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Promoting the Imperfect: Marketing Strategies to Reduce Product Waste

Ilona E. de Hooge

In science and in society, it is gradually becoming acknowledged that human natural resource usage exceeds planetary limits.[1] Climate change, biodiversity loss, and imbalances in the nitrogen and phosphorus cycle are all consequences of inefficient human resource usage. By implication, reducing our resource usage is essential to fulfil the needs of current and future generations.[2]

A central topic in discussions about human resource usage is the food supply chain. Food production currently ranks among the largest demands on natural resources such as water, land, and energy[3] and is assessed to cause approximately a third of all greenhouse gas emissions.[4] Surprisingly, one-third to one-half of all food produced is wasted.[5] Food waste, defined as "any food, and inedible parts of food, removed from the food supply chain to be recovered or disposed (including composted, crops ploughed in/

[1] J. Rockstrom, W. Steffen, K. Noone, A. Persson, F. S. Chapin III, E. Lambin, et al., "Planetary Boundaries: Exploring the Safe Operating Space for Humanity," *Ecology and Society* 14, no. 2 (2009), http://www.ecologyandsociety.org/vol14/iss2/art32/; W. Steffen, K. Richardson, J. Rockström, S. E. Cornell, I. Fetzer, E. M. Bennett et al., "Planetary Boundaries: Guiding Human Development on a Changing Planet," *Science* 347, no. 6223 (1259855) (2015).

[2] Ibid.; and UN, "Our Common Future. Report of the UN World Commission on Environment and Development. Annex to Document A/42/427" (1987).

[3] D. Cordell, J.-O. Drangert, and S. White, "The Story of Phosphorus: Global Food Security and Food for Thought," *Global Environmental Change* 19, no. 2 (2009): 292–305; Rockstrom et al., "Planetary Boundaries."

[4] T. Garnett, "Where Are the Best Opportunities for Reducing Greenhouse Gas Emissions in the Food System (Including the Food Chain)?" *Food Policy* 36 (2011): S23–S32. doi:10.1016/j.foodpol.2010.10.010.

[5] FAO, "Food Wastage Footprint: Impacts on Natural Resources," retrieved September 8, 2014, http://www.fao.org/docrep/018/i3347e/i3347e.pdf; J. Parfitt, M. Marthel, and S. MacNaughton., "Food Waste within Food Supply Chains: Quantification and Potential for Change to 2050," *Philosophical Transactions: Biological Sciences* 365, no. 1554 (2010): 3065–81. doi:10.1098/rstb.2010.0126.

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not harvested, anaerobic digestion, bio-energy production, co-generation, incineration, disposal to sewer, landfill or discarded to sea),"[6] is a very inefficient use of natural resources. Food wastage is also problematic from a food security perspective. In a world where the population is continuously growing and where the current challenge is to provide food and nutrition to almost 9 billion people, food wastage is in stark contrast with human efforts to provide food security to all.[7] In addition, food wastage is problematic from a moral perspective: it seems immoral to waste something valuable, in which others have invested effort, time, and energy.[8] For these reasons, reducing food waste is stated as one of the necessary worldwide actions for a more sustainable future.[9]

There are multiple causes of food waste and they vary in the degree to which they are avoidable. There are some situations where food waste is considered to be unavoidable. In the supply chain, such unavoidable food losses concern, for example, harvesting, storage, transportation, and processing losses that cannot be solved with the currently available technologies, as well as product contaminations.[10] In the consumer household, unavoidable food waste is, for example, the waste generated by foods or drinks that are not edible under normal circumstances, such as tea leaves and banana skins.[11] There are also types of food waste that can be considered potentially avoidable. For example, some elements of drinks and foods are consumed by some but not all consumers (e.g., apple peels), and some foods can be consumed when prepared in one way but not when prepared in another way (e.g.,

[6] FUSIONS, "FUSIONS Definitional Framework for Food Waste, Full Report" (2014): 6. Retrieved from https://www.eu-fusions.org/index.php/download?download=5:fusions-definitional-framework-for-food-waste.

[7] H. Godfray, C. J., Beddington, J. R., Crute, I. R., Haddad, L., Lawrence, D., Muir, J. F., . . . et al., "Food Security: The Challenge of Feeding 9 Billion People," *Science* 327 (2010): 812–18. doi:10.1126/science.1185383.

[8] Garnett, "Where Are the Best Opportunities."

[9] J. Foley, A., Ramankutty, N., Brauman, K. A., Cassidy, E. S., Gerber, J. S., Johnston, M., . . . P. C. West, "Solutions for a Cultivated Planet," *Nature* 478, no. 7369 (2011): 337–42; Godfray et al., "Food Security," 812–18.

[10] C. Beretta, F. Stoessel, U. Baier, and S. Hellweg, "Quantifying Food Losses and the Potential for Reduction in Switzerland," *Waste Management* 33 (2013): 764–73. doi:10.1016/j.wasman.2012.11.007; J. Gustavsson and J. Stage, "Retail Waste of Horticultural Products in Sweden," *Resources, Conservation and Recycling* 55 (2011): 554–6. doi:10.1016/j.resconrec.2011.01.007; T. E. Quested and H. Johnson, "Household Food and Drink Waste in the UK: A Report Containing Quantification of the Amount and Types of Household Food and Drink Waste in the UK," *Report Prepared by WRAP (Waste and Resources Action Programme), Banbury* (2009).

[11] Beretta et al., "Quantifying Food Losses," 764–73.

