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Taste of the Industry 2024

A Sensory Analysis of Plant-Based Meats

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Forward

While food choices are complex, global food consumption is largely built on the principle that “taste is king.” Since taste is a primary purchase driver, the plant-based foods industry is hyper-focused on achieving taste parity with animal-based foods. However, this pursuit raises a fundamental question: “What is the standard for taste?” and, consequently, “How will we know when we’ve achieved it?”

Enter **NECTAR**, a new initiative bringing an evidence-base to taste.

NECTAR is an initiative from Food System Innovations (FSI), a philanthropic impact platform that funds and creates efforts to accelerate the protein transition toward a more humane and sustainable food system.

NECTAR stands on three operational pillars:

LEARN by conducting large-scale, blind sensory analyses of alternative protein products.

SUPPORT brands and manufacturers in accelerating product development with relevant sensory data.

CELEBRATE great-tasting products and categories by elevating their culinary credibility, expanding their distribution opportunities, and ultimately driving broader consumer adoption.

NECTAR’s inaugural 2024 State of the Industry report is the world’s first and largest public sensory analysis of plant-based meats. The report synthesizes insights from sensory panels with omnivores evaluating 54 plant-based meat products and provides categorical and competitive insights, consumer satisfaction data, and specific R&D opportunities to inform and empower decision-makers across the food value chain.

As you explore this report, we invite you to share your experience with us. Your generous feedback will help NECTAR continue to deliver actionable insights and category-level value to drive large-scale consumer adoption of alternative proteins.

Together, we can achieve our vision of a world where doing good tastes great.

Caroline Cotto
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Survey Overview

Current context

Taste is the primary purchase criteria for all food products in the United States, with nearly nine out of ten Americans saying taste has a high impact on their food purchasing decisions.[1] Over the years, plant-based meat products have faced a considerable taste barrier to broader market adoption. The Food Industry Association has researched consumer attitudes with Kroger's analytics arm 84.51° and the Plant-Based Foods Association. They found that "taste is the most frequently mentioned reason for repeat consumption and the leading barrier to trial of plant-based alternative foods and beverages."[2]

Our approach

Food System Innovations (FSI) conducted blind sensory panels to get an objective view of how plant-based meat products taste today across five main categories: burgers, hot dogs, bacon, tenders, and nuggets. Using animal-based product benchmarking, the results of this survey provide a perspective into competitive positioning and R&D opportunities to better align the taste profiles of plant-based analogs with their animal-based counterparts.

FSI plans to repeat this survey annually and increase both the number of categories and the number of products within each category tested.

If you have any questions or would like to discuss this research further, please contact **caroline@fsi.org.**

1. International Food Information Council. 2023 Food & Health Survey. 23 May 2023. https://foodinsight.org/2023-foodhealth-survey/
2. Food Business News. "Taste remains a problem for many plant-based foods." 14 Sept 2023. https://www.foodbusinessnews.net/articles/24658-taste-remains-a-problem-for-many-plant-based-foods .

Nomenclature

Plant-based meats	Plant-based meats refer to food products created to mimic the taste, texture, and nutritional profile of traditional animal-based meats but made directly from plants.
Blended meats	Blended products are food items that combine both plant-based and animal-derived ingredients in varying proportions. These products aim to merge the sensory attributes, nutritional benefits, and taste profiles of plant and animal sources.
Plant-based leader	The product in each category that performed the highest in ‘average liking’/overall satisfaction.
Plant-based average	The averaged overall satisfaction for each product category (i.e. category-level, not product-level, taste performance).
Animal-based benchmark	Performance of the animal-based product tested provides a benchmark against which to compare all plant-based products, the plant-based leader, and the plant-based average.

Note: The term ‘plant-based’ is used throughout this report, however three products tested were ‘vegetarian’ as they included some animal-derived ingredients (e.g. eggs and/or milk).

Study Design & Methodology

Food System Innovations partnered with Precision Research to conduct hybrid quantitative monadic blind taste tests and qualitative breakout focus groups at Precision's Chicago-based research center between June and August, 2023.

