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How Consumers Make Sense of Hybrid Dairy-Based Foods: A Multistakeholder Qualitative Study

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ABSTRACT

This study employed a qualitative approach to investigate perceptions of hybrid products that combine dairy and plant-based ingredients. To this end, five virtual focus groups were conducted, involving different stakeholders related to the hybrid products market, including groups of omnivorous individuals, vegetarians, lactose-intolerant individuals, professionals working in the dairy processing industry, and professionals from the plant-based products industry. A semistructured script was used to guide—rather than constrain—the discussions, allowing the conversation to flow through various strategic themes without limiting participant contributions. The focus group methodology was grounded in the principle of enriching the information that emerges from interaction among individuals. Additionally, the sessions incorporated the projective word association technique, enabling participants to explore sensory expectations, product identity, labeling concerns, and regulatory perceptions of hybrid dairy products. The results showed that positive perceptions of hybrid products depend on clear communication, sensory appeal, and the healthiness conveyed to the consumer. While some individuals viewed hybrid dairy products as innovative and functional solutions, others questioned their naturalness or ethical coherence. Differences between groups highlighted the influence of dietary habits and professional context, and the findings deepen the understanding of consumer interpretations and inform strategies for the development and positioning of hybrid products.

1 | Introduction

The development of hybrid food products—those that combine animal- and plant-based ingredients—has emerged as a promising strategy in response to shifting consumption habits and the growing demand for more sustainable, healthier, and sensorially acceptable foods (Michel et al. 2021). Unlike conventional products, hybrids aim to incorporate perceived benefits from both food matrices—such as the nutritional value and familiarity of animal-based ingredients, combined with the perceived healthiness, innovation, and ecological appeal of plant-based components. This proposition gains relevance in a global context marked by environmental concerns, specific dietary needs, and the increasing role of identity-driven food choices (de Brito et al. 2025).

Practical Applications

- This study provides valuable insights for the development and strategic positioning of milk-based hybrid products.
- By understanding how different stakeholders interpret these products—whether as promising innovations, confusing propositions, or intermediate solutions—industries can refine formulations, labeling, and sensory attributes to better align with target audience expectations.
- The findings highlight the importance of clear communication regarding nutritional and environmental benefits, as well as the need to build a consistent product identity that avoids ambiguity.
- These insights can inform decision-making in research and development, marketing, and regulatory compliance within the context of alternative and sustainable food products.

Although the body of literature on plant-based substitutes for animal-derived ingredients and products is expanding, studies specifically focused on hybrid foods—that is, partial substitution—remain scarce, particularly from the consumer perspective. Furthermore, few works investigate, in an integrated manner, the multiple attributes influencing the perception of these products, such as sensory, symbolic, regulatory, and commercial dimensions (Curtain and Grafenauer 2019; Aschemann-Witzel et al. 2021). This gap is especially relevant considering that the acceptance of hybrid foods goes beyond the evaluation of nutritional functionality or perceived environmental benefits. Factors such as familiarity, naturalness, cultural values, and congruence between ingredients have proven decisive in consumer judgment (Onwezen et al. 2021).

Products that combine milk with plant-based ingredients—such as oats, coconut, or nuts—illustrate this complexity. In addition to raising doubts about flavor, texture, and compatibility, they also prompt questions concerning their regulatory classification, labeling, and market positioning (Profeta et al. 2021). Despite the anticipated growth of this market segment, little is known about how consumers perceive, interpret, and prioritize the attributes of these foods, especially in relation to their dietary profiles and consumption experiences. Such understanding is strategic not only for the food industry but also for the development of public policies, technical standards, and educational campaigns.

In this context, it becomes necessary to adopt approaches that capture the complexity of consumer attitudes, beliefs, and meanings attributed to hybrid products. This study aims to contribute to this understanding through a qualitative approach, focusing on the implementation of focus groups composed of participants with intentionally contrasting profiles: omnivores, vegetarians, individuals with lactose intolerance, professionals in the dairy industry, and professionals in the plant-based sector. The inclusion of stakeholders directly involved in the dairy and plant-based value chains broadens the analytical scope by incorporating technical, strategic, and market-oriented perspectives that directly influence the development and positioning of such products. Given that the acceptance of hybrid foods is shaped both by individual consumption experiences and by industrial decisions and marketing narratives, listening to these diverse agents allows for a more holistic and applied understanding of the phenomenon (Van Bussel et al. 2022).

The diversity of profiles involved enriches the discussion by simultaneously incorporating user and interpretative perspectives (emic and etic dimensions), enabling the investigation of acceptance factors from multiple viewpoints—from the end consumer to professionals responsible for formulation, regulation, and commercialization (Embling et al. 2022).

Additionally, the study stands out for its multidimensional character, as it explores how perceptions of hybrid products are articulated with sensory factors (appearance, flavor, texture), symbolic aspects (naturalness, food identity), regulatory issues (labeling, category definition), and market-related considerations (positioning, perceived functionality). By investigating intrinsic and extrinsic attributes as perceived by different stakeholders with varying motivations and relationships to the food system, this research helps to fill critical gaps in the literature on emerging foods, whose meanings and uses go beyond their nutritional composition. The adoption of focus group methodology is therefore appropriate for capturing collective representations, shared perceptions, and interpretative nuances that would be unlikely to emerge through traditional quantitative methods.

2 | Materials and Methods

2.1 | Images

The visual stimuli were developed exclusively for experimental purposes using the CANVA graphic design platform (Sydney, Australia, 2012). Eight fictional hybrid products were created, based on a previous study by our research group (de Brito et al. 2025), which identified yogurt and ice cream as the dairy products with the highest potential for hybrid development through consumer cocreation. Coconut and cashew plant extracts, the most frequently cited ingredients in that study, were incorporated into the hybrid product representations.