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potato skins).[12] Finally, there are types of food waste that are categorized as being avoidable. These occurrences of food waste concern foods and drinks being thrown away because the products are no longer wanted. In the supply chain, this can, for example, concern foods not harvested because of low demands, overproduction, surplus stocks, deviations from prescribed shapes or sizes, and changes in the production line.[13] For both retailers and consumer households, examples of avoidable food waste are foods or drinks that are wasted because they have been stored for too long, because they have exceeded the expiry date, or because parts of the food or drink have perished.[14] In consumer households, avoidable food waste can also concern leftovers after cooking, preparing too much food, or plate waste.[15]

Interestingly, most avoidable food waste occurs due to supply chain actors and consumers experiencing difficulties with *imperfect foods*. "Imperfect" or "suboptimal" foods I define as products that diverge from perfect standards not on the basis of their main defining product aspects—their intrinsic quality and safety—but on peripheral product aspects, such as appearance standards, date labeling, or packaging deviations. Misshapen fruits and vegetables, dairy close to, on, or slightly past the best before date, and soups in dented cans are examples of food products that are not perceived as perfect or optimal in the eyes of supply chain actors and consumers.[16] These products all rank, in short, as flawed.

[12] Ibid.; T. E. Quested, A. D. Parry, S. Easteal, and R. Swannell, "Food and Drink Waste from Households in the UK," *Nutrition Bulletin* 36 (2011): 460–7. doi:10.1111/j.1467-3010.2011.01924.x.

[13] J. C. Buzby and J. Hyman, "Total and Per Capita Value of Food Loss in the United States," *Food Policy* 37 (2012): 561–70. doi:10.1016/j.foodpol.2012.06.002; C. Mena, B. Adenso-Diaz and O. Yurt, "The Causes of Food Waste in the Supplier-Retailer Interface: Evidences from the UK and Spain," *Resources, Conservation and Recycling* 55 (2011): 648–58. doi:10.1016/j.resconrec.2010.09.006.

[14] Beretta et al., "Quantifying Food Losses"; J. Buzby, J. Bentley, B. Padera, C. Ammon and J. Campuzano, "Estimated Fresh Produce Shrink and Food Loss in US Supermarkets," *Agriculture* 5, no. 3 (2015): 626–48.

[15] H.-K. Koivupuro, H. Hartikainen, K. Silvernoinen, J.-M. Katajajuuri, N. Heikintalo, A. Reinikainen, and Jalkanen, "Influence of Socio-Demographical, Behavioural, and Attitudinal Factors on the Amount of Avoidable Food Waste Generated in the Finnish Household," *International Journal of Consumer Studies* 36 (2012): 183–91. doi:10.1111/j.1470-6431.2011.01080.x; Quested, "Household Food."

[16] I. E. De Hooge, M. Oostindjer, J. Aschemann-Witzel, A. Normann, S. Mueller Loose, and V. L. Almli, "This Apple Is Too Ugly for Me! Consumer Preferences for Suboptimal Food Products in the Supermarket and at Home," *Food Quality and Preference* 56 (2017): 80–92. doi:10.1016/j.foodqual.2016.09.012; K. White, L. Lin, D. W. Dahl, and R. J. B. Ritchie, "When Do Consumers Avoid Imperfections? Superficial Packaging Damage as a Contamination Cue," *Journal of Marketing Research* 53, no. 2 (2016): 110–23. doi:10.1509/jmr.12.0388.

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Multiple researchers have quantified food waste at various stages of the food supply chain and demonstrated that a prominent cause of (avoidable) food waste is the tendency of supply chain actors to develop and to adhere to rules that strictly separate imperfect from perfect foods.[17] Such cosmetic specifications categorize foods into perfect and imperfect products on the basis of solely extrinsic cues.[18] Imperfect products are subsequently deleted from the production line, even though these products are similar to the perfect products on the basis of intrinsic quality and safety.[19] In this chapter, I discuss different labels, definitions, and categories of imperfect and perfect foods.

Multiple scholars have argued that one of the essential causes of food waste in supply chains and in households is consumers' unwillingness to purchase and consume imperfect foods.[20] Consumers have, for example, been found to avoid buying or consuming fruits with small spots on their skin,[21] canned food with ripped labels,[22] bananas with browned skin,[23] or vegetables with

[17] Beretta et al., "Quantifying Food Losses," 764–73; J. C. Buzby, J. Hyman, H. Stewart, and H. F. Wells, "The Value of Retail- and Consumer-Level Fruit and Vegetable Losses in the United States," *Journal of Consumer Affairs* 45, no. 3 (2011): 492–515; C. Gobel, N. Langen, A. Blumenthal, P. Teitscheid, and G. Ritter, "Cutting Food Waste through Cooperation along the Food Supply Chain," *Sustainability* 7 (2015): 1429–45. doi:10.3390/su7021429; Gustavsson and Stage, "Retail Waste of Horticultural Products in Sweden"; S. Lebersorger and F. Schneider, "Food Loss Rates at the Food Retail, Influencing Factors and Reasons as a Basis for Waste Prevention Measures," *Waste Management* 34, no. 11 (2014): 1911–19. doi:10.1016/j.wasman.2014.06.013.

[18] I. E. De Hooge, E. Van Dulm, and H. C. M. Van Trijp, "Cosmetic Specifications in the Food Waste Issue: Addressing Food Waste by Developing Insights into Supply Chain Decisions concerning Suboptimal Food Products," *Journal of Cleaner Production* 183 (2018): 698–709. doi:10.1016/j/clepro.2018.02.132; A. Halloran, J. Clement, N. Kornum, C. Bucatariu, and J. Magid, "Addressing Food Waste Reduction in Denmark," *Food Policy* 49 (2014): 294–301. doi:10.1016/j.foodpol.2014.09.005.

[19] De Hooge, Van Dulm, and Van Trijp, "Cosmetic Specifications," 698–709; Gobel, Langen, Blumenthal, Teitscheid, and Ritter, "Cutting Food Waste," 1429–45.

[20] J. Aschemann-Witzel, I. E. De Hooge, P. Amani, T. Bech-Larsen, and M. Oostindjer, "Consumer-Related Food Waste: Causes and Potential for Action," *Sustainability* 7 (2015): 6457–77. doi:10.3390/su7066457; Buzby, Hyman, Stewart, and Wells, "The Value," 492–515; De Hooge, Van Dulm, and Van Trijp, "Cosmetic Specifications," 698–709; Lebersorger and Schneider, "Food Loss Rates"; R. Newsome, C. G. Balestrini, M. D. Baum, J. Corby, W. Fisher, K. Goodburn, . . . F. Yiannas, "Applications and Perceptions of Date Labeling of Food," *Comprehensive Reviews in Food Science and Food Safety* 13 (2014): 745–69. doi:10.1111/1541–4337.12086; Quested, Parry, Easteal, and Swannell, "Food and Drink Waste," 460–7; WRAP, *Household Food and Drink Waste: A People Focus* (2014a). Retrieved from Oxon; WRAP, *Household Food and Drink Waste: A Product Focus* (2014b). Retrieved from Oxon.

