

Consumers would rather buy a product with a levy for enhancing animal welfare than for environmental sustainability

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ABSTRACT

Taxes have been identified as efficient measures to facilitate sustainable behaviour change but tend to be unpopular. Sustainability levies, which are a special type of tax, are less investigated and could come with fewer prejudices. To test consumers' preferences for different sustainability levy options, we conducted an online survey in Switzerland with 481 participants (51 % female). They were presented with six products (i.e. fresh/processed vegetables, dairy, and meat) and for each product, they had four levy options to choose from. For vegetables, they were: (A) reduction of risks related to plant protection products, (B) more support for local farmers, (C) support for environmental sustainability, and (D) sustainability projects in general. For the animal products, option A was an increase in animal welfare. For all three comparisons (fresh vs. processed of vegetables, meat and dairy), the number of participants who chose the general sustainability information increased for processed products compared to fresh products. Further, we found that for the animal products, the majority of participants preferred the levy that increased animal welfare. For vegetables, participants preferred a levy that reduced risks related to plant protection products and supported local farmers. We found that when the sustainability levy was not defined, it tended to be understood as environmental sustainability. Using multinomial logistic regression, we identified the perception of farmers as a significant predictor of a levy choice to support local farmers. We conclude that animal products should ensure and transparently communicate animal welfare to drive sustainable behaviour change. Similarly, improving the public perceptions of farmers and encouraging interaction between farmers and consumers can help build public support for local farmers and promote the purchase of sustainable products.

1. Introduction

Our agri-food system accounts for around 31 % of the Earth's total anthropogenic greenhouse gas emissions (Tubiello et al., 2022). Further, there is a tendency for animal products to have higher environmental impacts than plant products (Poore and Nemecek, 2018). Thus, urgent action is needed to make our food system more sustainable. One means to change consumption behaviour is through political measures (Ammann et al., 2023a).

Policy measures are governmental interventions that can be used to address market failures, that is, situations where the allocation of goods in a free market is not efficient (Dollery and Wallis, 1997; NSW Department of Industry, 2017). Four major categories of policy measures for sustainable consumption include market-based (e.g. price

incentives), regulatory (e.g. laws or bans), information-based (e.g. campaigns), and nudges or behavioural measures (e.g. availability) (Ammann et al., 2023a; Reisch et al., 2017). In this paper, we focus on market-based measures.

A prominent example of market-based measures is taxes. They work as financial disincentives to buy taxed products, by making them more expensive than non-taxed products. Thus, they are effective and market-friendly measures for influencing dietary behaviour through incentivising sustainable behaviour (Mozaffarian et al., 2012). However, care must be taken regarding distributional effects, as carbon taxes tend to be regressive, which means that lower-income households pay higher shares of their income than households with higher incomes (Feng et al., 2010). A major challenge of taxes is that they need to be accepted by the public (Tan et al., 2022). The acceptance of taxes depends on what the

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tax revenue is used for (Perino and Schwickert, 2023).

Sustainability levies are a special type of tax where the (tax) revenue is used to support sustainability projects or to redistribute the money collected to specific actors in the supply chain. Sustainability levies can lead to increased consumer acceptance if the use of the tax revenue is in line with consumer preferences. For example, taxes whose revenues are used for increasing animal welfare are better accepted than those used for mitigating climate change (Perino and Schwickert, 2023). Using a sustainable levy on food, consumers pay a higher price for certain products, and part of the revenue is then reinvested in sustainability projects. Currently, there are various efforts to offer consumers the possibility of paying for more sustainable causes. For instance, in Switzerland, consumers can buy the so-called “Faireswiss milk”, which is sold at a higher price to ensure that producers receive a milk price that is cost-covering (Kiener, 2024). More and more restaurants and supermarkets offer their customers the possibility to make voluntary donations (e.g. the Ronald McDonald children's foundation in Switzerland, Weinmann and Ehrbar, 2024). Similarly, in some supermarkets, customers can compensate for their carbon footprints or donate money for climate funds (Weinmann and Ehrbar, 2024). Nevertheless, there are currently few scientific studies on consumer acceptance or preference for different levy options.

The question arises as to which factors contribute to consumers' acceptance of a sustainability levy. For instance, previous research found that consumers are concerned about the negative impacts of our current food production systems, animal welfare or preferences for healthier diets (Glick-Bauer and Yeh, 2014; Hallström et al., 2015; Plohl et al., 2020). In terms of sociodemographic factors, females tend to be more likely to buy sustainable products and to have a higher willingness to pay than males (Johnston et al., 2001; Moscovici et al., 2020; Pagiasslis and Krontalis, 2014).

Regarding personal attitudes, there is a strong connection between health and sustainability (Piracci et al., 2023). Consumers who are involved in sustainable eating tend to be involved in healthy eating as well (Van Loo et al., 2017). Similarly, sustainable products are often perceived as more healthy (Sánchez-Bravo et al., 2021). However, there is an important conceptual difference between the two attitudes. Health considerations aim to benefit oneself, whereas sustainability considerations tend to benefit society as a whole. Interestingly, a recent study that segmented consumers based on their food values and individual self-identities demonstrated that self-centred values are a stronger driver of sustainable choices than society-centred values (Piracci et al., 2023).

The present study, on the one hand, builds on the urgent need for the sustainable transformation of our food consumption patterns and, on the other hand, on the finding that taxes hold the promise of effectively and efficiently shifting consumer behaviour towards greater sustainability. Given that taxes tend to be unpopular, the article focuses on levies, which redistribute parts of the revenue and have received little scientific attention so far. Consequently, the purpose of this study was to explore consumers' acceptance of different sustainability levy options, covering various aspects of sustainability (e.g. environmental and social). We specifically focus on consumers, as consumer acceptance can be a major driver or barrier for the success of policy measures. Further, we analysed three different product categories to assess whether plant and animal products were perceived differently. Finally, we explored the role of different sociodemographic and psychological predictors in consumers' preferences for a specific levy option. Therefore, this study aims to investigate consumer preferences for different framings of a sustainability levy in relation to different product categories. We also hypothesise that different personal attitudes are predictors of consumer preferences for specific levy options.

2. Literature review

Different aspects are important when consumers make their purchase decisions. Here, we review different aspects, which we then

included as levy options in our experimental design. For instance, animal welfare plays a major role in animal products. Data from Eurobarometer surveys suggest that animal welfare is among the most important agricultural policy goals and that public concern has increased in Europe and particularly in Switzerland (European Commission, 2016; Hårstad, 2023; Umbricht and Schaub, 2022). Further, consumers have positive attitudes towards more animal-friendly products and are willing to pay a premium for them (Bozzo et al., 2019; Janssen et al., 2016; Lagerkvist and Hess, 2011). Therefore, we included animal welfare as a levy option for the animal products to investigate consumer preferences.

For plant products, a specific sustainability aspect concerns the use of chemical products, particularly those for plant protection (Mack et al., 2023), which is reflected in recent popular initiatives on the topic (Huber et al., 2023). Further, how weeds are controlled (e.g. mechanical, chemical) affects individuals' food evaluations in terms of sustainability (Saleh et al., 2024). Generally, food changes generated by chemical processes can reduce consumers' perceived naturalness and, consequently, their acceptance of the food product more than those originating from physical transformations (Siegrist and Hartmann, 2020; Spykman et al., 2021). As a result, reduced use of pesticides was included in our study as a levy option for plant products.

Another aspect that consumers care about is the environmental footprint of food. For the assessment of the environmental sustainability of food, several principles have been established, such as environmental effects, biodiversity, food packaging, and waste (FAO, 2018; James-Martin et al., 2022). Many consumers care about environmental sustainability, indicate their interest in sustainability labels, and are willing to pay more for sustainably produced food (Ammann et al., 2024a; Li and Kallas, 2021). However, they lack knowledge of the environmental impact of food and often associate sustainable production with organic farming (Sánchez-Bravo et al., 2021; Siegrist et al., 2015).

A final aspect here is social sustainability, a multidimensional concept that is difficult to define theoretically and has received little scientific attention so far but is gaining importance in the agri-food sector (Desiderio et al., 2022; Jackson and Holm, 2024; Orou Sannou et al., 2023). Social sustainability includes aspects such as human well-being and equity, fair distribution of income, good working conditions, decent wages, equality of rights, access to basic needs, justice, social inclusion, and participation (McGuinn et al., 2020). Importantly, consumers are sensitive to social sustainability aspects and are willing to pay price premia for food produced under fair work conditions (Rossi et al., 2024; Toussaint et al., 2021) or food labelled Fair Trade (De Pelsmacker et al., 2005).

3. Methods

3.1. Participants

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 on sex (50 % female) and age (33 % aged 18–35, 33 % aged 36–54, and 33 % aged 55–75). In total, 525 participants completed the survey. Participants who took less than half the median time of all participants (i.e., 362 s) to complete the survey were excluded, assuming that they did not complete it reliably. Thus, the final sample size was 481 participants (51.1 % female; Table 1). The mean age of the sample was 47 years (SD = 16 years). In terms of representativeness, it is important to note that our sample has a slightly different education level than the average Swiss population (Bundesamt für Statistik (BFS), 2023). Furthermore, in our sample, the percentage of individuals living in rural areas is higher than on the Swiss average (Eidgenössisches Departement für auswärtige Angelegenheiten (EDA), 2021).

