

Agriculture Practice

Novel proteins: Consumer appetite for sustainably made ingredients

Novel ingredients could shape the future of food—but are consumers willing to try (and pay for) them? Our survey on US consumer sentiment offers insights for formulators, brands, and retailers.

by Kimberly Stover, Kate Toews, and Roberto Uchoa



Ingredients made with biotechnology could play an important role in the future of food—and they're beginning to come to market. Over the past five years, \$4 billion has been invested to develop novel ingredients ranging from mycelium proteins to animal-free eggs.¹ These ingredients are made through fermentation to create proteins and fats that can function like conventional proteins, but they are animal-free and can be more sustainable.²

Novel ingredients offer the potential to decarbonize the food system, enable regional and global food security, and respond to increased demand from flexitarian consumers.³ However, because these products are new, there is limited insight into how consumers perceive them.

To shed light on the market potential for these ingredients, we conducted a survey of more than 1,500 US consumers (see sidebar, "About the survey"). The findings show that the majority of consumers appear open to try the range of ingredients tested and that more than half of consumers are willing to pay more for them. Our results reveal that to further increase consumer

adoption of novel ingredients, brands, retailers, start-ups, and investors can create categories and highlight specific product qualities on labels.

About the survey

We conducted a survey of a representative sample of 1,551 US consumers from all 50 states in February 2023. To qualify for the survey, respondents had to be the primary shopper for their household. Respondents were screened for their label-reading behaviors, with 70 percent of respondents certifying that they actively read labels. They were asked about their awareness of individual ingredient types, their reported experience of trying novel ingredients, and their openness and barriers to trying novel ingredients. They were also asked about their price perceptions and willingness to pay for products featuring novel ingredients, as well as how product descriptions and novel-ingredient category names resonated with them.

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¹ Sharyn Murray, "Catalyzing investment: Q3 2023," *The Alternative Protein Opportunity*, Good Food Institute, 2023.

² "Environmental impacts of alternative proteins," Good Food Institute, updated December 2023.

³ For more on flexitarianism, see Anne Grimmelt, Jessica Moulton, Chirag Pandya, and Nadya Snezhkova, "Hungry and confused: The winding road to conscious eating," McKinsey, October 5, 2022.

A brief overview of novel ingredients

Novel ingredients, such as animal-free dairy, cultured proteins, and mycelium proteins, may play a significant role in the future of food thanks to their potential ability to secure and decarbonize food systems. Over the past five years, there has been an increase in invested capital and regulatory approvals. While commercial products are still limited, a number of consumer packaged goods (CPG) companies and start-ups have launched their first novel-ingredient products in the United States.

These ingredients are fermented—including processes in which microorganisms are genetically programmed to produce specific compounds (precision fermentation) or are grown and harvested whole (biomass fermentation). Because they are grown in bioreactors, fermented novel ingredients can have lower emissions than traditional animal-based proteins and can be produced even in areas that are not traditionally agriculturally productive.⁴ However, despite novel ingredients' potential impact, industry shapers have limited insight on consumer appetite for them.

For our research into consumer perceptions of novel proteins, we identified and tested 12 ingredients. We chose to classify these ingredients according to three descriptors that could be applied to these products:

- *Animal-free bioidentical products (dairy protein, collagen, and eggs)*. These are biologically identical to animal proteins and are made via precision fermentation.
- *Biomass proteins (prebiotic, cultured, postbiotic, fermented, microbial, and gas-fed)*. These proteins are derived from microorganisms and are typically new to human consumption.
- *Fungi proteins (nutritional fungi protein, mycelium protein, and mycoprotein)*. These are derived from organisms in the fungi kingdom, most often as edible single-cell organisms.

We also examined plant-based proteins (almond, oat, chickpea, soy, pea, and barley) for benchmarking purposes, but they are not the focus of this research because they are already established in the market.

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⁴ "Environmental impacts," updated December 2023.