An array of sensory parameters were considered in the sampling process, including:

- ✓ Purchase intent
- ✓ Liking
- ✓ Flavor
- ✓ Texture
- ✓ Appearance
- ✓ Category specific attributes

Plant-based product selection criteria were based on popularity, availability (i.e. distributed in-market at the time of the test), and similarity to analog animal offerings (i.e. veggie burgers made from whole plants were not included, whereas plant-based burgers aiming to mimic the eating experience of animal-based burgers were included).

Conventional animal product selection criteria were based on popularity and availability.

All products tested were evaluated by a representative sample of at least **100 omnivores in a test kitchen** and handled, stored, and prepared according to the manufacturer's instructions without adding salt or seasonings. Various cooking equipment (e.g., skillet, grill, microwave), temperatures, and cook times were used to adhere to manufacturer instructions.

Objectives

Measure consumer satisfaction with plant-based analogs across product categories

- Overall liking and purchase intent for plant-based products
- Spread between the average plant-based product and the leading plant-based product in each category
- Comparison between burgers, hot dogs, bacon, chicken nuggets, and chicken tenders

Evaluate competitive positioning relative to animal-based products

- Overall liking and purchase intent for animal-based products
- Spread between the average plant-based product, plant-based leader, and animal-based product
- Comparison of the gap between plant-based and animal-based products

Identify and prioritize R&D opportunities for plant-based analogs

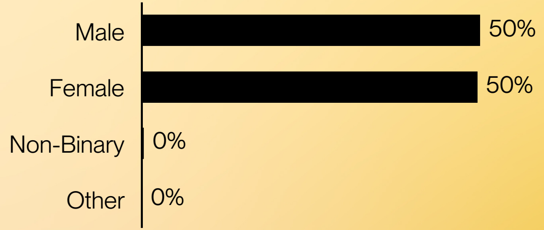
- High-level gaps across flavor, texture, and appearance tied to impact on overall liking
- Prevalence and impact on overall liking for each sensory sub-dimension
- Prioritization of opportunities based on impact on overall liking

1. International Food Information Council. *2023 Food & Health Survey*. 23 May 2023. https://foodinsight.org/2023-food-and-health-survey/
2. Leiserowitz, A., Ballew, M., Rosenthal S., & Semaan, J. (2020). *Climate change and the American diet.* Yale University and Earth Day Network. New Haven, CT: Yale Program on Climate Change Communication.

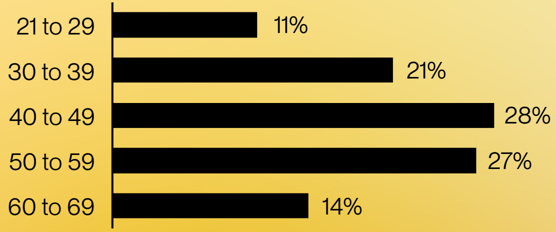
Study Population

Demographic overview of participants — a representative sample of omnivores (N=1,150)

