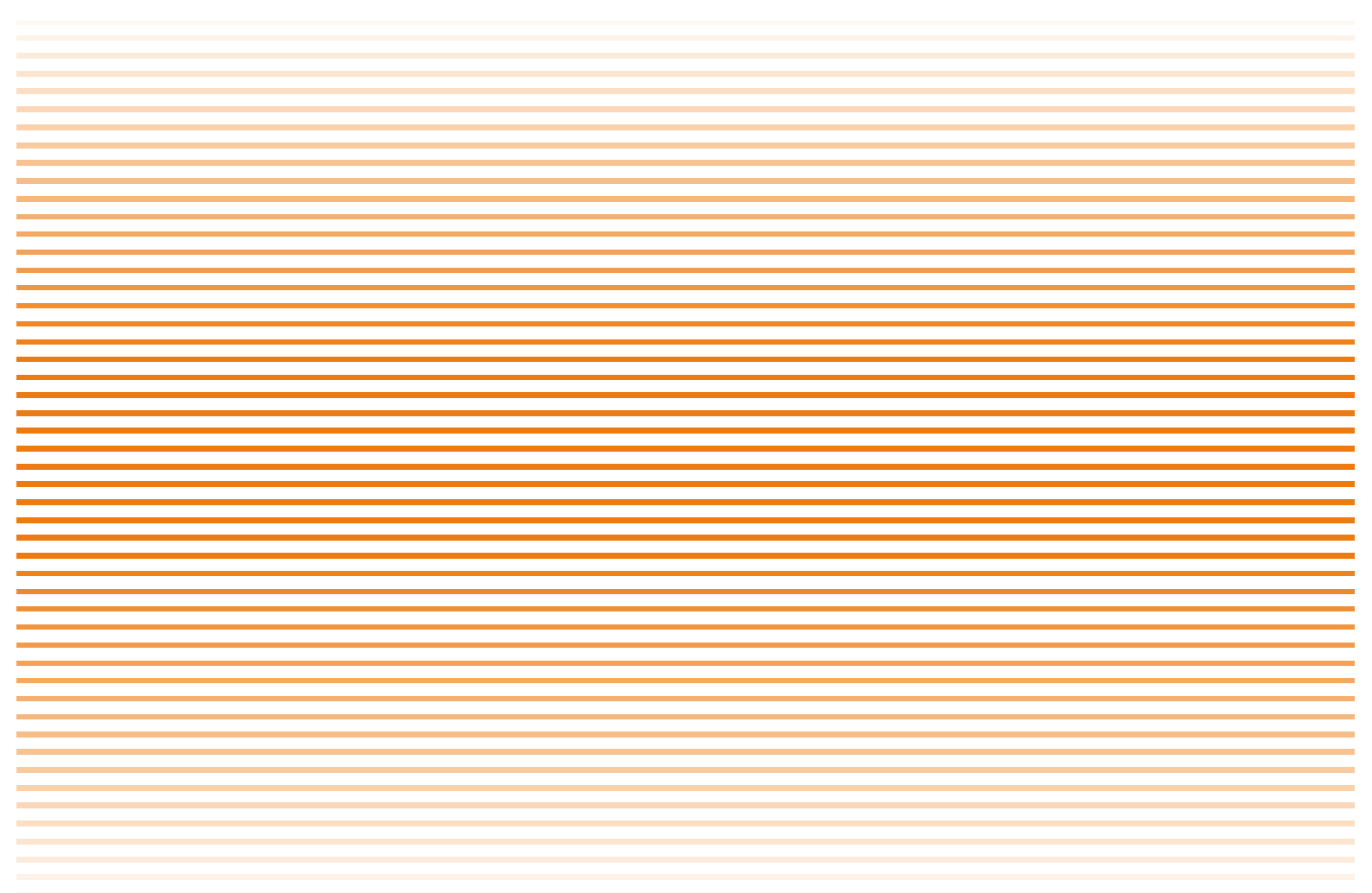


# Can interventions in supermarkets reduce household food waste?

A randomised controlled trial of 'nudging' in grocery  
shopping



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This report can be download from: [the Swedish Food Agency's website for ordering or downloading documents](#).

This report was commissioned by the Swedish Food Agency to support the Agency's work.

The Food Agency has not adopted any stance regarding the report's contents, and the report's authors alone are responsible for the report and its conclusions.

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Authors:

Christina Gravert, Evelina Gunnarsson, Anna Järneteg, Clara Leandersson.

Recommended citation (Swedish):

Gravert, C., Gunnarsson, E., Järneteg, A., Leandersson, C. 2021. Kan insatser i butiken minska konsumenternas matsvinn? Livsmedelsverkets externa rapportserie. Livsmedelsverket, Uppsala.

E 2021 nr 01

ISSN 1104-7089

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# Preface

Food waste is extensive both in Sweden and globally, entailing unnecessary strain on the environment, economic losses, and eventually a diminished capacity to feed a growing global population. The Swedish Food Agency, the Swedish Board of Agriculture, and the Environmental Protection Agency have been tasked by the government with working to reduce food waste. This work is based on the national plan of action, '*Fler gör mer: Handlingsplan för minskat matsvinn 2030*'. Our objective is to reduce food waste across the entire food system. Changed consumer behaviour is one of our key concerns.

'Nudging' is one promising method to be tested from the consumer perspective, namely, can nudging change how much food households throw away? The Food Agency commissioned Ramboll Management Consulting, together with Impactually, to design, complete, and evaluate what changes, or 'nudges', make it easier for consumers to reduce food waste. The results of the study are presented in this report.

The hope is that this report will provide significant support for grocery retailers in their continued efforts to reduce food waste.

The Food Agency would like to thank all those who enabled the completion of this study, including two grocery chains, researchers, consumer interest groups, and public authorities. The eight participating grocery stores, part of large national chains, made the most significant contributions to the study, as well as being, as a group, most accommodating, and sharing the goal of helping to reduce food waste.

Britta Ekman  
Head of Dept., Sustainable Food Habits  
Swedish Food Agency

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# Terms

- *Intervention* – The action or process of intervening or introducing a change.
- *Causality* – The term causality is used by researchers and scientists to describe causal relationships, or cause and effect.
- *Randomisation* – Distribution by chance.

# Summary (Swedish)

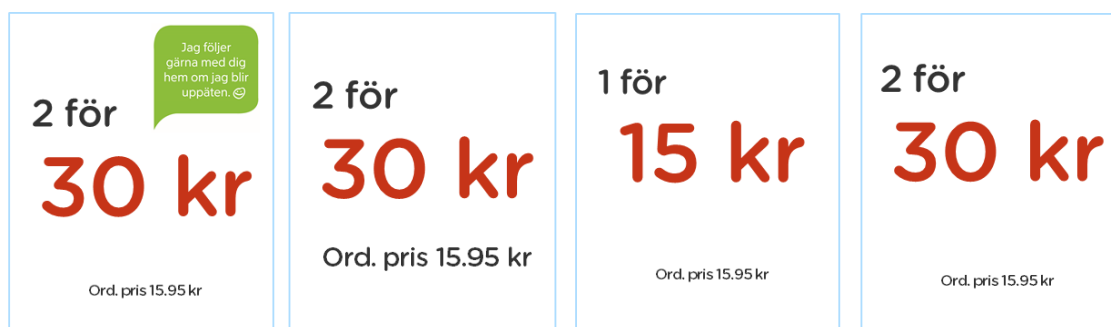
Matsvinn är ett allvarligt miljöproblem, både i Sverige och globalt. Matsvinnet uppstår i alla led i livsmedelskedjan, men det är hushållen som står för den största andelen. Ramboll Management Consulting tillsammans med Impactually har på uppdrag av Livsmedelsverket att designat, genomfört och utvärderat insatser som ska underlätta för hushåll att minska sitt matsvinn.

Studien fokuserar på utmaningen att konsumenter omedvetet köper för mycket mat när de möts av tillfälliga erbjudanden på varor, till exempel av multipriserbjudanden. Att köpa för mycket mat kan i förlängningen bidra till en ökad risk för matsvinn i hushållen.

Ett experiment genomfördes i samarbete med åtta butiker från två stora dagligvarukedjor i Sverige. Syftet var att studera om det är möjligt att påverka beteenden i en önskad riktning för att minska matsvinnet. Samarbetet med dagligvaruhandeln möjliggjorde ett experiment där konsumenters köpbeteenden kunde analyseras, utan att konsumenterna var medvetna om att studien pågick.

Fyra interventioner (skyltvarianter) designades baserat på beteendevetenskaplig forskning. Interventionerna testades på två vanliga produkter med relativt kort hållbarhet – gurka och broccoli – i en randomiserad kontrollstudie (RCT). Under två veckor satte de deltagande butikerna slumpmässigt upp en skylt i taget, medan priserna hölls konstanta. Sedan samlade författarna till studien in försäljningsdata för att studera effekter på köpbeteenden och kompletterande enkätdata för att studera matsvinnet i hushållen.

Följande fyra skyltvarianter testades i butik:



1. Multipris med meddelande

2. Multipris med synliggjort jämförpris

3. Nedsatt styckpris

4. Multipris (kontroll)

Resultaten visar att butiker med enkla medel kan få konsumenter att fatta mer informerade beslut och inte köpa mer än de faktiskt behöver. När konsumenterna uppmanades att aktivt överväga vilken mängd de vill ha och behöver, köpte de också färre varor. Det är alltså möjligt att minska matsvinnet genom att använda erbjudanden med nedsatt pris på en enskild vara istället för att använda multipris. Vidare visar studien på följande resultat:

- Samtliga testade interventioner (1, 2, 3) fungerar och får kunder att tänka till/ändra sitt beteende vid inköpstillfället. Samtliga interventioner leder till att kunderna köper färre produkter, mellan 10–18 procent jämfört med det vanliga multipriserbjudandet (4).



- Interventionen med nedsatt styckpris (3) har störst påverkan på försäljning (-18 procent), och visar även på signifikanta resultat vad gäller rapporterat matsvinn. Konsumenter som handlade flera varor med nedsatt styckpris åt i högre utsträckning upp maten jämfört med de som köpte flera varor i butiker med multipriserbjudanden (+10 procent).
- De konsumenter som antingen handlade en vara med ett multipris med synliggjort jämförpris (2) eller med ett multipris med meddelande (3), köpte färre varor än de som möttes av kontrollinterventionen multipriserbjudande (4). Båda interventionerna fungerar för att få konsumenter att reflektera över inköpet och får konsumenter att göra mer medvetna val. Något som minskar risken för att de köper för mycket.
- Interventionen som synliggör jämförpriset (2), och därmed synliggör hur mycket konsumenten sparar genom att köpa två varor, bidrog till en högre försäljning av ett ekologiskt alternativ som inte såldes med något erbjudande (+27 procent). En möjlig tolkning är att konsumenter har en bestämd uppfattning om ungefär hur mycket pengar de kommer att spendera i butiken. Det kan vara så att när de uppmuntras till att tänka efter om de behöver mer än en enhet av en produkt, upplever de att de ”sparat” de pengarna och därför kan spendera dem på att köpa en produkt med högre kvalitet.
- Enkätundersökningen visade att konsumenter som svarar att de ofta köper för mycket mat också slänger mat i högre utsträckning. Resultaten indikerar att de flesta konsumenter är medvetna om sitt beteende, men att denna medvetenhet inte räcker för att ändra sitt beteende.

Att följa en konsument från beslutet att inhandla en vara till de antingen äter upp eller slänger den är utmanande. Men resultatet från studien visar att det är möjligt. Rapporten ger både nya insikter om vilka effekter multipriserbjudanden och nudging har på försäljning och matsvinn och ett metodologiskt exempel på hur den vetenskapliga, experimentella metoden kan användas i framtida projekt.