Stimuli included conventional (dairy-based) and hybrid versions (with coconut or cashew extracts) of yogurt and ice cream. All images were standardized with a neutral layout, free from brand logos, slogans, or persuasive cues. Text elements were uniform in font type, size, and positioning, varying only by ingredient composition.

This standardization aimed to minimize marketing-related bias and focus participants' attention on sensory expectations and compositional attributes. The images functioned as visual projective tools to elicit spontaneous associations, sensory descriptors, and perceptions of market positioning, in line with qualitative methods used to explore consumer attitudes toward novel food concepts (Esmerino et al. 2017; De Alcântara et al. 2023) (Figure 1).

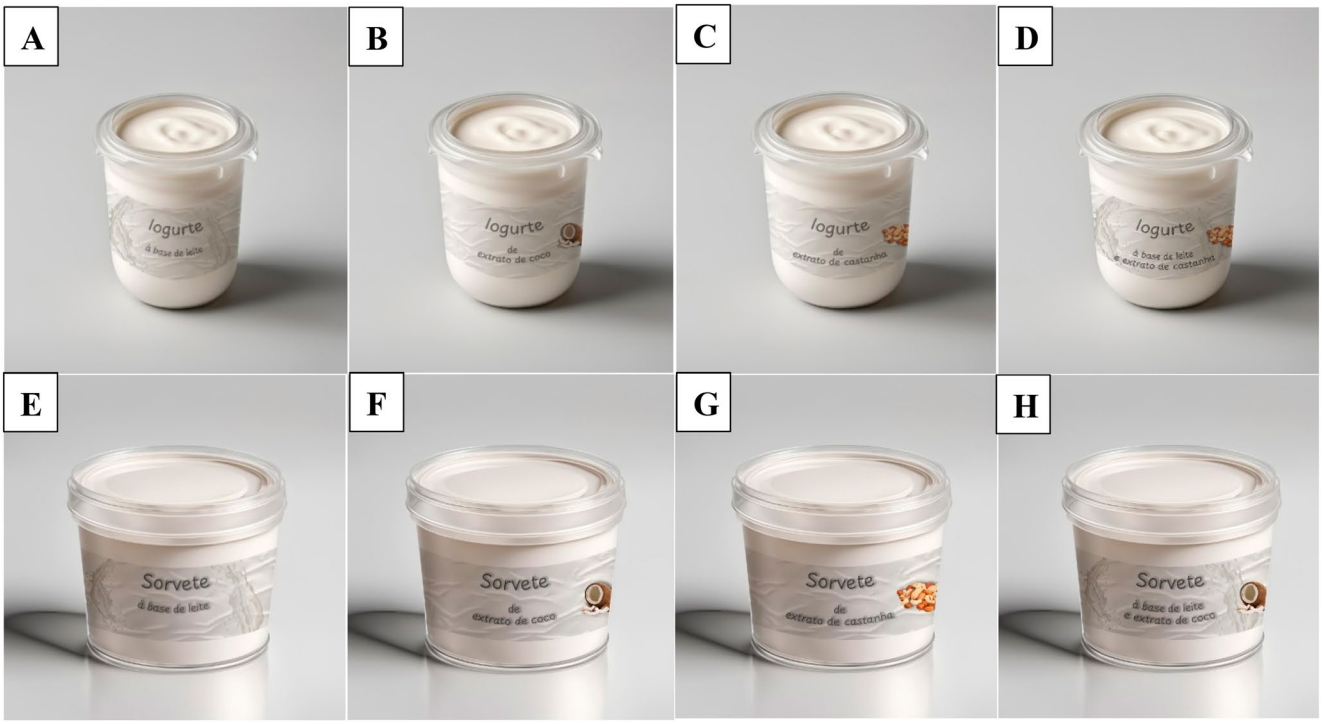

FIGURE 1 | Stimulus images used in the study: (A) plain yogurt with no added plant-based ingredient; (B) yogurt made from coconut extract; (C) yogurt made from nut extract; (D) hybrid yogurt made with milk and nut extract; (E) plain ice cream with no added plant-based ingredient; (F) ice cream made from coconut extract; (G) ice cream made from nut extract; and (H) hybrid ice cream made with milk and coconut extract.

TABLE 1 | Composition of focus groups according to dietary profiles and professional backgrounds.

Groups	Description	Participant (*n*)
Omnivores (ONI)	Consumers with no dietary restrictions	8
Vegetarians (VEG)	Individuals who do not consume meat but consume dairy products	8
Lactose-intolerant (INT)	Individuals with physiological lactose intolerance	8
Dairy industry professionals (LACT)	Professionals with experience in animal-based products	6
Plant-based industry professionals (PLANT)	Professionals working in the plant-based food sector	3

2.2 | Recruitment and Eligibility Criteria

This study adopted a qualitative, descriptive-interpretative approach using virtual focus groups to explore consumer perceptions, expectations, and representations related to dairy, plant-based, and hybrid products. Participants were recruited through digital channels (Instagram, Facebook, WhatsApp) and institutional and private email lists. The study was advertised as research on "new product development," intentionally omitting the specific focus on hybrid products to reduce self-selection bias. Eligibility criteria included: a minimum age of 18 years, regular consumption of dairy and/or plant-based foods, and availability to participate in online sessions. A combination of convenience and snowball sampling was used to ensure diversity of participant profiles. Participation was voluntary, unpaid, anonymous, and approved by the Ethics Committee of Universidade Federal Fluminense (CAAE: 79138824.0.0000.8160).

2.3 | Profile Selection and Focus Group Composition

Focus group composition was based on strategically defined profiles informed by the literature on food behavior and adoption of food innovations (Wendin and Nyberg 2021). Five homogeneous groups were formed according to dietary habits and/or professional affiliations, as detailed in Table 1. Internal homogeneity in dietary or occupational profiles was maintained to facilitate interaction and conversational comfort among participants (Acocella 2012).

