Food Quality and Preference 123 (2025) 105338

Contents lists available at ScienceDirect

Food Quality and Preference

journal homepage: www.elsevier.com/locate/foodqual

A food waste information-framing can help promote purchase of suboptimal potatoes

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ARTICLE INFO

Keywords:
Food waste
Suboptimal
Ugly
Framing
Potatoes
Wonky

ABSTRACT

Following specifications focusing on aesthetics, huge quantities of produce are discarded along the food value chain even before reaching the supermarket. One example is fresh potatoes, where only around 50% of the potatoes produced reach the consumer. In this study, we used an online study (N = 481, 51% women) to investigate whether food waste information-framing can make suboptimal potatoes more appealing to consumers. In the experimental part, we used a 2 × 2 design (setting × information). Participants were presented with either a supermarket or farm shop setting with or without food waste information. They chose between optimal potato A, suboptimal potato B, or neither. Both potatoes were equally expensive. We found that the participants' willingness to choose suboptimal potatoes increased significantly with food waste messages (25% to 41% and 29% to 46%, respectively). Our results show that the provision of food waste information-framing can help promote suboptimal potatoes.

1. Introduction

Food losses and waste along the whole food value chain contribute significantly to the human environmental footprint (Alexander et al., 2017). Around 1.3 billion tons of food are estimated to be wasted each year (FAO, 2011). For fruit and vegetables, specifications apply (e.g. cosmetic standards, the physical appearance of the products must be appealing). Products that deviate in appearance, size or shape are sorted out, which leads to a significant part of produce being lost early on in the food value chain (FAO, 2011). Nevertheless, one major contributor to food waste within the food value chain is consumers (Casonato et al., 2023; United Nations Environment Programme, 2021). In fact, estimates indicate that around 50% of food is wasted at the household level in Europe (Stenmarck et al., 2016).

1.1. Suboptimal food as a source of food waste

One specific source of food waste that has gained interest in recent years is ugly, wonky or suboptimal food, which is defined as food that is either close to or beyond the best-before date or that deviates visually (ugly, wonky) or in terms of sensory from what is defined as optimal (Aschemann-Witzel et al., 2015). Products deviating from existing standards in terms of size, shape, or colour are perceived as suboptimal (Loebnitz & Grunert, 2015). For apples, pesticides are used to enhance visual appearance, thus avoiding yield losses (Zachmann et al., 2024), while these products do not deviate in terms of nutritional properties or safety aspects (Qi et al., 2022). However, sorting out these products early in the food value chain significantly contributes to huge losses, especially for fruits and vegetables. For potatoes, it has been estimated that only around 60% of harvested potatoes in Switzerland ever reach consumers or restaurants (WWF, 2012).

The main problem is that products that do not meet cosmetic standards are usually sorted out at an early stage, leaving consumers without the opportunity to buy them. This has been taken up by some retailers (Tesco and Morrisons in the UK or Coop in Switzerland), where these products are successfully promoted (Gonçalves, 2021; Graham, 2018; Hollenstein, 2023). Still, product visuals can be the main barriers to buying ugly or suboptimal food products (Xu et al., 2021). These products are often well accepted by consumers when offered at reduced prices (Aschemann-Witzel et al., 2018). A recent review examined the barriers preventing consumers from buying suboptimal foods (Hartmann et al., 2021). It identified several quality concerns, which were often deduced from the products' appearance or nearing expiration, causing consumers to expect lower product prices (Hartmann et al.,

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https://doi.org/10.1016/j.foodqual.2024.105338
Received 27 June 2024; Received in revised form 26 September 2024; Accepted 27 September 2024
Available online 28 September 2024

2021). Overall, research shows that to reduce food waste and help sell suboptimal produce, strategies beyond price incentives are needed to enhance consumers' perceptions of suboptimal foods (Jaeger et al., 2018).

1.2. Promoting suboptimal food

Researchers have posited that "almost every type of suboptimal product can be sold when consumers receive a discount that fits the suboptimality" (de Hooge et al., 2017). However, these price incentives can send mixed signals, such as provoking lower quality expectations (Aschemann-Witzel et al., 2020; Aschemann-Witzel, Jensen, et al., 2017). For instance, they foster the "beauty-is-good" bias (Griffin & Langlois, 2006), implying to consumers that the more aesthetically appealing product is the better one. It has been shown that a food's aesthetics can impact consumers' risk perceptions, contributing to "ugly-is-risky" bias (Castagna et al., 2021). Mitigating food aesthetics biases can therefore help reduce food waste.

Another successful strategy to promote suboptimal food is communication. For instance, research has shown that using a sustainability positioning, that is, a message highlighting sustainability, positively affects consumers' purchase intentions for suboptimal products (van Giesen & de Hooge, 2019). Another study showed that using messages to link the purchase of suboptimal food to reductions in food waste and naturalness can improve consumers' willingness to pay (Qi et al., 2022). Positive effects have also been found for messages communicating budget savings or using emotions (Aschemann-Witzel et al., 2019).

Individuals who are willing to buy suboptimal food tend to be price conscious and follow environmental motives (Xu et al., 2021). Further, there seem to be sex differences. A recent study found that males were more likely than females to choose suboptimal food (Aschemann-Witzel et al., 2018), although the suboptimal food was offered at a lower price. Other research indicated that politically conservative individuals have lower willingness to buy suboptimal products than politically liberal individuals (Aydinli et al., 2023).

