



SEGRA (Sustainable Economic Growth for Regional Australia) 2018

Food Waste in Australia and Consumers' Willingness to Buy Novel, Value-Added Foods

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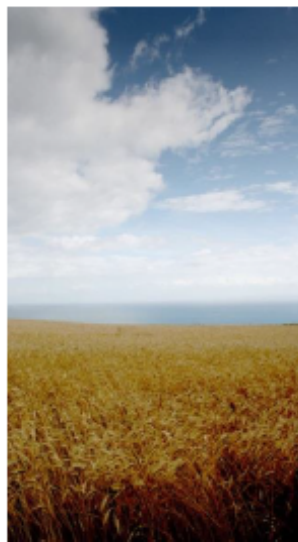


Sources: FAO; The United Nations Environment Programme (UNEP); The World Resources Institute.

Food is lost or wasted along the entire value chain

Production

During or immediately after harvesting on the farm



Handling and Storage

After produce leaves the farm for handling, storage, and transport



Processing and Packaging

During industrial or domestic processing and/or packaging



Distribution and Market

During distribution to markets, including losses at wholesale and retail markets

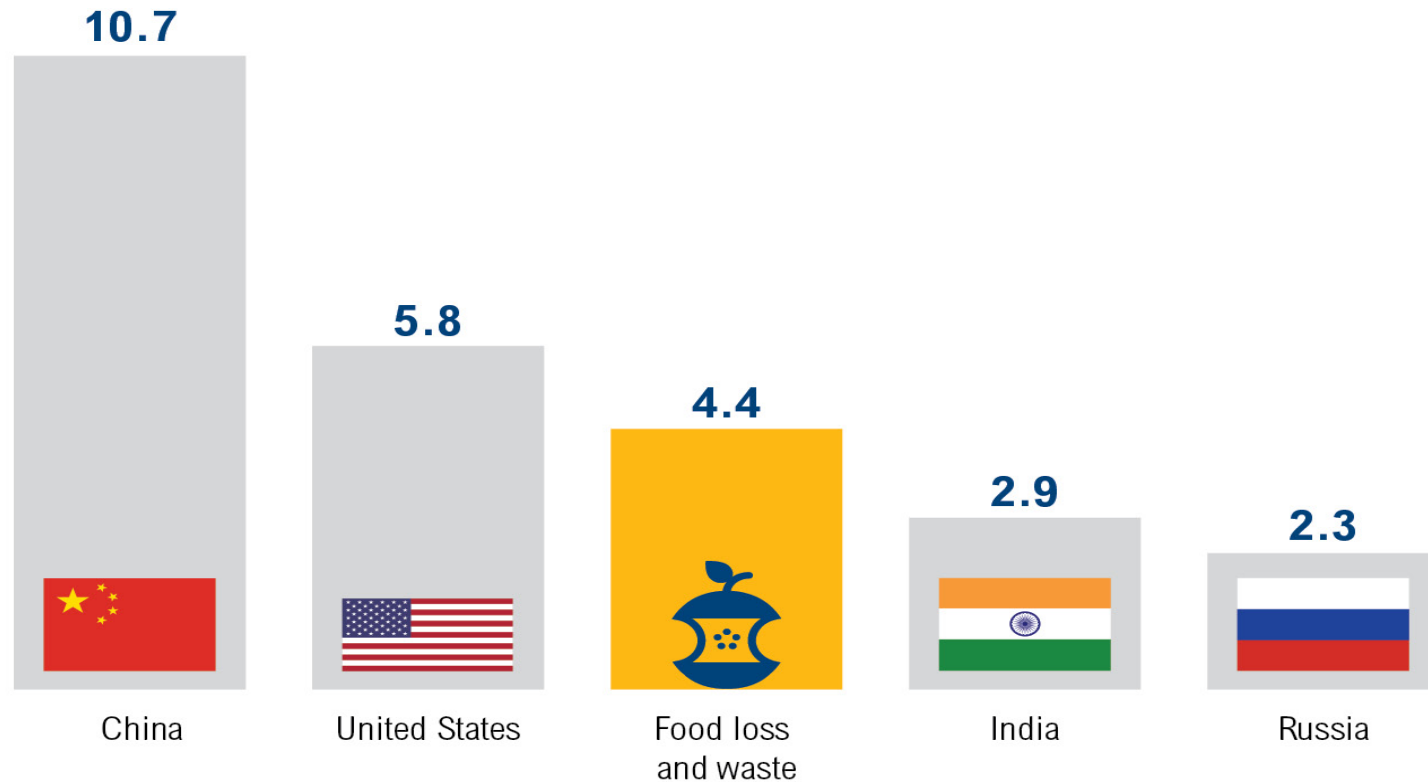


Consumption

Losses in the home or business of the consumer, including restaurants and caterers