Participants who expressed interest in joining the study were asked to complete a brief sociodemographic and dietary habits questionnaire. From this pool, individuals matching the predefined profiles (e.g., vegetarians, omnivores, professionals from the dairy or plant-based sectors) were randomly selected and later contacted to confirm their inclusion in the focus group

sessions. Each group included 3–10 participants, in accordance with best practices for virtual focus groups, ensuring both discussion depth and manageable moderation (Embling et al. 2022).

The proposed segmentation enabled the capture of both perceptions grounded in everyday consumption experiences (emic perspective) and interpretations informed by technical and strategic knowledge (etic perspective) (Embling et al. 2022).

2.4 | Conduct of Virtual Focus Groups

The focus group sessions were conducted synchronously via the Google Meet platform in December 2024 and followed a predetermined structure, as outlined in Table 2. Each session lasted approximately 90 min and was moderated by an experienced facilitator, assisted by team members responsible for recording observations and managing the stimulus materials. A semi-structured guide was used to support the discussions without constraining them, allowing for flexible exploration of strategic topics while encouraging participants to share spontaneous insights. This approach aimed to foster dynamic interaction and enrich the quality of information emerging from group dialog (Figure 1).

Activities began with the reading of the Informed Consent Form and a brief round of participant introductions. Participants then completed a short questionnaire via the virtual meeting chat, providing sociodemographic information (age, sex, education level, marital status) as well as details regarding their dietary habits and preferences. The general objectives of the study and the guidelines for the group discussion were then presented, with emphasis on maintaining a collaborative and nonjudgmental environment to encourage spontaneous responses.

The discussion was structured into three thematic blocks. The first block focused on dairy products. Participants completed a word association (WA) task by spontaneously evoking the first three words that came to mind when thinking of dairy products. This was followed by a discussion on perceptions of the concept of milk in light of current legislation (RIISPOA), personal experiences with lactose intolerance, and key decision-making criteria for choosing dairy products.

The second block addressed plant-based foods. Participants repeated the WA task, this time focusing on plant-based products, and discussed relevant attributes for their selection, comparisons with dairy products, and perceptions of sustainability and innovation in this segment.

The third block centered on hybrid products. Participants first engaged in a WA task focused on expected nutritional claims for such products. They were then shown visual stimuli composed of eight fictional images of hybrid products (yogurts and ice creams combining dairy and plant-based extracts), presented in randomized order across groups to mitigate sequence effects. Participants were invited to respond freely, describing presumed sensory perceptions, emotional reactions, possible product names, perceived barriers, and suggestions to improve market acceptance.

The choice of a virtual format was strategic, not only for logistical and geographical convenience but also for its potential to increase sample diversity, reduce social inhibition, and enhance the focus on verbal representations—an especially relevant aspect in research aimed at interpreting the symbolic dimensions of food categories (De Alcântara et al. 2023).

TABLE 2 | Stages of focus group sessions and activities conducted.

Session stage	Discussion points
Sociodemographic data collection	Welcome, introduction of the research team and participants, reading of the Informed Consent Form (ICF), and collection of sociodemographic data.
Perception of dairy products	Word association (WA): Mentions of dairy products; discussion on legislation, lactose intolerance, allergies, and dairy consumption.
Perception of plant-based products	WA: Mentions of plant-based products; discussion on sustainability and choice factors.
Perception of products	WA: Nutritional claims regarding hybrid products.
	Elicitation of attributes assigned to fictional images of conventional and hybrid products.

2.5 | Data Analysis

All focus group sessions were fully recorded and transcribed verbatim. The transcripts were subjected to thematic analysis following the approach proposed by Braun and Clarke (2006), which aims to identify recurring patterns of meaning in verbal data through the following systematic steps: (a) immersion and familiarization with the data; (b) generation of initial codes; (c) search for and grouping of semantically based themes; (d) theme review and refinement; and (e) definition, naming, and interpretative reporting of themes. The analysis was conducted collaboratively and interactively by three researchers experienced in qualitative research, ensuring analytical triangulation and enhancing the reliability of the findings.

Transcripts were manually coded and organized into thematic matrices to enable comparisons across different focus groups and participant profiles. The interpretation sought to integrate descriptive aspects (e.g., frequency and diversity of mentions) with interpretative elements (e.g., intensity, ambivalence, metaphors, and dilemmas), highlighting not only explicit content but also latent and symbolic meanings attributed to hybrid products.

In parallel, responses from the WA tasks were categorized based on frequency of occurrence and the semantic content of the evoked terms, using a minimum threshold of mentions by at least 5% of participants (de Andrade et al. 2016). Categories were

established by consensus among the analysts, based on thematic affinity, and visualized using word clouds generated with the WordClouds.com platform (Figure 2).

The integration of focus group discussions with WA responses enabled a multidimensional analysis that combined spontaneous perceptions, collective reflections, and symbolic interpretations—thus enriching the understanding of both sensory and nonsensory attributes most salient to different consumer profiles in relation to dairy, plant-based, and hybrid products.

3 | Results and Discussion

The analysis of focus group data was structured into three main topics: (1) participant profiles and the influence of sociodemographic factors; (2) perceptions and representations of dairy and plant-based products; and (3) perceptions and representations of hybrid products. These findings were complemented by the analysis of the WA task, which allowed for a deeper understanding of the cognitive representations associated with the food categories discussed.

3.1 | Participant Profile and Influence of Sociodemographic Factors

The focus groups included consumers with diverse dietary profiles—omnivores, vegetarians, and individuals with lactose intolerance—as well as professionals working in the dairy and plant-based industries. The majority of participants were female (69.7%), aged between 25 and 45, held a university degree (78%), and reported a strong interest in healthy eating (79%), as shown in Table 3.