1.3. Aim of the study

In the present study, we focus on potatoes, as they come with high losses along the food value chain (Beretta et al., 2013). It is estimated that between 12 and 20% of the overall production volume of the potato business is lost as waste or by-product (Chauhan et al., 2023). A study conducted in Switzerland found that for fresh potatoes, around 50% of produce is lost across the entire value chain (Willersinn et al., 2015). In addition, Willersinn et al. (2017) showed that the potential to reduce losses by optimising processes within the potato value chain (i.e. application of pesticides against wire worms, no quality sorting at farms) is limited. Approximately half of potato losses occur because potatoes do not meet quality standards (Willersinn et al., 2015). Around one fourth of quality-driven fresh potato losses are caused by the existing quality standards for food safety and consumer health, and the remaining three fourths are caused by consumer preferences or storage reasons (Willersinn et al., 2015).

Therefore, there is huge potential to reduce the losses of fresh potatoes by selling suboptimal potatoes. Following a mixed-method approach, we pursued three research aims. First, we aimed to investigate the impact of the purchase setting and the provision of food waste information on participants' willingness to buy suboptimal potatoes. Second, using a qualitative approach, we aimed to investigate participants' motivations for or against buying suboptimal potatoes. Third, using a quantitative approach, we aimed to better understand what kinds of consumers (in terms of personal and psychological characteristics) are willing to buy suboptimal potatoes. In sum, the results of this study aim to inform political efforts to promote the consumption of suboptimal produce and thus help reduce food waste.

2. Methods

2.1. Participants

The study presented herein was part of a larger research project (see Ammann et al., 2024 for the complete project). The data collection took place in the German-speaking part of Switzerland in February and March 2024 through an online survey. Participants were recruited by an ISO-certified panel provider (Bilendi AG). Quotas were used for sex (50% female) and age (33% aged 18–35, 33% aged 36–54, and 33% aged 55–75). We aimed for a minimum total sample size of 500 participants. In total, 525 participants completed the survey. We excluded all participants who took less than half the median time of all participants (i.e., 362 s) to complete the survey, assuming that they did not complete it reliably. Thus, the final sample size was 481 participants (51.1% women; Table 1). The mean age of the sample was 47 years (SD = 16 years).

2.2. Online survey

The survey consisted of six distinctive parts (see Fig. 1). In the first part of the survey, participants were informed that the study had been approved by the Agroscope Ethical Commission (application EK-AGS-2024-N-01). They provided their written informed consent.

In the second part of the survey, participants were asked about their sex, age, level of education, and place of residence (see Table 1). For the place of residence, participants were asked to choose from five options that best described their current place of residence, ranging from very urban to very rural. Using an interactive slider scale, participants further placed themselves on a political scale ranging from 0 (very left) to 100 (very right). On average, the participants placed themselves somewhere around the middle (M = 52.0, SD = 19.8).

Part three of the survey consisted of the potato experiment, which is described in more detail in the following section. For this, participants were randomly assigned to one of four experimental conditions in which they chose between the three options of an optimal potato A, a suboptimal potato B, or none. After making their choice, participants were asked to explain in a few words in a text box why they had chosen potato A, B or neither. We only analysed the responses in which participants chose potato A or B and excluded those responses in which participants indicated that they chose neither (n = 12). Supporting this exclusion, qualitative data analysis of participants who explained why they did not choose potato A or B revealed that most of them did not like or consume potatoes. This procedure resulted in a final sample size of 469.

In the fourth part of the survey, we assessed participants' health

Table 1
Sample description (N = 481).

	%
Sex (female)	51.1
Education	
No education, in education	0.2
Compulsory school	4.2
Vocational apprenticeship/vocational college/commercial (secondary) school	46.6
(Vocational) baccalaureate	9.1
Higher technical or vocational education	18.9
University of applied sciences or university of education	10.8
University	10.2
Place of residence	
Very rural	13.7
Rather rural	34.5
Suburban	28.3
Rather urban	15.6
Very urban	7.9

