



## STUDY CONCLUSIONS

### **A Critical Review and Meta Analysis of the Rates of Frozen Food Waste at the Retail and Consumer Levels<sup>1</sup>**

#### *Summary and Purpose*

The main purpose of this study was to assess the rate of frozen food waste at the retail and consumer levels. In general, the literature concludes frozen foods are wasted less than their fresh counterparts at grocery stores and in households.

Not surprisingly, the level of waste varies across different food categories and frozen foods are not immune to being discarded. The reasons why consumers throw out food from the freezer versus the refrigerator differ. While in both cases consumers forgetting about products is a common driver, concern about expiry dates on packages is a more typical driver for frozen foods while in comparison, foods stored in the refrigerator are more likely discarded because consumers felt the product was no longer edible or they had prepared too much.

#### *About Retail Food Waste*

All retail level studies show that frozen food is wasted less than fresh food (Table 1). Among retailers participating in the Pacific Coast Food Waste Commitment, the difference in the rate of waste is notable with items in fresh produce departments discarded nearly six times more than items sold frozen. Results from a few product-specific studies confirm that at retail the rate of waste for frozen products is lower than that of the fresh equivalent but, not surprisingly, the ratio of fresh to frozen waste rates does vary among different types of products.

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<sup>1</sup> Forthcoming Dyson Working paper by Harry de Gorter, Jieyu Hao, David R. Just, and Erika Kliaugas  
“Measurement of Frozen versus Fresh Food Loss and Waste (FLW) at the Retail and Consumer Levels: A Critical Review and Meta Analysis.”

**Table 1. Summary of Retail Food Waste Rates**

	<b>Pacific Coast Food Waste Commitment (2021)</b>	<b>Heller and Keoleian (2017)</b>	<b>Canals et al. (2008)</b>	<b>Neff et al. (2021)</b>
Frozen Products	1.1% (frozen food)	0.27% (green beans) 0.33% (blueberries)	2.1% (broccoli)	~ 0 (frozen fish products)
Fresh Products	6.4% (fresh produce)	4.9% (green beans) 0.72% (blueberries)	2.5% (broccoli)	3 – 7 % (fresh fish)
<i>Ratio of Fresh to Frozen Food Waste Rates</i>	5.82	9.47	1.19	600-1,400

*About Consumer Food Waste*

Seven studies look explicitly at the rate of food wasted by consumers for frozen food in general, or for a selection of specific frozen products versus comparable fresh products. In nearly all cases, frozen products are wasted less than fresh items.

