Paper/Poster Title	Avoid is Better than Generate: the Effect of Framing Information on Consumer Preferences and Willingness to Pay for Dairy and Plant-Based Milks

Abstract	*200 words max*

Agricultural and food systems have significant implications for climate change. Shifting towards plant-based diets is recognized as a beneficial strategy to alleviate environmental pressures. However, the broader implications for food security, nutritional quality, and consumer preferences regarding plant-based diets remain unclear. This study conducted a choice experiment in China and Canada to investigate consumer preferences for plant-based milk, collecting 1825 online survey responses in Canada and 1865 survey responses in China from online panels accessed through market research companies. The findings indicate that some consumers in both countries are willing to pay a higher price for milk-type beverages with reduced carbon emissions. The probability of choosing a beverage is influenced by greenhouse gas emissions information and its framing in terms of gains and losses, with the "avoid" framing having a greater impact on selecting beverages with lower emissions. Multinominal logit modeling and latent class analysis reveal heterogeneity in consumer preferences. Compared to Chinese respondents, Canadians exhibit a stronger preference for dairy milk over soy beverages. Moreover, some respondents strongly prefer options aligned with traditional dietary patterns, indicating potential challenges in promoting dietary transitions, such as plant-based diets, in different contexts.

Keywords	Framing information, Consumer behaviors, Sustainable Dietary Transition, Plant-based Beverage
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Introduction	*100 – 250 words*

Agricultural and food systems are significantly affecting the climate change, primarily through the food sector's substantial emissions of greenhouse gases, involvement in deforestation activities, and contribution to water pollution. Consequently, the adoption of plant-based foods has gained recognition as a favorable strategy to alleviate environmental pressures and foster a more sustainable food system. Additionally, plant-based diets have been associated with improved nutrition equity, providing low cost options to meet protein needs in some low income or disadvantaged communities.

Research has revealed that environmental information could be important drivers for consumer preferences and willingness to pay (WTP). Prospect theory suggests that individuals may exhibit different responses to gain-framed and loss-framed messages. Applying this theory to environmental information related to plant-based milk, we can gain a deeper understanding of how information framing can be effectively employed to guide individuals towards healthier and more sustainable dietary choices.

Meanwhile, the speed and process of diet transition varies considerably across countries. Examining consumer preferences for plant-based milk in different countries, such as China and Canada, can provide insights into the drivers of consumer behavior and identify potential barriers or facilitators for dietary transitions cross cultures.

The focus of this study on the response of gain and loss framing information will help to identify the better way of framing environment information for drawing consumers' attention to environmental-friendly plant-based foods. Understanding the cross-country differences in plant diet transition is crucial for designing targeted interventions and policies that improving public health and promoting sustainable dietary choices in different cultural and environmental contexts.

Methodology	*100 – 250 words*

Choice experiments are applied to understand consumer preference and explore factors affecting WTP. We choose the beverage type, organic label, added protein label and price as the attributes (shown in Table 1). The experimental design was developed using mktEx macro in SAS. The fractional factorial design (d-efficiency of 100) resulted in 32 choice sets. They were grouped into four sets of eight choices. Each set of eight choices contained all beverages, which were randomized across survey respondents. The choices were designed in two choice and neither of the two choices. For the information treatment, we used a split sample design to provide different information frames regarding the greenhouse gas emission impacts of respondents' choices.

We describe a specific scenario for the information treatment, that is the amount of GHG emissions can be avoided (gain-framing) or generated (loss-framing) by substituting one cup (240 ml) of plant-based beverage for dairy milk every day for one year, and the equivalent reduction miles by not driving a car in Canada (or in China). The complete experiment flow is shown in Figure 1.
We use conditional logit model for regression estimation and calculating WTP. A two sample t-test is used to examine whether there exist statistically significant differences between different information treatment groups of samples. Finally, we use latent class model for heterogeneity analysis.

Table 1 Conjoint Choice Experiment Attributes and Levels.