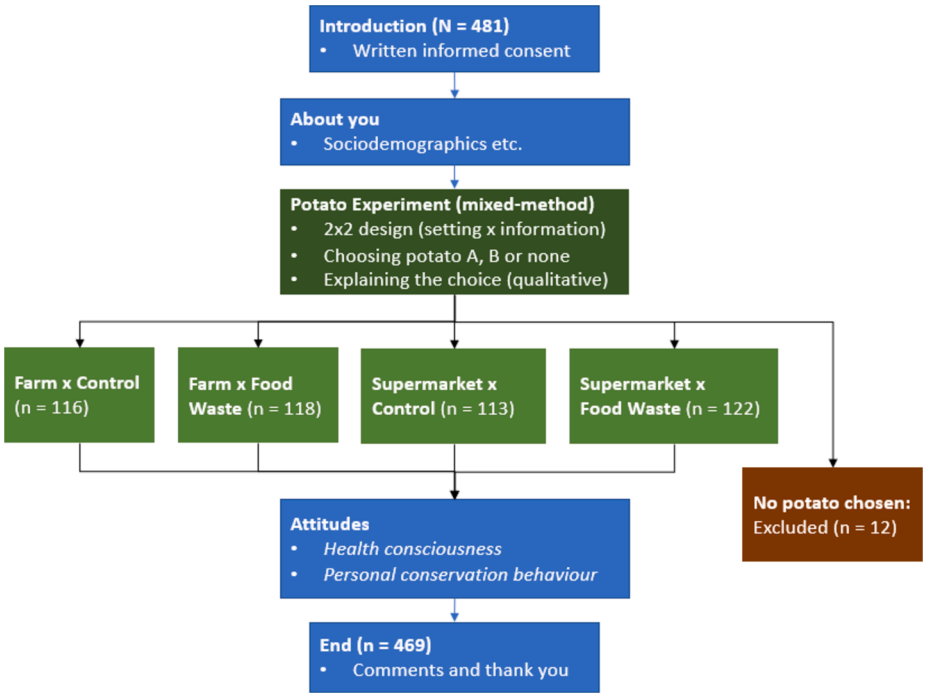

Fig. 1. Questionnaire structure and experimental design.

consciousness with four items according to Dohle et al. (2014). Sample items included "My health is dependent on how and what I eat" and "I am prepared to leave a lot, to eat as healthy as possible". Each item was rated for agreement on a scale from 1 (do not agree at all) to 6 (totally agree). The reliability of the scale was good ($\alpha = 0.80$, $M = 4.58$, $SD = 0.91$).

The participants' environmental attitudes were measured in part five of the survey. For this, we used 10 items from scale 4 (personal conservation behaviour) of the Environmental Attitudes Inventory by Milfont and Duckitt (2010). Sample items included "I could not be bothered to save water or other natural resources", or "I always switch the light off when I don't need it on any more". Each item was rated for agreement on a scale from 1 (do not agree at all) to 7 (totally agree). The reliability of the scale was good ($\alpha = 0.83$, $M = 5.4$, $SD = 1.01$).

Finally, in part six of the survey, participants were given the opportunity to write down comments if they wanted to do so, after which they were thanked for their participation and instructed to close the survey.

2.3. Experimental design

The experimental part (part three of the survey) followed a 2 × 2 design (setting × information). Participants were presented with either a supermarket or farm shop setting with or without additional food waste information. The two settings were chosen because shopping at a farmer's market has been shown to help make suboptimal products more appealing (Pfeiffer et al., 2021). Similarly, the information conditions were chosen because of their reported positive effects (van Giesen & de Hooge, 2019). The specifications of the two types of potatoes were chosen based on an exchange between the first author and the Swiss sector organisation for potatoes.

Depending on the setting, participants read the following instructions: "Imagine you want to buy firm cooking potatoes. You find the following two product variants in a [farm shop]/[supermarket]. Which product would you choose?" Participants were shown a description including a picture of two potatoes, A and B. Potato A corresponds to what is commonly found in supermarkets in Switzerland (see Fig. 2). Potato B has a suboptimal appearance with visible marks of common scab, a plant disease causing higher peeling losses but not affecting the taste or nutritional quality of the potato (see Appendix and Fig. 2 for the original phrasing).

For the food waste information condition, additional information was added for each of the potatoes. For potato A, we explained that these were potatoes currently commercially available in supermarkets. For potato B, we explained that these potatoes did not meet the usual standard specifications due to blemishes. We further mentioned, however, that they were ideal for cooking and that their consumption could help to reduce food waste (see Fig. 2). In the control condition, no additional information describing the potatoes was added, and there was no mention of food waste (see Fig. 2). Therefore, we had four experimental conditions: (1) farm shop/control, (2) farm shop/food waste information, (3) supermarket/control and (4) supermarket/food waste information. All participants, irrespective of the experimental condition to which they had been assigned, chose between the three options of potato A (optimal appearance), potato B (suboptimal appearance), or neither. Both potatoes were offered at the same price to control for price effects.

2.4. Data analysis

The potato choice was analysed using descriptive statistics. Further, to test whether there was a significant relationship between potato choice and the experimental condition, we used a chi-squared test. The qualitative responses (reason for choosing potato A or B) were coded through open coding. Categories were then formed through axial coding and finally, selective coding resulted in different themes (Williams & Moser, 2019). The coding was done by the first author and double-checked by the second author to reduce potential biases. Single mentions were summarised under the category "other". For further investigation of differences between individuals who chose optimal potato A compared to those choosing suboptimal potato B, we used the chi-squared test for dichotomous variables (i.e. sex) and independent samples t-tests to test for rank data (e.g. health consciousness). We analysed all data with the Statistical Package for the Social Sciences (SPSS) version 26 (IBM, New York, USA) for Windows. Following the open science policy, the questionnaire and data can be freely accessed