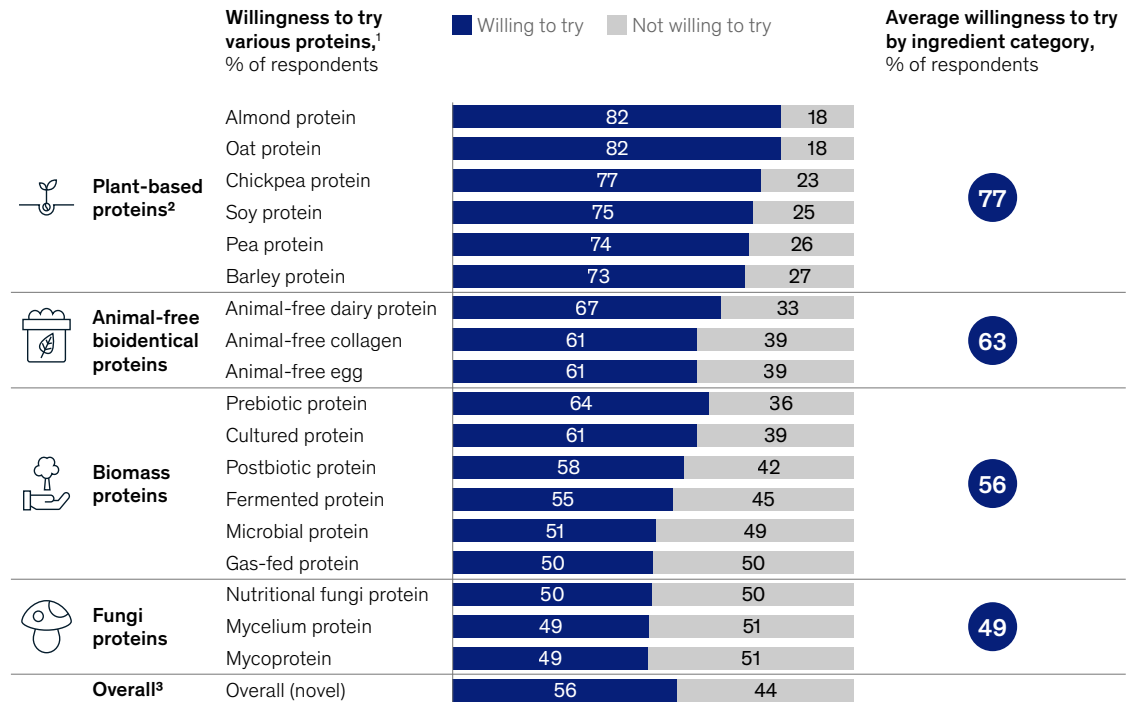
Most consumers are open to trying novel ingredients

The majority of consumers (from 49 to 67 percent, depending on the ingredient) reported that they were open to trying food or drinks that featured novel ingredients, driven by the perception that such ingredients can improve upon traditional foods by being healthier, having better or the same taste, and being sustainable (Exhibit 1).

On average, 28 percent of respondents would be more willing to try a novel ingredient if it made a product healthier, with Gen Z (age 18 or older) reporting the highest degree of importance for health. For older generations, taste was cited to be more important.

Exhibit 1

A majority of consumers have expressed a willingness to try at least one novel protein ingredient in their food or drinks.



¹Question: How open would you be to trying foods and beverages that contain these protein ingredients?

²Included for benchmarking purposes; plant-based proteins are not considered novel proteins.

³Excludes plant-based proteins.