Table 1
Sample description (N = 481).

| | % | Swiss average 2023 ^a |
|--|------|---------------------------------|
| Sex (female) | 51.1 | |
| Education | | |
| No education, in education | 0.2 | |
| Compulsory school | 4.2 | 13.7 |
| Vocational apprenticeship/vocational college/commercial (secondary) school | 46.6 | 33.4 |
| (Vocational) baccalaureate | 9.1 | 6.8 |
| Higher technical or vocational education | 18.9 | 15.3 |
| University of applied sciences or university of education | 10.8 | 30.8 |
| 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 | |

^a Bundesamt für Statistik (Schweiz). (8. Juli, 2024). Bildungsstand der Wohnbevölkerung in der Schweiz von 2012 bis 2023 [Graph]. In Statista. Accessed on 15. October 2024, <https://de.statista.com/statistik/daten/studie/782103/umfrage/bildungsstand-der-bevoelkerung-in-der-schweiz/>.

3.2. Online survey

The survey consisted of six distinctive parts (see Fig. 1 for an overview and supplementary information for the complete survey). In the first part of the survey, participants were informed that the study had been approved by the [blinded for review] ethical commission (application EK-AGS-2024-N-01) and 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). 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).

In part three of the survey, participants indicated how often they consumed meat and dairy products. We used the six categories as tested in previous studies (Michel et al., 2021), but split the category “seldom and never”, allowing for distinguishing between consumers and non-consumers. As a result, participants responded on a scale from 1 (never) to 7 (multiple times per day). Overall, 20 individuals declared that they did not consume meat, while 4 individuals indicated they did not consume dairy. As the study included meat and dairy products, it was important to control for participants' consumption of these products (Fig. 2).

In the fourth part, the participants assessed different framings of a hypothetical sustainability levy. We instructed participants that the supermarket where they most frequently did their grocery shopping used part of the selling price of a specific product for sustainability projects. This wording is used to differentiate between this levy (the amount of money collected is used, for example, to support certain projects or to redistribute the money to farmers or other supply chain actors) and a tax (the amount of money is not paid back to certain projects or actors, but used by the government for unspecified purposes). At the same time, we did not specify prices or price increases because we wanted to focus on the design of the levy and to control for the effect of budgetary constraints and income differences. The participants were then presented with six different product categories one at the time in random order, and each product was combined with four options of a sustainability levy (Fig. 2). We asked them to imagine that their preferred supermarket chose to use part of the sales price of a certain product for sustainability projects. We then instructed them: “Below you will see one product category and four possible product versions, all of

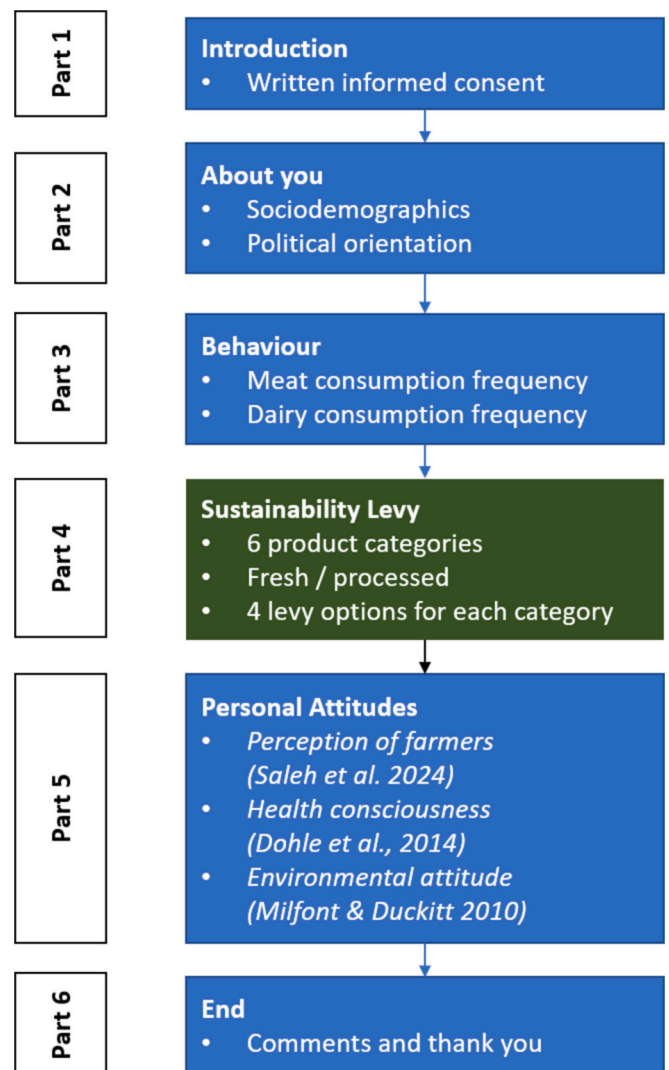


Fig. 1. Survey design.

which cost the same. Please select the product that you would be most likely to buy.” This means that for each of the six products, the participants were asked to choose one of the four levy options (see Fig. 2). We specifically chose this design, where consumers are presented with different options and are able to compare them, to find out which type of levy is most appealing to them.

In part five, we measured participants' personal attitudes, which included health consciousness, environmental attitudes, and the perception of farmers (Fig. 2). We assessed participants' health consciousness with four items according to Dohle et al. (2014). Sample items included “I think it is important to eat healthily” 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; see supplementary information for a table with all items and scales). Next, we measured the participants' environmental attitudes. 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 “Whenever possible, I try to save natural resources” and “I always switch the light off when I don't need it on anymore”. 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, for the perception of farmers, we used the five items that have been tested in previous studies (Ammann et al., 2023b; Saleh

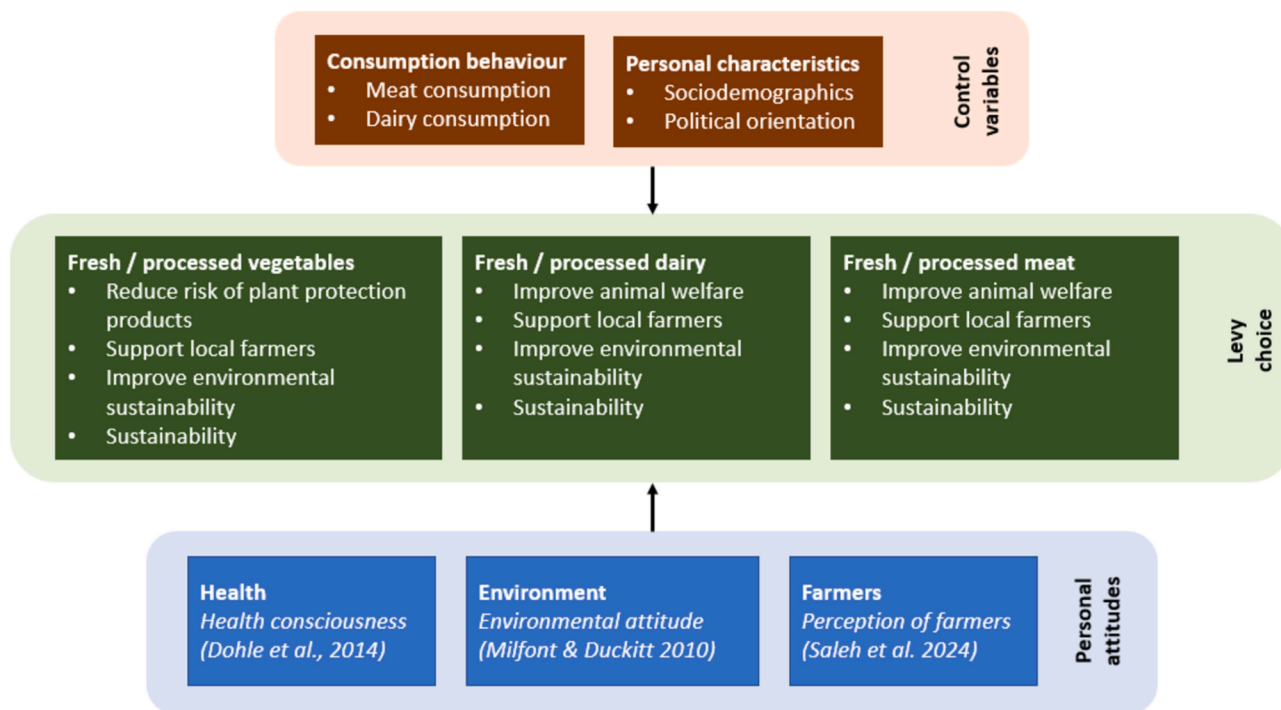


Fig. 2. Conceptual framework used for the study.

et al., 2024). Sample items included “I have a generally positive attitude towards farmers” or “farmers have a great environmental awareness”. All items were rated for agreement on a scale from 1 (do not agree at all) to 7 (totally agree). The reliability of the scale was good ($\alpha = 0.84$, $M = 5.41$, $SD = 1.00$).