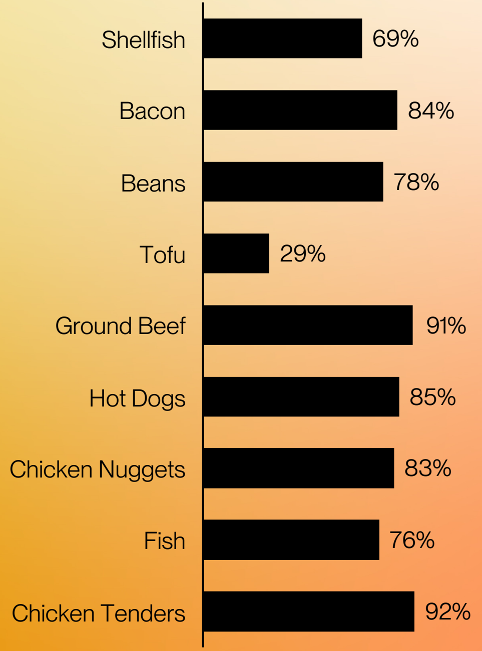
Gender, % of participants



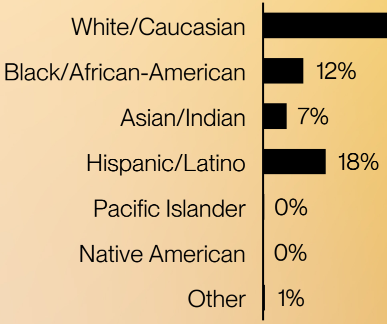
Age, % of participants



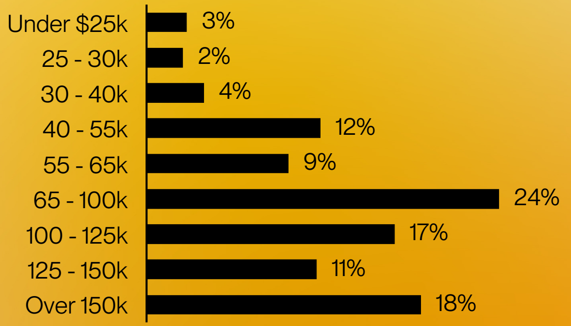
Proteins consumed, % of participants



Ethnicity, % of participants



Income, % of participants



Executive Summary

Consumer Satisfaction

Many consumers are satisfied with the leading plant-based products but are still demanding more from the average plant-based product.

- **Plant-based leaders are liked by a meaningful share of consumers** – 37-53% rated the plant-based leader as 'like very much' or 'like' (excluding hot dogs).
- **There is high variation in liking within and across categories** – there was a wide range in liking within categories, breaded products were generally higher-rated, and hot dogs far underperformed other categories.
- **The blended burger leader achieved significantly higher liking than the leading plant-based burger** – average liking for the blended product was half of a rating higher than the plant-based leader ($p<.1$).

Competitive Positioning

Plant-based leaders are close to, or beyond, taste parity with animal products, but there's a larger gap for the average plant-based product.

- **Leading plant-based products are generally comparable or preferred to the animal** – plant-based nuggets are preferred while bacon, burgers, and tenders are within roughly one 'liking' rating of the animal product (however, hot dogs are still far behind).
- **The average plant-based product is meaningfully behind the animal product** – average liking was 2 rating levels beneath the animal (e.g., 'like very much' -> 'like somewhat').

R&D Opportunities

Plant-based products have clear opportunities to improve.

- **Improvement is feasible** – plant-based leaders were rated 'like very much' or 'like' 2-3x as often as their category average and showed significant outperformance across almost all sensory dimensions.
- **Plant-based products should strive for 'bolder' profiles** – participants demanded bolder profiles (e.g., meatier, saltier, juicier), a common area of relative strength within the category for the plant-based leader.

Key Stakeholders

Food System Innovations

FSI is non-profit organization on a mission to create and fund high-impact efforts to remove animals from industrial food systems.

Palate Insights

Product feedback platform pioneering authentic, affordable, and agile tools exclusively for the sustainable food industry.

Palate helps companies get consumer feedback through pop-up events with their restaurant and grocer partners and chef feedback through their panel of 150+ Executive Chefs.

Precision Research

Precision Research functions as both a marketing research consulting firm and as a data collection company, administering surveys to consumers and industry decision makers.

Its efforts help companies to create and improve products and services based on what the market desires.

Consumer Satisfaction

Executive Summary > Consumer Satisfaction

Plant-based Leader

Plant-based leaders are liked by a meaningful share of consumers.

- **Plant-based leaders are appealing to a significant portion of the market** – 37-50% rated the leader as 'like very much' or 'like' (excl. hot dogs).
- **The leading plant-based chicken tenders are the highest performing meat analog** – 29% rated them 'like very much' (versus 16% or less for other categories).
- **There is whitespace in hot dogs** – only 11% of participants rated the leader 'like very much' or 'like' compared to 37-53% of participants for other product categories.

Plant-based Average

Consumers do not yet 'like' the average plant-based product.

- **Consumers do not yet 'like' the average plant-based product** – average liking across all categories tested ranged from 'neither like nor dislike' to 'dislike'.
- **Breaded products generally outperform unbreaded products** – 35% rated them 'like very much' or 'like' (versus 16% of participants for unbreaded products).