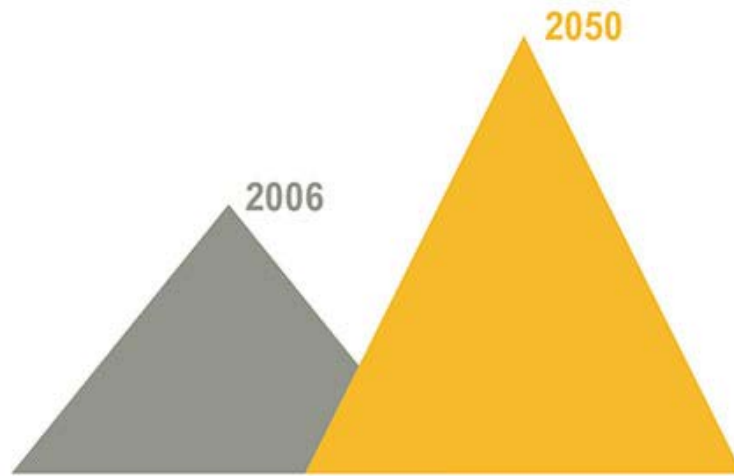
If Food Loss and Waste Were its own Country, it Would Be the Third-Largest Greenhouse Gas Emitter



GT CO₂E (2011/12)*

* Figures reflect all six anthropogenic greenhouse gas emissions, including those from land use, land-use change, and forestry (LULUCF). Country data is for 2012 while the food loss and waste data is for 2011 (the most recent data available). To avoid double counting, the food loss and waste emissions figure should not be added to the country figures.

Source: CAIT. 2015; FAO. 2015. *Food wastage footprint & climate change*. Rome: FAO.



69%

Required increase
in food calories
to feed 9.6 billion
people by 2050

Reducing food loss
and waste can
close the 2050
food gap by 22%
(World Resources
Institute, 2013)



SUSTAINABLE DEVELOPMENT GOALS



UN Development Goal (12). By 2030, halve per capita global food waste at retail and consumer levels, and reduce food losses along production and supply chains.

UN Development Goal (2) Zero Hunger - food security refers to a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.



There is a growing academic literature on household food waste, covering consumers' attitudes towards waste, reasons for wasting food, food-related habits and household demographics (Lea & Worsley, 2008; Koivupuro et al., 2012; Reynolds et al., 2014; Jörissen et al., 2015; Parizeau et al., 2015; Principato et al., 2015; Stancu et al., 2016; Thyberg et al., 2016; Hebrok & Boks, 2017; Schanes et al., 2018).