Although no statistical correlation was performed between age, education level, and openness to innovation, some statements from the focus groups suggest generational differences in the acceptance of hybrid products. For example, a woman (VEG, 18–30 years) noted: "My mother wouldn't understand this product—she likes the usual milk. But I enjoy new things." This comment reflects a generational contrast in how food innovations are perceived, aligning with studies that highlight the influence of age and cultural familiarity on the adoption of novel products, as well as the role of traditionalism in food choices (Makowska et al. 2024).

Studies indicate that sociodemographic factors such as gender, age, and education level significantly shape consumer perceptions of functional and hybrid foods. For instance, women and individuals with higher educational attainment tend to place greater value on attributes such as naturalness, nutritional quality, and food safety when choosing functional products. Furthermore, women show greater interest in functional components and are more likely to consider health and well-being aspects in their purchasing decisions (Ares and Gámbaro 2007). These findings support the results of the present study, in which female participants with higher education levels expressed similar concerns regarding hybrid dairy and plant-based products. Likewise, Curtain et al. (2022) identified clear differences across countries in terms of openness to hybrids, with younger age, higher education, and partial adherence to plant-based diets (e.g., flexitarianism) being positively associated with greater acceptance.

3.2 | Perceptions and Representations of Dairy and Plant-Based Products

The data reveal that among the five groups analyzed—omnivores (ONI), vegetarians (VEG), lactose-intolerant individuals (INT), dairy industry professionals (LACT), and plant-based industry professionals (PLANT)—the most frequently mentioned dairy products were cheese (36.3%), yogurt (25.0%), milk (13.6%), and cream cheese (9.09%), as shown in Table 4. Products such as butter and strained curd (coalhada seca) were mentioned much less frequently, both at 2.27%.

The high incidence of mentions of cheese and yogurt can be understood in light of recent industry data. According to the Annual Report of the National Supply Company (Conab) and the Annual Industrial Survey (PIA), 2024 showed a recovery in the consumption of cheese and yogurt in Brazil, with estimated growth rates of 8% and 6%, respectively. This resurgence may explain participants' greater familiarity with these products, along with their wide availability and variety in the national market.

Regarding plant-based sources, soy and almond extracts were the most frequently cited (25.8%), followed by coconut extract (19.3%), and chickpeas, rice milk, cashews, and oats (6.45%), as well as Brazil nuts (3.22%), as shown in Table 4. However, unlike the range of specific dairy categories mentioned (such as cheese, yogurt, milk, and cream cheese), responses related to plant-based products were concentrated almost exclusively in the generic term "plant-based milk," distinguished only by the base ingredient (e.g., soy milk, almond milk, coconut milk). This limited variety of associations suggests a lack of consumer awareness about the existence or potential development of other plant-based products, such as plant-based analogs of yogurt, cheese, and desserts. This finding reinforces the importance of consumer education and the need to expand product offerings and communication in this segment.

On the other hand, the growth of the plant-based food market was also noted in some participant comments, particularly, in associations with healthier eating and environmental concerns. In the WA task, terms such as "healthy," "light," and "sustainable" emerged in reference to plant-based products, reflecting positive perceptions aligned with contemporary consumption trends. According to data from The Good Food Institute (GFI), this segment grew by 42% in Brazil, driven by shifts in eating habits, particularly, the reduction in animal product consumption and increased concern for environmental and animal welfare issues.

The main findings from the discussions on dairy and plant-based products during the focus groups were organized into a framework summarizing six thematic axes that frequently emerged in participant discourse: sensory and symbolic expectations, labeling and legislation, marketing, nutrients and functionality, sustainability, and affective memory (see Table 5). Each theme is accompanied by descriptions of the perceptions expressed by different participant profiles, as well as practical and conceptual implications for the development, regulation, and communication of hybrid dairy and plant-based products.

3.3 | Sensory and Symbolic Expectations

The discussion on hybrid products elicited ambivalent reactions among participants. While some expressed curiosity and interest in trying them, others responded with skepticism, confusion, or unease regarding the concept. This ambivalence was evident both in the WA task—with terms such as "strange," "confusing," and "different"—and in the group discussions, where participants voiced uncertainty about the identity and sensory performance of such products. One participant (VEG, female, 31–40 years) remarked: "It feels like something that's neither meat nor fish. I'm not sure my body would understand this." This hesitation may be linked to expectations triggered by product names and images that evoke familiar items, such as traditional milk, yet deliver distinct sensory characteristics. Literature suggests that food neophobia can negatively impact the acceptance of products perceived as unusual or ambiguous (Siegrist and Hartmann 2020).

Professionals from both the dairy and plant-based sectors, however, emphasized the potential of hybrid products as an innovative response to the demand for more sustainable and healthier foods. Participants expected sensory attributes such as creaminess, absence of vegetal aftertaste, and a mild flavor- especially in scenarios involving coffee consumption. Visual appearance was also cited as important, reflecting the sensory ideal associated with traditional dairy products.

In the WA task, terms such as "curious," "different," "mix," "healthy," and "strange" emerged, reinforcing the perception of ambiguity, particularly regarding the clarity of hybrid products' identity. Comparisons to familiar products, such as cow's milk or pure plant-based beverages, created a symbolic gray area that could hinder acceptance in the absence of a well-defined identity for these emerging products.

Battezzati et al. (2023), in a study on hybrid meat products combining chicken and plant-based ingredients, observed that sensory frustration frequently occurred when expectations of flavor and texture were not met during actual consumption. Similarly, participants in this study described situations in which terms like "plant-based milk" or the visual presentation of hybrids as direct dairy substitutes created specific sensory expectations that were not fulfilled. One participant (VEG, female, 31–40 years) noted: "The packaging looks just like cow's milk, so we expect it to taste like milk, but then it has this weird flavor, and people end up rejecting it." Another (INT, female, 18–30 years) added: "I was convinced it would taste amazing ... but it was awful." These statements highlight how the use of familiar terminology can activate specific sensory representations, which, if unmet, lead to consumer rejection. This underscores the importance of aligning sensory attributes with labeling and marketing discourse, avoiding implicit promises that may generate disappointment.