# Summary

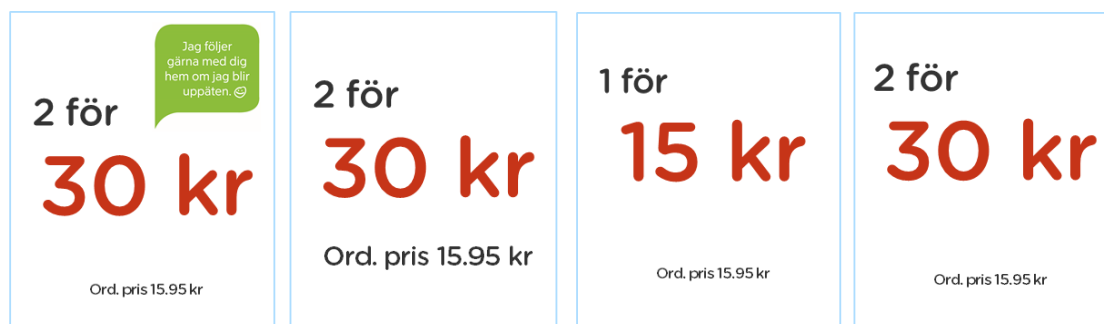
## Can interventions in supermarkets reduce household food waste?

Food waste is a serious global, environmental problem. In Sweden, it accounts for a large share of the climate impact. The following report is written by Ramboll Management Consulting and Impactually, who in 2020 received the mandate from the Swedish Food Agency to design, conduct and evaluate interventions that can make it easier for households to reduce their food waste.

The study focuses on the challenge that consumers unintentionally buy more perishable items than they want or need when confronted by quantity discounts in supermarkets. Unnecessary surplus buying due to quantity discounts can increase the risk of household food waste.

The study was conducted in collaboration with eight supermarkets from two of the largest Swedish supermarket chains. The stores provided the natural environment in which to conduct an experiment using real shoppers and real purchases, without shoppers being aware of the study. Four different interventions (different price displays) were designed, based on insights from behavioural science. These signs were tested in a randomised controlled study for two common and perishable vegetables – cucumbers and broccoli. Over two weeks, the participating stores randomly set up one of the displays at a time, while keeping the prices the same. The research team collected sales data to measure actual shopping behaviour and additional survey data to measure food waste during the experimental period.

The following four displays were tested in the supermarkets:



1. Quantity discount + message

2. Quantity discount + visible unit price

3. Unit price discount

4. Quantity discount (control)

The results show that supermarkets can use small interventions to nudge their consumers to make more deliberate decisions, and only buy as much as they need. Offering products with a simple discount, instead of a quantity discount, at the same price per item, contributes to a reduction in food waste.

- All interventions worked as intended. All three variations (1, 2, 3) encouraged shoppers to think before purchasing and to buy less. All interventions reduced sales on average (10–18 percent less compared to the basic quantity discount, 4).
- The unit price discount (3) had the biggest effect on sales. In comparison to the quantity discount (4), it reduced sales by 18 percent on average. This intervention also significantly reduced reported food waste. Consumers who bought more than one product when exposed to the unit

price discount were 10 percent more likely to eat their purchases, compared to those who bought more than one product, when exposed to the quantity discount.

- Those consumers who were randomly exposed to either the more visible unit price (2) or the message to only buy as much as they will eat (3) bought fewer products than consumers exposed to the normal quantity discount (4). Both interventions work to increase consumer reflection at time of purchase, and result in consumers making more deliberate purchases, in order not to buy too much.
- The intervention highlighting the unit price (2), and thus showing how much consumers can save by buying two, resulted in an increased sale of organic alternatives that were not on offer (+27 percent).
- Consumers who stated in the survey that they often buy too much food also reported having food waste. They were also less confident that they would eat the food they bought during the experimental period. These results indicate that most consumers are aware of their behaviour, but that this awareness is not enough to change behaviour.

To follow a consumer from purchase decision to consumption or disposal of their purchase is difficult. Nevertheless, this study shows that it can be done. This report provides novel insights into the effect of quantity discounts and nudges on sales and food waste, and also provides a methodological example of how the scientific, experimental method can be used in future projects.

# Introduction

Food waste is extensive both in Sweden and globally, entailing unnecessary strain on the environment, economic losses, and eventually a diminished capacity to feed a growing global population. The most recent measurement (2018) reported 1.3 million tons of food waste annually in Sweden. That is equivalent to an average of 133 kilogrammes per person. Food garbage includes both ‘necessary food waste (inedible food portions including shells, bones, and coffee grounds) as well as ‘unnecessary food waste,’ that is, food and drink which might have been consumed. The latter is usually termed ‘food waste.’ Food waste occurs throughout the food production, sales, and consumption system: at farms and factories, wholesalers, transporters, grocery stores, restaurants, industrial kitchens, and in households. Households are responsible for roughly 75 percent of total food garbage in Sweden, and thus a large portion of food waste.

## Ramboll and Impactually’s commission

The Swedish Food Agency has commissioned Ramboll and Impactually to examine actual consumer behaviour, and to study and evaluate interventions that can change behaviours towards reducing waste. Their commission instructs Ramboll and Impactually to identify consumer behaviours and design measures that make it easier for consumers to reduce food waste. These measures have been tested and evaluated using a randomised controlled trial (RCT). The aim was to better understand what drives consumer food waste, and how food waste can be reduced using behavioural measures, in order to further the work of the Food Agency and other concerned actors.

## Informational campaigns are commonplace in efforts to reduce food waste

We still know little regarding what works to reduce consumer food waste. Most interventions aimed at reducing food waste provide information and facts regarding the problem of food waste, and how it can be avoided. Indications are that informational campaigns do change attitudes and knowledge regarding food waste, and that consumers in general have a good understanding of the negative consequences of food waste. Nevertheless, informational campaigns do not seem to be sufficient for changing the related behaviour itself.<sup>1</sup> Individuals are often unaware of how much food they throw away. In addition, it’s an extensive process from planning food purchases and making food purchases, to preparing and storing food, with many decisions made along the way. This can result in consumers throwing away food, despite knowing better.

National and international actors, including government agencies, grocery chains, interest groups, and NGOs, have tried to influence food waste habits using different types of informational interventions to increase consumer awareness and knowledge.

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<sup>1</sup> Livsmedelsverket, *Fler gör mer! Handlingsplan för minskat matsvinn 2030*. (2018)

International NGOs like WRAP<sup>2</sup> and the EU-financed research project REFRESH<sup>3</sup> have worked for several years with broad and extensive information campaigns via Facebook, YouTube, and radio, to increase awareness of the consequences of food waste, and provide concrete advice to consumers regarding how to reduce food waste.

In Sweden, the national action plan to reduce food waste includes several measures that will result in reduced food waste among consumers. The Food Agency uses several different channels to provide information to consumers regarding grocery-shopping planning, food storage, consumption, and food waste management. The Agency has, for example, launched the ‘*Svinniska*’ campaign, which aims to use positive examples and everyday behaviours to encourage consumers to take better care of food.<sup>4</sup> Another example is a cook book, produced by the City of Stockholm, aiming to inspire consumers to use leftovers.<sup>5</sup> The Gothenburg region’s local federation of municipalities has launched two campaigns to help consumers reduce food waste, inter alia by encouraging them to stop and think before purchasing or throwing away food.<sup>6</sup>

Many grocery stores stated in interviews that they take active measures to reduce their own food waste, as well as that of consumers. Many focus on reducing food waste that occurs in the store, for example by selling so-called ‘ugly vegetables’ by weight, or encouraging consumers to purchase loose, un-bunched bananas, which are often thrown away. Many stores also report implementing differentiated pricing schemes, in order to sell perishable goods at risk of going bad. A couple of store owners mention interventions aimed at reducing household food waste. One example highlighted was offering recipe tips and alternatives for preparing products, in order to help consumers plan their purchases and manage residual food. Another example was instructing consumers at the time of purchase regarding the best way to store food.

Several actors are actively working with expiration dates. The Food Agency informs and reminds consumers to look at, smell, or taste food that has passed its expiration date. Arla and Norrmejerier, two large dairy producers, have complemented the expiration dates printed on their products with the suggestion, ‘Often good after’ (*Ofta bra efter*), printed below the expiration date.<sup>7</sup> Stores have also worked to reduce waste by, for example, reducing prices and foregrounding products with approaching expiration dates.<sup>8</sup>

The Danish grocery chain REMA 1000 has implemented several measures in its stores in Denmark to reduce food waste, both in stores and at home. The store has ceased entirely offering quantity discounts, to prevent consumers from purchasing more food than necessary and thereby contributing to food waste.

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<sup>2</sup> Love Food Hate Waste, WRAP (2018), <https://www.lovefoodhatewaste.com/>, accessed 24 June 2021.

<sup>3</sup> REFRESH, REFRESH (2015-2019), <https://eu-refresh.org/>, accessed 24 June 2021.

<sup>4</sup> Prata svinniska!, Livsmedelsverket (2019), <https://www.livsmedelsverket.se/globalassets/publikationsdatabas/handbocker-verktyg/prata-svinniska-riktlinjer.pdf>, accessed 24 June 2021.

<sup>5</sup> Det smarta köket, Stockholm stad (2015), <https://miljobarometern.stockholm.se/content/docs/tema/klimat/guider/Det-klimatsmarta-koket.pdf>, accessed 24 June 2021.

<sup>6</sup> Räkna till 10, Göteborgsregionen (2020), <http://raknatill10.se/om-oss/>, accessed 24 June 2021.

<sup>7</sup> Ofta bra efter, Arla Foods (2018), <https://www.arla.se/aktuellt/ofta-bra-efter/>, accessed 24 June 2021.

<sup>8</sup> Interviews with grocery-store owners

## Under-studied interventions

While many interventions have aimed to reduce food waste, few have been subject to scientific scrutiny. Even if broad informational campaigns can raise consumer awareness regarding food waste, only a few studies have evaluated the effects of individual informational interventions on consumer food waste.<sup>9</sup> For example, a study of WRAP's campaign 'Love Food Hate Waste' showed a 24 percent reduction of UK household food waste between 2007 and 2012. However, the study lacks an assessment of individual informational interventions, limiting its ability to permit conclusions regarding the campaign's effect on consumer behaviour.

One reason for the relative paucity of assessments is the difficulty of measuring food waste. It is complicated and resource-intensive to visit consumers at home to measure waste (although this has been done<sup>10</sup>). Furthermore, edible food garbage, food waste, must be distinguished from inedible food garbage.

Most studies rely on self-reported food waste, recorded using journals or by answering surveys. All such methods under-report food waste in comparison to methods in which waste is weighed. Studies that compare consumers' reports of their own food waste, recorded in journal entries, with weighed measurements of food waste, show that consumers underestimate their food waste by 40 percent.<sup>11</sup> One reason why consumers underestimate their food waste may be that social norms encourage consumers to report waste according to how they wish to act, rather than how they actually do act. Another reason may be that it takes time to estimate and record one's food waste, which can mean that some will carry out this task less carefully. Individuals mindful of their participation in a scientific study, however, may be particularly motivated to reduce food waste, constituting a self-selecting group that is not representative of the population at large. Yet again, the presence of mind and attention required to measure quantities of food garbage daily may in itself be enough to affect behaviour regarding food waste.<sup>12</sup>

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<sup>9</sup> S. Stöckli, E. Niklaus & M. Dorn., 'Call for testing interventions to prevent consumer food waste', *Resources, Conservation & Recycling*, 136 (2018) 445-462, <https://doi.org/10.1016/j.resconrec.2018.03.029>

<sup>10</sup> S. Williamson, L.G. Block & P.A. Keller., 'Of waste and waists: the effect of plate material on food consumption and waste'. *J. Assoc. Consum. Res.* (2016) 1, 147–160.