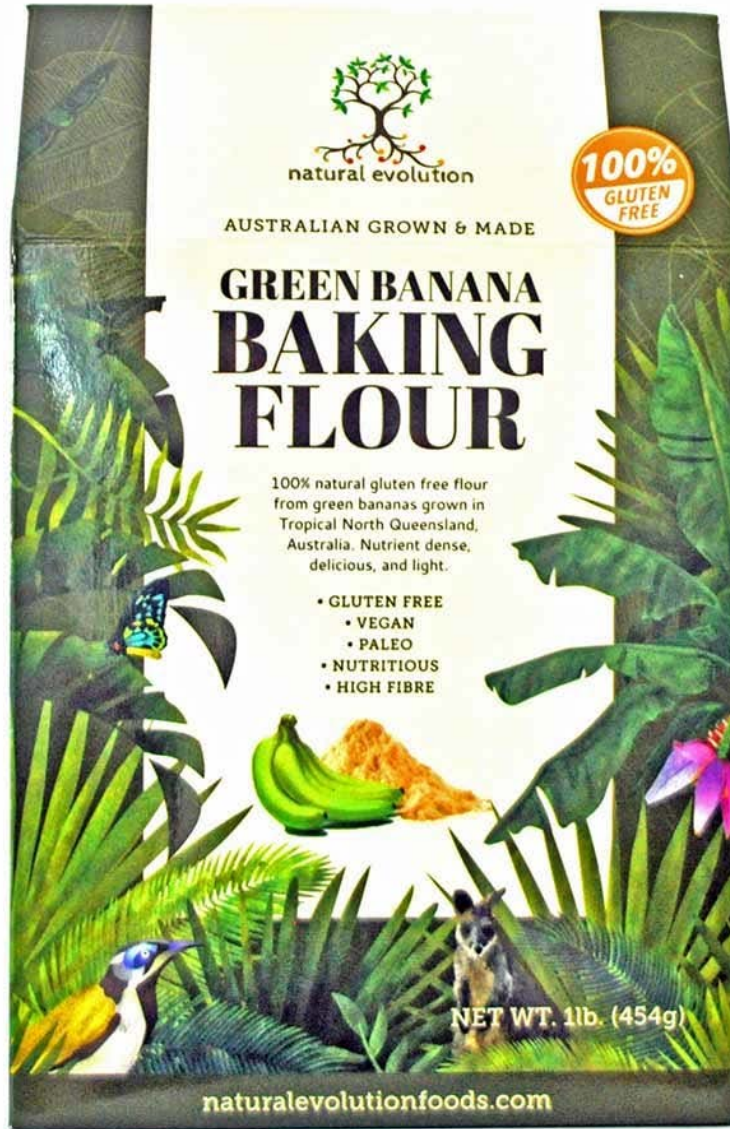


FOOD WASTE - SOLUTIONS

- A wide range of approaches for food loss and waste are in use – setting food waste reduction targets, measuring food loss and waste, and taking action such as:
 - improving packaging; reengineering manufacturing processes;
 - changing food date labelling practices;
 - changing in-store promotions;
 - consumer awareness campaigns;
 - reducing portion sizes and rethinking the buffet;
 - facilitating donation of unsold good from restaurants and caterers (World Resources Institute, 2013).

<https://www.wri.org/publication/reducing-food-loss-and-waste>





Value-adding turns fruit and vegetable residue into higher value products that allows companies to increase competitiveness by generating additional profits, reducing disposal costs and improving resource efficiency of the supply chain.

Risks associated with a new venture: launch, execution and meeting customer expectations.

<https://www.naturalevolutionfoods.com.au/nutritional-information/>

Value-Adding

- Markets are global and substantial (i.e., health and wellness trend, strong demand for plant-based ingredients in sectors such as snacks, cereals and baked goods (Euromonitor, 2017).
- Healthy snacks - worth US\$33 billion with industry-wide theme of “healthy indulgence” in snacks featuring vegetables, pulses and ancient grains (Corelli Consulting, 2018).
- Intensely competitive and fickle



Innovation in Technology Development at CSIRO using carrot and broccoli as feedstock



- **CSIRO Agriculture & Food**
- *Creating Value from Vegetable Waste* (Dr. Mary Ann Augustin, Project Leader).
- Aim: To optimise the value from the edible waste (underutilised biomass) in the vegetable supply chain.

RESEARCH METHODS

- Most studies on value-added foods are located in the food science discipline, studies describe restricted examples and pilot-scale laboratory experiences (Mirabella et al., 2014).
- Comparatively little attention is paid in the marketing literature to consumer acceptance of novel, value-added foods (derived from under-utilised biomass).
- The purpose of this study is to identify the role of moral norms and food-related attitudes on the willingness to buy novel, value-added foods.
- Norm activation model (Schwartz, 1977, Schwartz & Howard, 1981) includes several variables to predict behaviour: personal norms, awareness of consequences and ascription of responsibility.
- Target population: consumers who had responsibility for food shopping, cooking or waste disposal.
- Online survey with 330 usable responses



SURVEY QUESTIONS

- Descriptions of novel-value added products were drawn from CSIRO

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CSIRO

Hort Innovation
Biological Input Investment

VEGETABLE FUND

20% Broccoli snacks

A shelf stable, nutritious ready to eat vegetable snacks

CSIRO's food innovation centre experts in food science, food process engineering and ingredient and product development have developed a process for transforming fresh broccoli into a shelf stable, safe, nutritious, functional ingredients and products.

Our extruded snacks contains at least 20% broccoli and produced using a combination of selected pre-treatment, drying and extrusion process to retain the natural colour, flavour and nutrient composition of fresh broccoli.

Our 20% broccoli extruded snacks is an ideal on the go healthy snack containing 1 serve of broccoli per 60g serving.

Features

- Contains 20 % broccoli
- No added additives
- Good source of fibre in 60g serve
- 60 g serve is equivalent to >1 serves of broccoli

Nutritional Composition

Composition	g/100 g
Moisture (g/100g)	3.2
Protein (g/100g)	13.2
Fat (g/100g)	3.5
Ash (g/100g)	3.3
Total Carbohydrate (g/100g)	76.8
Total Sugars (g/100g)	4.1
Dietary Fibre (g/100g)	6.8



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VEGETABLE FUND

20% Carrot snacks

A shelf stable, nutritious ready to eat vegetable snacks.

CSIRO's food innovation centre experts in food science, food process engineering and ingredient and product development have developed a process for transforming fresh carrot into a shelf stable, safe, nutritious, functional ingredients and products.

Our extruded snacks contains at least 20% carrots and produced using a combination of selected pre-treatment, drying and extrusion process to retain the natural colour, flavour and nutrient composition of fresh carrot.

Our 20% carrot extruded snacks is an ideal on the go healthy snack containing 1 serve of carrot per 85g serving.