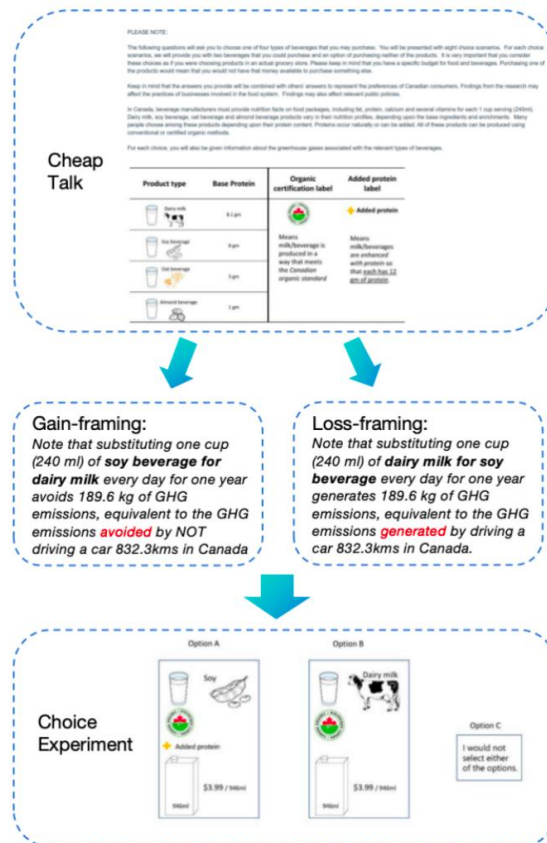| Attribute	Levels
Beverage types	1. Dairy milk 2. Soy beverage 3. Oat beverage 4. Almond beverage
Added protein label	1. No label 2. Added protein label
Organic label	1. No label 2. Canada Organic Label/Chinese Organic Label
Price	Four levels of prices based on the market conditions for each country Canada: $1.00, $4.00, $7.00 and $10.00/946 ml China: ¥2.50, ¥5.00, ¥7.50, ¥10.00/250ml

Figure 1. Experiment flow

Results	*100 – 250 words*

The results from the regression and WTP calculation reveal notable differences in preferences for various milk beverages between Canada and China. In Canada, the average WTP is highest for dairy milk, intermediate for almond and oat beverages, and low or negative for soy. In contrast, China, with its a long history of consuming soy beverages and a higher prevalence of lactose intolerance, showed the highest WTP for soy beverages, intermediate for almond and oat beverages, and low for dairy milk. The inclusion of added protein and organic labeling enhances the value of WTP for consumers in both countries.

The latent class analysis identified four distinct consumer segments in Canada and three in China. In Canada, except for 34% of the participants who are plant-milk enthusiasts, all others demonstrated a significant willingness to shift their preference from dairy milk to plant-based milk when provided with information on greenhouse gas (GHG) emissions. In China, half of the participants who prefer soy beverages and organic attributes were not sensitive to GHG information, while another third of participants who prefer dairy milk and protein showed a significant influence from GHG information.

The findings also highlight the importance of framing information. In Canada, a slightly smaller proportion of individuals were more sensitive to loss-framing, and the differences in household composition may explain this variation. In China, similar results were observed, with women and families with more children being more likely to be influenced by gain framing, while families with pregnant members were more likely to be influenced by loss-framing. These observations may reflect differences in risk preferences among individuals.

Discussion and Conclusion	*100 – 250 words*

Firstly, exposure to greenhouse gas emissions information will enhance willingness to pay for plant-based beverages. We also found that the variation in willingness-to-pay due to GHG varied by product, which raises concerns about exploring more consumer sensitivities to GHG for different foods in the future.

Secondly, consumers exhibit a higher willingness to pay for carbon reduction when exposed to avoid framing information, as compared to generate framing. In order to maximize the role of the exposure of environmental information, attention should be paid extra attention to the adoption of the strategy of gain framing. In particular, we note that there may be differences in the effect of framing on different beverages, which we believe is a key focus for future analysis.

Thirdly, we examine the difference in plant-based alternatives preference between Canada and China. Overall we find that Chinese urban consumers are more willing to pay for plant-based beverages, whereas the opposite is true in Canada. But for the framing messages, Canadians were affected more to choose the lower GHG beverage.

Overall, these findings provide insights into the preferences and WTP for milk beverages in Canada and China. The results suggest that promoting plant-based milk consumption as a sustainable alternative to dairy milk can be effective, but the specific factors influencing consumer behavior differ between the two countries. Understanding these differences and tailoring interventions accordingly can contribute to the development of targeted strategies for promoting sustainable and equitable dietary patterns in each context.

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