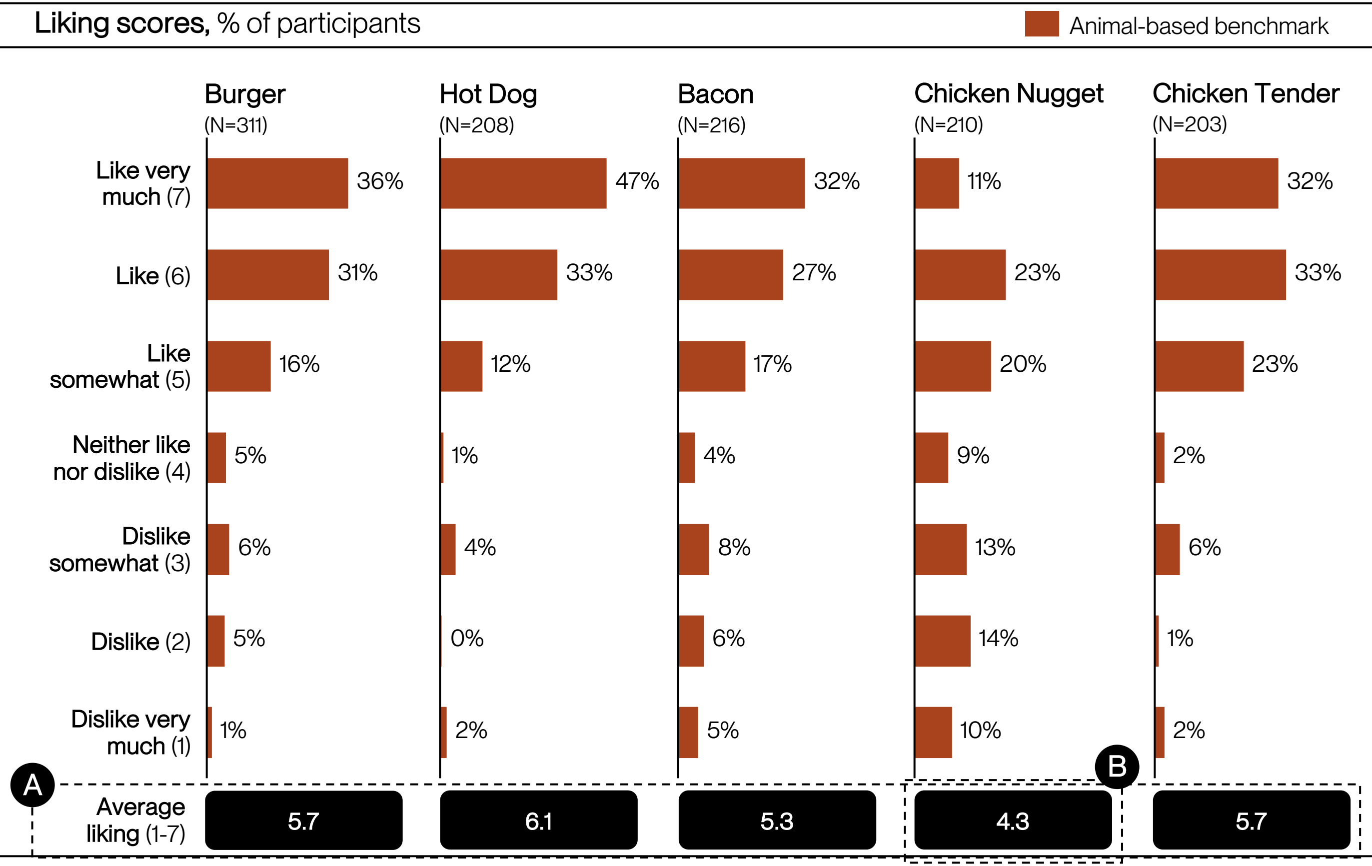
Relationship Between Liking & Purchase Intent

High 'liking' is needed to translate into purchase intent.

- **Products should strive to be 'liked very much'** – purchase intent dips below 'probably would buy' when ratings fall from 'like very much' to 'like'.
- **Products with moderate liking will not attract customers** – ratings of 'like somewhat' and 'neither like nor dislike' result in neutral to negative purchase intent.

Satisfaction with animal-based products

Liking scores, % of participants



Takeaways

A Consumers generally like animal-based products, but aren't in love with them.

- Excluding chicken nuggets, animal-based products score on average between 'like somewhat' and 'like'.

B There is immediate opportunity to displace animal-based chicken nuggets.

