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**Consumer Perception and Purchase Behavior towards Plant-based Eggs: A Vignette Experiment**

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# Consumer Perception and Purchase Behavior towards Plant-based Eggs: A Vignette Experiment

## Background and Research Question

Current food systems, which encompass interlinked activities along food production and consumption, have a significant impact on the environment. Along with consumer's concerns on environment, consumers' growing interests related to animal welfare, health and nutrition motivates new food sources that are more sustainable than conventional foods. Accordingly, plant-based alternatives to meat, dairy, seafood, and eggs are gaining popularity over the decades in the United States. The plant-based food market is projected to grow faster than the overall total food market in terms of US dollar sales. While almost every category is growing, the plant-based eggs category is growing exceptionally fast with more than 1000% growth since 2019 (Good Food Institutes, 2021). Despite the growing trend in the plant-based eggs market, there is limited research regarding consumer behavior towards plant-based eggs. The majority of current literature on consumer behavior related to plant-based foods focuses on beef alternatives, such as burger patties. Previous studies have examined consumer preferences, willingness to pay, acceptance, and perception of plant-based meat. However, little is known for the case of plant-based eggs. As the popularity and interests of plant-based eggs grow among producers and consumers in response to the sustainability issue, it becomes crucial to comprehend the consumer behavior towards plant-based eggs and the factors influencing consumers' purchasing decisions. Within this context, the purpose of this study is to examine consumers' purchase behavior of plant-based eggs. This study investigated factors such as price, consumption location, and product form that affect consumers' likelihood to purchase plant-based eggs and the relative importance of those factors utilizing experimental vignettes. Additionally, we explored consumer perceptions of plant-based eggs. This study aims to answer the following research question; i) What factors (e.g. price, consumption location, product forms) affect consumers' likelihood to purchase plant-based eggs? ii) what are the relative importance of those factors? iii) what are consumers' perception towards plant-based eggs in relation to food attributes and nutrition?

## Methodology and Data

This study employed a vignette experiment approach to explore consumer behavior towards plant-based eggs. Vignettes refers to concise descriptions of a person or a social situation. Vignettes are a type of stated-preference experiment, similar to conjoint analysis, where individuals are asked to select or evaluate hypothetical profiles with featuring diverse attributes (Ben-Akiva et al., 2019; Ellison & Lusk, 2018). The strength of this methodology lies in its simplicity and straightforwardness. Survey questions could be challenging for some participants to answer, particularly when tasked with responding to abstract judgements or unfamiliar concepts. To address this challenge, a vignette methodology was proposed. Given the novelty of plant-based eggs in the market, consumers might not have fully developed or realized their attitudes and perceptions. By presenting a detailed and contextual scenario through a vignette, respondents could provide better and reliable responses. Data collection took place in May 2023 through an online survey facilitated by the web-based survey tool Qualtrics. Participants, recruited through Qualtrics Research Panel service, comprised a national representative sample of N=1,628. The survey incorporated an experimental vignette, manipulating three key variables – price, consumption location, and product form – across eight vignettes ( $2^3=8$ ). The base scenario presented as follows: “*Imagine you are planning to [eat breakfast at home; order breakfast at a restaurant]. You are considering [scrambled eggs; pancakes] that are made from plant-based eggs. The meal costs about [\$4.99; \$7.99]. How likely or unlikely would you be to purchase the product?*”

Adopting a between-subject vignette design, approximately 200 respondents were randomly assigned to one of eight vignettes, enabling comparisons across participants. The second part of the survey delved into consumers' perceptions towards plant-based eggs. Built upon a study by Taylor et al., (2022). the survey items for measuring consumer perception were developed. Consumer perceptions of foods are divided into

two categories, food attribute-related perceptions (e.g., taste, safety, price) and nutritional perception (e.g., calories, fat, cholesterol). Participants were asked to compare traditional eggs and plant-based eggs using a 5-point Likert scale. Lastly, the survey also captures socio-demographic factors, ensuring a comprehensive understating of consumers. Key variables included age, gender, education level, household composition, geographical location based on residency, income, and SNAP/WIC participation.

## **Analysis and Result**

To determine which attributes influence the purchase likelihood of plant-based eggs, we estimated an ordered logit regression, utilizing a scale likelihood question where 5 indicates “I’d definitely purchase” and 1 indicates “I’d definitely not purchase”. The Model 1 (base model), presented as follows.

$$\text{Purchase Likelihood} = \text{Intercept} + b_p * \text{price} + b_t * \text{product type} + b_l * \text{consumption location} \quad (1)$$

The result from the ordered logit regression revealed that both price and product type significantly impact consumers' purchase likelihood. Lower prices increased the probability of choosing plant-based egg products. Respondents exhibited a higher likelihood of purchase more processed product where plant-based eggs are consumed as an ingredient rather than the whole product. The location variable did not exhibit statistical significance. In Model 2, we expanded the analysis by introducing the interaction term between product type and consumption location to explore potential joint effects. The interaction term between location and product became statistically significant, indicating that consumers express lower willingness to purchase processed plant-based egg product at restaurants. Model 3 explored individual heterogeneity by incorporating socio-demographic variables. Age, race, residing area, political views, household size, having children, SNAP/WIC participation, and previous experience with the product were identified as significant determinants on consumer likelihood to purchase plant-based eggs.

The study also found that consumer generally perceived traditional eggs to be better than plant-based eggs in terms of food attribute-related factors and nutrition components. When it comes to food attributed-related factors, plant-based eggs were perceived more favorably regarding environmental impact and animal welfare. Prticipants perceived plant-based eggs as being better in terms of total fat and cholesterol, aligning with sustainability and health consideration.

## **Contribution and Discussion**

To our knowledge, this study is the first attempt to investigate the factors affecting consumer behavior towards plant-based eggs that involves quantitative analysis. The findings of this study shed light on the multifaceted factors influencing consumers' decisions regarding plant-based egg products. The implications of this study extend to various stakeholders in the food industry. For producers and retailers of plant-based eggs, understanding the factors that influence consumers' purchase decisions can help optimize marketing strategies. Price sensitivity and product type should be considered when targeting specific consumer segments. For example, introducing plant-based eggs as an ingredient in a favorite product may be a more effective way to encourage new consumers to try the product. Additionally, the significance of environmental impact and animal welfare in consumers' perceptions suggests that highlighting the sustainability aspects of plant-based eggs could be a key marketing strategy. Policymakers can also benefit from this study's findings, particularly concerning food environments. While the consumption location did not show significant impacts on purchase likelihood, the interaction between product type and location implies that interventions in food environments, such as restaurants and cafeterias, could influence consumer decision to choose plant-based options. Encouraging the availability of plant-based egg options in such settings may facilitate healthier and more sustainable dietary choices.

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