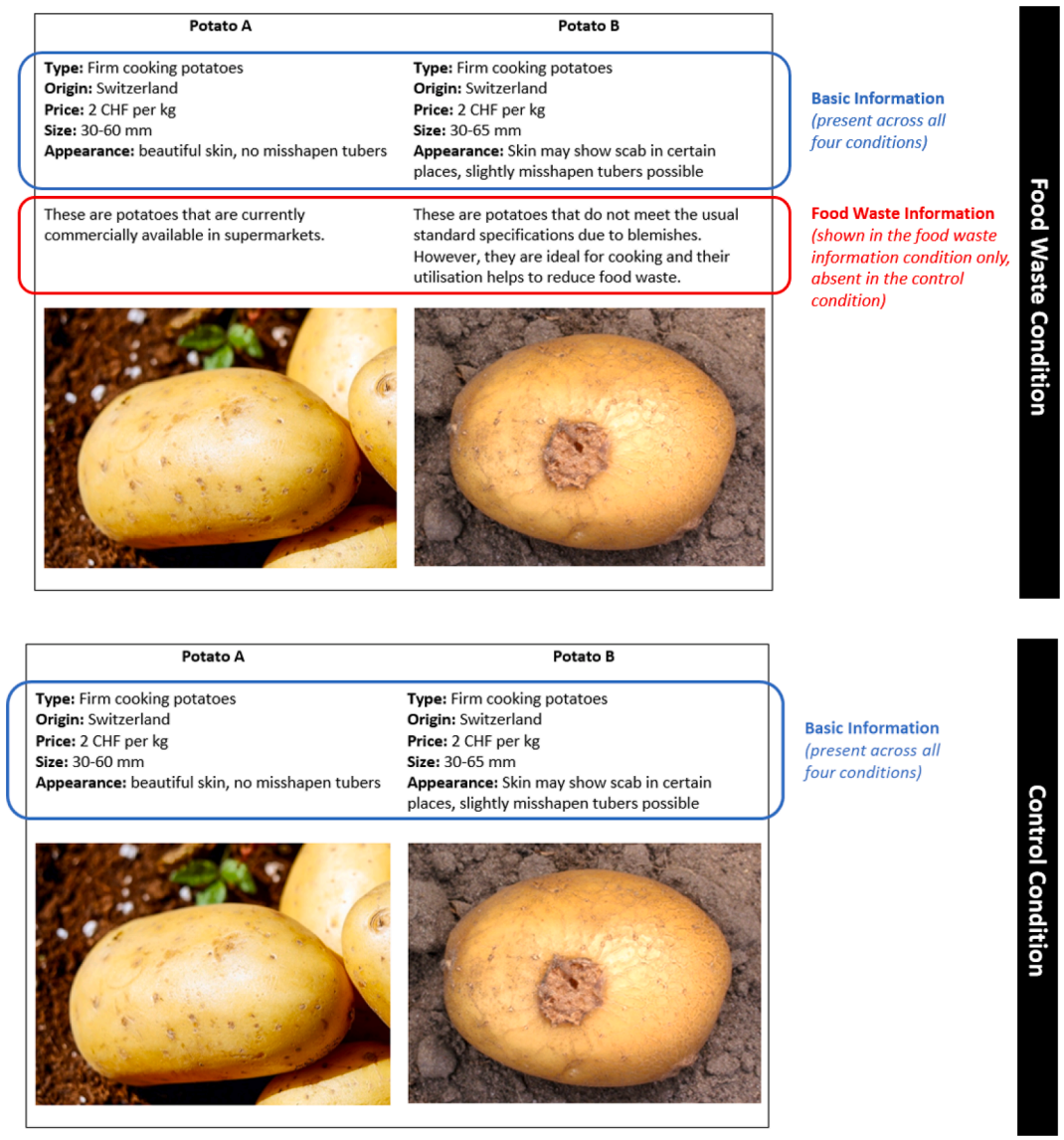

Fig. 2. Experimental design showing the information provided to participants across experimental conditions (Picture source for potato A: pixabay.com Couleur. Potato A. https://pixabay.com/de/photos/kartoffeln-gem%C3%BCse-lebensmittel-1585060/; picture source for potato B: wikipedia.org Potato B. https://upload.wikimedia.org/wikipedia/commons/1/17/Aardappelschurft_%28Streptomyces_scabies_on_potato%29.jpg).

through Zenodo (https://zenodo.org/records/13736436).

3. Results and discussion

3.1. Potato choice

Participants were randomly assigned to one of four experimental conditions, where they chose between optimal potato A and suboptimal potato B. The frequencies and percentages for the potato choices across the four experimental conditions are reported in Table 2. Comparing the farm shop with the supermarket setting (conditions 1 vs. 3 and 2 vs. 4), we found that there is a small tendency towards participants choosing optimal potato A more often in the farm shop setting than in the supermarket setting (75% vs. 71% and 59% vs. 54%). Assuming that participants would associate the products offered in a farm shop with more naturalness and therefore tend towards choosing suboptimal potato B, this finding seems unexpected. Furthermore, our results seem to contradict findings from previous research reporting that participants showed a higher willingness to pay for suboptimal carrots when they were sold in a farmers' market (Qi et al., 2022). Another study reported no significant main effects of store type for produce, whereas for packed bread, there was an effect, with consumers more likely to choose the suboptimal product in the supermarket than in the farmers' market

Table 2
Choice of optimal potato A or suboptimal potato B across the four experimental conditions (n = 469).

Conditions	Potato A (optimal)		Potato B (suboptimal)		Total
	n	%	n	%	n
Farm shop/control group	87	75	29	25	116
Farm shop/food waste group	70	59	48	41	118
Supermarket/control group	80	71	33	29	113
Supermarket/food waste group	66	54	56	46	122
Total	303	65	166	35	469

Note. Participants who did not choose a potato were excluded. Control group: participants received no additional information regarding food waste; food waste group: participants received additional information regarding food waste for the suboptimal potato.

condition (Aschemann-Witzel et al., 2019).