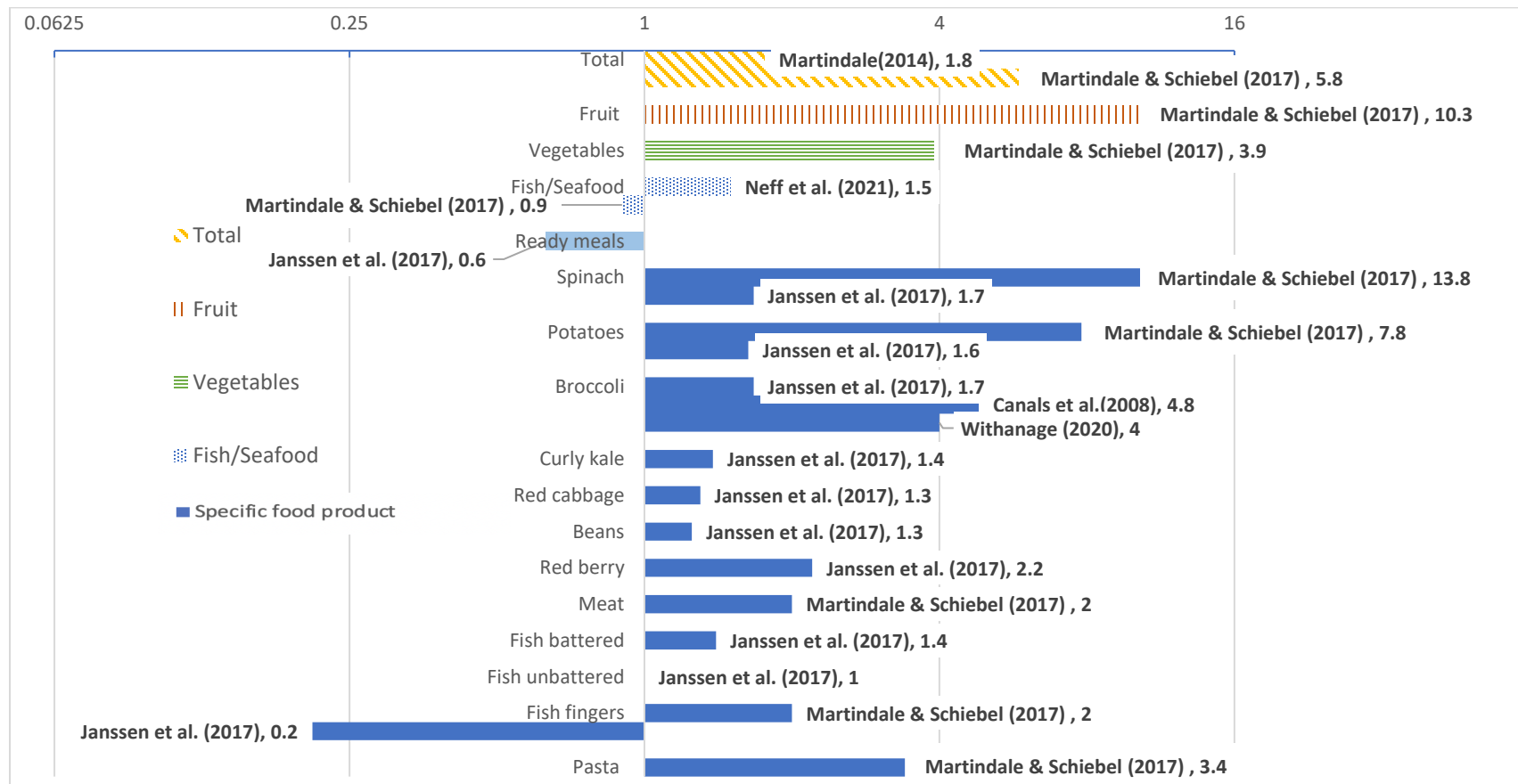
The degree to which waste rates vary depends on the products under consideration. Figure 1 compares the ratio of fresh to frozen food waste rates at the consumer level. These vary across products and studies. For example, while one study indicates that fresh food is wasted two times that of frozen, another study reports that it is six times higher. Moreover, the difference in rates of food waste varies among different types of food. For most fruits and vegetables studied, frozen products are wasted much less than fresh products. However, for fish and seafood products, the findings are mixed.

In terms of why consumers waste food, in the Janssen et al. (2017) study, the greatest number of respondents said for food from the freezer it was because 'the expiry date had passed' (38%) and/or 'the product was forgotten' (32%). By contrast, food waste from products in the refrigerator was largely driven by the 'food product was no longer edible' (51%), 'too much was prepared' (44%), and/or 'the food product was forgotten' (40%).

It is important to note that since the consumer-level studies are mostly based on self-reported data, it is highly likely that the actual food waste is underestimated but, presumably, the bias in fresh and frozen food waste estimates go in the same direction. In addition, methodological, temporal, and cultural variations may explain the difference among households in the United Kingdom (Martindale 2014), Austria (Martindale 2017), and the Netherlands (Janssen et al. 2017).

**How to interpret Figure 1:** For the consumer studies analyzed, this figure presents a ratio of fresh to frozen food waste rates calculated by the Cornell University authors to facilitate comparison among the studies. Figure 1 supports the hypothesis that food which is frozen is wasted to a lesser degree than fresh products; however, these ratios should not be used to draw other conclusions as the methodologies vary sufficiently limiting direct comparisons. In this figure, the axis is centered on 1 and scaled in proportion to 4. A ratio greater than 1 indicates that the rate of consumer food waste for a *fresh* product was greater than the *frozen* equivalent. By comparison, a ratio lower than 1 indicates that the rate of food waste for a *frozen* product was greater than the *fresh* equivalent. Note that the scale to the left of 1 is much smaller than that to the right of 1.

**Figure 1. Ratio of Fresh to Frozen Food Waste Rates at the Consumer Level**



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**Full Report: The full study report can be made available by contacting: [hd15@cornell.edu](mailto:hd15@cornell.edu)**