<sup>11</sup> S. Høj., 'Metrics and measurement methods for the monitoring and evaluation of household food waste prevention interventions', *Food Waste and Sustainable Food Systems*, (2011).

<sup>12</sup> C. Reynolds et al., 'Review: Consumption-stage food waste reduction interventions- What works and how to design better interventions', *Food Policy*, 83 (2019) 7-27, <https://doi.org/10.1016/j.foodpol.2019.01.009>

# Behavioural insights improve our understanding of food waste habits

In this section, we will offer a brief overview of the discipline of behavioural economics, the field's behavioural insights, and the OECD framework BASIC, upon which this project is based.

## Behavioural economics shows our occasional irrationality

Changing behaviours is not simple. Most of us understand the environmental hazards of overconsumption, but many still buy more than they will consume. Thus, our intentions don't also match our behaviour. Food waste is not the only area of life where our actions diverge from our own, or society's best interests. Even when it comes to money, health, or environmentally related behaviours, individuals often fail to act according to their intentions. Insights into human behaviour can help policymakers understand why people act as they do and help design more accurate policy measures.

## Behavioural insights explain what changes behaviours

Working with behaviour insights entails designing interventions based on how humans make decisions in practice and is aimed at changing behaviours. Behavioural insights are premised on behavioural economics and psychology research. One example of a behavioural insight is so-called 'nudging.' Nudging refers to small changes in a decision context that are intended to facilitate and promote individual and social well-being, without limiting their freedom to act or deploying economic incentives. A nudge is a gentle push in the right direction, one might say. One crucial thing that nudging shows is that the right action must also be an easy one. One example of a nudge in action, concerning reduced food waste, is offering smaller-sized plates on buffet lines.<sup>13</sup> This induces buffet guests to serve themselves less food, and increases the likelihood that they will eat the food they have taken.

*"...Any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting fruit at eye level counts as a nudge. Banning junk food does not."*

**Definition of 'nudge' by behavioural economists Richard Thaler and Cass Sunstein**

Work with behavioural insights is not limited to nudging measures. Other measures are often applied, including economic incentives, to create change. The essential point is that such interventions are based on the group targeted, and that they create a positive effect for both societies and individuals.

<sup>13</sup> M. R., Freedman & C. Brochado., 'Reducing Portion Size Reduces Food Intake and Plate Waste', *Obesity* (2009) 18 (9); S.Kallbekken,., & H. Sælen, 'Nudging' hotel guests to reduce food waste as a win – win environmental measure.' *Economics Letters*. 119 (3), (2013), Elsevier B.V.: 325–27; P.G. Hansen, A.M. Jespersen & L.R. Skov. 'Size matter! A choice architectural field experiment in reducing food waste', *Journal of Food and Hospitality Research* vol. 4 (2015)

## Based on OECD's BASIC framework

The authors of the present study recommend that work with behavioural insights be carried out using a systematic and well-elaborated framework. At present, only a limited number of frameworks are available for the entire process of developing behavioural interventions. One such framework is BASIC (*BASIC Toolkit and Ethical Guidelines for Policy Makers*), published by the Organisation for Economic Co-operation and Development (OECD) in 2019.<sup>14</sup> This framework is the first policy framework that systematically shows the fundamental steps necessary for creating sustainable change using behavioural insights.

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<sup>14</sup> 'Tools and Ethics for Applied Behavioural Insights: The BASIC Toolkit', *OECD Publishing Paris (2019)*



# Identifying potential target behaviours

To establish an understanding of the overarching challenge of reducing consumer food waste, the authors carried out an extensive survey of behaviours. Household food waste arises in several phases, and the focus of this study is how in-store behaviour affects food waste. We identified four behaviours in the store environment that especially affect food waste: consumers often shop without a plan; they consciously purchase more than they need; they purchase bulk food packages; and they purchase too much food when offered quantity discounts. Of these four behaviours, we selected to prioritise consumers' tendency to purchase too much food when offered quantity discounts for the development of our intervention.

## Data collection for behaviour identification

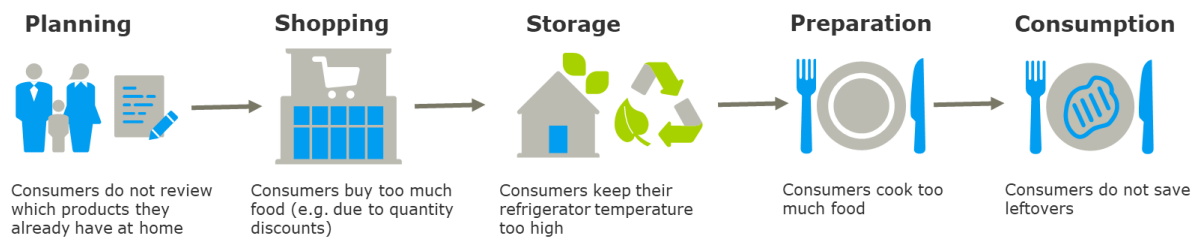
To establish an understanding of the overarching challenge of reducing consumer food waste, the authors carried out an extensive survey of behaviours. The aim of this survey was to identify those behaviours that lead to food waste. The survey showed established several challenges which we then further investigated, in order to identify the behaviours to be addressed by the project. We carried out the following data-collection steps:

- A study of the literature and documentation generated by studies on the national and international levels
- Workshop with representatives from the Food Agency, Environmental Protection Agency, and the Board of Agriculture.
- Interviews with food waste experts
- Interviews and meetings with grocery trade representatives
- Interviews with other concerned parties

## Household food waste arises in several phases

Household food waste arises in several phases. Food is stored, prepared, and consumed in the home. Food is purchased at the grocery store. Attitudes, habits, and behaviours affect consumer behaviour in the different phases, and by extension what food gets eaten, and what gets thrown away.

Fig. 1. Household food waste arises in several phases



Food waste can arise when consumers purchase food without **planning** what they will buy, and thus purchase more than necessary, or purchase items they will later fail to eat. A lack of time, and the emergence of unforeseen circumstances, have both been shown to affect how much food is unnecessarily thrown away.

When consumers **shop** while stressed and distracted, the brain functions on autopilot. At such times, consumers are more receptive to messages, special offers, and impulse-buys. The literature indicates that bulk food packages are a contributing factor to food waste. For small or single-person households, this may be because smaller food packages are not offered by retailers. Special offers on bulk packages of food are another cause of surplus consumer purchases. Quantity discounts have also been shown to lead consumers to purchase more food than they can eat.

How consumers **store**, **prepare**, and **consume** food affects food waste. Bread, dairy, fruit, and vegetables are those products that consumers report throwing away in the greatest amounts. Of these products, fruit and vegetables are particularly sensitive to storage methods. A shortage of knowledge regarding expiration dates has been shown to be a factor in creating food waste, since consumers place trust in expiration dates and dispose of food that might have been eaten. Even attitudes and preferences regarding the visual appearance of food can mean that food that is perfectly edible, but bruised or 'ugly', is thrown away. A failure to use leftovers, or to freeze food, is another example of how knowledge shortages regarding food preparation can lead to food waste.

## A focus on in-store behaviour

Multiple behaviours and decisions lead to food being ultimately thrown away. Many of the decisions that cause food waste already occur in grocery stores. A review of the literature, and interviews with experts, brings forth the point that the main problem with food waste is that consumers purchase more food than they can eat. People can only throw away the food that they have brought home, and therefore it is the point of purchase that is significant for food that will later be thrown away. Grocery stores are also an arena where private actors frequently interact with consumers, providing extensive possibilities to affect behaviour. Providing consumers with information can increase awareness regarding how to manage food, and give them advice about storing, preparing, and saving food, but it is more difficult to reach consumer behaviours in such a private sphere as the household.

## Behaviour identification resulted in four areas of focus

The authors of the present study identified four categories that explain how shopping behaviours can affect household food waste. Common to all four behaviours is the fact that consumers purchase too

much food. This, namely purchasing too much food, is the principal reason offered for throwing away food in the journal studies.<sup>15</sup> When consumers unwittingly purchase too much, they risk not eating food before it goes bad. Many products can be frozen to preserve freshness. But fruit and vegetables can be more difficult to freeze. One Swedish study shows that the main reasons why individuals throw away food are that they forgot about it, that food became unappetising, and that food was stored incorrectly.<sup>16</sup> Purchasing too much food can be broken down into four behavioural mechanisms.

- Consumers shop without a plan
- Consumers purchase more than they need
- Consumers purchase bulk packages of food
- Consumers purchase too much when offered discounts

### **Consumers shop without a plan**

One behaviour that affects how much food consumers purchase is related to planning. Consumers often fail to plan meals before going grocery shopping, and perhaps don't always know what food they already have at home. There are also studies that indicate that consumers do not always plan how many meals will be eaten at home, and away from home, in the days ahead.<sup>17</sup> This behaviour is not as pronounced in Swedish studies, compared with international results. In a Swedish study from 2021, four out of five people reported using a shopping list the last time they grocery shopped. The same study shows that many people plan meals often, or on the same day.<sup>18</sup> An international study shows that consumers rarely write shopping lists, and that when they do write shopping lists, they most often write down those items that they do not normally purchase. Younger people are less likely than older people to plan purchases.<sup>19</sup> Planning meals for a whole week can be difficult and demanding, requiring the sacrifice of a degree of flexibility. It is mostly younger consumers who care especially about freedom, flexibility, and spontaneity as regards food.<sup>20</sup>

### **Consumers purposely purchase more than they need**

On occasion, consumers purposely purchase more food than they need, partly due to a desire for healthier eating habits, partly to ensure that they have enough food. Studies show that consumers are motivated by a desire to eat healthy foods, and thus purchase more fruits and vegetables than they eat. One example is parents who wish to increase their family's consumption of fruit and vegetables. In this case, a family purchases more than they will eat in the hope that the availability of fruit and

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<sup>15</sup> V. Stefan., et al., 'Avoiding food waste by Romanian consumers: the importance of planning and shopping routines'. *Food Qual. Prefer.* (2013) 28 (1).

<sup>16</sup> A., Isaksson., L. Näkne., 'Mat(s)vinnare. En studie om miljöengagerade människors uppfattningar om matsvinn'. *Högskolan i Jönköping*, (2013).

<sup>17</sup> C.M., Bava., S.R. Jaeger., & J. Park., 'Constraints upon food provisioning practices in 'busy' women's lives: trade-offs which demand convenience.' *Appetite* 50 (2008.), 486e498; R. Comber., et al. 'Food practices as situated action: exploring and designing for everyday food practices with households.' In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. ACM*, (2013) pp. 2457e2466; D. Evans., 'Blaming the consumer - once again: the social and material contexts of everyday food waste practices in some English households.' *Crit. Public Health* 21 (4), (2011a), 429e440. *Special Issue: Food and Public Health*.