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. Overall, with the conceptual framework shown in Fig. 2, we wanted to test consumers' preferences for different framings of a sustainability levy in relation to different product categories. Based on the current literature, we decided to control for meat and dairy consumption, age, gender and education level as well as political orientation. Further, we included personal attitudes (i.e. health consciousness, environmental attitude and perception of farmers) as possible predictors.

3.3. Experimental design for the sustainability levy

The experimental design for the levy options is shown in Fig. 2 (see supplementary information for the exact phrasing). The product categories chosen for the experimental part included fresh and processed vegetables, dairy, and meat. The differentiation between fresh and processed was included to test whether the degree of processing influenced consumers' sustainability perceptions. Due to consumers' perceived importance of naturalness in food (Michel and Siegrist, 2019), we assumed that processed products were perceived differently from fresh products.

Dairy and meat were included due to the high environmental impact of these animal products (FAO, 2006; Mondière et al., 2024; Scarborough et al., 2023). We further included vegetables to cover a plant-based food category, as different sustainability concerns apply to plants than to animal products. These include, for instance, the use of plant protection products or biodiversity loss (Mazzocchi et al., 2019; Saleh et al., 2024), whereas animal products might raise concerns in terms of greenhouse gas emissions or animal welfare (Reimert et al., 2023; Zhou et al., 2022).

For the levy options, we aimed to cover different areas of

sustainability. For instance, levy option A captured the reduction of risks of plant protection products for vegetables, as this is one of the major public concerns for this product category (Mack et al., 2023; Saleh et al., 2024). For the animal-based product, we chose animal welfare instead, as previous studies have identified the importance of animal welfare for consumers (El Benni et al., 2024; Zander et al., 2013).

Levy option B included the support of local farmers as a measure of social sustainability for all food categories. We included this aspect based on previous research on social sustainability, identifying public appreciation and public relations as important aspects of social sustainability perceived by farmers (Saleh and Ehlers, 2023).

For levy option C, a reduction in the ecological footprint was included as a measure of environmental sustainability. In Switzerland, there are efforts to offer consumers to pay more for a product to support investments in climate change mitigation (Weinmann and Ehrbar, 2024).

Finally, levy option D included sustainability as an umbrella term without a specific description. This was included to see whether the participants were interested in knowing the details and whether sustainability has a halo effect that leads to positive perceptions, regardless of the specific domain targeted.

As previous studies have shown that taxes are not the best accepted policy measures (Ammann et al., 2023a; Haggmann et al., 2018), we adapted the phrasing to avoid associations with taxes as much as possible. Thus, we framed the measure as a levy option, informing participants that part of the products' prices was used to invest in sustainability projects. The sustainability projects were specified through the levy option. Knowing that prices are a major driver of consumers' decision making, we controlled for price differences by informing participants that all four levy options were equally expensive.

Finally, for meat and dairy products, we excluded non-consumers by filtering out those individuals who indicated earlier in part three of the survey that they did not consume these products. This resulted in a reduced sample size of 461 for the meat categories and 477 for the dairy categories. No other filters were used.

3.4. Data analysis

We used descriptive statistics to analyse the overall distribution of levy choices for the different food products. Next, we used Pearson chi-squared tests to investigate whether there was a significant relationship between the two categorical variables. Finally, using multinomial logistic regression analysis, we investigated the predictors for the levy choices by comparing specific sustainability descriptions (levy options A–C) with general sustainability (levy option D). Data analyses were run using the Statistical Package for the Social Sciences (SPSS) version 26 (IBM, New York, USA) for Windows. The questionnaire can be found in the supplementary materials and the data has been made available (Ammann et al., 2024b).

4. Results

4.1. Levy choices

We found that for the animal products (i.e. meat and dairy), the participants most often chose the animal welfare option, followed by the social and then environmental sustainability option (Fig. 3). Social sustainability seemed to play a more important role for vegetables than for animal products. The consumers' willingness to distribute part of the product price to support local farmers (around 22 %)—that is, social sustainability—were particularly less for meat products than for vegetable (around 32 %) and dairy (around 29 %) product prices.

Using Pearson's chi-squared test of independence, we compared the fresh and processed categories for the vegetables, meat, and dairy and found that all three comparisons were statistically significant, indicating that participants' levy choices differed depending on whether the product was processed or unprocessed. For all three comparisons, more participants chose the general sustainability information (levy option D) for the processed product. Similarly, the choice of environmental sustainability (levy option C) also increased for the processed product.

4.2. Group differences

Using Pearson's chi-squared test of independence, we investigated whether individuals who consumed a lot of meat or dairy products differed in their levy choices compared to consumers who indicated

consuming these products less frequently. We found no significant association between levy choice and consumption frequency for processed or fresh meat or dairy products.

We used Pearson's chi-squared test of independence to determine whether there was a relationship between sex and levy choice in our sample. We found no significant association between levy choice and sex for the vegetables (Table 2). However, for the animal products, we found that females chose the animal welfare option (levy choice A) more often than males. Further, it is interesting to note that males more often chose the generic sustainability option (levy choice D) than females. This difference was especially pronounced for animal products. This could be an indication that males tend to care less about knowing exactly how sustainability is being tackled than females do.

4.3. Predictors of consumers' levy choices

Finally, we used multinomial regression analyses to investigate the importance of different predictors of participants' levy choices across the

Table 2
Sex differences using Pearson chi-squared tests for the choice of sustainability levy for all six food categories.

| Product | Sex | Levy choices | | | | Total | X ² |
|----------------------|--------|--------------|----|----|----|-------|----------------|
| | | A | B | C | D | | |
| Fresh vegetables | Female | 80 | 79 | 42 | 45 | 246 | 0.56 (ns) |
| | Male | 75 | 74 | 37 | 49 | 235 | |
| Processed vegetables | Female | 68 | 75 | 55 | 48 | 246 | 1.19 (ns) |
| | Male | 59 | 80 | 47 | 49 | 235 | |
| Fresh meat | Female | 133 | 48 | 41 | 11 | 233 | 20.03*** |
| | Male | 101 | 54 | 35 | 38 | 228 | |
| Processed meat | Female | 127 | 38 | 44 | 24 | 233 | 18.06*** |
| | Male | 88 | 59 | 37 | 44 | 228 | |
| Fresh dairy | Female | 117 | 62 | 37 | 28 | 244 | 10.08* |
| | Male | 82 | 78 | 33 | 40 | 233 | |
| Processed dairy | Female | 110 | 71 | 38 | 25 | 244 | 12.74** |
| | Male | 79 | 67 | 38 | 49 | 233 | |

Note. Levy choices: A = reducing the risk of plant protection/increasing animal welfare, B = supporting local farmers/social sustainability, C = increasing environmental sustainability, D = sustainability.

* $p < .05$, ** $p < .01$, *** $p < .001$, ns = not significant.

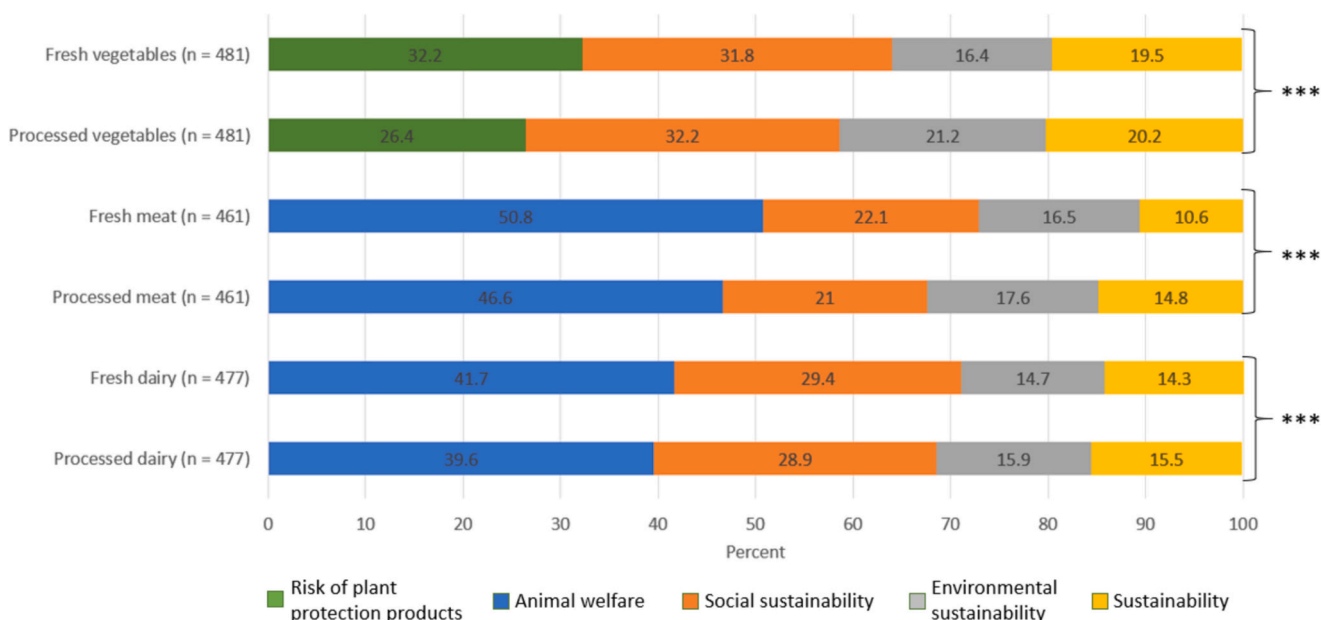


Fig. 3. Levy choice for the six food categories and the four levy framings, including Pearson's chi-squared test of independence to compare fresh and processed food categories (** $p < .001$).

six food categories. The levy choices A, B, and C were compared with choice D. For the vegetable products, both models were statistically significant (Model $X^2(21) = 72.7, p > .001$ and Model $X^2(21) = 65.5, p > .001$). A few significant predictors emerged for the comparison between plant protection products and sustainability, and no significant predictors emerged for the comparison between environmental sustainability and sustainability (Table 3).

