specific packaging
  - Change packaging consumers have to handle

- Category-wide initiatives on food waste reduction and more sustainable packaging

- Use Food Service as means to guide Consumers
  - Food waste reduction at Consumer and BOH & FOH Food Service level
  - Opportunity and value drivers are higher

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