Comparing the information conditions (conditions 1 vs. 2 and 3 vs. 4), we found that adding food waste information clearly increased the probability of participants choosing less attractive potato B (25% vs. 41% and 29% vs. 46%). This is in line with previous studies reporting that messages linking the purchase of suboptimal food to reductions in food waste successfully increased participants' willingness to pay for suboptimal carrots (Qi et al., 2022). Given that consumer preferences are important along the food value chain (e.g. driving processors' decisions), this is an important finding (Boesch & Weber, 2012).

Next, to assess whether these differences were statistically significant, we conducted a chi-squared test. We found that the groups differed significantly ($X^2(3, n = 469) = 14.71$, $p < 0.01$), indicating that the experimental conditions, that is, the purchase setting and the information provided, had a significant effect on the potato choice.

3.2. Reasons for the choice

Using the qualitative responses to why participants had chosen optimal potato A or suboptimal potato B, we explored participants' motivations. Overall, qualitative responses were of high quality, with only nine individuals in total refusing to motivate their choice or indicating that they did not know. These answers were summarised together with single mentions in the category.

We found that in the control group (blue bars in Fig. 3), most participants named the visual attractiveness of potato A as a reason to choose it over less attractive potato B (see Fig. 3). Across all conditions, the price, which did not differ between potato A and B, was also a strong reason for choosing potato A. Some participants indicated that potato B should be cheaper than potato A or, similarly, when both were sold at the same price, they would choose the more attractive one. In a similar vein, other participants explained that they would cut out the bad spots from potato B, which would result in a better price-performance ratio for optimal potato A or less food waste. Previous research showed that consumers associate suboptimal products with financial losses and that they refrain from buying suboptimal products when they later might be wasted at home (Aschemann-Witzel, Jensen, et al., 2017; Cao & Miao, 2021). In the context of the current literature, this is not surprising, as most supermarkets offer suboptimal products at a reduced price (Aschemann-Witzel, de Hooge, et al., 2017). However, as these price signals can influence consumers' perceptions of the product (Aschemann-Witzel et al., 2020), we expressly refrained from using price incentives.

Further, some participants mentioned that they chose optimal potato A out of "convenience/habit" because this potato would be easier to prepare or was bought out of habit. Similar argumentation applies for the "recipe/peeling" reason, for which participants explained that for some certain recipes (e.g. Raclette), potato A would be more suitable than the less attractive potato B or that they would have to peel potato B. Additionally, freshness (e.g. this potato looks more fresh) was another reason that was specifically provided for the choice of potato A. As shown by previous studies (Pfeiffer et al., 2021), this clearly demonstrates that consumers derive further product characteristics from the appearance of the product. Given that consumers' barriers to choosing suboptimal products include taste and health attributes (Yang et al., 2023), it is interesting that health was mentioned more often than taste in our sample.

The reasons for choosing suboptimal potato B were distinctly different. In the food waste group (red bars in Fig. 4), participants most often indicated that potato B was still suitable for consumption ("usable") or that they specifically chose it to reduce food waste ("(food) waste"). Interestingly, for the control group, the food waste reason was only mentioned in the farm setting but not in the supermarket setting. Further, participants in all conditions mentioned taste as a reason for choosing suboptimal potato B, which corroborates well with Symmank et al. (2018) recommending that convincing consumers that suboptimal