<sup>18</sup> K. Fritz., 'Matsvinn i hemmet – kännedom, attityd och beteende.' *Livsmedelsverket*. (2021), L 2021 nr 02

<sup>19</sup> R. Comber., et al. 'Food practices as situated action: exploring and designing for everyday food practices with households'. In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. ACM*, (2013) pp. 2457e2466

<sup>20</sup> TÆNK Forbrugerrådet., 'Undersøgelse af danskernes madspildsadfærd, forandringspotentialer og anbefaling til tiltag [Study of food waste behaviour in Denmark, potential for change and recommendations for action]'. *TÆNK Forbrugerrådet, Stop Spild af Mad and Landbrug Fødevarer*. (2012)

vegetables will cause the family to eat more fruit and vegetables.<sup>21</sup> Families with children also throw away fruit and vegetables because they wish their children to eat more, and accept the consequence of wasted, uneaten food. The understanding that fresh fruit and vegetables are more healthy than frozen can contribute to the consumers purchasing more than necessary, and then throwing away a portion of what they purchase.

Another example of how consumers purposely purchase too much food is during festive occasions and holidays. Individuals are motivated by a desire to be a good host or hostess, and providing plenty of food is a part of this desire. This is especially true of younger people, whose food waste can be connected to social events.<sup>22</sup>

### **Consumers purchase bulk food packages**

Expert interviews and the literature indicate that bulk packaging contributes to food waste. In the case of small or single-person households, the purchase of bulk packages may be due to the unavailability of smaller offerings. The savings that result from purchasing bulk-size packages are another cause. Approximately 20–25 percent of household food waste in Sweden can be attributed to bulk-size packaging that is overlarge, or difficult to empty, resulting in expired food being thrown away.<sup>23</sup> One study estimated that as much as 36 percent of fruit and vegetable food waste was related to package dimensions and construction. But packaging causes greater problems for bread and dairy products, than fruit and vegetables, since the latter can often be purchased individually.<sup>24</sup>

Consumers' consideration of related environmental or climate-change related concerns can have a negative effect on food waste. For example, shoppers might purchase larger packages of yoghurt or salad, with the intention of reducing their consumption of plastic. Most consumers figure that waste from food packaging has a greater effect on the environment than food waste, since food is natural and biodegradable.<sup>25</sup> Food packaging often entails less environmental impact than food waste.<sup>26</sup> Therefore, it is important to consider the perhaps contradictory messages being communicated to consumers and citizens.

### **Consumers purchase too much when offered sales discounts**

Shoppers are affected by displays and discounts in stores, which can result in over-purchasing and food waste.<sup>27</sup> Research shows that consumers themselves expect that they will throw away more food

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<sup>21</sup> V. Mavrakis., 'The Generative Mechanisms of Food Waste in South Australian Household Settings.' PhD thesis. *Flinders University, Faculty of Health Sciences, Department of Public Health* (2014)

<sup>22</sup> J. Aschemann-Witzel, et al., 'Consumer-related food waste: causes and potential for action'. *Sustainability* 7 (6), (2015), 6457–6477.

<sup>23</sup> H. Williams et al., 'Reasons for household food waste with special attention to packaging.' *Journal of Cleaner Production* 24, (2012) 141e148.

<sup>24</sup> H. Williams et al. 'Avoiding food becoming waste in households – The role of packaging in consumers' practices across different food categories,' *Journal of Cleaner Production*, Volume 265, (2020).

<sup>25</sup> H. Williams et al. 'Principato, L., Secondi, L., Pratesi, C.A., 2015. Reducing food waste: an investigation on the behaviour of Italian youths.' *British Food Journal* 117 (2), (2012), 731e748.

<sup>26</sup> Consumer Attitudes to Food Waste and Food Packaging, WRAP (2013), <https://wrap.org.uk/resources/report/consumer-attitudes-food-waste-and-food-packaging>, hämtad 24 jun 2021

<sup>27</sup> J. Aschemann-Witzel et al. 'Consumer behaviour towards price-reduced suboptimal foods in the supermarket and the relation to food waste in households.' *Appetite*, (2017), 116, 246–258.

when they are tempted by sales offerings.<sup>28</sup> In one Swedish study, participants stated that the low prices and quantity discounts offered by grocery stores cause food waste.<sup>29</sup>

Several studies indicate that sales discounts in grocery stores are one factor affecting household food waste.<sup>30</sup> A meta-analysis<sup>31</sup> including many studies considered the relationship between discounts and household food waste. Twenty-four articles analyse the effect of discounts on household food waste. Most of the studies used surveys or interviews to investigate the relationship, and did not test any intervention or measure actual food waste. Twelve of the twenty-four studies found evidence that price reductions increase food waste, eight found evidence that price-conscious shoppers throw away food at higher rates, and four studies provided no clear answer.

### **A closer look at the relationship between discounts and food waste**

Another recently completed study used a survey of panel households and data from a scanner tool to estimate the effect of discounts on household food waste.<sup>32</sup> Households reported consumption, storage, and waste of foodstuffs that were purchased at retail prices, discounted individual items, or items that were part of quantity discounts. Household data concerning purchase and waste were connected to sales and discount information from a large Dutch grocery store chain. The study found no effect of discounts on reported food waste. The authors draw the conclusion that shoppers who purchase items on sale eat or freeze the greater portion of their purchases. The study has a high number of observations, but the in-store sales discounts are not random, weakening interpretation of the study's results. For example, grocery stores offer sales campaigns before the weekend, when households are likely to plan meals differently. We therefore cannot know whether this study indicates a correlation or a real causal effect. Furthermore, the households included in the study are members of a panel, and are paid to report their grocery purchases each week. Thus, it is likely that these individuals are already conscious of their shopping habits and are more mindful of their grocery budget than the average consumer. The results are in line with previous studies showing that budget-conscious consumers find sales attractive, and that these consumers are more inclined to consume their purchases. Certain studies show that more well-off households throw away more food, since they can afford to do so. Still other studies show that even budget-conscious households throw away lots of food, in a desire to be perceived as well off, for example during social gatherings.<sup>33</sup> Overall, the available literature provides greater evidence that sales offerings increase food waste of perishable items. Items that keep longer, or which can easily be frozen, do not pose as great a problem.

## Prioritising relevant behaviours to be addressed

In all, the survey of behaviours yielded several possible challenges to address during the project. The main challenge for consumer shopping behaviours is that consumers buy more food than they eat. We who carried out this study wished to address those behaviours that can result in households throwing

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<sup>28</sup>G. Le Borgne, Guillaume., S. Lucie., & S. Costa. 'Perceived Probability of Food Waste: Influence on Consumer Attitudes towards and Choice of Sales Promotions,' *Journal of Retailing and Consumer Services*, 42 (May 2018), 11-21.

<sup>29</sup> A. Isaksson., & L. Näkne., 'Mat(s)vinnare. En studie om miljöengagerade människors uppfattningar om matsvinn.' *Högskolan i Jönköping*. (2013).

<sup>30</sup> Aschemann-Witzel, *Consumer behaviour towards price-reduced suboptimal foods in the supermarket and the relation to food waste in households*, 246–258.

<sup>31</sup> Sammanställning av genomförda forskningsstudier för att studera evidensen för ett område.

<sup>32</sup> A. van Lin et al., 'Does Cash Really Mean Trash? An Empirical Investigation into the Effect of Retailer Price Promotions on Household Food Waste.' Working Paper, (2020)

<sup>33</sup> G. Porpino., J. Parente., B. Wansink., 'Food waste paradox: antecedents of food disposal in low income households.' *Int. J. Consumer Stud.* 39 (6), (2015) 619e629.

away edible food. We identified four behaviours that lead consumers to purchase too much food, and which can be addressed to possibly reduce household food waste. We wish to focus on those behaviours which might enable behavioural change within the context of the study. The behaviour of consumers who purposely purchase too much food, for example during holidays and to eat more healthy foods, we chose not to prioritise in the present study, since it is more important to first address unintentional food waste. Reducing careless shopping consumption helps consumers to save money and helps the environment. To address this challenge is also in line with the goal of improving consumer wellbeing. Affecting bulk-size purchases is also challenging to address, and not possible in the context of the present study. It is furthermore a technical, rather than a behavioural, challenge. But what we can affect is what consumers see and notice in grocery stores. Therefore, we have chosen to focus our research on the consumer behaviour of purchasing too much when offered discounts.

The challenge is further concretised in the table below, regarding both the desired and undesired behaviours, the target group, and in what context the behaviour is carried out.

Table 1. Concretising behaviour challenge

|                            |  |
|----------------------------|--|
| <b>Challenge</b>           | Consumers purchase too much food when offered discounts                                    |
| <b>Target group</b>        | Consumers shopping in grocery stores   |
| <b>Desired behaviour</b>   | Consumers purchase the correct amount of food (the amount they will eat)                   |
| <b>Undesired behaviour</b> | Consumers purchase too much food, which they then throw away                               |
| <b>Context</b>             | Shopping in actual stores, where the target group makes decisions about how much they need |

# Interventions to reduce food waste

In this chapter, the authors of the present study will present interventions that can help consumers purchase food in quantities that they will subsequently eat. In order to identify suitable interventions, we carried out an in-depth behavioural analysis.

## Behavioural analysis to identify suitable interventions

We carried out an in-depth behavioural analysis to identify suitable interventions. The analysis aimed at identifying factors that prevent the target group from carrying out the desired behaviour, namely not purchasing too much food. The analysis primarily proceeded on the following basis:

- Literature review
- Workshop with representatives from the Food Agency
- Interviews with food waste experts
- Interviews and meetings with grocery trade representatives

## Analysis yielded several hypotheses related to the prioritised areas

There are many possible reasons why consumers purchase too much food when offered discounts. In interviews with experts, the observation was made that discounts are very significant with regards to consumers purchasing too much. There is both an economic incentive to purchase discounted items, and a feeling, for consumers, of “getting a good deal” when they purchase discounted items. When discount terms require purchase of multiple items, the discount risks inciting consumers to purchase more than initially planned. Perishable items, like fruit or vegetables, can be difficult for consumers to eat before they go bad/are considered inedible.

Interviews with experts and grocery trade representatives also indicate that consumers often do not see or become aware of how much they save when purchasing discounted items. By law, discounted price displays must be shown alongside the item’s unit price, but the latter are often printed in small font, and difficult to see, especially for inattentive shoppers.<sup>34</sup>

The analysis is compiled in the table below.

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<sup>34</sup> Prisinformation och jämförpris, Konsumentverket (2021) <https://www.konsumentverket.se/for-foretag/prissattning-och-ta-betalt/prisinformation-och-jamforpris/>, hämtad 24 jun 2021

Table 2. Behaviour analysis

| <b>Challenge</b>                       | <b>Analysis</b>  |
|--|--|
| Consumers purchase too much of an item | <i>They are inattentive and the discount is attention-grabbing (otherwise they may not have sought it out)</i> |
|  | <i>They feel like they “get a good deal” when they buy products with a special discount</i>                    |
|  | <i>They are unaware of their actual savings</i>  |

## Three strategies to enable the desired behaviour

With the analysis as our starting point, the authors of this study identified a number of suitable strategies for addressing the behavioural challenge that consumers purchase too much. We used these different strategies to develop the interventions. All rely on evidence-based behavioural science research, and have been used successfully in prior completed studies that aim to enable behaviour change.<sup>35</sup> Below, we present the three established tools, namely ‘Prompt,’ ‘Salience,’ and ‘Default.’

**Prompt:** The ability to process information or decide is greatly affected by an individual’s status. For example, a shopper may need to divide his or her attention while grocery shopping, creating a mental strain/cognitive burden. Imagine a late-afternoon shopping trip to a grocery store with a large selection: even if a shopper knows, on the whole, the right choice—reducing food waste by not buying too much food—they may not be thinking about that when they decide to make any particular discounted purchase. A prompt can help remind consumers of the right choice at decision points. We use prompts as tools, during shopping trips, to remind customers to only buy what they will eat. This helps shift consumers’ attention from, ‘This looks like a good deal, I should buy this,’ to: ‘Even if this is a good deal, do I really need two?’