The participants' perceptions of farmers were a significant predictor of the levy choice to support local farmers. Specifically, we found that participants with a higher perception of farmers were more likely to choose a levy option that supported local farmers (OR = 1.9). In other words, with each one-unit increase in the perception of farmers, the odds of a participant choosing to support local farmers instead of sustainability increased by a factor of 1.9.

For meat products, both models were statistically significant (Model $X^2(21) = 83.2, p > .001$ and Model $X^2(21) = 93.3, p > .001$; Table 4). For most comparisons, except for local farmers vs. sustainability for processed meat, females were more likely than men to choose the specified levy (options A, B, and C) as compared to the generic sustainability levy (option D).

Again, participants' perception of farmers emerged as a significant predictor of the levy choice to support local farmers. Specifically, we found that participants with a higher perception of farmers were more likely to choose the option supporting local farmers (OR = 2.7 and 2.6).

Finally, for dairy products, both models were statistically significant (Model $X^2(21) = 113.1, p > .001$ and Model $X^2(21) = 62.1, p > .001$; Table 5). For most comparisons, females were more likely than men to choose the specified levy (options A, B, and C) as compared to the

generic sustainability levy (option D). Again, consumers' perceptions of farmers emerged as a significant predictor for a levy choice to support local farmers. Specifically, we found that the participants with a higher perception of farmers were more likely to choose the option to support local farmers (OR = 2.3 and 2.1).

5. Discussion

We assessed consumers' preferences for different framings of a sustainability levy for vegetables, meat, and dairy and found that for animal products, the majority of consumers preferred a levy that aimed to increase animal welfare over a levy that supported local farmers or increased environmental sustainability. For plant products, however, the majority preferred a levy that aimed to reduce the risk of plant protection products or that aimed to support local farmers. Not surprisingly, the participants' perceptions of farmers were a significant predictor in all models, predicting the choice of the levy to support local farmers. The findings are of significant importance for the formulation of policy, as they can assist in the design of effective measures that are readily accepted by the population. For instance, animal welfare and social sustainability seem to be more readily accepted than environmental sustainability.

Regarding levy choices, we found that social sustainability seemed to be more acceptable for vegetables than for animal products. For plant-based products, Swiss consumers strongly rely on the “our own country is best” heuristic, preferring local products when evaluating social sustainability (Lazzarini et al., 2017). However, the participants in our study were less willing to distribute part of the product price to support

Table 3
Multinomial logistic regression analysis for levy choice for the vegetable categories (n = 481).

| | Fresh vegetables | | | | | Processed vegetables | | | | |
|--|---|------|------------------------|-------|-------|---|------|------------------------|-------|-------|
| | B | SE | 95 % CI for odds ratio | | | B | SE | 95 % CI for odds ratio | | |
| | | | OR | Lower | Upper | | | OR | Lower | Upper |
| Plant protection vs. sustainability | | | | | | | | | | |
| Intercept | 0.29 | 1.16 | | | | -0.75 | 1.19 | | | |
| Age | <0.01 | 0.01 | 1.00 | 0.98 | 1.02 | 0.02** | 0.01 | 1.02 | 1.00 | 1.04 |
| Education | -0.19* | 0.09 | 0.83 | 0.69 | 1.00 | -0.14 | 0.10 | 0.87 | 0.72 | 1.06 |
| Political Orientation | 0.01 | 0.01 | 1.01 | 1.00 | 1.02 | 0.02 | 0.01 | 1.02 | 1.00 | 1.03 |
| Perception of farmers | -0.15 | 0.14 | 0.86 | 0.65 | 1.14 | -0.15 | 0.14 | 0.87 | 0.65 | 1.15 |
| Health Consciousness | -0.04 | 0.17 | 0.96 | 0.69 | 1.34 | 0.10 | 0.18 | 1.10 | 0.78 | 1.56 |
| Conservation Behaviour | 0.27 | 0.16 | 1.30 | 0.95 | 1.78 | 0.04 | 0.17 | 1.05 | 0.76 | 1.44 |
| Sex = male | -0.07 | 0.27 | 0.93 | 0.55 | 1.59 | -0.20 | 0.28 | 0.82 | 0.47 | 1.42 |
| Local farmers vs. sustainability | | | | | | | | | | |
| Intercept | -2.08 | 1.22 | | | | -2.27 | 1.18 | | | |
| Age | -0.01 | 0.01 | 0.99 | 0.97 | 1.01 | 0.01 | 0.01 | 1.01 | 0.99 | 1.02 |
| Education | 0.01 | 0.09 | 1.01 | 0.84 | 1.21 | 0.02 | 0.09 | 1.02 | 0.85 | 1.22 |
| Political Orientation | 0.01 | 0.01 | 1.01 | 1.00 | 1.03 | 0.02* | 0.01 | 1.02 | 1.00 | 1.03 |
| Perception of farmers | 0.65*** | 0.16 | 1.92 | 1.39 | 2.65 | 0.64*** | 0.16 | 1.90 | 1.39 | 2.59 |
| Health Consciousness | -0.27 | 0.17 | 0.76 | 0.55 | 1.07 | -0.37* | 0.17 | 0.69 | 0.49 | 0.97 |
| Conservation Behaviour | 0.01 | 0.16 | 1.01 | 0.74 | 1.38 | -0.05 | 0.16 | 0.95 | 0.70 | 1.30 |
| Sex = male | -0.29 | 0.28 | 0.75 | 0.44 | 1.30 | -0.15 | 0.28 | 0.87 | 0.50 | 1.49 |
| Environment vs. sustainability | | | | | | | | | | |
| Intercept | 2.31 | 1.31 | | | | 0.21 | 1.22 | | | |
| Age | -0.02 | 0.01 | 0.98 | 0.96 | 1.00 | 0.00 | 0.01 | 1.00 | 0.98 | 1.02 |
| Education | -0.05 | 0.11 | 0.95 | 0.77 | 1.17 | 0.06 | 0.10 | 1.06 | 0.87 | 1.28 |
| Political Orientation | 0.01 | 0.01 | 1.01 | 0.99 | 1.02 | 0.01 | 0.01 | 1.01 | 0.99 | 1.02 |
| Perception of farmers | -0.26 | 0.16 | 0.77 | 0.56 | 1.06 | 0.06 | 0.15 | 1.06 | 0.78 | 1.43 |
| Health Consciousness | -0.03 | 0.20 | 0.97 | 0.66 | 1.42 | -0.25 | 0.18 | 0.78 | 0.54 | 1.11 |
| Conservation Behaviour | -0.02 | 0.18 | 0.98 | 0.69 | 1.40 | 0.05 | 0.17 | 1.05 | 0.75 | 1.47 |
| Sex = male | -0.22 | 0.32 | 0.80 | 0.43 | 1.50 | -0.27 | 0.29 | 0.77 | 0.43 | 1.36 |
| | $R^2 = 0.14$ (Cox & Snell), 0.15 (Nagelkerke) | | | | | $R^2 = 0.13$ (Cox & Snell), 0.14 (Nagelkerke) | | | | |
| | Model $X^2(21) = 72.74$ *** | | | | | Model $X^2(21) = 65.52$ *** | | | | |

Note. Political orientation from 0 (very left) over 50 (middle) to 100 (very right); perception of farmers = scale from 1 (do not agree at all) to 7 (totally agree), higher values indicating more positive perception of farmers; health consciousness = scale from 1 (do not agree at all) to 6 (totally agree) with increasing values indicating higher health consciousness; conservation behaviour = scale from 1 (do not agree at all) to 7 (totally agree) with increasing values indicating higher environmental attitudes.

* $p < .05$.
** $p < .01$.
*** $p < .001$.