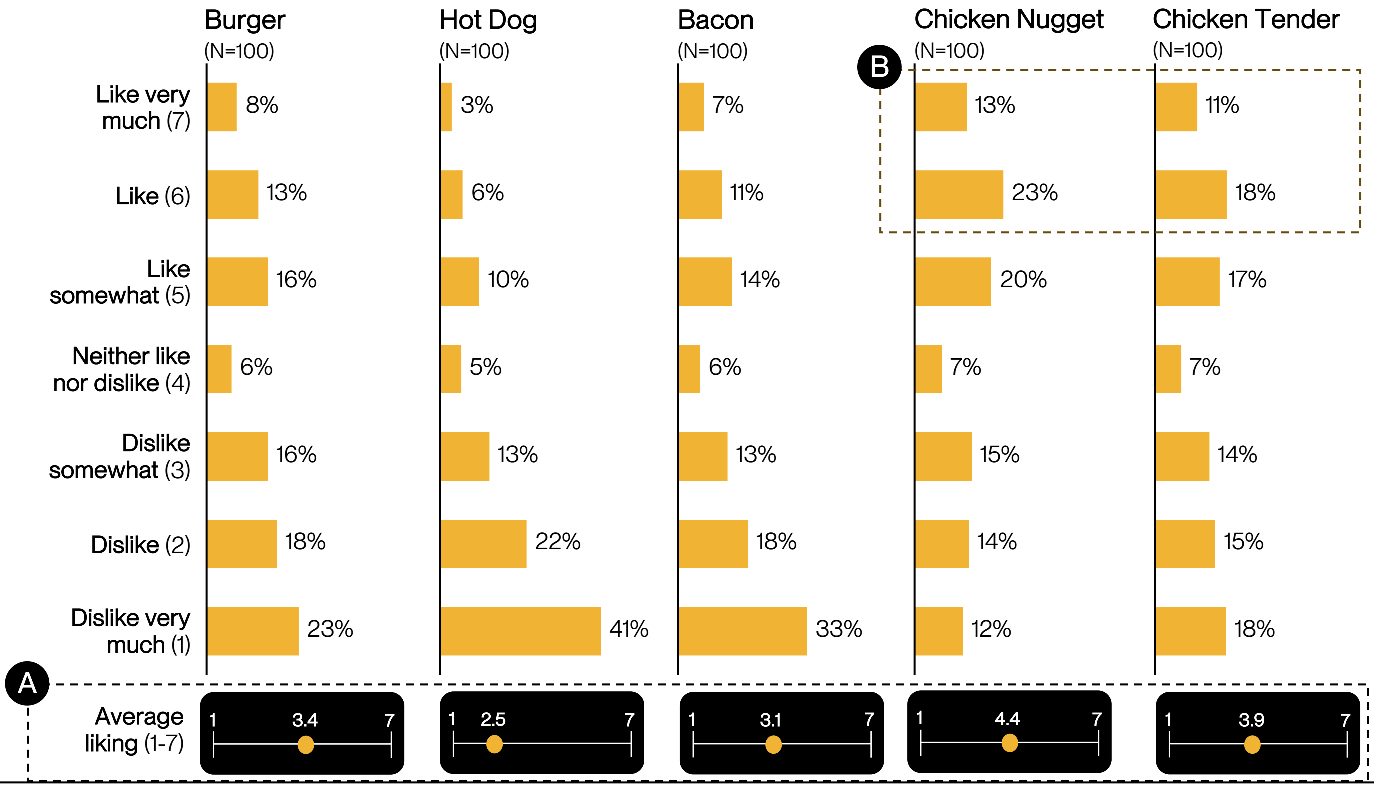
- Consumers are currently indifferent towards the animal-based chicken nugget option giving it an average rating of 'neither like nor dislike'.

Satisfaction with plant-based products

Takeaways

Liking scores, % of participants

Plant-based average[1]



A Consumers do not yet 'like' the average plant-based product.

- Average liking by category ranged from 'neither like nor dislike' to 'dislike'.

B Breaded products generally outperform unbreaded products.