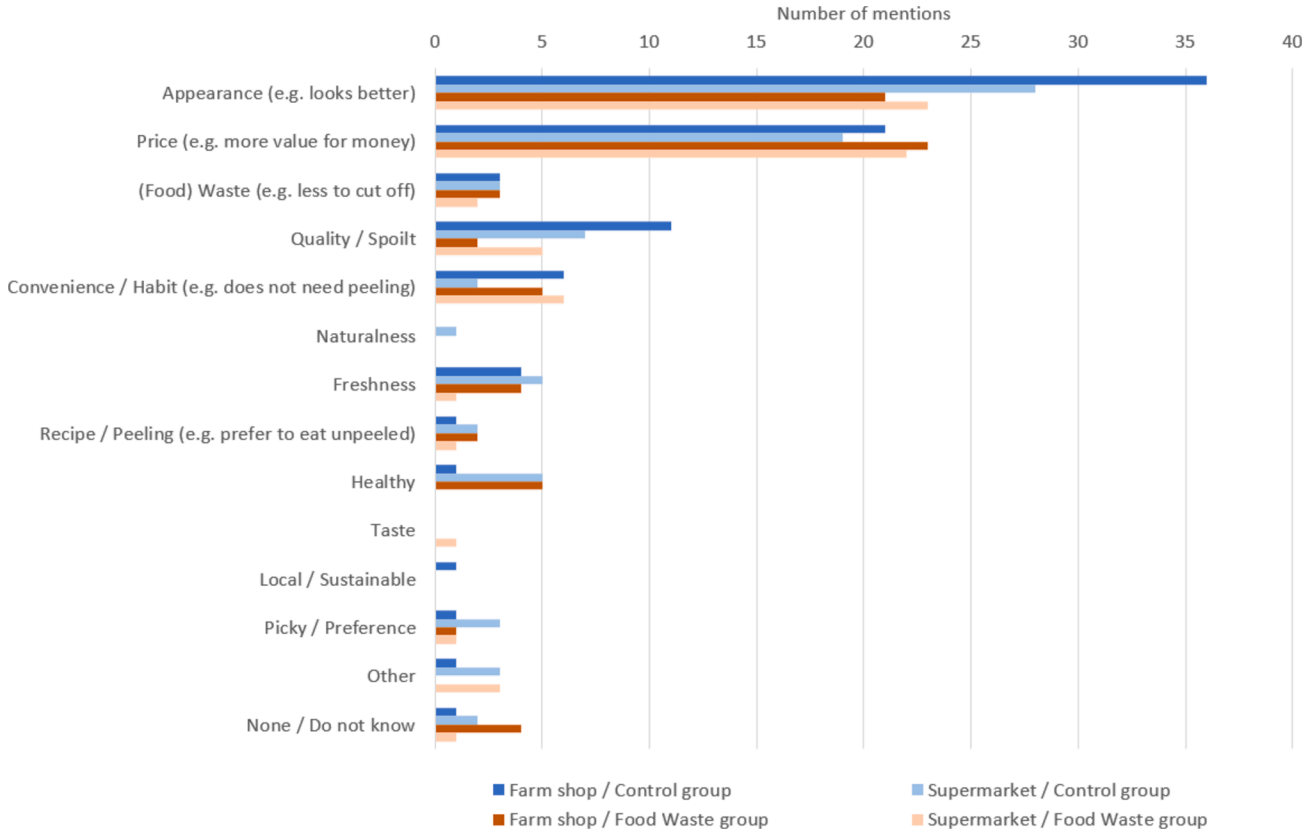

Fig. 3. Reasons for choosing optimal potato A for the four conditions (n = 303 individuals who chose potato A).

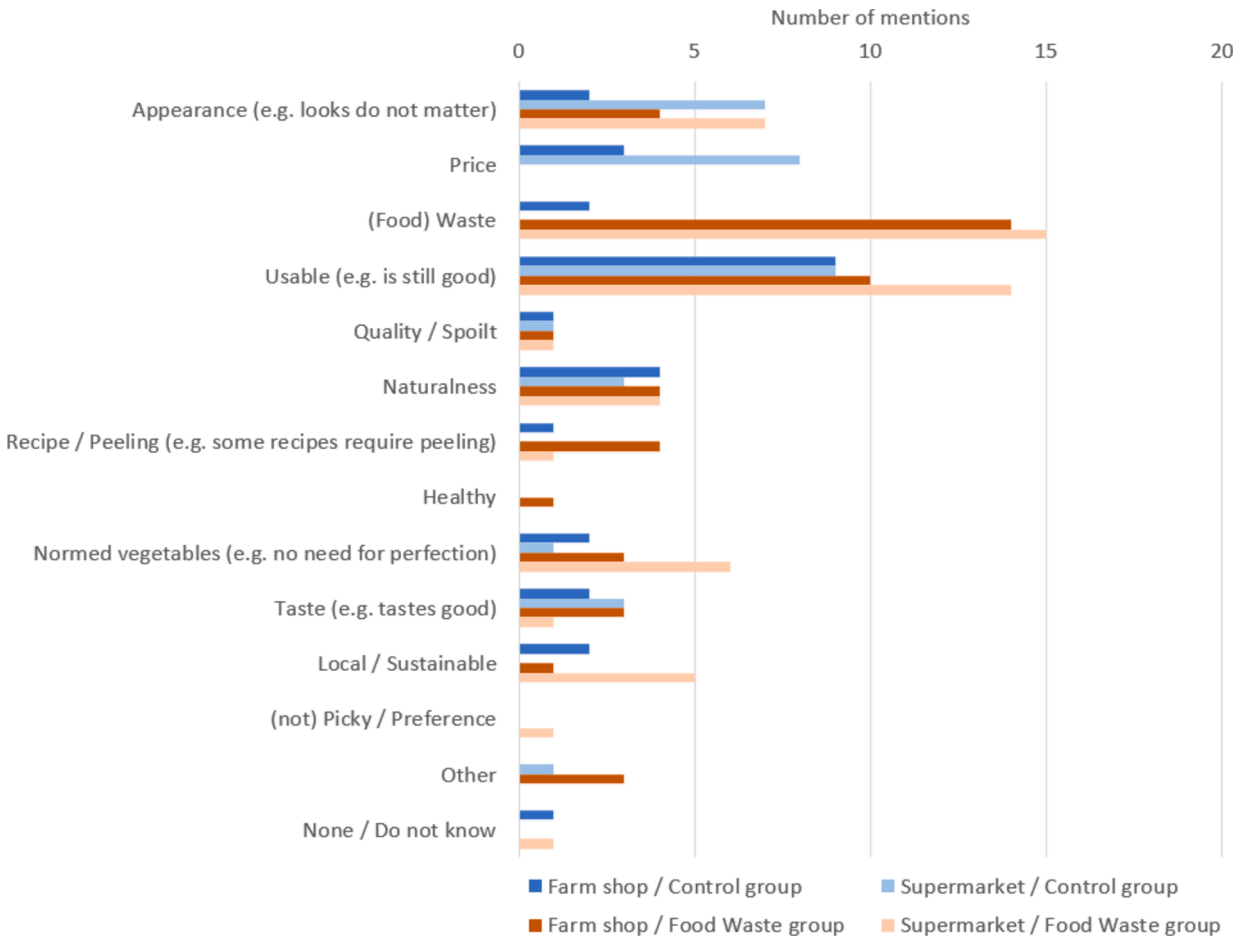

Fig. 4. Reasons for the choice of suboptimal potato B for the four conditions (n = 166 individuals who chose potato B).

food tastes good is a promising avenue for communication strategies.