Table 4
Multinomial logistic regression analysis for levy choice for meat categories (n = 461).

| | Fresh meat | | | | | Processed meat | | | | |
|--|---|------|------------------------|-------|-------|---|------|------------------------|-------|-------|
| | B | SE | 95 % CI for odds ratio | | | B | SE | 95 % CI for odds ratio | | |
| | | | OR | Lower | Upper | | | OR | Lower | Upper |
| Animal welfare vs. sustainability | | | | | | | | | | |
| Intercept | 0.14 | 1.39 | | | | 2.45* | 1.24 | | | |
| Age | -0.01 | 0.01 | 0.99 | 0.97 | 1.01 | -0.01 | 0.01 | 0.99 | 0.97 | 1.01 |
| Education | 0.09 | 0.12 | 1.09 | 0.86 | 1.39 | -0.12 | 0.10 | 0.89 | 0.73 | 1.08 |
| Political orientation | 0.02 | 0.01 | 1.02 | 1.00 | 1.04 | 0.01 | 0.01 | 1.01 | 1.00 | 1.03 |
| Perception of farmers | 0.19 | 0.17 | 1.21 | 0.86 | 1.71 | 0.00 | 0.15 | 1.00 | 0.74 | 1.36 |
| Health Consciousness | 0.18 | 0.20 | 1.20 | 0.81 | 1.77 | -0.28 | 0.18 | 0.75 | 0.53 | 1.08 |
| Conservation Behaviour | 0.01 | 0.19 | 1.01 | 0.69 | 1.47 | 0.18 | 0.17 | 1.19 | 0.86 | 1.66 |
| Sex = male | -1.62*** | 0.38 | 0.20 | 0.09 | 0.42 | -0.98** | 0.30 | 0.38 | 0.21 | 0.68 |
| Local farmers vs. sustainability | | | | | | | | | | |
| Intercept | -5.42** | 1.67 | | | | -4.97** | 1.56 | | | |
| Age | 0.00 | 0.01 | 1.00 | 0.97 | 1.02 | 0.00 | 0.01 | 1.00 | 0.98 | 1.03 |
| Education | 0.22 | 0.13 | 1.24 | 0.96 | 1.62 | 0.06 | 0.12 | 1.06 | 0.85 | 1.33 |
| Political Orientation | 0.02 | 0.01 | 1.02 | 1.00 | 1.04 | 0.02 | 0.01 | 1.02 | 1.00 | 1.04 |
| Perception of farmers | 0.98*** | 0.22 | 2.65 | 1.72 | 4.08 | 0.96*** | 0.21 | 2.61 | 1.72 | 3.96 |
| Health Consciousness | 0.20 | 0.23 | 1.22 | 0.78 | 1.90 | -0.20 | 0.21 | 0.82 | 0.54 | 1.24 |
| Conservation Behaviour | -0.16 | 0.21 | 0.85 | 0.56 | 1.29 | -0.10 | 0.19 | 0.90 | 0.62 | 1.31 |
| Sex = male | -1.40*** | 0.42 | 0.25 | 0.11 | 0.56 | -0.39 | 0.35 | 0.67 | 0.34 | 1.34 |
| Environment vs. sustainability | | | | | | | | | | |
| Intercept | 0.50 | 1.58 | | | | 0.87 | 1.45 | | | |
| Age | -0.02 | 0.01 | 0.99 | 0.96 | 1.01 | -0.02 | 0.01 | 0.98 | 0.96 | 1.01 |
| Education | 0.23 | 0.14 | 1.26 | 0.96 | 1.64 | 0.14 | 0.12 | 1.15 | 0.92 | 1.44 |
| Political orientation | 0.00 | 0.01 | 1.00 | 0.98 | 1.02 | 0.00 | 0.01 | 1.00 | 0.98 | 1.02 |
| Perception of farmers | 0.15 | 0.20 | 1.16 | 0.79 | 1.72 | 0.00 | 0.18 | 1.00 | 0.71 | 1.42 |
| Health Consciousness | 0.04 | 0.23 | 1.05 | 0.66 | 1.65 | -0.14 | 0.22 | 0.87 | 0.57 | 1.32 |
| Conservation Behaviour | -0.05 | 0.22 | 0.95 | 0.62 | 1.46 | 0.10 | 0.20 | 1.10 | 0.75 | 1.62 |
| Sex = male | -1.46*** | 0.43 | 0.23 | 0.10 | 0.54 | -0.82* | 0.35 | 0.44 | 0.22 | 0.88 |
| | $R^2 = 0.17$ (Cox & Snell), 0.18 (Nagelkerke) | | | | | $R^2 = 0.18$ (Cox & Snell), 0.20 (Nagelkerke) | | | | |
| | Model $\chi^2(21) = 83.24^{***}$ | | | | | Model $\chi^2(21) = 93.34^{***}$ | | | | |

Note. Political orientation from 0 (very left) over 50 (middle) to 100 (very right); Perception of farmers = scale from 1 (do not agree at all) to 7 (totally agree), higher values indicating more positive perception of farmers; Health consciousness = scale from 1 (do not agree at all) to 6 (totally agree) with increasing values indicating higher health consciousness; Conservation behaviour = scale from 1 (do not agree at all) to 7 (totally agree) with increasing values indicating higher environmental attitudes.

- * $p < .05$.
- ** $p < .01$.
- *** $p < .001$.

local farmers in production than in vegetable and dairy production. This may be attributable to the fact that in the context of meat production, it is evident that the animals will ultimately be killed, which inevitably raises concerns about animal welfare. For the animal products, participants favoured the animal welfare option. This is in line with previous research reporting that consumers favour animal welfare over environmental sustainability (El Benni et al., 2024; Perino and Schwickert, 2023).

For all product categories, environmental sustainability and sustainability (not specified) were chosen equally often, which might indicate that participants associated sustainability with environmental sustainability. This corroborates well with previous studies reporting that consumers mostly associate sustainable food with environmental sustainability (Sánchez-Bravo et al., 2021). Given that sustainability is an umbrella term and definitions are often lacking or differ depending on the context (Ammann et al., 2023a), this is an important finding for future studies to consider. When sustainability tends to be understood as environmental sustainability, policymakers and researchers need to be specific about the definitions we are working with, especially if we aim to cover a wider or different construct than environmental sustainability.

We found that for all three comparisons (fresh vs. processed of vegetables, meat and dairy), the number of participants who chose the general sustainability information increased for processed products compared to fresh products. Similarly, participants chose environmental sustainability more often for processed products than for fresh products. Again, this points towards participants' association of sustainability mostly with environmental sustainability. The production process (e.g.

products being highly processed) affects consumers' perception of naturalness (Román et al., 2017). Therefore, highly processed products are perceived as less natural and possibly a product that is not strongly related to farmers, which, in turn, could raise environmental attitudes and lead participants to choose the environmental sustainability option to compensate for this.

For the animal products, we found that females chose the animal welfare option more often than males. This is in line with previous studies showing that females had a stronger preference for animal welfare than males (Ammann et al., 2023b). Females and males are known to differ regarding food consumption in general and sustainable consumption in particular (Loginova and Mann, 2024). For instance, females have been found to be more concerned about sustainability and followed environmentally friendly behaviour more consequently (Funk et al., 2021; Grunert et al., 2014).

In line with previous studies indicating that males find sustainability labels more helpful than females (Ammann et al., 2024a), this would mean that it is mostly about the presence of the information and not so much about the details. Further, because the sustainability option in this study left room for interpretation, as it did not specify what it meant by sustainability, participants might have interpreted it as personal benefit (e.g. better taste due to local production and short transportation), which has been shown to be more appealing for males than females (Piracci et al., 2023). Taken together, it seems that males seek sustainability information, but it suffices to cover that using the umbrella term, without specifying details of what it entails. A possible way to deal with this and to cover the needs of both males and females could be to offer some kind of sustainability label as a general indicator on the front of the

Table 5
Multinomial logistic regression analysis for levy choice for dairy categories (n = 477).