**Salience:** We are influenced by how messages are presented, and we tend to focus on information that sticks out from the crowd. One strategy is thus to make visible the desired behaviour by strategically designing and placing information. If the relevant information is emphasised, it becomes easier for individuals to make the ‘right’ decisions. We use this tool in two ways, to inform customers of the unit price of discounted items, and to draw consumers’ attention to the prompt we wish them to act on. In both cases, important information is made visible, helping consumers to make more conscious choices.

**Default:** We often accept the predetermined alternative when it can save us time and energy, or because we are inattentive or understand it as a recommendation. By changing the default in a decision situation to the alternative which is most favourable for the target group, and society at large, the desirable behaviour can be achieved. Grocery stores regularly offer quantity discounts, and offerings like ‘buy two for X euros’ include a built-in default for consumers. To test the effect of the quantity-discount default, we try changing the default to a reduced price for individual items. The reduced price remains constant (for example, an item that is 1.50 euros compared to two for 3 euros) so as not to

<sup>35</sup> OECD, *Tools and Ethics for Applied Behavioural Insights: The BASIC Toolkit* (2019), Carlsson et al, 2019



capture the result of a price reduction. If consumers wish to buy more, they can make the conscious choice to do so.<sup>36</sup>

These tools aim to help people reflect over their shopping choices, rather than shopping on autopilot. The tools do not aim to induce people to buy less, but to consider how much they really need. For some people, this can result in purchasing fewer items, while others will consciously purchase just as much, since that's what they need.

The diagram below provides an overview of the strategies identified.

Table 3. Strategies identified for addressing behaviour

| <b>Challenge</b>                              | <b>Analysis</b>   | <b>Strategi</b>  |
|---|---|--|
| <i>Consumers purchase too much of an item</i> | They are inattentive and the discount is attention-grabbing (otherwise they may not have sought it out) | Prompt customer reflection (Prompt + Saliency)                                 |
|   | They feel like they “get a good deal” when they buy products with a special discount                    | Swap out quantity discounts and reduce price of single items instead (Default) |
|   | They are unaware of their actual savings  | Make unit price more visible (Saliency)  |

## Identified tools implemented in four grocery store interventions

In this section, the authors of the present study present details of the concrete implementation of these tools in the development of three interventions. These three interventions were then compared with a fourth alternative, designed to resemble a quantity discount offered by grocery stores.

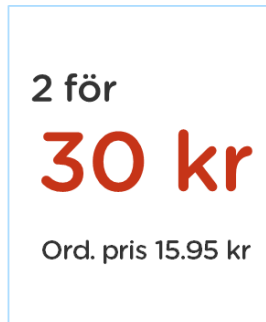
<sup>36</sup> OECD, 'Tools and Ethics for Applied Behavioural Insights: The BASIC Toolkit' (2019); Naturvårdsverket. 'Nudge som miljöekonomiskt styrmedel, Att designa och utvärdera.' (2019)

**1. Quantity discount + message (Prompt and Salience):**

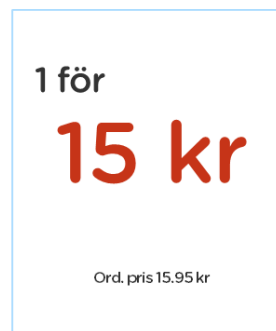
Highlighting the message with a speech balloon, “You can take me home, but only if you eat me up 😊”. Helps consumers stop and consider whether they will eat what they buy.



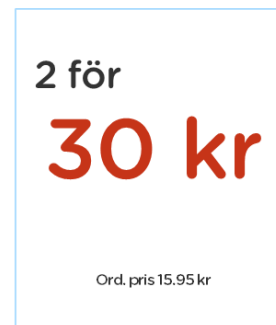
**2. Quantity discount + visible unit price (Salience):** Makes it easy for consumers to determine whether a discount is good enough to make them purchase two. Interrupts impulse shopping and provides the opportunity for a considered decision.



**3. Reduced unit price (Default):** The same price as the quantity discount offered in unit price. The discount is the same, but consumers can get the same rate of savings when purchasing just one product. Thus, the consumer saves the same amount per item as when purchasing several items as part of a quantity discount.



**Quantity discount + less visible unit price info (control):** Control intervention stimulating a potential impulse to purchase quantity discounts.



Simultaneous with our survey and prioritisation of the relevant behaviours to be addressed, Ramboll and Impactually began designing the experiment. Experiment design was carried out in dialogue with several grocery stores. This step is described in the following chapter.

# Experiment design

To test the four interventions described above, we designed a randomised controlled trial together with participating grocery stores. During the design process, we engaged in close dialogue with grocery store representatives, which has been essential in ensuring a resulting study design that can be implemented by stores. The experiment's design is described below.

## Interventions tested in a randomised controlled trial

The interventions identified by behavioural analysis were tested in a randomised controlled trial (RCT). The primary outcome measure of the study was the rate of sales (number sold and number of discounts used) for those items included in the study, as well as the self-reported rate of household consumer food waste. In addition, we also investigated how the interventions affected the sale of related items.

The idea of an RCT is that shoppers randomly encounter one of the four interventions (price displays) when they go into the grocery store. Participants are unaware, beforehand, that an experiment is being conducted, so we can measure shopping behaviours as they would normally occur. Everything else in the grocery store remains unchanged, and we change only the appearance of the price displays. The prices of the selected items at the grocery remain constant during the trial period. If we can observe differences in behaviour between the different intervention groups, then we can say with certainty that price display changes have a causal effect on behaviour.

## Experiment conducted on two types of items in eight stores

The experiment was carried out during calendar weeks 10 and 11 in eight stores in Sweden. The experiment was not carried out during holiday weeks, to avoid sales results that vary significantly from the norm.

The experiment was carried out using the items cucumber and broccoli. According to a 2019<sup>37</sup> study in Sweden, vegetables are the food that households most throw away. Cucumbers, in particular, are thrown away at high rates. The price of these items is also relatively stable, permitting stores to keep prices constant under the trial period. Furthermore, these items are sold in high quantities, providing a larger data set for investigation. These items also represent products that the average consumer might purchase in larger quantities at once.

## Each store tests two interventions

Figure 2 illustrates the experimental design. The eight participating stores are each assigned two interventions through randomisation. Thus, each intervention is tested in a total of four different stores. To control for variation in number of customers, and differences in shopping behaviour between weekdays and weekends, the fourteen-day test period is divided into three periods. The stores' first intervention is active under the first three days of the experiment. On the fourth day, the

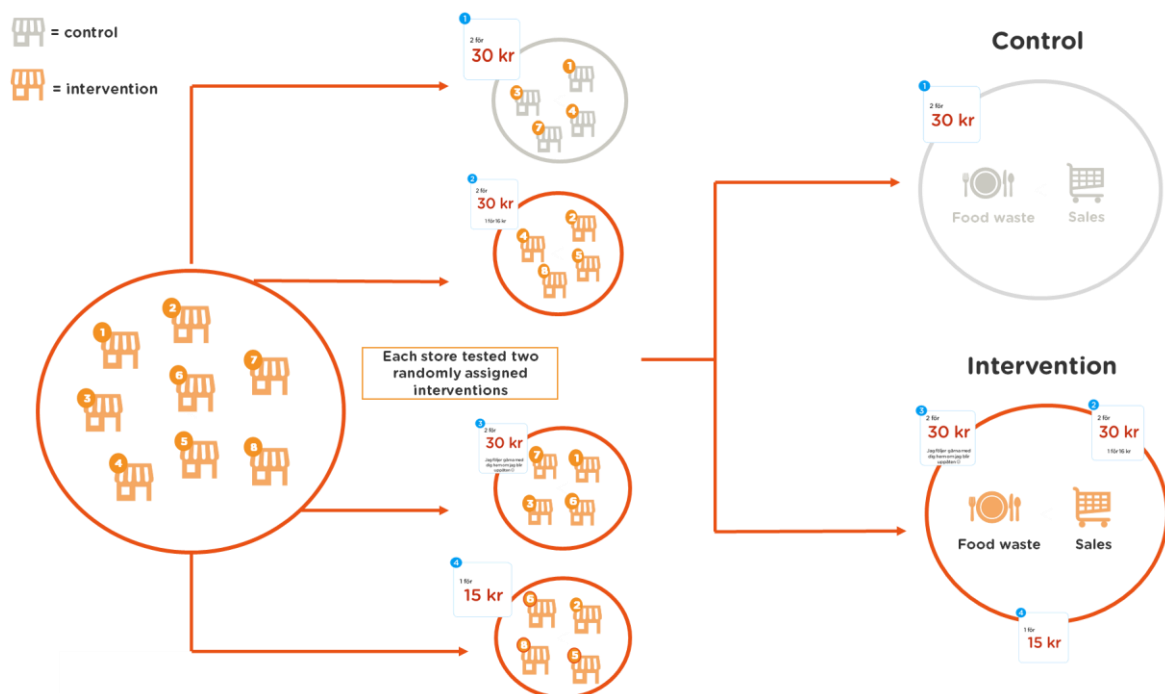
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<sup>37</sup> Varannan svensk har minskat sitt matsvinn, *Axfood* (2019), <https://www.axfood.se/nyhetsrum/pressmeddelanden/2019/09/varannan-svensk-har-minskat-sitt-matsvinn/>, hämtad 24 jun 2021

price displays are changed to the second intervention. During the final four days of the experiment, intervention 1 is once more active. It is important that stores change interventions at two points in time in order to control for other factors that affect sales. If we were to test just one intervention one week, then a second intervention another week, any observed changes in sales may be due to the weather, or other time-related factors. We measure the sales rate of cucumbers (in all stores) and the sales rate of broccoli (in two stores) during the two-week trial period.

Were all shoppers to consciously purchase what they plan to eat, then there should occur no differences in sales derived from the interventions. The price for two cucumbers or two heads of broccoli remains constant in the stores during the trial period. If we observe sales differences, then we know that these are related to our interventions.

Figure 2. Experiment design



### Collection of sales data

We analysed the sales of the items tested by the intervention. After the end of the trial period, each store reported sales data on the included items, as well as related items (for example, imported or organic cucumbers or broccoli). Sales data from the trial period were compared with data from the weeks prior to the trial period.

### Consumer food waste measured by survey

Consumer food waste was measured with a survey. The survey included questions about how much of an item consumers purchased, and how much they ate. Consumers also were asked whether, at the time of purchase, they expected to eat what they bought, as well as whether they normally throw away lots of food.

Survey studies that include reports of self-evaluated behaviours risk being affected by several biases. For example, respondents may underreport behaviours that are socially unacceptable, a bias known as the ‘social desirability bias.’ If consumers themselves experience food waste as bad, then there is thus a risk that they will underestimate the amount they throw away. One way to avoid or reduce the risk of this bias is by formulating questions in a non-normative way, which should not lead consumers to answer according to what they believe is desirable. The questions included in the survey are those formulated: ‘Did you eat what you bought?’ rather than, “Did you throw the item away?”. The survey refers specifically to the items purchased by consumers, to help them remember their purchases and answer truthfully. Another risk for bias is that consumers, aware of participating in a study on food waste, will notice their behaviour, and change it, as a result of the study. Therefore, we do not provide consumers with prior information regarding the purpose of the survey. Since each store and each intervention carried out its own survey study, we know in which intervention group, and at which store, each purchase occurred. This allowed us to follow the interventions and investigate whether they affected food waste. Another advantage of our ability to easily follow the interventions is that even if several random respondents under-report food waste in the different interventions, the differences among the interventions as a whole remain correct. See **Fel! Hittar inte referensälla.** for the survey.