Price was mentioned only in the control group (blue bars in Fig. 4), where no additional information on food waste was provided. However, a closer examination of the data and the reasons behind the "price" code revealed that some participants said that "*this kind of potato is often cheaper*". This indicates that not all of them read the description carefully enough and automatically assumed that the less attractive-looking potato would be sold for a lower price.

Specific to the food waste group (blue bars in Fig. 4), participants mentioned local production or sustainability as drivers of their choice of suboptimal potato B. This reason did not appear in the control group. Together with the mention of "food waste", the results accord well with the current literature reporting that sustainability framings support consumers' choice of suboptimal products (van Giesen & de Hooge, 2019). Indeed, the qualitative responses indicate that for some of the participants, environmental sustainability was a driver for their choice of potato B. Another unique reason to choose potato B was that the quality norms applied to vegetables (regarding size, shape, and appearance), which result in sorting out these kinds of potatoes, were questionable or not supported by participants (coded as "normed vegetables").

3.3. Group differences in potato choice

For all groups, except for the farm shop/food waste group, we found significant sex differences, with more females choosing potato B than males ($X^2_{\text{condition 1}}(1, n = 116) = 4.60, p < 0.05$; $X^2_{\text{condition 3}}(1, n = 113) = 6.34, p < 0.05$) and $X^2_{\text{condition 4}}(1, n = 122) = 4.75, p < 0.05$). This accords well with females being more sustainably minded and being more likely to reduce food waste than males (Aschemann-Witzel, 2018; Secondi et al., 2015).

For the farm/control groups, we found that individuals living in a more rural environment tended to choose less attractive potato B (Table 3). Age differences emerged for the farm/food waste condition, where individuals who chose the less attractive potato B were significantly older than those who chose optimal potato A. Previous studies indicated that older individuals wasting less could be due to better food management skills (Karunasena et al., 2021).

In the two supermarket conditions, health consciousness was a significant predictor for potato choice, with individuals with higher health consciousness tending towards choosing the less attractive potato B. This might align with the qualitative responses of naturalness, taste, and healthiness as reasons for choosing suboptimal potato B.

For all conditions except the farm shop/control group, we found that conservation behaviour was a significant driver for choosing the less attractive potato B. This fits well with the qualitative data, where participants named sustainability or the reduction of food waste as reasons for their choice of suboptimal potato B. Similarly, previous research has indicated that consumers with higher environmental commitment show a higher preference for suboptimal produce (de Hooge et al., 2017). As mentioned in the qualitative answers, the use of non-optimal potatoes may require more time for preparation. We assume that environmentally conscious individuals are more willing to take on this extra work.

3.4. Implications

In summary, our results show that even in the absence of price incentives, there is a significant interest in suboptimal potatoes. This can

Table 3
Independent samples t-tests testing for group differences between individuals who chose optimal potato A and individuals who chose suboptimal potato B.

	Farm shop/control group df = 114			Farm shop/food waste group df = 116			Supermarket/control group df = 111			Supermarket/food waste group df = 120		
	A	B	t	A	B	t (df)	A	B	t (df)	A	B	t (df)
Age	46.1	46.8	−0.2	46.1	54.8	−3.1**	46.5	46.5	<-0.1	44.5	46.5	−0.7
Place of residence	2.9	2.4	2.1*	2.6	2.5	0.7	2.9	2.8	0.5	2.7	2.5	0.8
Political orientation	50.9	57.5	−1.5	53.9	48.6	1.5	49.0	53.6	−1.1	56.4	50.9	1.5
Health consciousness	4.6	4.6	−0.4	4.5	4.7	−1.1	4.4	4.8	−2.0*	4.4	4.8	−2.4*
Conservation behaviour	5.4	5.4	<0.1	5.1	5.8	−3.7***	5.3	5.8	−2.5*	5.1	5.6	−2.6*

Note. Place of residence: on a scale from 1 to 5 with 1 = very rural, 5 = very urban; health consciousness following (Dohle et al., 2014) and conservation behaviour following (Milfont & Duckitt, 2010); * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

be leveraged by retailers, especially as the prevailing approach most often includes price reductions for suboptimal produce. As suggested elsewhere (Louis & Lombart, 2018), retailers should gradually introduce suboptimal foods and familiarise consumers with these products. Indeed, some retailers have introduced a wonky fruit and vegetable range (Gonçalves, 2021; Graham, 2018; Hollenstein, 2023). This introduction should be and often is accompanied by information campaigns informing consumers on the edibility of these products, as previous research showed that their edibility assessment influenced their willingness to consume (Neubig & Roosen, 2024). Increasing the consumption of suboptimal foods contributes to a more environmentally-friendly consumption (Funk et al., 2021). Overall, the availability and attractiveness of suboptimal produce should be enhanced and could help reduce discount expectations (Hartmann et al., 2021; Szymkowiak et al., 2024).