| | Fresh dairy | | | | | Processed dairy | | | | |
|--|-------------|------|---|-------|-------|-----------------|------|---|-------|-------|
| | B | SE | 95 % CI for odds ratio | | | B | SE | 95 % CI for odds ratio | | |
| | | | OR | Lower | Upper | | | OR | Lower | Upper |
| Animal welfare vs. sustainability | | | | | | | | | | |
| Intercept | 1.24 | 1.25 | | | | 1.82 | 1.22 | | | |
| Age | 0.01 | 0.01 | 1.01 | 0.99 | 1.02 | 0.00 | 0.01 | 1.00 | 0.98 | 1.02 |
| Education | −0.06 | 0.10 | 0.94 | 0.77 | 1.15 | −0.17 | 0.10 | 0.85 | 0.70 | 1.03 |
| Political Orientation | 0.02 | 0.01 | 1.02 | 1.00 | 1.03 | 0.01 | 0.01 | 1.01 | 1.00 | 1.03 |
| Perception of farmers | −0.22 | 0.16 | 0.81 | 0.59 | 1.10 | 0.00 | 0.15 | 1.00 | 0.76 | 1.34 |
| Health Consciousness | −0.11 | 0.18 | 0.89 | 0.62 | 1.28 | −0.02 | 0.18 | 0.98 | 0.69 | 1.39 |
| Conservation Behaviour | 0.22 | 0.17 | 1.25 | 0.89 | 1.75 | −0.04 | 0.17 | 0.96 | 0.69 | 1.34 |
| Sex = male | −0.76* | 0.30 | 0.47 | 0.26 | 0.83 | −1.03*** | 0.30 | 0.36 | 0.20 | 0.64 |
| Local farmers vs. sustainability | | | | | | | | | | |
| Intercept | −4.22** | 1.44 | | | | −1.31 | 1.34 | | | |
| Age | 0.00 | 0.01 | 1.00 | 0.98 | 1.02 | 0.00 | 0.01 | 1.00 | 0.98 | 1.02 |
| Education | 0.04 | 0.11 | 1.04 | 0.84 | 1.29 | −0.06 | 0.10 | 0.95 | 0.77 | 1.16 |
| Political Orientation | 0.03*** | 0.01 | 1.03 | 1.02 | 1.05 | 0.01 | 0.01 | 1.01 | 0.99 | 1.03 |
| Perception of farmers | 0.85*** | 0.20 | 2.34 | 1.59 | 3.45 | 0.72*** | 0.17 | 2.06 | 1.47 | 2.88 |
| Health Consciousness | −0.39 | 0.20 | 0.68 | 0.46 | 1.00 | −0.15 | 0.19 | 0.86 | 0.59 | 1.24 |
| Conservation Behaviour | 0.03 | 0.18 | 1.03 | 0.72 | 1.47 | −0.19 | 0.18 | 0.83 | 0.58 | 1.18 |
| Sex = male | −0.41 | 0.32 | 0.67 | 0.35 | 1.25 | −0.87** | 0.32 | 0.42 | 0.23 | 0.78 |
| Environment vs. sustainability | | | | | | | | | | |
| Intercept | 2.13 | 1.47 | | | | 1.09 | 1.42 | | | |
| Age | 0.01 | 0.01 | 1.01 | 0.98 | 1.03 | 0.00 | 0.01 | 1.00 | 0.98 | 1.02 |
| Education | 0.08 | 0.12 | 1.08 | 0.85 | 1.37 | 0.05 | 0.11 | 1.05 | 0.84 | 1.31 |
| Political Orientation | 0.00 | 0.01 | 1.00 | 0.98 | 1.02 | 0.00 | 0.01 | 1.00 | 0.98 | 1.02 |
| Perception of farmers | −0.34 | 0.18 | 0.71 | 0.50 | 1.02 | 0.22 | 0.18 | 1.25 | 0.88 | 1.75 |
| Health Consciousness | −0.15 | 0.22 | 0.86 | 0.56 | 1.32 | −0.15 | 0.21 | 0.86 | 0.57 | 1.29 |
| Conservation Behaviour | 0.02 | 0.20 | 1.02 | 0.68 | 1.51 | −0.23 | 0.20 | 0.80 | 0.54 | 1.17 |
| Sex = male | −0.57 | 0.36 | 0.57 | 0.28 | 1.15 | −0.74* | 0.35 | 0.48 | 0.24 | 0.94 |
| | | | $R^2 = 0.21$ (Cox & Snell), 0.23 (Nagelkerke) | | | | | $R^2 = 0.12$ (Cox & Snell), 0.13 (Nagelkerke) | | |
| | | | Model $\chi^2(21) = 113.12$ *** | | | | | Model $\chi^2(21) = 62.13$ *** | | |

Note. Political orientation from 0 (very left) over 50 (middle) to 100 (very right); Perception of farmers = scale from 1 (do not agree at all) to 7 (totally agree), higher values indicating more positive perception of farmers; Health consciousness = scale from 1 (do not agree at all) to 6 (totally agree) with increasing values indicating higher health consciousness; Conservation behaviour = scale from 1 (do not agree at all) to 7 (totally agree) with increasing values indicating higher environmental attitudes.

* $p < .05$.
 ** $p < .01$.
 *** $p < .001$.

package while offering more detailed sustainability information on the back of the package. This is important, as labels can positively influence consumer behaviour (Majer et al., 2022).

Consumers' perceptions of farmers emerged as a significant predictor for the choice of the social sustainability option across all six models. This is an important finding, as it shows that a positive public perception of farmers is associated with the willingness to support local farmers. This is not only relevant for grocery stores, which can promote their locally produced products, but may also be relevant for direct marketing efforts. On the one hand, it is evident that consumers are willing to support local farmers, although the question remains as to how this can be put into practice. On the other hand, campaigns to promote the public perception of farmers could be a tool for encouraging consumers to show greater support for local farmers. For instance, these campaigns could aim at increasing public appreciation and trust in farmers and creating a deeper understanding of the hard work in agriculture (Saleh and Ehlers, 2023).

Social sustainability at the consumer stage has benefited from little scientific attention thus far. This shows, for instance, the paucity of measures available for the construct (Jackson and Holm, 2024). Instead of certifications, more transparency is needed, as information regarding social sustainability is difficult for consumers to access (Toussaint et al., 2021). It is important to look at more than one domain of sustainability, as they often come with trade-offs, and focusing on one might drive unwanted effects on another (Jackson and Holm, 2024).

The fact that environmental attitude was not a significant predictor for levy choice might have different reasons. One possibility is that pro-environmental actions (i.e. choosing environmental sustainability over

the other options) might not necessarily be motivated by environmental concerns (de Boer and Aiking, 2021). Another possibility could be the fact that the participants were forced to choose between the different options. This also means that individuals who assigned similar importance to the two options or those who did not care about sustainability at all had no choice to opt out.

Finally, we wish to acknowledge that in the context of this study, we focused on sustainability levies, which use their revenues and reinvest parts of it in sustainable projects. Based on the literature, we assume that levies tend to be better accepted than taxes. If levies are indeed more acceptable, they could be a way of raising more funds for sustainability projects. However, the extent to which a levy is preferable to a tax that disincentivize environmentally unfriendly production and consumption patterns is a matter of social and political debate.

5.1. Limitations and outlook

This study has a few limitations that should be addressed. First, our sample is not completely representative of the Swiss population in terms of education level and place of residence. Care must be taken when transferring the results to the Swiss population. Second, our results provide interesting and novel results for consumers' acceptance of different framings for a sustainability levy, but further work is needed to investigate whether these findings apply to other countries and cultures. Third, for the sustainability levy options, we kept the definitions very brief, leaving room for interpretation. For instance, mentioning "the risk of plant protection product use", we did not check whether this was understood as a risk to participants' health or the environment. Finally,

participants were faced with a simplified and hypothetical scenario in which they were forced to choose one of four product options. Our work provides an indication for consumer preferences, but future work is needed to better understand whether our findings can be transferred to real shopping situations where real economic decisions are made. Most importantly, it has to be kept in mind that there tends to be a gap between consumers' stated preferences and their revealed preferences (de Corte et al., 2021). Price is well known to be a major driver of meat purchase decisions and food choices in general (Ammann et al., 2023a; Bozzo et al., 2019). Therefore, future studies should also examine price effects.

6. Conclusion

Market-based policy measures are promising tools for changing consumers' behaviour, as they work with price incentives. Our results showed that a sustainability levy that aims to improve animal welfare was preferred by the participants compared to social, environmental, or generic sustainability. For vegetables, a levy for social sustainability and for the reduction of risks related to the use of plant protection products was preferred over a levy that aims to support environmental sustainability or sustainability in general. Future studies are needed to translate these findings into real consumption situations. Nevertheless, our study paves the way for improved policy efforts to promote the consumption of sustainable plant and animal products and to ensure synergies between different domains of sustainability. Animal welfare levies for animal products and social sustainability levies for plant products might have the potential to sustainably shift consumer behaviour, if put into action by policy makers, producers and retailers. Policy makers and producers can promote the public perception of farmers and foster the exchange between farmers and consumers to strengthen public support for local farmers and encourage the purchase of local and sustainable products.

CRedit authorship contribution statement

Jeanine Ammann: Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Gabriele Mack:** Writing – review & editing, Resources, Conceptualization. **Nadja El Benni:** Writing – review & editing, Conceptualization. **Rita Saleh:** Writing – review & editing, Investigation, Formal analysis, 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.

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Appendix A. Supplementary data

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References

Ammann, J., Arbenz, A., Mack, G., Nemecek, T., El Benni, N., 2023a. A review on policy instruments for sustainable food consumption. *Sustain. Prod. Consum.* <https://doi.org/10.1016/j.spc.2023.01.012>.
 Ammann, J., Mack, G., Irek, J., Finger, R., El Benni, N., 2023b. Consumers' meat commitment and the importance of animal welfare as agricultural policy goal. *Appetite* 112 (105010). <https://doi.org/10.1016/j.foodqual.2023.105010>.