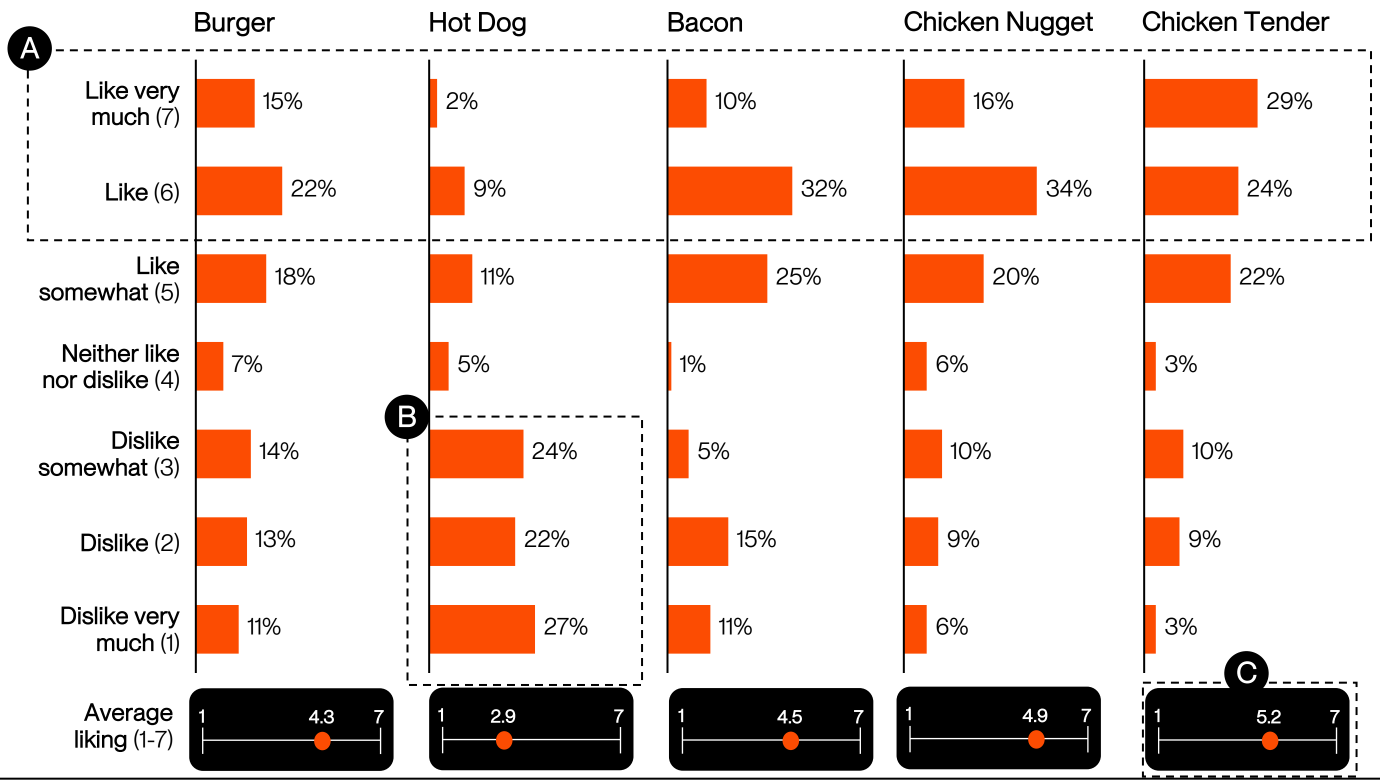
- 35% of participants rated breaded products 'like very much' or 'like' compared to just 16% of participants for unbreaded products.

1. Aggregated across 5+ commercially available plant-based brands; includes 3 vegetarian products that contain milk and/or eggs (hot dog, bacon, and chicken nugget)

Satisfaction with leading plant-based products

Liking scores, % of participants (N=212)

Plant-based leader[1]



Takeaways

A Plant-based products are appealing to a significant portion of the market.

- 37-53% of participants rated the leader as 'like very much' or 'like' (excl. hot dogs).

B There is whitespace for hot dogs.

- The leader in the category was 75% less likely to be rated 'like very much' or 'like' than other plant-based leaders.