[21] De Hooge, "Cosmetic Specifications," 698–709.

[22] White et al., "When Do Consumers," 110–23.

[23] C. Symmank, S. Zahn, and H. Rohm, "Visually Suboptimal Bananas: How Ripeness Affects Consumer Expectation and Perception," *Appetite* 120 (2018): 472–81.

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strongly deviating shapes.[24] Retailers have also observed these consumer tendencies to avoid imperfect foods, and provide the consumers' avoidance behavior as one of the main reasons why they would not put imperfect foods on the shelves.[25] Being able to motivate consumers to buy and consume food that ranks as imperfect would therefore reduce food waste at both the household level and the supply chain level.

In sum, as the wastage of suboptimal products is an extensive part of food waste in general and falls under the category of avoidable food waste, there is potential in trying to reduce the food waste of imperfect products. The current chapter examines supply chain actors' and consumers' perceptions of and decisions concerning imperfect food products, and explores whether it is possible to make imperfect foods attractive for supply chain actors and consumers. It studies whether marketing strategies that focus on imperfection in products as an advantage can hold promising avenues for the future. These insights can make an essential contribution to existing imperfection literature—of which I offer some samples below—and to our understanding of the positive sides of imperfection. Moreover, the present insights can hopefully provide some valuable steps toward a more sustainable future.

Defining Imperfect Food Products

Aesthetic, moral, and other imperfections can be found in many different objects and situations. For example, decision-makers can use imperfect information or imperfect algorithms when making decisions,[26] people can perceive themselves or others as being imperfect,[27] music and art can contain

[24] N. Loebnitz, G. Schuitema, and K. Grunert, "Who Buys Oddly Shaped Food and Why? Impacts of Food Shape, Abnormality, and Organic Labeling on Purchase Intentions," *Psychology & Marketing* 32, no. 4 (2015): 408–21. doi:10.1002/mar.20788.

[25] De Hooge, Van Dulm, and Van Trijp, "Cosmetic Specifications," 698–709.

[26] B. J. Dietvorst, J. P. Simmons, and C. Massey, "Overcoming Algorithm Aversion: People Will Use Imperfect Algorithms If They Can (Even Slightly) Modify Them," *Management Science* 64, no. 3 (2016): 1155–70; J. E. Stiglitz and A. Weiss, "Credit Rationing in Markets with Imperfect Information," *American Economic Review* 71, no. 3 (1981): 393–410.

[27] D. Dunning, K. Johnson, J. Ehrlinger, and J. Kruger, "Why People Fail to Recognize Their Own Incompetence," *Current Directions in Psychological Science* 12, no. 3 (2003): 83–7; L. H. Janda, *How to Live with an Imperfect Person* (Gretna, LA: Wellness Institute, 2000); D. Sweet and M. McCue-Enser, "Constituting 'the People' as Rhetorical Interruption: Barack Obama and the Unfinished Hopes of an Imperfect People," *Communication Studies* 61, no. 5 (2010): 602–22.

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imperfect elements,[28] and supply chain actors and consumers can consider products to be imperfect or suboptimal.[29]

One type of product that can be considered imperfect or suboptimal is food. "Imperfect" foods, as said, are products that depart from perfect or optimal products:

1. on the basis of appearance standards (in terms of, e.g., color, shape, or size),[30]
2. on the basis of their date labeling (e.g., close to the best before date),[31] or
3. on the basis of their packaging (e.g., a dented carton).[32]

One may think, for example, of a bent cucumber, a carrot with two legs, a dented can of soda, or dairy on the best before date. For all products, quality cues can be separated into intrinsic and extrinsic cues.[33] Whereas intrinsic cues concern cues that, if changed, would result in a substantial change of the product itself (e.g., taste), extrinsic cues concern cues that can be alternated without substantially changing the product itself (e.g., price). Essentially, in all cases of imperfect or suboptimal foods, the imperfect foods solely diverge from perfect foods on the basis of their extrinsic cues.[34]

In the case of imperfection on the basis of appearance standards, the imperfection mostly concerns a type of imperfection that is described by Saito as atemporal.[35] *Atemporal imperfection* can, in Saito's view, be understood as a type of imperfection based on "the norm that describes a perfection

[28] K. Cascone, "The Aesthetics of Failure: 'Post-Digital' Tendencies in Contemporary Computer Music," *Computer Music Journal* 24, no. 2 (2000): 12–18; Y. Saito, "The Role of Imperfection in Everyday Aesthetics," *Contemporary Aesthetics* 15, no. 1 (2017): 1–15.

[29] D. Bunn, G. W. Feenstra, L. Lynch, and R. Sommer, "Consumer Acceptance of Cosmetically Imperfect Produce," *Journal of Consumer Affairs* 24, no. 2 (1990): 268–79. doi:0022-0078/0002-268; S. S. Sana, "A Production-Inventory Model of Imperfect Quality Products in a Three-Layer Supply Chain," *Decision Support Systems* 50, no. 2 (2011): 539–47. doi:10.1016/j.dss.2010.11.012.

[30] Bunn et al., "Consumer Acceptance," 268–79; De Hooge et al., "Cosmetic Specifications," 698–709.

[31] De Hooge et al., "This Apple," 80–92.

[32] White et al., "When Do Consumers," 110–23.

[33] G. J. Szybillo and J. Jacoby, "Intrinsic versus Extrinsic Cues as Determinants of Perceived Product Quality," *Journal of Applied Psychology* 59 (1974): 74–8; V. A. Zeithaml, "Consumer Perceptions of Price, Quality, and Value: A Means-End Model and Synthesis of Evidence," *Journal of Marketing* 52, no. 3 (1988): 2–22. doi:http://www.jstor.org/stable/1251446.