3.4 | Labeling and Regulation

Labeling and the use of the term "milk" for plant-based products were central topics in the discussions. Omnivorous participants (ONI) expressed concerns about the use of the term as a marketing strategy that could mislead consumers, particularly by creating the expectation of similarity to animal-derived milk. In contrast, professionals from the plant-based industry (PLANT) acknowledged that using the term "milk" serves a strategic function to ease cultural and commercial acceptance. One participant (PLANT, male, 41–50 years) stated: "I think using the word milk for plant-based beverages is more about marketing—to make it closer to what consumers are used to."

The use of the term "milk" raises regulatory and ethical issues. In fact, the Brazilian RIISPOA regulation defines milk strictly as a product of animal origin (Brasil 2017). Similarly, Regulation (EU) No. 1308/2013 restricts the designation "milk" to mammary secretions. Despite this, inconsistencies exist in Brazilian regulations—for example, the term "soy milk" is prohibited (RDC No. 91/2000), while "coconut milk" is permitted (RDC No. 83/2000)—generating confusion among consumers and producers.

Participants suggested alternatives such as "milk analog" or "plant-based beverage with dairy-like properties," emphasizing the need for clearer regulatory guidelines and consumer education. Likewise, De Alcântara et al. (2023)) found that in the context of UHT milk, the lack of clear information on stabilizers led many consumers to confuse them with preservatives, reinforcing mistrust. Such evidence highlights that labeling of innovative products must prioritize not only regulatory compliance but also accessible and transparent communication about ingredients and their technological functions. These observations are aligned with the ongoing debate on hybrid food labeling and the urgent need for clearer communication regarding their composition and purpose (Castellari et al. 2025).

The discussion on labeling expanded to include the role of marketing and symbolic language in shaping consumer perceptions. Participants acknowledged that using familiar terms such as "milk" is a marketing strategy intended to trigger instant recognition and facilitate acceptance, even when the products differ significantly in sensory and nutritional aspects. Omnivores voiced concerns about the potential manipulation of expectations by the industry, while plant-based professionals emphasized the need for accessible terminology to position their products closer to conventional dairy. One participant (PLANT, male, 41–50 years) summed it up by stating: "If the sensory experience isn't good, the product won't survive on the shelf."

The use of the word "milk" and packaging that evokes the dairy universe was understood as a symbolic strategy to transfer positive attributes—such as creaminess, healthfulness, and trustworthiness—to plant-based products, thereby enhancing their competitiveness at the point of sale. However, this symbolic familiarization process can lead to disappointment when sensory expectations are not met. According to Chan et al. (2024), linguistic familiarity is a key factor in generating positive expectations, even when they do not align with the actual product experience.

The 42% growth in Brazil's plant-based food market (GFI 2024) reinforces the notion that effective communication strategies shape preferences and attitudes. However, this also entails

greater ethical and educational responsibility, especially in the context of food innovation, where balancing commercial appeal with informational transparency is essential.

3.5 | Nutrients and Functionality

Nutritional composition was a recurring concern throughout the discussions, especially among participants with lactose intolerance. These individuals expressed interest in hybrid products as long as they were lactose-free and offered additional functional benefits. One participant (INT, female, 18–30 years) commented: "I can't tolerate lactose, so if there's an option that helps with digestion or has more protein, I'd definitely buy it."

Regardless of dietary profile, participants valued attributes such as high protein content, presence of calcium, absence of lactose, low fat content, and a natural appeal. The search for foods that combine the nutritional density of dairy with the functional benefits of plant-based ingredients reflects a trend already identified in the literature. According to Niva (2007), functionalist consumers tend to view food as a vehicle for health and well-being, prioritizing products that offer specific benefits aligned with their lifestyle.

During the WA task, participants highlighted key claims expected for hybrid products, as shown in Table 6: "high in protein" (20.0%), "low in fat," "low in sugar," and "flavor" (12.7% each), followed by "source of calcium" (10.9%), "source of fiber," "vitamins," "lactose-free," "natural," "organic," and "healthy" (1.8% to 9%). These results demonstrate that nutritional appeal is central to the value proposition of hybrid products.

A shared desire was noted among both LACT and PLANT groups for products that combine the most valued parameters from both domains: traditional dairy nutrients such as calcium and protein, and functional plant-based components such as β-glucans and magnesium. This expectation for nutritionally complete hybrids was recurrent among industry professionals, who emphasized the strategic potential of this combination for innovation in healthy food development.

However, concerns also emerged regarding how these nutrients are added. One participant (PLANT, female, 61 years) observed: "Plant-based beverages end up adding chemical calcium, which becomes a chemical ingredient, and in my view that affects acceptance." This comment reflects a tension between the appreciation for functionality and the desire for naturalness, especially when synthetic nutrient additives generate mistrust.

These findings point to a broader tension between the demand for natural products and the need for fortification, revealing regulatory and communication challenges. Previous studies on UHT milk have shown that consumers' lack of knowledge about additives such as stabilizers can negatively influence acceptance, even when such ingredients are technically necessary (De Alcântara et al. 2023). These insights contextualize the ambivalent reactions of participants in this study regarding the addition of synthetic ingredients in hybrid products, particularly when their function is not clearly communicated. Transparency about the origin and role of added ingredients may be decisive for consumer acceptance (Porpino et al. 2020).

International studies involving flexitarian consumers have shown that their involvement in the co-creation of hybrid products increases acceptance, especially when transparency regarding ingredient origin and functionality is ensured (Curtain et al. 2022). Although this study did not directly correlate education level with product acceptance, some participants expressed greater openness to hybrids when nutritional benefits and composition were communicated clearly and transparently. This suggests that active consumer participation strategies may be useful not only in the development stage but also in postlaunch communication, helping to align expectations and actual experiences.