In practice, our results could be used to encourage farmers and retailers to use food waste information when offering suboptimal products to consumers, thus increasing product acceptance. At the end of the day, all involved stakeholders including policy makers should make sure that selling these products is more economically attractive than discarding them or using it as feed or for the production of biogas. Farmers could offer suboptimal produce in their farm shops, if available. Retailers could create a demand for suboptimal produce and promote it in the store with informative packaging or in-store information. Based on our results, a combination of information on product quality and the positive effect in terms of food waste reduction might help motivate consumers to choose these products.

3.5. Limitations and outlook

As in all research, there are limitations to this study that need to be acknowledged. First of all, our sample was recruited in the German-speaking parts of Switzerland. Transferability of the results to the other Swiss language regions or to other European countries remains to be investigated. Further, in our online experiment, the participants were faced with a simplified scenario in which they were forced to choose between two purchase options or no purchase. Additional research is required to investigate whether consumers are more accepting of suboptimal products in certain shopping environments. Further, our work is subject to desirability bias. Future work is required to control for this bias and to understand whether our findings can be transferred to real purchase situations that lead to actual purchase decisions. Given that this study was part of a larger project, we were not able to specifically recruit for potato consumers. We tried to control for this by allowing participants to opt out of the potato choice. Still, our sample might be biased in the sense that some participants might rarely buy or consume potatoes, which should be kept in mind when interpreting the data. It should also be noted that although care was taken to ensure that the potato images were as similar and comparable as possible, there were slight differences in the background of the images, with one being slightly darker brown than the other. Finally, our study specifically focused on potatoes. Future studies should extend to other foods.

4. Conclusion

Our study shows that there is a clear consumer interest in buying suboptimal potatoes, even if there are no price incentives. With specific food waste messages, we were able to significantly increase participants' willingness to choose suboptimal potatoes. More research is needed to translate these findings into real consumption situations and other products. Nevertheless, our results can serve as a basis for political efforts to promote the consumption of suboptimal produce and thus help reduce food waste.

Ethical statement

Participants were informed that the study had been approved by the Agroscope ethical commission (application EK-AGS-2024-N-01). They provided their written informed consent.

CRediT authorship contribution statement

Jeanine Ammann: Writing – original draft, Visualization, Methodology, Investigation, Data curation, Conceptualization. **Carole Liechti:** Writing – review & editing, Data curation. **Gabriele Mack:** Writing – review & editing, Resources, Conceptualization. **Rita Saleh:** Writing – review & editing, Methodology, Investigation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data is available on Zenodo: https://zenodo.org/records/13736436.

Acknowledgements

The authors thank Christian Bucher from swisspatat (sector organisation for Swiss potatoes) for his valuable insights regarding specifications of optimal and suboptimal potatoes. This research did not receive any specific grant from funding agencies in the public, commercial, or non-profit sectors.

Appendix

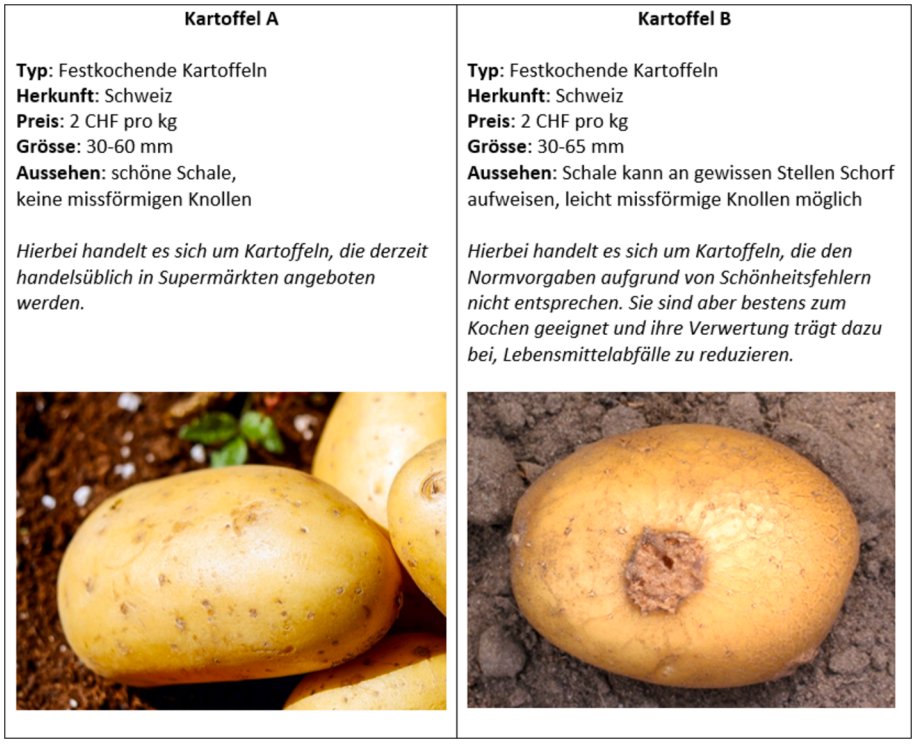

Fig. 5. Original phrasing of the potato experiment in German, showing the food waste information-framing

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