[34] Aschemann-Witzel et al., "Consumer-Related Food Waste: Causes," 6457–77; Gobel et al., "Cutting Food Waste," 1429–45; Halloran et al., "Addressing Food Waste Reduction," 294–301.

[35] Saito, "The Role of Imperfection," 1–15.

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of [a] kind"; this form of imperfection has been perceived as imperfect from birth and remains imperfect over time. Imperfection on the basis of appearance standards is one of the largest causes of fruit and vegetable waste and generates food waste along the whole supply chain.[36] As this type of imperfection depends on what supply chain actors and consumers perceive as perfect or imperfect, it may be malleable depending on, for example, local contexts or marketing strategies.[37]

The current chapter mostly focuses on this atemporal type of imperfection. The contrary type—imperfections on the basis of date labeling and packaging—concerns a *temporal* form of imperfection: the food has once been perfect, but is now considered imperfect due to a deterioration (aging, destruction). Interestingly, the date labeling imperfection is already a topic of scientific and societal debate: supply chain actors currently have to adhere to date legislation that does not always match with reality, and consumers have been found to frequently confuse the "best before" and "use by" labels.[38] Consequently, more food than necessary is wasted out of misplaced safety concerns, and both scholars and policymakers are examining whether this issue can be resolved. Multiple consumer initiatives also address food waste based on this type of imperfection. An example is the "Over Datum" ("passed the best before date") dinners, organized by the Dutch cultural foundation Mediamatic: participants jointly prepare and consume dinners consisting of foods that have passed the best before date.[39]

An essential question is who defines the food product as perfect or imperfect. In all three cases of imperfection, every actor along the supply chain (e.g., producers, producer organizations, wholesalers, retailers) checks the product on its appearance, date (if applicable), and packaging (if applicable), and removes the product from the production line when the product deviates from the product specifications.[40] Many of these product specifications have been formalized in national legislations. The European Union has, for instance, specified the minimally required levels of quality,

[36] Aschemann-Witzel et al., "Consumer-Related Food Waste: Causes" 6457–77; Beretta et al., "Quantifying Food Losses," 764–73; H. Blatt, *America's Food: What You Don't Know about What You Eat* (Cambridge, MA: MIT Press, 2011).

[37] De Hooge et al., "Cosmetic Specifications," 698–709; Symmank, Zahn, and Rohm, "Visually Suboptimal Bananas," 472–81.

[38] Newsome et al., "Applications and Perceptions," 745–69; T. E. Quested, E. Marsh, D. Stunell, and A. D. Parry, "Spaghetti Soup: The Complex World of Food Waste Behaviours," *Resources, Conservation and Recycling* 79 (2013): 43–51. doi:10.1016/j.resconrec.2013.04.011.

[39] For details about Mediamatic's "Over datum" dinners (2011–), see https://www.mediamatic.net/nl/page/73291/over-datum-eetclub, accessed March 30, 2020.

[40] Buzby et al., "The Value," 492–515; Gobel et al., "Cutting Food Waste," 1429–45; Lebersorger and Schneider, "Food Loss Rates."

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maturity (ripeness), safety, smell, taste, origin of produce, packaging, uniformity across products within one package, shape, skin, size, and weight of multiple fruits and vegetables.[41] Based on these specifications, nations and supply chains have developed quality-grade classifications such as Extra, A-class, or B-class products.[42] Similar requirements have been formalized for the United States.[43]

In addition, supply chain actors frequently set their own product specifications.[44] Producers, producer organizations, and retailers have been found to set product specifications, for example, for the shape, size, weight, or color of fruits and vegetables to signal being a high-quality player delivering high-quality products to customers and consumers.[45] Product specifications about the size and shape of products can increase the efficiency of packaging and transport logistics.[46] Finally, supply chain actors have been found to develop and apply product specifications because they perceive consumers to demand solely perfect-looking products.[47] Thus, the definition of foods as perfect or imperfect is dependent on governments, supply chain actors, and, at least partially, consumers.

It is interesting to see that, in the field of food, perfection seems to be the standard. In most social domains, perfection is something exceptional or unique, something that is desired but that does not occur frequently—as can be read in more detail in the contributions to this volume by Mieke Bal, Yuriko Saito, and Ellen Rutten. On the contrary, in the field of food, perfection is set as the norm, and all foods should adhere to this norm of perfection. Moreover, it appears that debates about food production build on hard dichotomies: food is ranked either as perfect or imperfect. There is no gradation. This is markedly different from other fields, where imperfection is often more a matter of scale.[48]

[41] European Union, *Council Regulation (EC).* No 1234/2007, 2007. European Union. *Commission Implementing Regulation (EU),* no. 543/2011. Official Journal of the European Union, 2011.

[42] De Hooge et al., "Cosmetic Specifications," 698–709.

[43] USDA, "U.S. Grade Standards for Fruits, Vegetables, Nuts, and Other Specialty Products," 2016. https://www.ams.usda.gov/grades-standards/fruits.

[44] Ibid.; T. Stuart, *Waste: Uncovering the Global Food Scandal* (London: W. W. Norton, 2009).

[45] De Hooge et al., "Cosmetic Specifications," 698–709.

[46] Ibid.; N. Raak, C. Symmank, S. Zahn, J. Aschemann-Witzel, and H. Rohm, "Processing- and Product-Related Causes for Food Waste and Implications for the Food Supply Chain," *Waste Management* 61 (2017): 461–72.

[47] Aschemann-Witzel et al., "Consumer-Related Food Waste: Causes," 6457–77; De Hooge et al., "Cosmetic Specifications," 698–709.

[48] See on less "dichotomous" readings of perfection and imperfection also Rutten's introduction to this book.