3.6 | Sustainability and Environmental Appeal

Sustainability was identified as a relevant motivator for certain consumer profiles. Participants valued practices such as responsible water use, traceability, animal welfare, and organic production. Environmental concerns related to both animal and plant-based supply chains emerged as central factors in the acceptance of hybrid products. One participant (ONI, female, 41–50 years) remarked: "Soy uses a lot of pesticides—it contaminates the soil, water, and people... I'm not sure it's better than milk." Another participant (LACT, female, 31–40 years) stated: "I think it's really important for the industry to take action on sustainability to reduce environmental impact."

These comments reflect not only an appreciation for environmental attributes but also a degree of mistrust and lack of awareness regarding industry practices. Requests for greater transparency and clearer communication were frequent, suggesting that sustainability narratives must be more accessible, evidence-based, and capable of building consumer trust.

There was also criticism of intensive plant-based production, particularly soy, reflecting broader environmental and health concerns: "Soy uses a lot of pesticides—it contaminates the soil, water, and people" (ONI, female, 41–50 years). Such comments reinforce the need for sustainability narratives to be rooted in real practices and better communicated to consumers.

Additionally, some participants demonstrated limited knowledge of existing sustainability initiatives within the industry, indicating a need for enhanced transparency and environmental education. As one LACT group participant (female, 31–40 years) noted: "I think it's really important for the industry to take action on sustainability to reduce environmental impact."

The study by Brunin et al. (2022) reinforces that perceived sustainability is influenced both by concrete actions and how those actions are communicated. When well-informed, consumers are more likely to consider environmental attributes as decisive in their food choices.

Comparisons with other types of hybrid food innovations—such as cultivated and plant-based meats—reinforce a broader pattern: while consumers often value ethical and environmental attributes, they still prioritize flavor and sensory familiarity in their purchase decisions (Elzerman et al. 2023). These findings help explain why, despite perceiving hybrids as more sustainable, many Brazilian Focus Group participants remained

resistant when confronted with unfamiliar flavors, confusing labels, or unfamiliar additives. This indicates that sustainability appeal must be accompanied by convincing sensory performance and accessible communication.

Curtain et al. (2022) emphasize that flexitarian consumers—particularly young, college-educated women—tend to be more interested in products that combine flavor, health, and sustainability, which aligns with the profiles most open to hybrids in their study. Similarly, Elzerman et al. (2023) found that familiarity with plant-based foods and access to information are key determinants in the acceptance of hybrid and cultivated products. More informed individuals tend to rely less on appearance and more on nutritional and environmental arguments.

3.7 | Affective Memory and Symbolic Acceptance

Participants' accounts revealed a strong symbolic attachment to traditional milk, especially among members of the ONI group. Milk was frequently recalled as a staple of childhood, associated with family care and health. This affective memory creates significant barriers to the acceptance of plant-based or hybrid products that fail to align with such symbolic constructs. As one ONI participant (female, 41–50 years) stated: "I was raised drinking milk, so it feels very strange to think of anything else."

Conversely, consumers already accustomed to plant-based beverages showed less symbolic attachment to animal-based milk and greater openness to functional products, provided they meet sensory and nutritional standards. A VEG group participant (male, 31–40 years) remarked: "For me, milk is just anything white and nutritious. If it tastes good and is good for me, it doesn't matter whether it comes from a cow or from oats."

These statements illustrate that symbolic acceptance is linked to both tradition and innovation, requiring positioning strategies that consider both dimensions. For traditional consumers, the emotional bond with animal milk remains a strong validation reference. Meanwhile, for consumers more familiar with alternative foods, this symbolic construct can be redefined based on perceived benefits and positive sensory experiences.

According to Chan et al. (2024), symbolic and emotional attributes shape long-term food preferences, making it necessary for innovative products to "dialog" with such memories in order to foster affective engagement. This emotional connection can be strategically leveraged through labeling, advertising, and consumption experiences.

3.8 | Perceptions and Representations of Hybrid Products

In the WA task, participants were asked to list the first three words that came to mind when hearing the term "dairy–plant hybrid product." The most frequent words were: "strange," "curious," "mix," "healthy," and "different."

Omnivores and lactose-intolerant participants associated hybrid products with potential functionality and health benefits, while vegetarian participants used expressions such as "confusing," "doubtful," and "not for me," reflecting ethical and identity-based barriers. This contrast indicates that the acceptance of hybrid foods goes beyond perceived functionality and involves symbolic constructions and personal values.

According to Esmerino et al. (2017), projective techniques like WA can capture spontaneous reactions that reveal both positive predispositions and symbolic resistance. In this study, a VEG group participant (female, 31–40 years) stated: "'Mix' sounds messy to me—I'm not sure it fits." Meanwhile, an INT group participant (male, 31–40 years) commented: "Healthy, maybe ... if it's less processed than isolated plant products."

These reactions reflect an ambivalence that must be considered in product development and communication strategies: while some consumers view hybrids as a functional bridge between two worlds, others perceive them as a transgression of established food identities.

A semantic analysis suggests that hybrid products still lack a clear identity for consumers, being perceived at times as opportunities for innovation and at other times as artificial or confusing. This confirms the findings of Preece et al. (2021), who emphasize the need for a clearer brand narrative for hybrid products. The multiplicity of meanings highlights the importance of

FIGURE 2 | Word cloud of common terms found in responses to the open-ended question about claims made on hybrid products (dairy + plant-based).

TABLE 3 | Sociodemographic data of focus group participants.