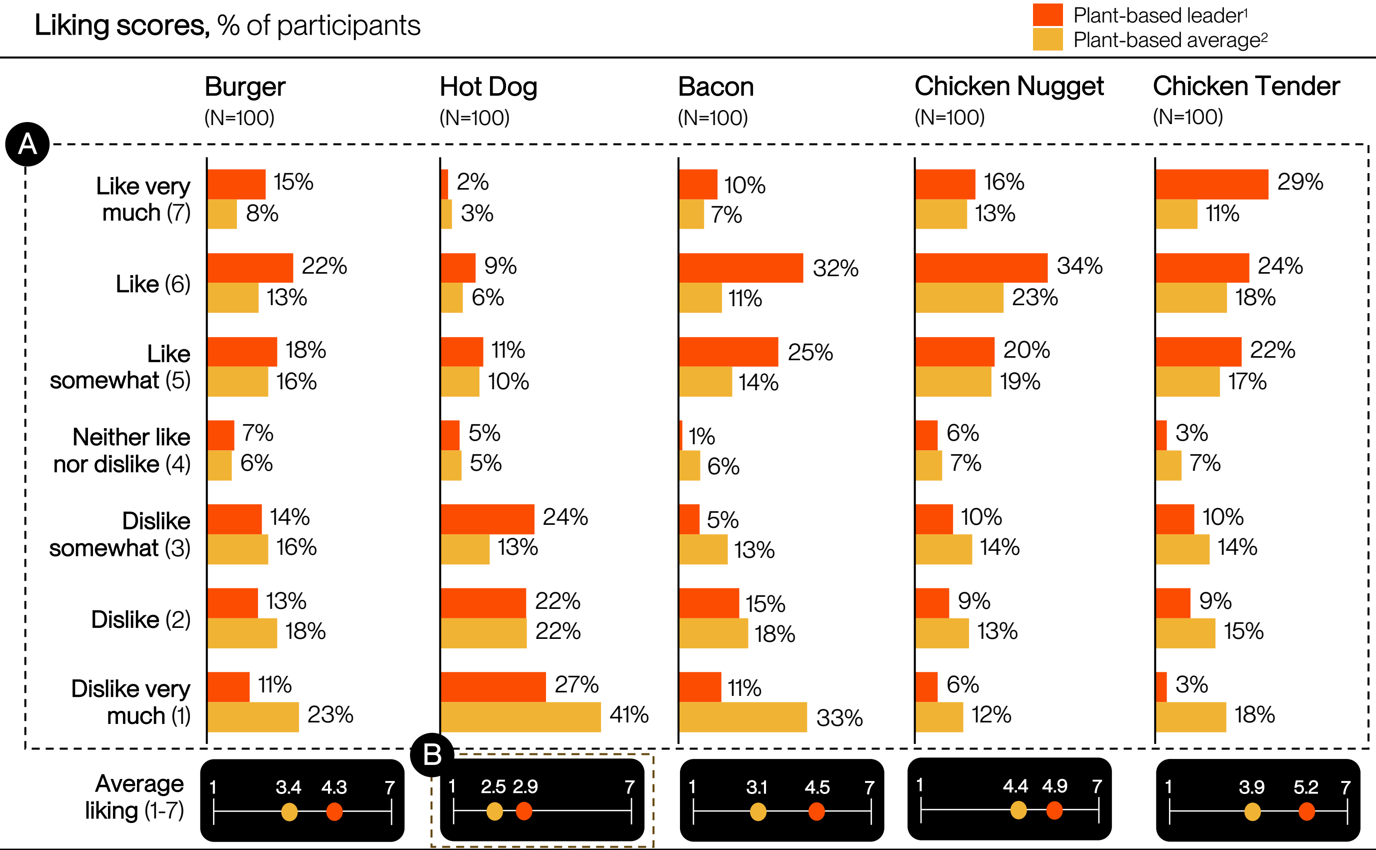
C The leading chicken tender is the most liked product across all plant-based products.

- The leader was rated 'like very much' more than 1.8x as often as other plant-based leaders.

1. Top performing plant-based product amongst 5+ commercially brands in each category

Delta in satisfaction within plant-based categories

Liking scores, % of participants



Takeaways

A There is wide variation in consumer liking of burgers, bacon, and tenders within each category.

- The leader of each category was rated 'like very much' or 'like' 2-3x as often as its category average.