Source: McKinsey Novel Ingredient Survey 2023, n = 1,551

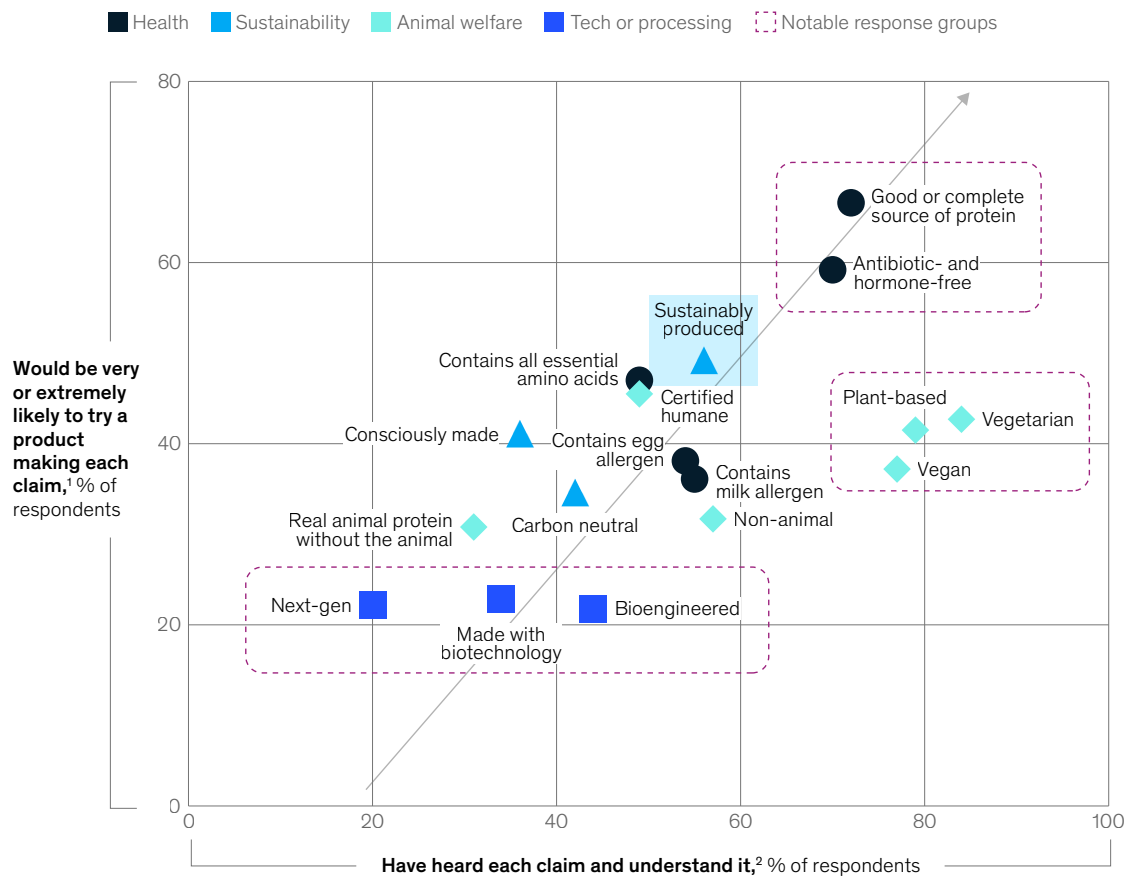
We also tested descriptions of novel ingredients that could be put on a product label or package to see what appealed most to consumers. We found that familiar terminology and well-understood nutritional statements about potential health impacts (such as “good or complete source of protein”) are most compelling, followed closely by statements that communicate environmental impact (such as “sustainably produced”) (Exhibit 2). Vegetarian and vegan language is well understood but does not appear to significantly drive the trial of products, and language about production methods (for example, “bioengineered” or “made with

biotechnology”) is not as well understood and does not drive trial with consumers.

Among respondents, 44 percent were uninterested in trying any of the novel ingredients explored in this survey. Unwillingness to try was most strongly correlated with lack of awareness or questions regarding production (“how it’s made”). Concerns about taste, naturalness, and price closely follow. Higher-income (more than \$100,000 per year) consumers stated greater doubts about long-term health effects (33 percent).

Exhibit 2

Statements that highlight that products are vegan, vegetarian, or made with biotechnology do not drive high rates of willingness to try.