Data	Total ($n=33$)	%	ONI ($n=8$)	VEG ($n=8$)	INT (n-8)	LACT ($n=6$)	PLANT ($n=3$)
Sex							
Male	10	30.3%	4	1	2	2	1
Female	23	69.7%	4	7	6	4	2
Age							
18–30	15	45.4%	1	5	6	2	1
31–40	8	24.2%	3	1	1	3	0
41–50	6	18.2%	1	2	1	1	1
51–60	2	6.06%	2	0	0	0	0
61 and over	2	6.06%	1	0	0	0	1
Marital status							
Single	18	54.5%	5	5	6	1	1
Domestic partnership	5	15.1%	0	2	0	3	0
Married	8	24.2%	2	1	2	1	2
Divorced	2	6.06%	1	0	0	1	0
Education level							
Completed high school	7	21.2%	0	2	2	2	1
Completed higher education (university degree)	12	36.3%	4	3	2	2	1
Completed postgraduate education	14	42.4%	4	3	4	2	1

assertive communication and consumer education in introducing such products to the market (Varela and Ares 2012).

Although Battezzati et al. (2023) did not directly apply a WA task, they observed that first impressions of hybrid products are strongly linked to the product's name and appearance, which activate a network of prior meanings in the consumer's mind (e.g., meat = flavor, satiety; plant = healthy, tasteless). This spontaneous relationship with symbolic attributes is analogous to what the WA task aims to capture. Initial perception directly influences the decision to try or reject a product. The study suggests that if the name or appearance of the product triggers an expectation that is not met by the sensory experience, it may lead to immediate rejection—closely relating to the role of symbolic language discussed in this research.

The use of the WA task proved effective in identifying consumer perceptions and emotional responses to hybrid products. In previous studies, Preece et al. (2023) found that after participating in cocreation activities for hybrid products, consumers began using more positively connoted words—such as "nutritious," "tasty," and "innovative"—and fewer negative ones like "artificial" and "tasteless." These results suggest that active consumer involvement in product development can improve perceptions and increase acceptance of hybrid foods. In the present study, the WA task similarly captured nuanced perceptions among participants, underscoring its value as a methodological tool for understanding symbolic expectations and valued attributes.

At the end of the focus group sessions, participants were invited to respond freely to eight fictional images of dairy–plant hybrid products. This exercise revealed a rich diversity of perceived attributes (Table 7), which were grouped into six main categories: nutritional, sensory, environmental, emotional, barriers, and symbolic appeals. These attributes reflect both positive expectations and latent resistance.

The perceptions evoked reveal a latent tension between innovation and familiarity, a theme that permeates the qualitative analyses throughout this thesis. The presence of terms such as "healthy," "chemical-free," and "good for the environment" reinforces that the sustainable and functional appeal of hybrid products is diffusely recognized among participants, particularly among lactose-intolerant individuals and professionals in the plant-based industry. This trend aligns with findings by Curtain et al. (2022) and Castellari et al. (2025), who identified a growing appreciation for hybrid products among consumers concerned with health and environmental impact.

However, symbolic and sensory barriers were recurrent. References to attributes like "gritty texture" or "vegetal taste" suggest resistance toward the sensory incongruence between expectation and experience. The spontaneous mention of expressions such as "hesitant to consume" and "I don't know these ingredients" also indicates uncertainty regarding the naturalness and transparency of components—especially among omnivorous or more conservative consumer profiles.

TABLE 4 | Frequency of terms mentioned during the WA task on dairy and plant-based products in focus group meetings by evaluated groups.

	ONI	VEG	INT	LACT	PLANT	TOTAL	%
Dairy products							
Cheese	3	3	4	4	2	16	36.3%
Yogurt	3	2	2	3	1	11	25.0%
Milk	1	2	1	1	1	6	13.6%
Cream cheese	2	1	1	0	0	4	9.09%
Dulce de Leche	0	0	1	1	0	2	4.54%
Dairy dessert	0	1	1	0	0	2	4.54%
Ricotta	0	0	1	1	0	2	4.54%
Ice cream	0	1	1	0	0	2	4.54%
Butter	0	0	1	0	0	1	2.27%
Labneh	0	1	0	0	0	1	2.27%
Plant-based products							
Soy extract	2	1	2	2	1	8	25.8%
Almonds	1	3	3	1	0	8	25.8%
Coconut milk	2	1	1	2	0	6	19.3%
Chickpeas	1	0	1	0	0	2	6.45%
Rice extract	1	0	0	0	1	2	6.45%
Cashew	0	2	0	0	0	2	6.45%
Oats	0	1	0	1	0	2	6.45%
Brazil nut	0	0	0	1	0	1	3.22%

Note: Only terms mentioned by at least 5% of participants were included.

The appearance of the product and the symbolism activated by the images strongly influenced emotional responses. Comments such as "The image suggests something light and natural, but I don't trust if it's real" (ONI, female, 31–40 years) and "It looks tasty, but seems like an expensive and complicated product" (INT, male, 18–30 years) show that visual judgments served as key mediators of product acceptance. This phenomenon is widely discussed in the literature on anticipated sensory expectations (Ares and Deliza 2010; Drigon et al. 2023).

Finally, environmental attributes (e.g., "reduces carbon emissions," "sustainable farming") were perceived as potential differentiators but not sufficient to overcome sensory frustration or compositional distrust. This reinforces the need to align sensory performance, objective functionality, and clear communication, as advocated by Siegrist and Hartmann (2020) and Elzerman et al. (2023) (Figure 2).

3.9 | Limitations

This study presents several limitations inherent to the sampling strategy and online format, such as the absence of nonverbal and expressive cues, which may restrict the capture of relevant communicative nuances. First, a potential self-selection bias must be acknowledged, as volunteer participants may have a greater interest in topics related to food and health. Additionally, although the smaller size of the PLANT group may have limited the diversity of perspectives within that segment, it is important to note that the number of participants was consistent with methodological best practices for focus group research.