Ammann, J., Mack, G., El Benni, N., Jin, S., Newell-Price, P., Tindale, S., Hunter, E., Vicario-Modroño, V., Gallardo-Cobos, R., Sánchez-Zamora, P., Miskolci, S., Frewer, L.J., 2024a. Consumers across five European countries prioritise animal welfare above environmental sustainability when buying meat and dairy products. *Food Qual. Prefer.* 117. <https://doi.org/10.1016/j.foodqual.2024.105179>.
 Ammann, J., Meierhofer, C., Saleh, R., 2024b. Dataset on Consumers' Perception of Different Types of Sustainability Levies, Swiss Agriculture and Farmers and Willingness to Choose Suboptimal Potatoes in Different Settings. <https://doi.org/10.5281/zenodo.13736435>.
 Bozzo, G., Barrasso, R., Grimaldi, C.A., Tantillo, G., Roma, R., 2019. Consumer attitudes towards animal welfare and their willingness to pay. *Vet. Ital.* 55 (4), 289–297. <https://doi.org/10.12834/VetIt.1823.9669.2>.
 Bundesamt für Statistik (BFS), 2023. Bildungsstand [education levels]. <https://www.bfs.admin.ch/bfs/de/home/statistiken/querschnittsthemen/wohlfahrtsmessung/alle-indikatoren/gesellschaft/bildungsstand.html>.
 de Boer, J., Aiking, H., 2021. Exploring food consumers' motivations to fight both climate change and biodiversity loss: combining insights from behavior theory and Eurobarometer data. *Food Qual. Prefer.* 94. <https://doi.org/10.1016/j.foodqual.2021.104304>.
 de Corte, K., Cairns, J., Grieve, R., 2021. Stated versus revealed preferences: an approach to reduce bias. *Health Econ.* 30 (5), 1095–1123. <https://doi.org/10.1002/hec.4246>.
 De Pelsmacker, P., Driesen, L., Rayp, G., 2005. Do consumers care about ethics? Willingness to pay for fair-trade coffee. *J. Consum. Aff.* 39 (2), 363–385. <https://doi.org/10.1111/j.1745-6606.2005.00019.x>.
 Desiderio, E., García-Herrero, L., Hall, D., Segre, A., Vittuari, M., 2022. Social sustainability tools and indicators for the food supply chain: a systematic literature review. *Sustain. Prod. Consum.* 30, 527–540. <https://doi.org/10.1016/j.spc.2021.12.015>.
 Dohle, S., Hartmann, C., Keller, C., 2014. Physical activity as a moderator of the association between emotional eating and BMI: evidence from the Swiss Food Panel. *Psychol. Health* 29 (9), 1062–1080. <https://doi.org/10.1080/08870446.2014.909042>.
 Dollery, B.E., Wallis, J.L., 1997. Market failure, government failure, leadership and public policy. *J. Interdiscip. Econ.* 8 (2), 113–126. <https://doi.org/10.1177/02601079X9700800202>.
 Eidgenössisches Departement für auswärtige Angelegenheiten (EDA), 2021. Stadt und Land [city and countryside]. <https://www.eda.admin.ch/aboutswitzerland/de/home/gesellschaft/bevoelkerung/stadt-und-land.html>.
 El Benni, N., Irek, J., Finger, R., Mack, G., Ammann, J., 2024. Citizens' perceptions of agricultural policy goals—evidence from Switzerland. *Food Policy* 125. <https://doi.org/10.1016/j.foodpol.2024.102643>.
 European Commission, 2016. Attitudes of Europeans towards animal welfare. <https://europa.eu/eurobarometer/surveys/detail/2096>.
 FAO, 2006. Livestock's long shadow: environmental issues and options. <https://www.fao.org/3/a0701e/a0701e.pdf>.
 FAO, 2018. Sustainable food systems, concept and framework. <http://www.fao.org/3/ca2079en/CA2079EN.pdf>.
 Feng, K., Hubacek, K., Guan, D., Contestabile, M., Minx, J., Barrett, J., 2010. Distributional effects of climate change taxation. *Environ. Sci. Technol.* 44 (10). <https://doi.org/10.1021/es902974g>.
 Funk, A., Sütterlin, B., Siegrist, M., 2021. Consumer segmentation based on stated environmentally-friendly behavior in the food domain. *Sustain. Prod. Consum.* 25, 173–186. <https://doi.org/10.1016/j.spc.2020.08.010>.
 Glick-Bauer, M., Yeh, M.C., 2014. The health advantage of a vegan diet: exploring the gut microbiota connection. *Nutrients* 6 (11), 4822–4838. <https://doi.org/10.3390/nu6114822>.
 Grunert, K.G., Hieke, S., Wills, J., 2014. Sustainability labels on food products: consumer motivation, understanding and use. *Food Policy* 44, 177–189. <https://doi.org/10.1016/j.foodpol.2013.12.001>.
 Hagmann, D., Siegrist, M., Hartmann, C., 2018. Taxes, labels, or nudges? Public acceptance of various interventions designed to reduce sugar intake. *Food Policy* 79, 156–165. <https://doi.org/10.1016/j.foodpol.2018.06.008>.
 Hallström, E., Carlsson-Kanyama, A., Börjesson, P., 2015. Environmental impact of dietary change: a systematic review. *J. Clean. Prod.* 91, 1–11. <https://doi.org/10.1016/j.jclepro.2014.12.008>.
 Hårstad, R.M.B., 2023. The politics of animal welfare: a scoping review of farm animal welfare governance. *Rev. Policy Res.* <https://doi.org/10.1111/ropr.12554>.
 Huber, R., El Benni, N., Finger, R., 2023. Lessons learned and policy implications from 20 years of Swiss agricultural policy reforms: a review of policy evaluations. *Bio-Based Appl. Econ.* <https://doi.org/10.36253/bae-14214>.
 Jackson, P., Holm, L., 2024. Social and economic dimensions of food sustainability - a background paper for the Nordic Nutrition Recommendations. *Food Nutr. Res.* 68. <https://doi.org/10.29219/fnr.v68.10450>.
 James-Martin, G., Baird, D.L., Hendrie, G.A., Bogard, J., Anastasiou, K., Brooker, P.G., Wiggins, B., Williams, G., Herrero, M., Lawrence, M., Lee, A.J., Riley, M.D., 2022. Environmental sustainability in national food-based dietary guidelines: a global review. *Lancet Planet. Health* 6 (12), e977–e986. [https://doi.org/10.1016/S2542-5196\(22\)00246-7](https://doi.org/10.1016/S2542-5196(22)00246-7).
 Janssen, M., Rödiger, M., Hamm, U., 2016. Labels for animal husbandry systems meet consumer preferences: results from a meta-analysis of consumer studies. *J. Agric. Environ. Ethics* 29 (6), 1071–1100. <https://doi.org/10.1007/s10806-016-9647-2>.
 Johnston, R.J., Wessells, C.R., Donath, H., Asche, F., 2001. Measuring consumer preferences for eco-labeled seafood: an international comparison. *J. Agric. Resour. Econ.* 26 (1), 20–39.
 Kiener, B., 2024. Aldi Schweiz verkauft neu "faire Milch" (Schweizer Bauer).