¹Question: How likely would you be to try a product with these claims on the package?
²Question: From the product claims listed, what is your understanding of each claim?
 Source: McKinsey Novel Ingredient Survey 2023, n = 1,551

Midday food options significantly increase consumers' willingness to try novel ingredients

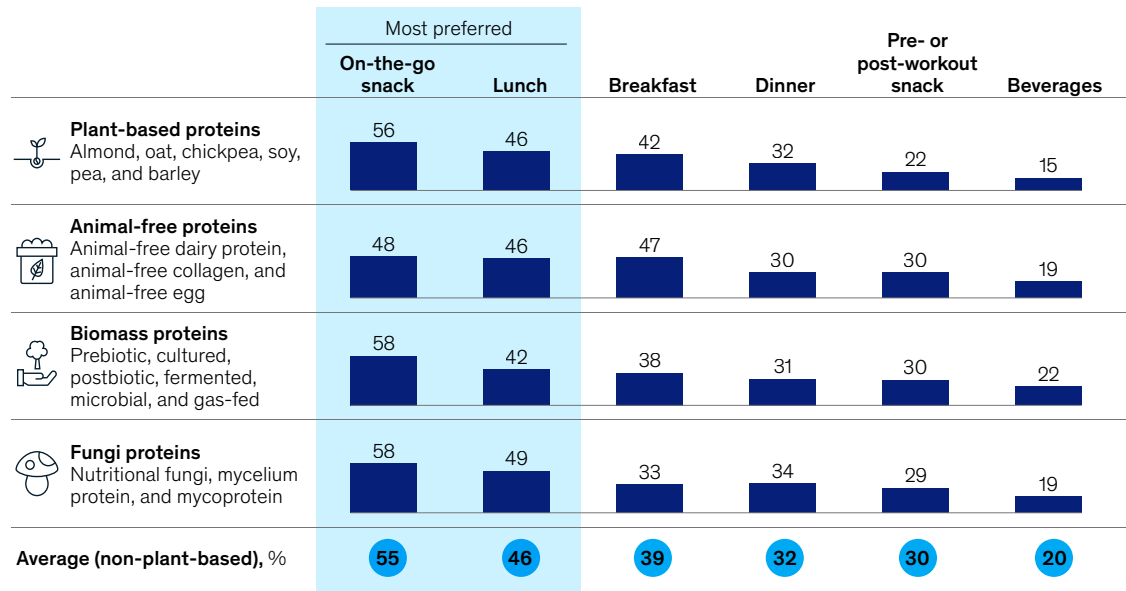
Consumers are willing to try novel foods more at different meals and times of day, with much greater openness to trying them at lunch and in on-the-go snacks (Exhibit 3). They are less willing to try novel

ingredients at dinner, a trend that has been seen in the market over the past several years as meat analogs have continued to struggle to deliver on consumer preferences. As innovators develop new products in the coming years, brands may choose to focus on snack, lunch, and (to a lesser degree) breakfast foods while potentially avoiding center-of-plate dinner proteins.

Exhibit 3

Consumers are more interested in trying novel ingredients on the go as a snack, at lunch, or at breakfast than at other meals or times.

Times of day when respondents would be most interested in trying products made with various protein sources, % of respondents



Source: McKinsey Novel Ingredient Survey 2023 (n = 1,417)

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About half of consumers express willingness to pay more for novel ingredients