Convenience and snowball sampling are nonprobabilistic methods widely used in qualitative and exploratory research; however, the limited representativeness and generalizability of the findings must be recognized. Another limitation concerns the use of virtual focus groups, which may have affected the spontaneity of interactions and restricted the expression of certain participants, particularly those less familiar with digital technologies.

Future studies may expand this approach to other regions, increase the sample size, and incorporate complementary quantitative methods.

4 | Conclusion

This study explored the perceptions of different consumer profiles regarding dairy, plant-based, and hybrid products through qualitative approaches such as virtual focus groups and the projective WA technique. The chosen methodology proved particularly effective for investigating an emerging and

TABLE 5 | Summary of focus group findings on hybrid dairy/plant-based products.

Theme	Observed perceptions	Research implications	Examples
Sensory expectations	Frustration with taste/texture of plant-based beverages; expectation of similarity to milk; experienced consumers adapt to the difference.	Importance of aligning communication and sensory development of hybrids.	"If the sensory quality isn't good, the product dies on the shelf" (PLANT, man, 41–50); "It seems like something that's neither meat nor fish" (VEG, woman, 41–50)
Regulatory aspects	Confusion between the legal concept of milk (RIISPOA) and commercial use; suggestions for new terms ("analog," "extract"); resistance to change from the industry.	Relevance of discussing regulation and providing clear, educational labeling.	"For that, the legislation needs to change. RIISPOA defines milk legally" (ONI, man, 61); "This is marketing trying to convince us it's the same" (PLANT, woman, 18–30)
Marketing	Strategic use of the term "milk" facilitates acceptance; product naming influences purchase decisions and culinary recognition.	Label language shapes consumer behavior and expectations.	"The big companies play a marketing game ... and people play along" (ONI, man, 51–60); "Animal protein companies are repositioning to meet new demands" (PLANT, man, 41–50)
Nutrients and functionality	Low nutritional knowledge among beginners; preference for lactose-free milk over plant-based drinks; some value calcium-fortified products.	Need for educational strategies and nutritional innovation in hybrids.	"I look at the ingredients, especially additives and sugar" (ONI, woman, 51–60); "Chemical calcium impacts acceptance" (PLANT, man, 41–50)
Sustainability	Perception that plant-based products are more sustainable; awareness of environmental impact of traditional agriculture; demand for more transparency and green certifications.	Environmental attributes can be a competitive advantage, but require clear and accessible communication.	"If it has less impact than regular milk, I'd try it" (VEG, man, 31–40); "Soy pollutes soil and water" (ONI, woman, 41–50)
Affective memory and acceptance	Strong emotional bond with cow's milk; plant-based milk seen as a functional, not emotional, substitute; difficulty accepting name changes for familiar products.	New hybrid products need to balance tradition and innovation to win over consumers.	"Milk is care, it's childhood" (ONI, woman, 31–40); "I prefer plant-based, I think the body absorbs it better" (VEG, woman, 18–30)

TABLE 6 | Frequency of nutritional claims during the WA task on hybrid products in focus group meetings by evaluated groups.

Nutritional claim	ONI	VEG	INT	LACT	PLANT	TOTAL	%
High protein content	2	2	2	3	2	11	20.0%
Low fat content	2	2	1	1	1	7	12.7%
Flavor	3	2	1	1	0	7	12.7%
Low sugar content	2	1	1	2	1	7	12.7%
Calcium source	1	1	1	2	1	6	10.9%
Fiber source	2	0	1	1	1	5	9.0%
Vitamin source	1	2	1	0	0	4	7.2%
Healthy	1	1	1	1	0	4	7.2%
Lactose-free	0	1	1	0	0	2	3.6%
Organic	1	0	0	0	0	1	1.8%
Natural	1	1	0	0	0	1	1.8%

multidimensional topic, allowing for the collection of rich qualitative data with broad geographic reach and participant diversity. The online format facilitated spontaneous and dynamic interactions and enabled the use of visual stimuli and projective tasks, such as free WA, which enriched the understanding of consumer representations of the products studied.

TABLE 7 | Attributes assigned to hybrid products based on the visual stimulus task.

Category	Mentioned attributes
Nutritional	Healthy, calcium source, protein source, fiber source, low-fat content, low sugar content
Sensory	Sweet taste, sour taste, dairy-like taste, cereal-like taste, creaminess, shiny appearance, grainy texture, vegetal taste, white color
Environmental/ symbolic	Chemical-free, sustainable cultivation, environmentally friendly, reduces carbon emissions, eases the conscience
Emotional/ symbolic	Life satisfaction, adopted for daily consumption, transitional food product, can be consumed by anyone
Perceived barriers	Fear of consuming, unfamiliar ingredients, confusing appearance, frustrated expectations

The results show that the acceptance of hybrid products is strongly influenced by sensory, symbolic, nutritional, and regulatory factors. The findings suggest promising opportunities for developing products that combine desirable attributes of traditional dairy (creaminess, protein content, calcium) with perceived benefits of plant-based ingredients (fiber, naturalness, sustainability). However, it is essential that such formulations consider the diversity of consumer expectations, avoiding the creation of sensory or nutritional promises that are not fulfilled during actual consumption.

From a marketing perspective, the findings underscore the importance of more transparent and context-sensitive communication strategies that balance innovation with familiarity. The use of the term "milk" to describe plant-based beverages was perceived as controversial—potentially aiding consumer acceptance but also generating frustration or regulatory and symbolic confusion. This highlights the need for better alignment between commercial labeling, current legislation, and consumers' actual understanding of these products.

From a regulatory standpoint, the results point to the urgency of revising and organizing the standards that govern the nomenclature, labeling, and nutritional claims of hybrid and plant-based foods. It is necessary to ensure that consumers are informed clearly, without misleading messages or interpretative gaps, while respecting both legal frameworks and the principles of responsible communication.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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