### Items marked with a QR code

In order to connect the survey with the purchased item, all items included in the experiment were labelled with stickers. The stickers included a QR code and a request for consumers to register for a survey by following the link (see Figure 3). The QR code was linked to a registration page, where consumers could provide an e-mail address to receive the survey. To ensure participation, consumers were offered a discount on their next purchase in the store. To avoid receiving survey responses from only those individuals who care about food waste, and thus biasing our results, no information regarding the survey contents was included.

Figure 3. Sticker with QR code linked to survey registration



Stickers were placed on all items included in the experiment, and the stickers were unique to each intervention and grocery store. This means that the stickers were changed simultaneously with the signs, to ensure that survey answers were related to the intervention active at the time of registration.

One week after consumers registered, the survey was sent to the provided e-mail address. We provided the survey after one week to enable consumers to complete the survey close in time to their having eaten the product or thrown it away. Most people registered for the survey when they purchased the product, at which point they could not yet have thrown it away.

### Pilot test

The study was preceded by a pilot test on cucumbers in one of the participating stores. Two of the total four interventions were tested: quantity discount + less visible unit price info (control), and quantity

discount + message. Consumers were offered a 25 SEK discount off a future purchase in the participating store, as compensation for study participation.

The pilot test was carried out during calendar week 2. The principal lesson of the pilot study was that the response rate was too low, and that the economic incentive was probably too small to motivate participation. The compensation rate was thus raised to 100 SEK.

# Results: The effect on sales and food waste

This chapter presents the results of the three interventions.

## Effect of the three interventions

The primary outcome measure of the study was the rate of sales for those items included in the study, as well as if they were eaten. The former outcome was measured using sales data from participating stores, and the latter using a consumer survey. The study thus answers both how the interventions affected shopping behaviours, and how they affected consumer food waste.

## Sales data results

The authors of the present study analysed all sales data for both items (cucumber and broccoli) from all stores collectively. We used regression analysis<sup>38</sup> to analyse the effect of the interventions on our results (sales and whether an item was eaten). In the regression analyses, we controlled for either the number of costumers per day (sales data) or the size of the stores (survey data). We divided the stores into two main groups based on size. This entails that those stores located somewhat outside of city centres, and primarily reached by car, form one group, while the remainder of stores form another group. We also controlled for product sales trends in the weeks preceding the experiment (calendar weeks 7 and 8).

All interventions (quantity discount + message (1), quantity discount + visible unit price (2), reduced unit price (3)) are compared in the same regressions with the control intervention as the baseline (quantity discount only).

### All interventions result in fewer product purchases

The stores sold on average 309 cucumbers and heads of broccoli per day, but the number of products sold varies greatly among the stores. Sales data regarding the number of products sold appears in Table 4.

Table 4 Products sold

| <b>Products sold</b> |       |
|----------------------|-------|
| Average              | 309   |
| Min.                 | 25    |
| Max.                 | 1,157 |

<sup>38</sup> Note: Statistical method for creating a function that can best estimate a relationship. We use a 'random effects' regression model with clustered standard error. Sales numbers are in log form.

Figure 4 Sales compared with quantity discount



Not: n=140. Robust standard error, \*\*\* p<0.01, \*\* p<0.05 and \*p<0.1.

The results show that, after controlling for all other factors (customer number and store size), the intervention ‘reduced unit price’ results in approximately 18 percent fewer products sold than the control. The intervention ‘quantity discount + visible unit price’ results in 10 percent fewer sales compared to control. The intervention ‘quantity discount + message’ results in 11 percent fewer cucumbers and heads of broccoli sold.

### Unit price intervention has the greatest effect on number of products sold

The greatest effect was created by the unit price intervention. We estimate that this effect results in 18 percent fewer products sold compared with the control intervention, while the price remains unchanged. The difference between the effect of reduced unit price (3) and the other quantity-discount interventions is statistically significant.

### Interventions that prompt reflection during shopping support consumers purchasing less

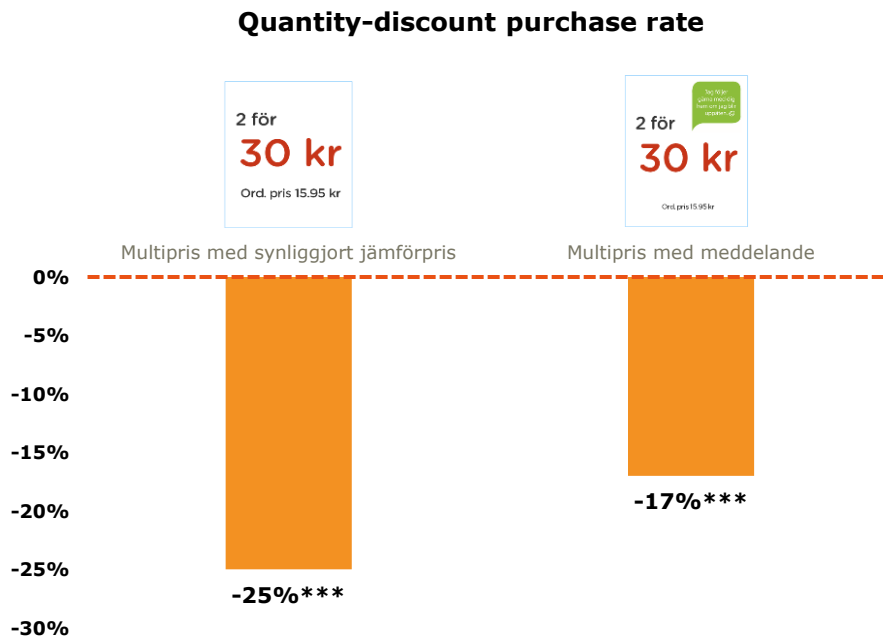
We also investigated if the two quantity-discount interventions (1 and 2) affected whether consumers took advantage of the offer (2 for 30 SEK) at the same rate as in the control intervention. The results show that both quantity-discount interventions lead to a lower rate of consumers taking advantage of



quantity discounts, compared with control. The intervention ‘quantity discount + visible unit price’ (2) reduced the rate of consumers taking advantage of the discount by 25 percent compared with control, and for the intervention ‘quantity discount + visible unit price’ (1) this rate was 17 percent lower compared with control.

The results indicate that both interventions prompted consumers to reflect while shopping, and not to purchase more food than necessary.

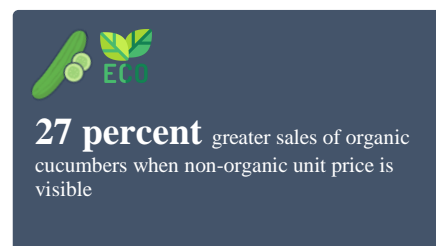
Figure 5 Number of shoppers taking advantage of quantity discount, compared with control



Not: n=76. Robust standard error, \*\*\* p<0.01, \*\* p<0.05 and \*p<0.1.

### Making unit price visible results in increased sale of organic products

The results of the impact assessment show that the intervention ‘quantity discount + visible unit price’ (2) leads to an increase in sales of 27 percent for alternate item organic cucumber (on average, 23 organic cucumbers per day were sold).



One potential explanation for this result is that consumers have a fixed idea of the amount they will spend in the grocery store. When they are prompted to reflect over whether they need more than one of any given product, they feel that they are ‘saving’ money, which can then be spent on a higher-quality product.

### Survey results

The follow-up survey was sent to consumers who purchased broccoli and cucumbers approximately one week after they registered their e-mail addresses. The survey posed questions regarding how many products they purchased (cucumbers and heads of broccoli), whether someone in their household had

eaten the purchase, and how certain they were, at the time of purchase, that the product would be eaten. Those consumers who had not yet consumed their purchase were asked about the likelihood that they would throw away the product, or parts of the product. We also questioned consumers regarding whether they regularly purchase too much food, and if they are often influenced by discounts and sales.

In total, we received 178 survey responses. Consumers who purchased cucumbers and consumers who purchased broccoli both provided answers to questions regarding food waste. Due to the relatively limited data set, the answers from both items were analysed together. The results of our analysis are presented below.

### **Reduced unit price lowers sales compared to quantity discounts**

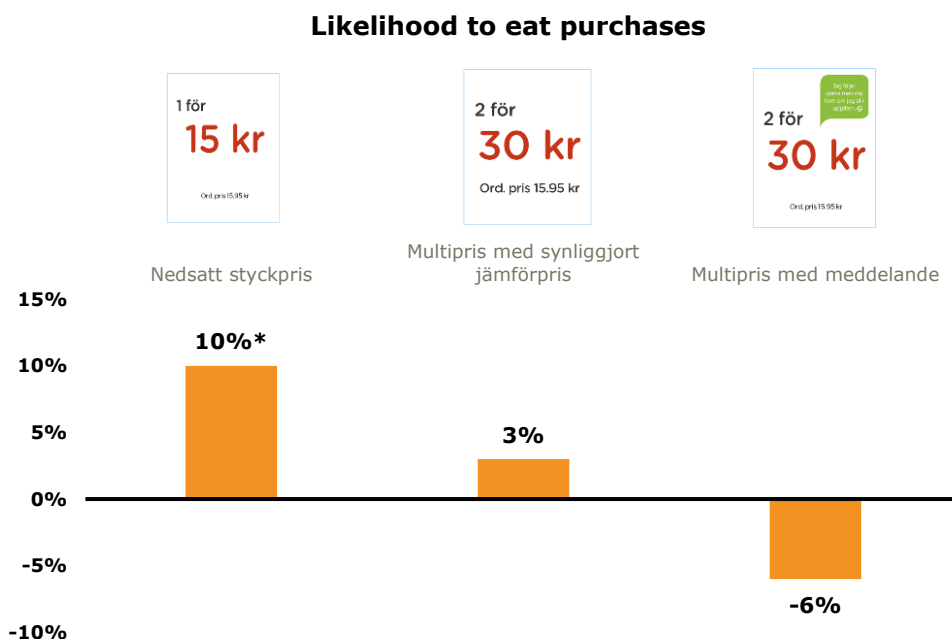
The results of the survey show that when an item is sold with reduced unit price, consumers purchase fewer items than when taking advantage of a quantity discount. Just as the sales data show, we see a reduction in sales of approx. 17 percent (sales data 18 percent) when items are sold by unit price, even though the price remains the same for both. The result of the intervention ‘quantity discount + visible unit price’ tends in the same direction (the number of items sold goes down), but is not significant. ‘Quantity discount + message’ suggests a weakly positive relationship, but is not significant. As a whole, the survey study results show a trend of lower sales that resembles the actual sales data. This indicates that shoppers answering the survey are representative of shoppers in the store. This is an advantage compared to other survey studies, which tend to attract individuals who care greatly about food waste and sustainability, distinguishing them from the average consumer. In line with the study design, participants seemed to have enrolled in the study and provided responses in order to receive the 100 SEK discount, rather than to answer questions about food waste.

### **Consumers who purchase several items at unit price throw away less than those getting quantity discounts**

We analysed survey answers from those consumers who stated they purchased more than one of the included items. Figure 6 shows the results of this analysis. When consumers are presented with the unit price offer, and purchase more than one item (bar at the far left in Fig. 6), then the likelihood is 10 percent greater that they will eat what they buy, compared to consumers who purchase more than one item as part of a quantity-discount purchase (control). The results of the other two interventions are not significant.

**10 percent** greater likelihood that a food item is eaten when sold at reduced unit price compared with quantity discounts where customers purchase multiple items

Figure 6 Likelihood to eat purchases, compared to quantity discount (control).