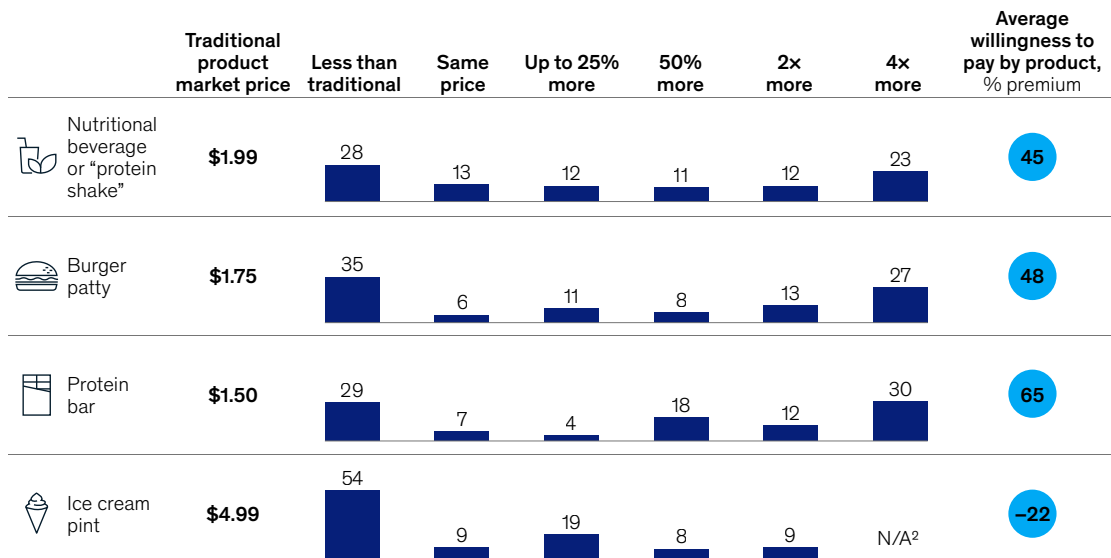
More than one-fifth of respondents were willing to pay four times as much for products if they featured a novel ingredient (Exhibit 4).⁵ Respondents' willingness to pay for novel ingredients did not vary significantly across ingredient type, but it did vary

based on the product type and the channel. For example, consumers were more willing to pay for beverages, snacks, and burgers (compared with ice cream, egg sandwiches, and cookies) and for retail and CPG concepts (compared with food service). This is particularly interesting because out-of-home consumption has been a key driver of the alternative-meat category.

Exhibit 4

More than half of consumers are willing to pay more for products with conventional price points below \$2 that contain novel ingredients.

Premium respondents would be willing to pay for a [product] featuring [novel ingredient category]¹ whose conventional version costs about [\$X] per pound, %



¹ Respondents were asked about one of three categories: plant-based (presented as "plant-based proteins [eg, pea protein, soy protein, chickpea protein]"); animal-free (presented as "bioidentical animal proteins [eg, animal-free dairy protein, animal-free egg protein, cage-free vegan egg protein]"); and biomass, fungi, and others (presented as "novel proteins [eg, postbiotic protein, cultivated protein, fermented protein]"). Only animal-free and biomass, fungi, and others are included in this analysis (plant-based is for reference).

² A maximum selection of \$10 was allowed.

Source: McKinsey Novel Ingredient Survey 2023 (protein shake, n = 892; burger patty, n = 1,052; protein bar, n = 1,055; ice cream, n = 1,180)

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⁵ Prices for foods containing novel ingredients were compared to food and drinks traditionally priced below \$2.

Is ‘sustainably made’ the new ‘plant-based’?