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Supply Chain Actors' Perceptions and Decisions

Few retailers currently offer imperfect foods as standard assortment in their stores, and imperfect foods are mostly removed from the standard production line.[49] Until recently, most imperfect foods were ploughed back into the ground, developed into cattle feed, fertilizer, or biogas, offered to alternative markets (e.g., daily markets or export markets), or simply wasted.[50] A notable exception is recent marketing activities of some supply chain actors that position imperfect foods as irregular assortment. Some supply chain actors have, for instance, offered a limited supply of imperfect foods—limited in terms of days of the campaign, supply, or ways to buy the imperfect products—by positioning them as "Inglorious fruits and vegetables" (French retailer Intermarché), "Buitenbeentjes" ("Misfits," Dutch Albert Heijn), "Wonky Veggies" (Asda, Britain), "Fruta Feia" ("Ugly fruit," Lisbon), or "Perfectly imperfect" (Tesco, Britain).[51] Some retailers today also offer imperfect foods (either on the basis of appearance standards or close to the best before date) in a special discount section.[52] These campaigns appear successful in selling imperfect foods to consumers, making one wonder why imperfect foods are not part of the standard assortment.

To answer this question, together with my colleagues from various European universities I have examined both supply chain actors' and consumers' perceptions of and decisions concerning imperfect foods. We conducted an interview study with Dutch and German producers, producer organizations, and retailers to examine supply chain actors' perceptions and decisions.[53] The findings revealed that supply chain actors strongly vary in their perceptions of and willingness to market imperfect foods, and that there are more or less two groups of supply chain actors. One consists of supply chain actors (producers, producer organizations, and retailers) who

[49] J. Aschemann-Witzel, I. E. De Hooge, H. Rohm, A. Normann, M. B. Bossle, A. Grønhøj, and M. Oostindjer, "Key Characteristics and Success Factors of Supply Chain Initiatives Tackling Consumer-Related Food Waste–A Multiple Case Study," *Journal of Cleaner Production* 155 (2017): 33–45; De Hooge et al., "Cosmetic Specifications," 698–709; Gobel et al., "Cutting Food Waste," 1429–45.

[50] Beretta et al., "Quantifying Food Losses," 764–73; De Hooge et al., "Cosmetic Specifications," 698–709.

[51] J. Aschemann-Witzel, I. E. De Hooge, and A. Normann, "Consumer-Related Food Waste: Role of Food Marketing and Retailers and Potential for Action," *Journal of International Food & Agribusiness Marketing* (2016): 2–15. doi:10.1080/08974438.2015.1110549.

[52] Ibid.; J. Aschemann-Witzel, "Consumer Perception and Preference for Suboptimal Food under the Emerging Practice of Expiration Date Based Pricing in Supermarkets," *Food Quality and Preference* 63 (2018): 119–28. doi:10.1016/j.foodqual.2017.08.007.

[53] De Hooge, Van Dulm, and Van Trijp, "Cosmetic Specifications," 698–709.

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set cosmetic specifications to appear as a high-quality player. These actors perceive imperfect foods as being of lower quality compared to perfect foods, and appear unmotivated to include imperfect foods in their assortment. These actors fear that such marketing actions would threaten the desired high-quality positioning of their company and of their supply chain.

The other group consists of supply chain actors who perceive imperfect foods as boasting the same quality as perfect foods but with a small deviation.[54] These actors are willing to include imperfect foods in their assortment, but they currently encounter three issues in doing so. First, many of these actors suggest that their imperfect products do not move through the regular distribution channels, because consumers only buy perfect-looking foods. After all, imperfect foods can only be successfully included in the standard assortment when consumers purchase and consume these products.

Second, presuming that the total demand for food does not change, the introduction and marketing of imperfect foods would directly compete with perfect foods, and would harm the market and prices of both types of food.[55] That is, if imperfect foods would be introduced as a similar product as perfect foods with the same price, then the total food supply would increase and prices for both types of food would decrease. If imperfect foods would be introduced as a lower-quality class product with a lower price, this would come at the expense of the market for perfect foods, and thereby reduce prices and demands for perfect foods. Thus, supply chain actors would only market imperfect foods when the marketing strategy presents the imperfect food as a distinctive category that does not interfere with the existing market for perfect foods.

A third issue is that imperfect foods are more difficult or challenging marketing objects than perfect products.[56] In terms of distribution, distributing oddly shaped cucumbers and zucchinis, for example, is more challenging and thereby more expensive compared to perfectly straight cucumbers and zucchinis. Also, retailers offer limited amounts of shelf space for every product, and offering imperfect foods would take up more shelf space compared to perfect foods.

To overcome these challenges, it is relevant for supply chain actors that imperfect foods are attractive to consumers, do not compete with perfect products, and can be sold for a higher price compared to perfect foods to overcome the distribution issues. Indeed, "if supply chain actors could find

[54] Ibid.
[55] Ibid.
[56] Ibid.

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channels that would financially reward them sufficiently for the production and marketing of suboptimal products, many would do it."[57]

Consumers' Perceptions and Decisions

Of all the supply chain actors, retailers are perceived to be the actor with the most frequent interaction with consumers and the most potential influence on consumers.[58] Retailers usually assess consumers' preferences and translate these preferences into orders and order specifications.[59] The case of imperfect foods is no exception. Multiple studies have shown that retailers generally believe that consumers have a strong preference for homogeneous and perfect-looking products, leading to the situation that retailers and other supply chain actors set tight cosmetic specifications for foods.[60]

There are some studies that support retailers' beliefs about consumers' unwillingness to purchase imperfect foods. One study demonstrated that consumers were willing to purchase imperfect foods only when they were appalled by the alternative, namely perfect foods sprayed with pesticides.[61] Two studies showed consumers to be willing to purchase imperfect foods only when these products moderately deviated from perfect foods, but not when their deviation was more extreme.[62] In another study consumers under high cognitive load—consumers who were mentally preoccupied with other tasks, that is—perceived superficial packaging damages (e.g., a torn wrapper, a dented can) as a source of potential contamination and of health and safety risks.[63] Consequently, consumers under high cognitive load

[57] Ibid., 706.