Features

- Contains 20% carrot
- No added additives
- Good source of fibre in 85g serve
- 85 g serve is equivalent to >1 serve of carrots

Nutritional Composition

Composition	g/100 g
Moisture (g/100g)	5.3
Protein (g/100g)	7.6
Fat (g/100g)	0.9
Ash (g/100g)	3.1
Total Carbohydrate (g/100g)	82.7
Total Sugars (g/100g)	11.0
Dietary Fibre (g/100g)	4.7



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Willingness to buy

Attitudinal Item	Sample Mean	Std. Deviation	Extremely Unwilling	Not at all Willing	Unwilling	Neither willing nor unwilling	Willing	Very willing	Extremely willing
1. A vegetable powder made from 100% whole carrot that can be used as a healthy ingredient for smoothies, dips, sauces etc.	4.22	1.484	7.3 (24)	7.6 (25)	9.1 (30)	29.1 (96)	30.9 (102)	11.2 (37)	4.8 (16)
2. A vegetable snack product made from 20% broccoli that is an ideal on-the-go healthy snack.	4.37	1.460	6.1 (20)	5.2 (17)	10.6 (35)	26.7 (88)	33.9 (112)	10.3 (34)	7.3 (24)
3. A fermented product based on vegetables that is rich in nutrients and fibre and can be used in baby food, dips, smoothies etc.	4.11	1.460	8.5 (28)	6.1 (20)	12.1 (40)	29.1 (96)	30.9 (102)	10 (33)	3.3 (11)



Comparison

Scale item	Group 1 Willing to buy (responses ≥ 5) Mean	Group 2 Unwilling to buy; neither willing nor unwilling to buy (responses < 5) Mean	Sig. (t- test)
<i>Moral attitudes</i>			
I don't feel bad when I waste food.	2.33	2.66	.028
<i>Awareness</i>			
In my country, households are responsible for a great proportion of the food waste.	5.09	4.54	.000
Food waste is a big environmental issue.	5.39	4.94	.000
Food waste is an important social issue (e.g. world hunger).	5.54	5.18	.006
Foods are scarce over the world and should be consumed consciously.	5.42	5.16	.027
Foods are gifts of nature and have to be treated as such.	5.34	5.08	.042
In my country, the food waste generated by households has great financial consequences.	4.92	4.53	.002
<i>Ascription of responsibility</i>			
I believe that every little effort by consumers helps to reduce the food waste problem.	5.33	4.93	.004
<i>Price concern</i>			
I always check prices, even on small items.	5.49	5.16	.010
I notice when products I buy regularly change in price.	5.40	5.13	.035
<i>Intention to avoid waste</i>			
I try to waste no food at all.	5.51	5.19	.016
I always try to eat all purchased foods.	5.53	5.15	.003
I aim to use all leftovers.	5.49	5.10	.003

Some factors influencing decision

Factor	1 % (n)	2 % (n)	3 % (n)	4 % (n)	5 % (n)	6 % (n)
Helping farmers	37.9 (125)	24.1 (70)	12 (35)	8.6 (25)	5.5 (16)	6.9 (20)
Effects on economy	10.7 (31)	23.7 (69)	18.2 (53)	21.3 (62)	16.8 (49)	8.9 (26)
Healthy food	11.7 (34)	12 (35)	15.8 (46)	21.3 (62)	23 (67)	16.2 (47)
Natural environment	19.6 (57)	16.5 (48)	21.6 (63)	16.2 (47)	15.8 (46)	10.3 (30)
Helping society	7.9 (23)	14.8 (43)	20.3 (59)	19.9 (58)	21.3 (62)	15.8 (46)
Price	11.7 (34)	7.2 (21)	11.3 (33)	11.3 (33)	17.2 (50)	40.5 (118)

Note. 1 = ranked as first factor to 6 = ranked as the last factor influencing decision to buy value-added food product.

KEY FINDINGS

- Our results show that one element in the norm activation model was significant – awareness of consequences – in differentiating between people who were willing to purchase value-added foods and those who were not.
- An emphasis on the consequences of food waste avoidance for growers, as well for the natural environment, could be important in promoting value-added foods.
- Being environmentally-friendly is not enough to gain consumer loyalty—a value-added product also needs to show a high score in terms of price.
- Marketing communications should also stress health to encourage this consumer segment to buy value-added food.

Conclusions

- There are opportunities to value-add fresh vegetables and meet customer needs.
- Market segmentation, targeting and positioning (STP) are keys to success.
- Functional Food + Ethical (“Good for you. Good for Growers.”)



*Health-conscious
Price-conscious
Ethical
Aware of food waste problem
Natural environment*



Thank you.

Questions, comments and suggestions?

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