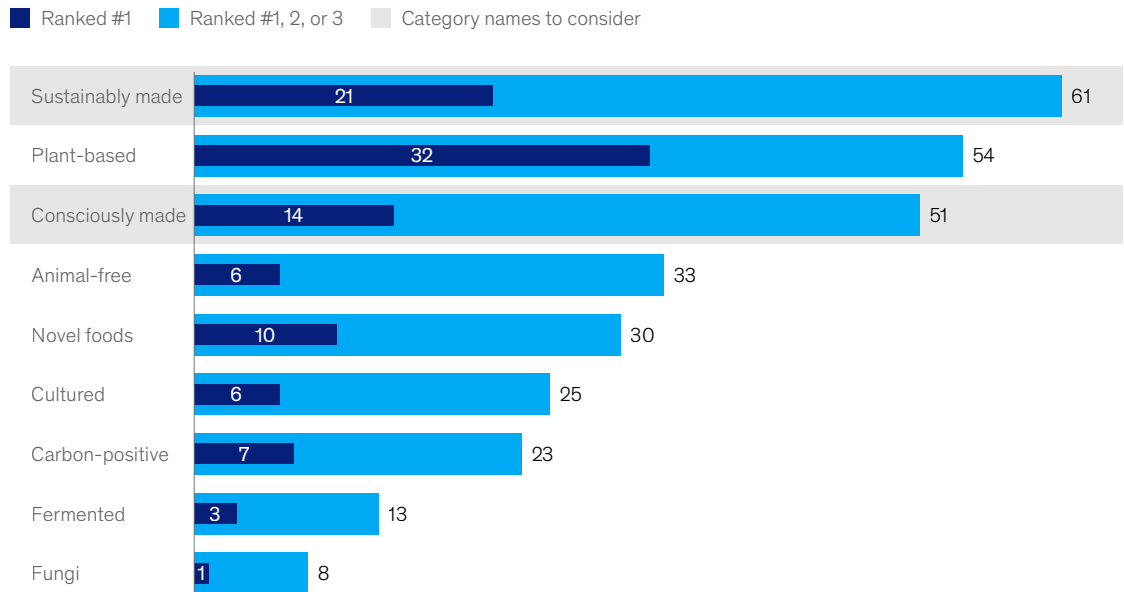
As sales in the “plant-based” category have declined over the past two years,⁶ some retailers have searched for new innovations that could appeal to consumers. For our survey, we examined a variety of category names that could represent this

range of novel products on shelves. Of the category names we tested, “sustainably made” appears to appeal most to consumers, followed by “consciously made” (Exhibit 5). By contrast, “fermented” and “fungi” labels were less likely to drive consumer adoption, which may indicate consumers need further education about these category labels.

Exhibit 5

For novel ingredients, new category names—notably ‘sustainably made’ and ‘consciously made’—could capture consumer attention.

Aisle or department names that would catch respondents’ attention or motivate them to shop that section, % of respondents



Source: McKinsey Novel Ingredient Survey 2023 (n = 1,551)

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⁶ McKinsey analysis of Nielsen data.

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Takeaways for the food industry

Many of the novel ingredients we asked consumers about have not yet been commercialized at scale. As the industry matures, brands, retailers, start-ups, and investors have an opportunity to shape this emerging category through the following considerations:

- *Consumer education.* Less than half of consumers indicated awareness of novel ingredients, and “unsure of how these ingredients are made” was the largest barrier to trial. Stakeholders across the food industry may consider investing in consumer education as novel ingredients begin to come to market. While consumers did not prefer language about production methods on package labels, they were more likely to try a product if it was recommended by a doctor, nutritionist, or other professional (44 percent said they would be more likely to try) or by family and friends (27 percent).
- *Health, taste, and sustainability.* As has been the case with other alternative proteins, consumers believe novel proteins should be healthier than conventional animal sources, and they are more likely to eat proteins that are. Some novel ingredients taste similar to animal-derived sources, which could increase adoption as food

offerings are developed that are comparable or present desirable alternatives to the taste and texture of traditional products.

- *Innovation.* A thoughtful approach to innovation that prioritizes the end application and channel could increase consumer adoption potential. To increase consumer trial, manufacturers, brands, and food service operators can prioritize launching end products for breakfast, lunch, and snacks. Similarly, blending familiar terminology such as “a good source of protein” with emerging language such as “sustainably made” may encourage trial for consumers who care about health and environmental factors.
- *Willingness to pay.* We did not see a significant gap in willingness to pay based on the type of ingredient, despite varying levels of awareness and trial. Consumers stated that willingness to pay was more closely linked to the category than it was to the type of protein used in the food, signaling that the underlying technology—even if new to human consumption—may not be a strong barrier.

By understanding how consumers perceive novel ingredients, biotech start-ups, brands, and CPG companies can shape this emerging market to help contribute to building a more sustainable and resilient food system.

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