[58] Aschemann-Witzel et al., "Consumer-Related Food Waste: Role," 2–15; D. Fuchs, A. Kalfagianni, and T. Havinga, "Actors in Private Food Governance: The Legitimacy of Retail Standards and Multistakeholder Initiatives with Civil Society Participation," *Agriculture and Human Values* 28, no. 3 (2011): 353–67; Halloran et al., "Addressing Food Waste Reduction," 294–301.

[59] Aschemann-Witzel et al., "Consumer-Related Food Waste: Role," 2–15; N. Loebnitz and K. Grunert, "The Effect of Food Shape Abnormality on Purchase Intentions in China," *Food Quality and Preference* 40 (2015): 24–30. doi:10.1016/j.foodqual.2014.08.005; N. Loebnitz, G. Schuitema, and K. Grunert, "Who Buys Oddly Shaped Food and Why? Impacts of Food Shape, Abnormality, and Organic Labeling on Purchase Intentions," *Psychology & Marketing* 32, no. 4 (2015): 408–21. doi:10.1002/mar.20788.

[60] De Hooge et al., "Cosmetic Specifications," 698–709; Halloran et al., "Addressing Food Waste Reduction," 294–301; Loebnitz et al., "The Effect of Food Shape Abnormality"; Loebnitz et al., "Who Buys Oddly Shaped Food"; Stuart, *Waste*.

[61] Bunn et al., "Consumer Acceptance," 268–79.

[62] Loebnitz et al., "The Effect of Food Shape Abnormality," 24–30; Loebnitz et al., "Who Buys," 408–21.

[63] White et al., "When Do Consumers," 110–23.

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perceived imperfect foods less positively and were less inclined to purchase imperfect foods. In yet another study, the majority of consumers (62 percent) purchased foods with the longest remaining shelf lives,[64] suggesting that they avoided imperfect foods that were close to the best before date.

At the same time, there are some indications from daily life that retailers may be overrating consumers' demands for perfect foods. For example, after a recent bad harvest of potatoes and apples in Denmark and Sweden due to weather issues, retailers could only offer potatoes and apples that normally would be qualified as imperfect. Consumers, however, simply bought the imperfect potatoes and apples.[65] Also, the previously mentioned marketing activities of some retailers to present imperfect foods as irregular assortment or at a discount have all been successful.[66]

To develop a better understanding of consumers' perceptions of and decisions toward imperfect food products, we conducted an experiment with more than four thousand consumers from five different Northern European countries.[67] Consumers were presented with imperfect foods and their perfect counterparts, and asked to indicate for every choice set whether they would purchase (in a supermarket) or consume (in their home) the imperfect or the perfect food. As we thought that consumers might respond differently to the three different types of imperfection, we measured consumer preferences for products that were imperfect in terms of appearance (an apple with a spot, a bent cucumber), date labeling (milk and yoghurt close to the best before date), and damaged packaging (dented carton of juice, broken biscuits).

Overall, we found that consumers were willing to choose on average two out of the six imperfect products. Consumers appear to vary in their willingness to choose the imperfect product dependent on the situation that they are in and on the type of imperfection that they are confronted with. When consumers found themselves in a supermarket, 25 percent of the consumers were willing to purchase a bent cucumber, but hardly any consumer would purchase an apple with a spot or broken biscuits (both about 3 percent). When consumers were at home, more than 40 percent of the target group were fine with consuming milk (42 percent) or yoghurt (47 percent) past the best before date, but only 21 percent would consume the apple with a spot.

[64] Newsome et al., "Applications and Perceptions," 745–69.
[65] Aschemann-Witzel et al., "Consumer-Related Food Waste: Causes," 6457–77.
[66] Aschemann-Witzel, "Consumer Perception," 119–28; Aschemann-Witzel et al., "Consumer-Related Food Waste: Role," 2–15.
[67] De Hooge et al., "This Apple," 80–92.

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Importantly, for any type of imperfect product, fewer than 25 percent of the consumers were willing to purchase it. Thus, it seems that the majority of consumers are not in favor of purchasing imperfect products.

We also wanted to develop some insights into the perceptions underlying consumers' unwillingness to purchase imperfect products. Therefore, we presented consumers with the imperfect products and asked them to indicate on a list which associations they thought applied to the imperfect product.[68] It appeared that for all products consumers focused on whether the product appeared attractive or tempting to consume, and on whether the product was safe to consume. Almost 41 percent of the consumers found the apple with a spot unattractive to consume, and between 10 and 20 percent of the consumers found the other products unattractive to consume. Although the percentages varied across products, at most 69 percent of the consumers found the imperfect products safe to consume. This indicates that the marketing of imperfect foods should be joined with a message conveying that imperfect products are safe and attractive to consume.

In terms of appearance, consumers also focused on the taste of the product, using the appearance as an indication for the intrinsic quality of taste of the product. Only 25 percent of the consumers perceived the apple with a spot to have a good taste, whereas 60 percent of the consumers perceived the bent cucumber to have a good taste. For the other products the percentages varied between 33 and 45 percent. These findings converge with the idea that consumers are uncertain about the intrinsic quality of imperfect products.[69] When consumers are unsure about the intrinsic quality of a product, they tend to search for some extrinsic quality cues to make their purchase decision.[70] In the case of imperfect products, the extrinsic cues (e.g., the shape of the product, the packaging, the date labeling) are lower compared to the perfect products, resulting in a choice for the more attractive perfect product.[71] To increase the attractiveness of imperfect products, marketing strategies should thus include signals that make the high intrinsic quality evident. In this way, consumers' uncertainties about the intrinsic quality of

[68] Ibid.

[69] Ibid.; Loebnitz et al., "The Effect of Food Shape Abnormality," 24–30; Loebnitz et al., "Who Buys," 408–21.

[70] B. L. Connelly, S. T. Certo, R. D. Ireland, and C. R. Reutzel, "Signaling Theory: A Review and Assessment," *Journal of Management* 37, no. 1 (2011): 39–67. doi:10.1177/0149206310388419; M. R. Darby and E. Karni, "Free Competition and the Optimal Amount of Fraud," *Journal of Law and Economics* 16 (1973): 67–88; M. Spence. "Job Market Signaling," *Quarterly Journal of Economics* 87, no. 3 (1973): 355–74.