Not: n=120. Robust standard error, \*\*\* p<0.01, \*\* p<0.05 and \*p<0.1.

Results include purchases of more than one item.

The results suggest that quantity discounts lead to greater food waste, since they result in individuals purchasing more products in greater numbers, and subsequently eating what they purchase at lower rates.

#### Conscious choices reduce food waste

We also analysed survey responses from consumers who purchased just one item. The results show that the likelihood that consumers will eat their purchase when they only purchase one item is equally great, regardless of which intervention they encounter. That is, those consumers who decided to buy just one item subsequently ate their purchases at greater rates, regardless of whether they encountered a discount to purchase more or not. This indicates that consumers who chose to purchase just one item at greater rates make a conscious choice to do so.

#### Interventions that prompt reflection during shopping help consumers to think more about what they buy

We analysed answers from those consumers who purchased one item when offered quantity discounts in all the quantity-discount interventions. It appears that consumers who stated that they purchased one item when offered a quantity discount believed, at greater rates, that they would eat their purchase, compared with control. This indicates that interventions which prompt consumers to reflect over purchases help consumers to be more conscious of what they buy.

### **Awareness of undesirable behaviour insufficient to create behaviour change**

The results also showed that the consumers who reported often purchasing too much food also ate their purchases at lower rates during the test period. They themselves also believed they would eat the food they bought at lower rates. The results indicate that consumers are aware of their behaviour, but nevertheless throw food away. Interventions to help consumers change behaviour thus can be effective for ‘nudging’ them in a more sustainable direction.

# Discussion

Ramboll and Impactually were commissioned to investigate how behavioural insights can be used to develop interventions that help households reduce their food waste. The study shows that it is possible to reduce food waste by changing shopping behaviours. The clearest results came from the intervention reducing the price of single items, instead of corresponding price reductions as part of a quantity discount. The result is in line with previous studies that have identified a relationship between discounts and food waste.

Our study is the first of its kind. Most studies in this research area consist of survey investigations, and fail to measure actual consumer behaviour. We, by contrast, measure actual shopping decisions in grocery stores. Furthermore, we randomise customers into several different intervention groups in order to measure the causal effect of price displays on shopping behaviour. Our complementary survey study was carried out with individuals who were randomly exposed to one of the interventions, which permits conclusions regarding what customers would have done when faced with other interventions.

Corresponding previous studies, in which actual behaviour is evaluated, are largely missing, especially in the Swedish context. A previously presented Dutch study<sup>39</sup>, one of the largest in this research area, finds no effect of quantity discounts on food waste. It finds that individuals purchasing quantity-discounted food eat what they buy. The difference in results can be explained by several factors. Even though the Dutch study includes a large number of observations, the discount offerings in the study are not random, which weakens the interpretation of the results. A strength of the present study is our randomisation of interventions, despite the smaller sample of participating stores. The discount offerings in our study were not anticipated by the consumers.

The households participating in the present study did not do so within the context of a panel. Nor did they know in advance that they would be answering questions related to food waste. Instead, they received a discount as compensation for filling out a survey about consumer habits. The Dutch study included panel households, thus making it likely that participants were already aware of their shopping habits, and were more budget-conscious than the average consumer.

We used two main sources of data for analysis: sales data and survey data. In the survey, we asked consumers how many of certain items they purchased during each shopping trip. A strength of the results is that both sources, the sales data and the survey data, point in the same direction. The survey data shows a sales reduction of 17 percent among consumers who purchased an item at reduced unit price in comparison with those who were in the control group. Sales data show a similar reduction of 18 percent for the same comparison.

Ultimately, the results remain valid despite variations in design across the different participating grocery stores. All stores used price displays that correspond with how such displays usually appear. Stores' displays differ, for example, in colour, font, and size, as well as in how discounts are termed ('sale' or 'bargain'). The results are nevertheless clear and significant.

We use a randomisation of interventions in grocery store environments, where we can track actual behaviour in the store using sales data. In addition, we use a survey to track how respondents self-

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<sup>39</sup> van Lin et al., 2020

report their behaviour. There is a risk that individuals under-estimate the amount of food they throw away. To avoid this, survey questions were posed in non-normative forms, which is a way of reducing this type of bias. This is a challenge for self-reported results, but we designed the survey according to state-of-the-art research design regarding minimisation of bias in survey investigations. Posing questions approx. one week after purchase, and asking about specific items, makes it easier for consumers to remember whether they ate the specific cucumber or head of broccoli about which we enquire. Many investigations pose questions regarding portions of food, which are quite difficult for consumers to answer correctly, no matter how good their intentions are to give a valid answer.

One of the biggest challenges of the present study was collecting enough data to provide sufficient robustness in the results, so that we might say something about how behaviour is affected. The stores include much variation in terms of the number of customers and sales. We also have a relatively small sample of respondents for the survey. The significant result of the interventions ‘visible unit price’ and ‘quantity discount + message’ on shopping behaviour is not observed in the survey results. The effects on sales are smaller for these two (-10 and -11 percent respectively) in comparison with ‘reduced unit price’ (-18 percent). It is probable that we had an insufficiently large sample in the survey data to determine the exact effect on food waste. Variation within the data was too great to show smaller changes, and the sample was too small to infer the effects on food waste. As expected, most consumers report eating the food they buy, so we can only compare the small groups in each intervention who did not eat everything they bought. Future studies would benefit from larger numbers of participating stores. A collaboration with an entire grocery store chain would have been ideal.

We designed this experiment to be easily replicable in many stores. The individual stores reported that it took approx. ten to fifteen minutes each morning to apply stickers, approx. one hour to design and set up price displays, and, at the end of the study, two more hours to compile and send data. Given a greater number of participating stores, it would be possible to test one intervention per store and collect data in one week. In all, each store would only need to contribute four or five hours of labour to the experiment. Given the enormous advantages of learning the effects of these interventions, we consider that time well spent.

# Conclusions and recommendations

In this section, we present our conclusions and recommendations. Our point of departure in the present study has been that individuals have good intentions, and seldom throw away food unnecessarily. But when decision-making processes are complex, good intentions don't always lead to action. We therefore need to understand the decision-making process and reflect over how to support decision making that facilitates good decisions.

## Conclusions

Our conclusions from the present study are numerous. First, we conclude that it is possible to develop, test, and evaluate measures in the grocery store environment. It is also possible to develop measures that affect household food waste behaviour using behavioural change during shopping. Finally, reduced unit prices most clearly contribute to reducing food waste compared with quantity discounts.

### **We can develop effective measures based on behaviour insights**

Basing intervention design on behaviour insights has been successful in terms of reducing food waste. A conclusion from this project is that an approach using behavioural insights works when creating measures that contribute to desirable change.

### **Experiments work and enable buy-to-bin observation**

Following consumers from the decision to purchase an item, until they eat the item or throw it in the bin, presents a challenge. But the study results show that it is possible to carry out an experiment that follows an item from purchase to disposal. There are thus also lessons to be learned related to how to design experiments for future projects.

### **Behaviour insights addressing shopping decisions can help reduce food waste**

Using a purely behavioural analysis to create effective measures to reduce food waste does work. The aim of the interventions tested was to reach consumers' shopping decisions, and influence consumers to only purchase the necessary amount of food, which many studies indicate is where much waste is created.

- All tested interventions work, and help shoppers think about/change shopping decisions.
- Those who purchase items with quantity discounts purchase fewer items when they are reminded of the unit price and are encouraged to only buy as much as they need. Both interventions can be a way to help consumers purchase only as much as they can eat, or really want, and to reduce the risk of buying too much.
- We also see that the intervention making visible the unit prices leads to consumers considering and purchasing organic alternatives in greater amounts. It may be the case that when consumers are reminded of the savings from buying two cucumbers, some consumers choose to use that money to buy more expensive organic varieties.

- The greatest effect came from the reduced unit price intervention, which also showed significant results in terms of reduced food waste.

### **Extensive engagement of numerous actors made this study possible**

Within the frame of the study, many actors stepped up and contributed in different ways that permitted the study to be carried out. Participants included two grocery chains, researchers, consumer groups, and public authorities. The eight participating grocery stores, part of two large national chains, made the most significant contributions to the study, as well as being, as a group, most accommodating, and sharing the goal of helping to reduce food waste. One conclusion drawn from this process of collaboration is that extensive investments of time or energy from stores are unnecessary, and that some grocery stores will gladly help test new ideas to help consumers make sustainable choices.

## Recommendations for grocery retailers and the Food Agency

Below, we list a number of recommendations for grocery retailers and the Swedish Food Agency to use in future policy development and food waste reduction efforts.

### **Recommendations for grocery retailers**

Grocery retailers play an important role in household food waste. The results of the study show that grocery stores can use simple tools to help consumers make more informed decisions, and to buy what they need. Purchasing items with a unit price, rather than quantity, discount reduces food waste. We therefore make the following recommendations:

- **Concretise the roll of grocery retailers in reducing household food waste.** The study shows that it is possible for grocery retailers to affect household food waste. We therefore recommend that grocery retailers concretise their role in reducing household food waste, using the present study as a point of departure.
- **Further develop concerns within existing cooperative organs.** There exist organisations and forums for developing the concerns addressed here. Concretise how to collectively communicate and cooperate within the existing network.
- **Make clear retailers' ambitions for reducing household food waste.** Calculate defined ambitions to reduce household food waste, as well as in-store food waste, and set concrete qualitative and quantitative goals. Consumers need information about food waste. But also needed are goals in relation to how context affects unconscious consumer choices, for example, the presentation of discounts.
- **Take care when offering quantity discounts on perishable items.** The study shows that discounted unit prices for cucumbers and broccoli reduce food waste in comparison to quantity discounts. The test is limited to just two vegetables, both of which are easily perishable. Since the results apply to these items, they should also apply to other similarly perishable items.
- **Test a variety of items.** To develop interventions for diverse groups of less-perishable items, tests must be carried out on more items and in more stores. These tests can use the same method developed for this project.



- **Use methods developed in the study to continue to track grocery retail's effect on food waste.** We recommend that grocery retailers continue to track their effect on food waste. A larger sample of stores, including different sizes and locations, would be profitably used. Further studies can also be carried out using online grocery retailers.

## Recommendations for the Food Agency

The authors of the present study offer four recommendations for the Food Agency's continued work with behaviour insights and food waste.

- **Continue to develop, test, and evaluate interventions based on behavioural insights.** Continue using behavioural insights as a tool for the effective development of interventions. We find that it is positive that the Food Agency has carried out the present project, which can provide a basis for further work both internally, and with outside actors.
- **Spread behavioural-insight based work.** We find that the Food Agency is in advance of other Swedish public authorities when it comes to designing, testing, and evaluating interventions based on behavioural insights. This work can spread to other public authorities. Spreading knowledge widely can promote a common understanding among public agencies in Sweden regarding what working with behavioural insight really means, when it comes to policy development, which can yield benefits for society in the long run.
- **Investigate how other challenges identified in the study can be addressed.** The present study identified a number of behaviours, both in grocery stores and in households. For example, behaviours related to bulk-size packages and unplanned grocery shopping. The potential exists to continue designing, testing, and evaluating interventions to nudge behaviours in a more sustainable direction.
- **Spread the study's results and continue dialogue with grocery retailers and interested parties.** We find that the study's results should be discussed with many parties, for example, grocery retailers and other public authorities. This dialogue should consider how different interventions affect food waste, as well as the importance of consumer information.