- Lagerkvist, C.J., Hess, S., 2011. A meta-analysis of consumer willingness to pay for farm animal welfare. *Eur. Rev. Agric. Econ.* 38 (1), 55–78. <https://doi.org/10.1093/erae/jbq043>.
- Lazzarini, G.A., Visschers, V.H.M., Siegrist, M., 2017. Our own country is best: factors influencing consumers' sustainability perceptions of plant-based foods. *Food Qual. Prefer.* 60, 165–177. <https://doi.org/10.1016/j.foodqual.2017.04.008>.
- Li, S., Kallas, Z., 2021. Meta-analysis of consumers' willingness to pay for sustainable food products. *Appetite* 163, 105239. <https://doi.org/10.1016/j.appet.2021.105239>.
- Loginova, D., Mann, S., 2024. Sweet home or battle of the sexes: who dominates food purchasing decisions? *Humanit. Soc. Sci. Commun.* 11 (1). <https://doi.org/10.1057/s41599-024-02745-8>.
- Mack, G., Finger, R., Ammann, J., El Benni, N., 2023. Modelling policies towards pesticide-free agricultural production systems. *Agric. Syst.* 207. <https://doi.org/10.1016/j.agsy.2023.103642>.
- Majer, J.M., Henschler, H.A., Reuber, P., Fischer-Kreer, D., Fischer, D., 2022. The effects of visual sustainability labels on consumer perception and behavior: a systematic review of the empirical literature. *Sustain. Prod. Consum.* 33, 1–14. <https://doi.org/10.1016/j.spc.2022.06.012>.
- Mazzocchi, C., Ruggeri, G., Corsi, S., 2019. Consumers' preferences for biodiversity in vineyards: a choice experiment on wine. *Wine Econ. Policy* 8 (2), 155–164. <https://doi.org/10.1016/j.wep.2019.09.002>.
- McGuinn, J., Fries-Tersch, E., Jones, M., Crepaldi, C., Masso, M., Kadarik, I., Samek Lodovici, M., Drufuca, S., Gancheva, M., Geny, B., 2020. Social sustainability, concepts and benchmark. [https://www.europarl.europa.eu/RegData/etudes/STUD/2020/648782/IPOL_STU\(2020\)648782_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/648782/IPOL_STU(2020)648782_EN.pdf).
- Michel, F., Siegrist, M., 2019. How should importance of naturalness be measured? A comparison of different scales. *Appetite* 140, 298–304. <https://doi.org/10.1016/j.appet.2019.05.019>.
- Michel, F., Knaapila, A., Hartmann, C., Siegrist, M., 2021. A multi-national comparison of meat eaters' attitudes and expectations for burgers containing beef, pea or algae protein. *Food Qual. Prefer.* 91. <https://doi.org/10.1016/j.foodqual.2021.104195>.
- Milfont, T.L., Duckitt, J., 2010. The environmental attitudes inventory: a valid and reliable measure to assess the structure of environmental attitudes. *J. Environ. Psychol.* 30 (1), 80–94. <https://doi.org/10.1016/j.jenvp.2009.09.001>.
- Mondière, A., Corson, M.S., Auberger, J., Durant, D., Foray, S., Glinec, J.-F., Green, P., Novak, S., Signoret, F., van der Werf, H.M.G., 2024. Trade-offs between higher productivity and lower environmental impacts for biodiversity-friendly and conventional cattle-oriented systems. *Agric. Syst.* 213. <https://doi.org/10.1016/j.agsy.2023.103798>.
- Moscovici, D., Rezwani, R., Mihailescu, R., Gow, J., Ugaglia, A.A., Valenzuela, L., Rinaldi, A., 2020. Preferences for eco certified wines in the United States. *Int. J. Wine Bus. Res.* 33 (2), 153–175. <https://doi.org/10.1108/ijwbr-04-2020-0012>.
- Mozaffarian, D., Afshin, A., Benowitz, N.L., Bittner, V., Daniels, S.R., Franch, H.A., Jacobs Jr., D.R., Kraus, W.E., Kris-Etherton, P.M., Krummel, D.A., Popkin, B.M., Whitel, L.P., Zakai, N.A., American Heart Association Council on, E., Prevention, C. o. N. P. A., & Metabolism, C. o. C. C. o. C. D. i. t. Y. C. o. t. K. i. C., 2012. Population approaches to improve diet, physical activity, and smoking habits: a scientific statement from the American Heart Association. *Circulation* 126 (12), 1514–1563. <https://doi.org/10.1161/CIR.0b013e318260a20b>.
- NSW Department of Industry, 2017. Market failure guide - a guide to categorising market failures for government policy development and evaluation. https://media.opengov.nsw.gov.au/pairtree_root/41/eb/7e/1a/65/1b/4e/a2/b8/d8/68/9a/1d/8d/75/1a/obj/PUB17_509_Market_failure_guide.pdf.
- Orou Sannou, R., Kirschke, S., Günther, E., 2023. Integrating the social perspective into the sustainability assessment of agri-food systems: a review of indicators. *Sustain. Prod. Consum.* 39, 175–190. <https://doi.org/10.1016/j.spc.2023.05.014>.
- Pagiaslis, A., Krontalis, A.K., 2014. Green consumption behavior antecedents: environmental concern, knowledge, and beliefs. *Psychol. Mark.* 31 (5), 335–348. <https://doi.org/10.1002/mar.20698>.
- Perino, G., Schwickert, H., 2023. Animal welfare is a stronger determinant of public support for meat taxation than climate change mitigation in Germany. *Nat. Food* 4 (2), 160–169. <https://doi.org/10.1038/s43016-023-00696-y>.
- Piracci, G., Casini, L., Contini, C., Stancu, C.M., Lähteenmäki, L., 2023. Identifying key attributes in sustainable food choices: an analysis using the food values framework. *J. Clean. Prod.* 416. <https://doi.org/10.1016/j.jclepro.2023.137924>.
- Plohl, U., Petritz, H., Stern, T., 2020. A social innovation perspective on dietary transitions: diffusion of vegetarianism and veganism in Austria. *Environ. Innov. Soc. Trans.* 36, 164–176. <https://doi.org/10.1016/j.eist.2020.07.001>.
- Poore, J., Nemecek, T., 2018. Reducing food's environmental impacts through producers and consumers. *Science* 360 (6392), 987–992. <https://doi.org/10.1126/science.aag0216>.
- Reimert, I., Webb, L.E., van Marwijk, M.A., Bolhuis, J.E., 2023. Review: towards an integrated concept of animal welfare. *Animal* 100838. <https://doi.org/10.1016/j.animal.2023.100838>.
- Reisch, L., Eberle, U., Lorek, S., 2017. Sustainable food consumption: an overview of contemporary issues and policies. *Sustain.: Sci. Pract. Policy* 9 (2), 7–25. <https://doi.org/10.1080/15487733.2013.11908111>.
- Román, S., Sánchez-Siles, L.M., Siegrist, M., 2017. The importance of food naturalness for consumers: results of a systematic review. *Trends Food Sci. Technol.* 67, 44–57. <https://doi.org/10.1016/j.tifs.2017.06.010>.
- Rossi, E.S., Cacchiarelli, L., Severini, S., Sorrentino, A., 2024. Consumers preferences and social sustainability: a discrete choice experiment on 'quality agricultural work' ethical label in the Italian fruit sector. *Agric. Food Econ.* 12 (1). <https://doi.org/10.1186/s40100-024-00307-9>.
- Saleh, R., Ehlers, M.-H., 2023. Exploring farmers' perceptions of social sustainability. *Environ. Dev. Sustain.* <https://doi.org/10.1007/s10668-023-04140-w>.
- Saleh, R., El Benni, N., Masson, S., Ammann, J., 2024. Public acceptance and sustainability perceptions of food produced with chemical, digital and mechanical weed control measures. *Food Qual. Prefer.* 113. <https://doi.org/10.1016/j.foodqual.2023.105079>.
- Sánchez-Bravo, P., Chambers V, E., Noguera-Artiaga, L., Sendra, E., Chambers Iv, E., Carbonell-Barrachina, Á.A., 2021. Consumer understanding of sustainability concept in agricultural products. *Food Qual. Prefer.* 89. <https://doi.org/10.1016/j.foodqual.2020.104136>.
- Scarborough, P., Clark, M., Cobiac, L., Papier, K., Knuppel, A., Lynch, J., Harrington, R., Key, T., Springmann, M., 2023. Vegans, vegetarians, fish-eaters and meat-eaters in the UK show discrepant environmental impacts. *Nat. Food* 4 (7), 565–574. <https://doi.org/10.1038/s43016-023-00795-w>.
- Siegrist, M., Hartmann, C., 2020. Consumer acceptance of novel food technologies. *Nat. Food* 1 (6), 343–350. <https://doi.org/10.1038/s43016-020-0094-x>.
- Siegrist, M., Visschers, V.H.M., Hartmann, C., 2015. Factors influencing changes in sustainability perception of various food behaviors: results of a longitudinal study. *Food Qual. Prefer.* 46, 33–39. <https://doi.org/10.1016/j.foodqual.2015.07.006>.
- Spykman, O., Gabriel, A., Ptacek, M., Gandorfer, M., 2021. Farmers' perspectives on field crop robots – evidence from Bavaria, Germany. *Comput. Electron. Agric.* 186. <https://doi.org/10.1016/j.compag.2021.106176>.
- Tan, Z., Wu, Y., Gu, Y., Liu, T., Wang, W., Liu, X., 2022. An overview on implementation of environmental tax and related economic instruments in typical countries. *J. Clean. Prod.* 330. <https://doi.org/10.1016/j.jclepro.2021.129688>.
- Toussaint, M., Cabanelas, P., González-Alvarado, T.E., 2021. What about the consumer choice? The influence of social sustainability on consumer's purchasing behavior in the food value chain. *Eur. Res. Manag. Bus. Econ.* 27 (1). <https://doi.org/10.1016/j.iedeen.2020.100134>.
- Tubiello, F.N., Karl, K., Flammini, A., Gütschow, J., Griffiths, O.-L., Conchedda, G., Pan, X., Qi, S.Y., Halldórudóttir Heiðarsdóttir, H., Wanner, N., Quadrelli, R., Rocha Souza, L., Benoit, P., Hayek, M., Sandalov, D., Mencos Contreras, E., Rosenzweig, C., Rosero Moncayo, J., Conforti, P., Torero, M., 2022. Pre- and post-production processes increasingly dominate greenhouse gas emissions from agri-food systems. *Earth Syst. Sci. Data* 14 (4), 1795–1809. <https://doi.org/10.5194/essd-14-1795-2022>.
- Umbricht, A., Schaub, A., 2022. Univox Landwirtschaft 2022 - Schlussbericht einer repräsentativen, persönlichen Bevölkerungsbefragung im Auftrag des Bundesamtes für Landwirtschaft.
- Van Loo, E.J., Hoefkens, C., Verbeke, W., 2017. Healthy, sustainable and plant-based eating: perceived (mis)match and involvement-based consumer segments as targets for future policy. *Food Policy* 69, 46–57. <https://doi.org/10.1016/j.foodpol.2017.03.001>.
- Weinmann, B., Ehrbar, S., 2024. Migros, Swiss, Coop: Weshalb Schweizer Firmen den Kunden vermehrt ins Gewissen reden und Spenden verlangen. *Tagblatt*.
- Zander, K., Isermeyer, F., Bürgelt, D., Christoph-Schulz, I., Salamon, P., Weible, D., 2013. *Erwartungen der Gesellschaft an die Landwirtschaft*.
- Zhou, Y., Jain, N., Jha, G.K., Begho, T., 2022. Nitrogen pollution from cattle production in India: a review of the social, cultural and economic influences [review]. *J. Agric. Sci.* 160 (1–2), 98–106. <https://doi.org/10.1017/S0021859622000120>.