[71] Aschemann-Witzel et al., "Consumer-Related Food Waste: Causes," 6457–77; White et al., "When Do Consumers," 110–23.

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the imperfect products can be removed and the purchase and consumption of imperfect products can be increased.

In sum, retailers underestimate consumers' willingness to purchase and consume imperfect products—and consumer uncertainties about their attractiveness, safety, and quality appear to be malleable. This malleability offers perspectives for the topic to which we turn now: marketing strategies of imperfect foods.

Marketing Strategies for and Benefits of Imperfection

Few studies have examined how imperfect products could be made attractive for both supply chain actors and consumers. Multiple scholars have argued that price reductions for imperfect products should increase consumers' willingness to purchase imperfect products.[72] However, lower product prices signal lower intrinsic product quality.[73] A price reduction strategy for imperfect products would therefore decrease rather than increase consumers' perceptions of imperfect products.[74] Moreover, due to the competition with perfect products and the distribution costs for imperfect products, supply chain actors would not be able to offer imperfect products for reduced prices.[75]

Multiple retailers have adopted a sustainability marketing strategy for imperfect products, regularly combined with a price reduction.[76] A sustainability marketing strategy presents imperfect products in a way

[72] Aschemann-Witzel et al., "Consumer-Related Food Waste: Causes," 6457–77; J. Aschemann-Witzel, J. H. Jensen, M. H. Jensen, and V. Kulikovskaja, "Consumer Behaviour towards Price-Reduced Suboptimal Foods in the Supermarket and the Relation to Food Waste in Households," *Appetite* 116 (2017): 246–58. doi:10.1016/j.appet.2017.05.013; Lebersorger and Schneider, "Food Loss Rates"; K. Verghese, H. Lewis, S. Lockrey, and H. Williams, *The Role of Packaging in Minimising Food Waste in the Supply Chain of the Future* (2013). Prepared for: CHEP Australia.

[73] J. J. Olson, "Price as an Informational Cue: Effects in Product Evaluation," in *Consumer and Industrial Buying Behavior*, ed. A. G. Woodside, J. N. Sheth, and P. B. Bennett (New York: North Holland, 1977), 267–86; Zeithaml, "Consumer Perceptions of Price," 2–22.

[74] Aschemann-Witzel et al., "Consumer-Related Food Waste: Causes," 6457–77; A. Theotokis, K. Pramatari, and M. Tsiros, "Effects of Expiration Date-Based Pricing on Brand Image Perceptions," *Journal of Retailing* 88, no. 1 (2012*):* 72–87. doi:101.1016/j.jretai.2011.06.003; R. I. Van Giesen and I. E. De Hooge, "Too Ugly, but I Love Its Shape: Reducing Food Waste of Suboptimal Products with Authenticity (and Sustainability) Positioning," *Food Quality and Preference* 75 (2019): 249–59.

[75] De Hooge et al., "Cosmetic Specifications," 698–709.

[76] Aschemann-Witzel et al., "Consumer-Related Food Waste," 6457–77.

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that highlights their environmental sustainability.[77] The general idea is that increasing consumers' awareness about sustainability motivates consumers to behave more sustainably.[78] For example, providing information on the carbon footprint of bread production has been found to increase consumers' willingness to pay for lower-carbon-footprint bread.[79] Also, raising consumer awareness of food waste (e.g., through public awareness campaigns, or with diary studies where consumers keep track of their daily food waste) has been shown to increase consumers' intentions to reduce their household food waste.[80]

In a series of studies with more than 1,800 consumers in total, we have examined whether a sustainability marketing campaign would affect consumer perceptions of and decisions toward imperfect foods.[81] Consumers were presented with imperfect and perfect apples and carrots, and were asked to make a choice between the imperfect and the perfect apples and carrots. They were also asked to indicate for the imperfect products how likely they were to purchase these product and to indicate their product perceptions. The imperfect apples and carrots only deviated from the perfect products in terms of shape and had the same price as the perfect products. We presented one group of consumers with imperfect products accompanied by a sustainability slogan, such as "Embrace imperfection: Join the fight against food waste!" or "Apples (carrots) with special shapes: Don't let them be wasted!" The findings showed that the sustainability strategy hardly increased consumers' preferences for imperfect products compared to a situation without any marketing strategy, and only slightly increased consumers' purchase intentions for the imperfect products. Only when the sustainability strategy was combined with a price discount of 15 percent did the strategy have a positive effect on consumers' choices for the imperfect products.

Based on our studies, I argue that a sustainability marketing strategy does not have a strong effect on consumers' perceptions of and decisions toward imperfect products, because the marketing strategy does not focus on the safety, intrinsic quality, or attractiveness of the imperfect products. A sustainability marketing strategy provides an external reason for

[77] Van Giesen and De Hooge, "Too Ugly," 249–59.

[78] W. Abrahamse, L. Steg, C. Vlek, and T. Rothengatter, "A Review of Intervention Studies Aimed at Household Energy Conservation," *Journal of Environmental Psychology* 5, no. 3 (2005): 273–91; FAO, "Food Wastage Footprint."

[79] T. Del Giudice, F. La Barbera, R. Vecchio, and F. Verneau, "Anti-Waste Labeling and Consumer Willingness to Pay," *Journal of International Food & Agribusiness Marketing* 28, no. 2 (2016): 149–63.

[80] Quested et al., "Food and Drink Waste," 460–7.

[81] Van Giesen and De Hooge, "Too Ugly," 249–59.

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purchasing imperfect products, namely to behave more sustainably, but does not address consumers' uncertainties about the safety and intrinsic quality of the imperfect products.