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# Appendix 1. Survey

**Your household consists of how many individuals?**

\_\_\_\_\_

**How many of those are children?**

\_\_\_\_\_

**How often do you shop for groceries?**

- (1)  Less than once a week
- (2)  Once a week
- (3)  2–3 times a week
- (4)  Every day

**How many cucumbers did you buy?**

\_\_\_\_\_

**Did someone in your household eat the cucumber(s)?**

- (1)  Yes
- (2)  No

**If you answered no, then how likely is it that portions of the item will be thrown away? (%)**

\_\_\_\_\_

**When you bought the cucumber, how sure were you that it would be eaten? (%)**

\_\_\_\_\_

**How often do you buy too much food (more than you can eat) when you grocery shop?**

- (1)  Never
- (2)
- (3)
- (4)
- (5)
- (6)
- (7)  Always

**How often do you purchase items that you did not plan to purchase when you started shopping?**

- (1)  Never
- (2)
- (3)
- (4)
- (5)
- (6)
- (7)  Always

**To what extent do you agree with the statement "discount offerings affect my shopping habits"?**

- (1)  Very little
- (2)
- (3)
- (4)
- (5)
- (6)
- (7)  Very much

# Appendix 2. Behavioural insights improve our understanding of food waste habits

In this section, we will offer a brief overview of the discipline of behavioural economics, the field's behavioural insights, and the OECD framework BASIC, upon which this project is based.

## Behavioural economics shows our occasional irrationality

Changing behaviours is not simple. Most of us understand the environmental hazards of overconsumption, but many still buy more than they will consume. Thus, our intentions don't also match our behaviour. Food waste is not the only area of life where our actions diverge from our own, or society's best interests. Even when it comes to money, health, or environmentally related behaviours, individuals often fail to act according to their intentions. Insights into human behaviour can help policymakers understand why people act as they do and help design more accurate policy measures.

Traditional economic theory presumes that individuals always make logical and rational choices, and that choices always reflect food intentions, values, and preferences. This theory also presumes individuals always make the optimal choice based on available information, that they possess unlimited quantities of self-discipline, and that they are unaffected by their feelings. Behavioural researchers have however shown that these presumptions do not agree with the reality of human beings. In recent decades, a new discipline has grown up in the borderland between economics and psychology, namely behavioural economics. Behavioural economist Richard Thaler, who shared the 2017 Nobel Prize in Economics, has shown in his research how individuals act contrary to what economic theory predicts, and instead behave 'humanely'. [Trans. note: authors, 'humanely' represents my best guess for Swedish 'mänsklig'. A brief review of Thaler's work did not reveal the English original. Perhaps your sources can supply it.]

The greatest contribution of behavioural economics is consequently the insight that humans are not so rational as traditional economics supposes. Rather, human decisions are affected by an array of psychological mechanisms, which in turn affect the ability to form rational decisions, and lead to individuals acting in ways that benefit neither themselves, nor society as a whole. One example of such a mechanism is that humans prefer to seek instant gratification, and have difficulty relating future consequences to their actions now, the so-called present bias.<sup>40</sup> This may, for example, explain why people tend to impulse buy, and why they purchase more than what they can consume. The table below lists two more examples of other mechanisms affecting food waste behaviour.

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<sup>40</sup> T. O'Donoghue., M. Rabin., 'Doing it now or later', *American Economic Review*, 89(1), (1999), 103-124.

Table 5. Examples of behavioural mechanisms

| <i>Bias</i>           | <i>Explanation</i>  | <i>Example</i>   |
|-----------------------|---|--|
| <i>Risk aversion</i>  | Describes a tendency to avoid risks or exposing oneself to uncertain future events. <sup>41</sup>   | Consumers may fear getting sick from expired food and throw food away to be better safe than sorry. Another example is when consumers buy food they probably already have at home. When individuals are uncertain, they prefer to err on the side of caution, and ensure they won't have to make do without. |
| <i>Cognitive load</i> | The human brain is limited in terms of the amount of information it can manage at once. This means that people often have difficulty remembering things, or that they miss important information. <sup>42</sup> | When consumers shop without a list, or in a hurry, they easily buy more than what they will eventually eat.  |

## Behavioural insights explain what changes behaviours

Working with behaviour insights entails designing interventions based on how humans make decisions in practice and is aimed at changing behaviours. Behavioural insights are premised on behavioural economics and psychology research. One example of a behavioural insight is so-called 'nudging.' Nudging refers to small changes in a decision context that are intended to facilitate and promote individual and social well-being, without limiting their freedom to act or deploying economic incentives. A nudge is a gentle push in the right direction, one might say. One crucial thing that nudging shows is that the right action must also be an easy one. The term 'nudging', or 'nudge' was first used in the book *Nudge: Improving Health and Happiness (2008)*<sup>43</sup> by Richard Thaler (see above)

“...Any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting fruit at eye level counts as a nudge. Banning junk food does not.”

**Definition of 'nudge' by behavioural economists Richard Thaler and Cass Sunstein**

and Cass Sunstein<sup>44</sup>. One example of a nudge in action, concerning reduced food waste, is offering smaller-sized plates on buffet lines.<sup>45</sup> This induces buffet guests to serve themselves less food, and increases the likelihood that they will eat the food they have taken.

Work with behavioural insights is not limited to nudging measures. Other measures are often applied, including economic incentives, to create change. The essential point is that such interventions are based on the group targeted, and that they create a positive effect for both societies and individuals.

<sup>41</sup> J. Werner., 'Risk Aversion'. In: *Palgrave Macmillan (eds) The New Palgrave Dictionary of Economics*. Palgrave Macmillan, (London, 2008)

<sup>42</sup> J., Sweller., 'Cognitive Load During Problem Solving: Effects on Learning'. *Cognitive Science* 12(2), (April 1988), 257-285

<sup>43</sup> R. H. Thaler & C.R. Sunstein. 'Nudge: Improving decisions about health, wealth, and happiness.' *Yale University Press*. (2008).

<sup>44</sup> Sunstein, a law professor, worked for a time in the administration of US president Barack Obama.

<sup>45</sup> M. R., Freedman & C. Brochado., 'Reducing Portion Size Reduces Food Intake and Plate Waste', *Obesity* (2009) 18 (9); S.Kallbekken,., & H. Sælen, 'Nudging' hotel guests to reduce food waste as a win – win environmental measure.' *Economics Letters*. 119 (3), (2013), Elsevier B.V.: 325–27; P.G. Hansen, A.M. Jespersen & L.R. Skov. 'Size matter! A choice architectural field experiment in reducing food waste', *Journal of Food and Hospitality Research* vol. 4 (2015)



## Many countries already work systematically with behavioural insights

Public authorities in Denmark and the UK already work systematically with scientific behavioural insights. In Denmark, for example, the Competition and Consumer Authority has established a unit focused on developing behaviour-based consumer policy.<sup>46</sup> The Danish Veterinary and Food Administration has also conducted experiments in grocery stores to promote sustainable behaviour, and the Danish Environmental Protection Agency has mentioned nudging in a report on food waste.<sup>47</sup>

Public authorities in the UK have gone far in their work with behavioural insights, and institutions including *Public Health England (PHE)*, *Her Majesty's Home Civil Service*, *National Health Service (NHS)*, *Financial Conduct Authority (FCA)* and *Her Majesty's Revenue and Customs* work in this area to a great extent. The UK is also home to the *Behavioural Insights Team (BIT)*, an organisation that is a pioneer within the field, and which coined the term 'behavioural insights'<sup>48</sup>. Another UK organisation that has furthered the field of behavioural insights is WRAP. They have carried out a number of projects related to food waste, inter alia an extensive informational campaign on food waste, and studies where they investigated food waste behaviour.<sup>49</sup> In Sweden, the use of behavioural insights in policy making has not come so far as of yet, but much curiosity already exists. Examples of public authorities that have noticed the research area include, in addition to the Swedish Food Agency, the Environmental Protection Agency and the Consumer Agency. The Environmental Protection Agency, for example, has published a report showing how nudging can be used as an environmental-economic instrument.<sup>50</sup>

## Based on OECD's BASIC framework

The authors of the present study recommend that work with behavioural insights be carried out using a systematic and well-elaborated framework. At present, only a limited number of frameworks are available for the entire process of developing behavioural interventions. One such framework is BASIC (*BASIC Toolkit and Ethical Guidelines for Policy Makers*), published by the Organisation for Economic Co-operation and Development (OECD) in 2019.<sup>51</sup> This framework is the first policy framework that systematically shows the fundamental steps necessary for creating sustainable change using behavioural insights.

The present study is based on BASIC, and in the table below we briefly summarise the five overarching phases of the framework.

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<sup>46</sup> Adfærdsprincipper, *Konkurrence og forbrugerstyrelsen* (2021), <https://www.kfst.dk/forbrugerforhold/forbrugerpolitik/adfærdsprincipper/>, hämtad 24 jun 2021

<sup>47</sup> Nudging til mere grønt i REMA 1000, *REMA 1000* (2016), <https://raadetforsundmad.dk/viden/rapport/nudging-til-mere-groent-i-rema-1000/>, hämtad 24 jun 2021

<sup>48</sup> Madspild: Forstudie af forbrugeradfærd med henblik på nudging *Miljøministeriet*, (2016), <https://mst.dk/service/publikationer/publikationsarkiv/2016/apr/madspild-forstudie-af-forbrugeradfaerd-med-henblik-pa-nudging/>, hämtad 24 jun 2021

<sup>49</sup> Waste prevention activities, *WRAP* (2020), <https://wrap.org.uk/resources/guide/waste-prevention-activities/food>, hämtad 24 jun 2021

<sup>50</sup> Naturvårdsverket. 'Nudge som miljöekonomiskt styrmedel, Att designa och utvärdera.' *Naturvårdsverket rapport 6900* (2019) <https://www.naturvardsverket.se/Documents/publikationer6400/978-91-620-6900-1.pdf?pid=25590>, hämtad 24 jun 2021

<sup>51</sup> 'Tools and Ethics for Applied Behavioural Insights: The BASIC Toolkit', *OECD Publishing Paris* (2019)

Table 6

| <b>Phase</b>        | <b>Description</b>  |
|---------------------|---|
| <i>Behaviour</i>    | This phase involves <i>identifying and targeting crucial behavioural aspects related to the over-arching challenge</i> the project seeks to address (e.g., reduced food waste).   |
| <i>Analysis</i>     | Behaviour analysis aims to <i>identify the most important factors preventing or enabling a given behaviour in the target group</i> . It is important to devote sufficient time and energy to conducting a proper analysis since this creates better conditions for developing effective behavioural interventions. The BASIC framework includes a diagnostic tool that enables systematic analysis of behaviours.   |
| <i>Strategies</i>   | The focus in this phase is on <i>designing interventions</i> that will have a clear connection to the prior analysis phase. It is important to ensure the relationship between the analysis and the chosen strategy since this increases the likelihood that the identified interventions affect behaviour in the desired way.  |
| <i>Intervention</i> | The aim in this phase is to <i>determine whether the developed interventions impacted the target group's behaviour in the desired way or not</i> . The results of this impact evaluation are central, since they determine whether an intervention should be implemented on a larger scale. Randomised controlled trials (RCT) are an experimental method with a very high weight of evidence, and they are often the most desirable method for evaluating behavioural interventions. |
| <i>Change</i>       | The aim of the framework's final phase is to <i>plan further work</i> . If the results of the impact evaluation show desirable effects, the next step can be to plan how interventions can be implemented and evaluated on a greater scale. If the impact evaluation instead indicates that the intervention did not have any effect, or even has undesirable effects, the next step can instead be to return to previous phases in the project.                                      |