Indeed, in our studies the sustainability marketing strategy did not affect consumers' perceptions of the imperfect products.[82]

In existing theorizing on imperfection, multiple scholars have suggested that imperfections should not be considered as defects, but that it is more productive to see them as having their own benefits. In (audio-)visual arts, for example—so Mieke Bal demonstrates in her contribution to this volume—such imperfections as compositional mistakes can bring the art to life, make it more realistic, and provide a more layered meaning to the artwork. In design and fashion, imperfections can enrich aesthetic knowledge and imagination, and be perceived as a way to overcome, for example, discrimination (see also Saito's chapter in this book).[83] In cinema, as Bal argues, imperfect features such as wobbly camera images can signify a claim of authenticity; and in this book's introduction, Rutten outlines how, in various social domains, imperfections are seen as hallmark for authenticity, humanness, or mental well-being.

When we apply the same reasoning to marketing strategies for imperfect products, this would suggest that highlighting the benefits of imperfect products could motivate consumers to perceive imperfect products in a more positive light and to purchase imperfect products. As in other discourses of imperfection, imperfect products can be perceived as having positive aspects. With only perfect products in the assortment, all with equal shapes, sizes, and colors, the assortment can be considered repetitive and uniform. Imperfect products increase the variety in the assortment, turning the assortment into something heterogeneous, diverse, and perhaps even exciting. In addition, consumers are known to purchase products that diverge from what other consumers purchase to signal their unique identity.[84] By increasing the variety of an assortment, imperfect products can increase the likelihood that every consumer will find something of their liking. Imperfect products may even be perceived to have their own identity and to be unique in their own way. For example, Intermarché's "Inglorious fruits" three-day marketing campaign, in which imperfect products were marketed as each having a unique personality,[85] managed to sell the complete supply of imperfect products that were offered.

[82] Ibid.
[83] Saito, "The Role of Imperfection," 1–15.
[84] J. Berger and C. Heath, "Where Consumers Diverge from Others: Identity Signaling and Product Domains," *Journal of Consumer Research* 34, no. 2 (2007): 121–34.
[85] Aschemann-Witzel et al., "Consumer-Related Food Waste"; Saito, "The Role of Imperfection," 1–15.

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Another bonus of products that are imperfect in terms of appearance standards may be their authentic, natural aspect. Everybody who has ever grown fruits or vegetables in their own garden knows that nature does not produce only perfect-looking fruits and vegetables.

Instead, fruits and vegetables grow in all sizes, shapes, and colors. Therefore, one could argue that imperfect products are more genuine, natural, or authentic compared to the perfect products that are currently offered on the supermarket shelves. Authenticity can be understood as a reference to what is genuine, real, and/or true.[86] Presenting products as authentic by emphasizing their purportedly genuine, true, or real elements has previously been found to increase quality perceptions,[87] purchase intentions, and willingness to pay for perfect products.[88] In the series of studies presented earlier on sustainability marketing strategies for imperfect products, my coauthor and I also examined whether a marketing strategy focusing on the authenticity of imperfect products would have any effect on consumers' perceptions of and purchase decisions.[89] To one group of consumers, the imperfect apples and carrots were presented with slogans focusing on the authenticity of the products, such as "Naturally imperfect: Apples the way they actually look!" or "Directly from the tree: apples with natural shapes! (Directly from the field: carrots with natural shapes!)." The findings revealed that the authenticity strategy increased consumers' preferences for imperfect products compared to a situation without any marketing strategy and compared to the sustainability marketing strategy. Moreover, the authenticity strategy increased consumers' purchase intentions for the imperfect products and their quality perceptions of the imperfect products.

Thus, an authenticity marketing strategy for imperfect products can increase consumers' perceptions of and decisions toward imperfect products. Such a campaign, or any other campaign focusing on the positive sides of

[86] R. Bendix., "Diverging Paths in the Scientific Search for Authenticity," *Journal of Folklore Research* (1992): 103–32; P. L. Berger, "Sincerity and Authenticity in Modern Society," *Public Interest* 31 (1973): 81; M. B. Beverland and F. J. Farrelly, "The Quest for Authenticity in Consumption: Consumers' Purposive Choice of Authentic Cues to Shape Experienced Outcomes," *Journal of Consumer Research* 36, no. 5 (2010): 838–56; C. J. Thompson, A. Rindfleisch, and Z. Arsel, "Emotional Branding and the Strategic Value of the Doppelgänger Brand Image," *Journal of Marketing* 70, no. 1 (2006): 50–64.

[87] A. C. C. Lu, D. Gursoy, and C. Y. Lu, "Authenticity Perceptions, Brand Equity and Brand Choice Intention: The Case of Ethnic Restaurants," *International Journal of Hospitality Management* 50 (2015): 36–45; J. G. Moulard, R. D. Raggio, and J. A. G. Folse, "Brand Authenticity: Testing the Antecedents and Outcomes of Brand Management's Passion for Its Products," *Psychology & Marketing* 33, no. 6 (2016): 421–36.

[88] K. O'Connor, G. R. Carroll, and B. Kovács, "Disambiguating Authenticity: Interpretations of Value and Appeal," *PloS one* 12, no. 6 (2017): e0179187.

[89] Van Giesen and De Hooge, "Too Ugly," 249–59.

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imperfect products, is likely to provide cues for the imperfect products' safety and intrinsic quality, thereby reducing consumers' uncertainties about these elements. Moreover, marketing campaigns focusing on the positive sides of imperfect products, such as their uniqueness or authenticity, can make imperfect products more attractive to consume.

Highlighting the positive sides of imperfect products would also address supply chain actors' needs related to the marketing of these products. Marketing strategies that highlight the positive sides of imperfection would enable supply chain actors to position imperfect foods as unique products, avoiding direct competition with perfect products. Moreover, such strategies make it possible for supply chain actors to develop new prices for imperfect products and potentially sell them for a higher price compared to perfect products. It thus seems that a focus on the benefits of imperfections can have positive effects on both supply chain actors' and consumers' perceptions of and decisions toward imperfect products.

Actively marketing the positive sides of imperfection may, in sum, be an interesting avenue for imperfection research, and it holds promising avenues for a more sustainable future.

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9781501380341_pi-308.indd 126 23-Sep-21 14:30:44