B There is little variation in plant-based hot dogs.

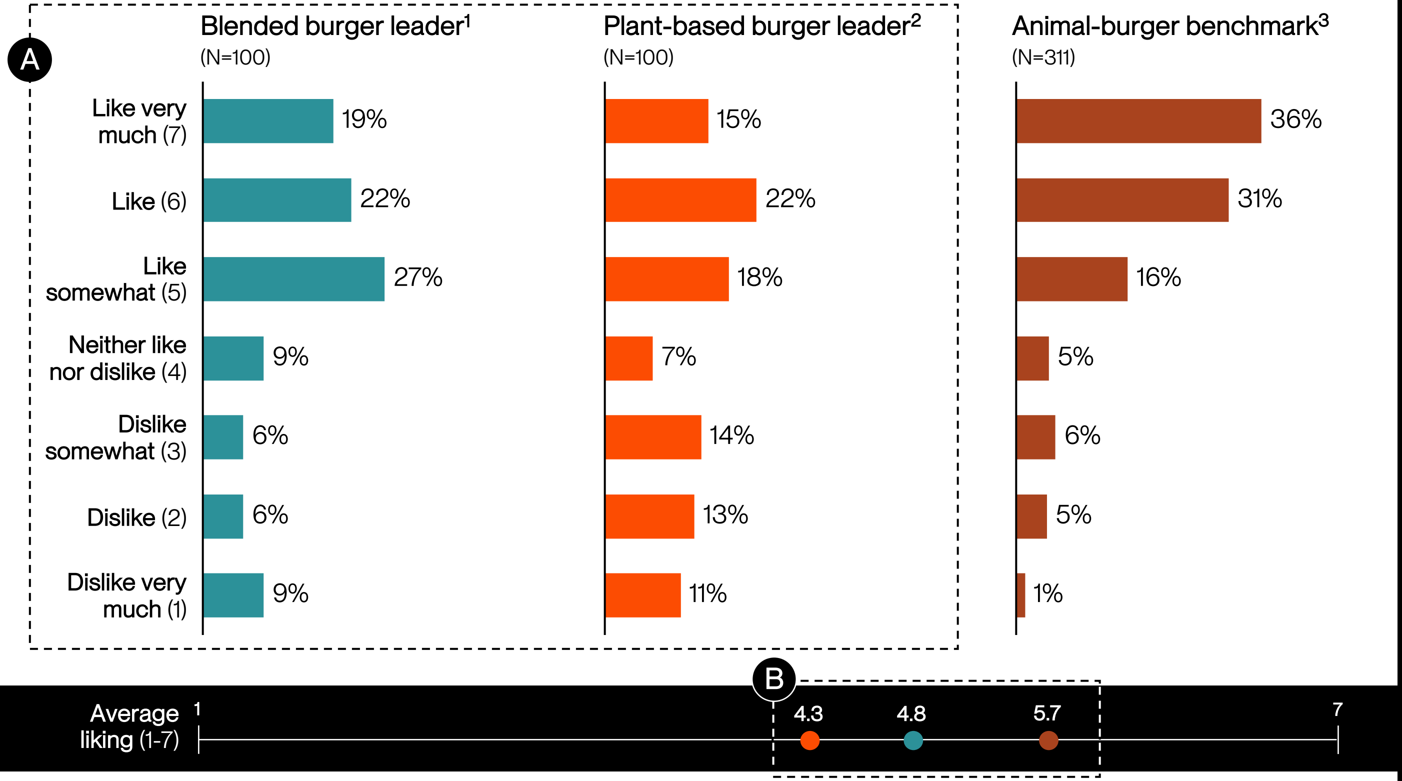
- There is just 0.4 difference in average liking between the category average and leader.

1. Top performing plant-based product amongst 5+ commercially brands in each category
2. Aggregated across 5+ commercially available plant-based brands; Includes 3 vegetarian products that contain milk and/or eggs (hot dog, bacon, and chicken nugget)

Burger Deep Dive: Potential of blended Meats

Takeaways

Liking scores, % of participants



A **The blended leader outperforms the plant-based leader.**

- The blended leader achieved significantly higher liking than the leading plant-based product, despite limited R&D for the category ($p < 0.1$).

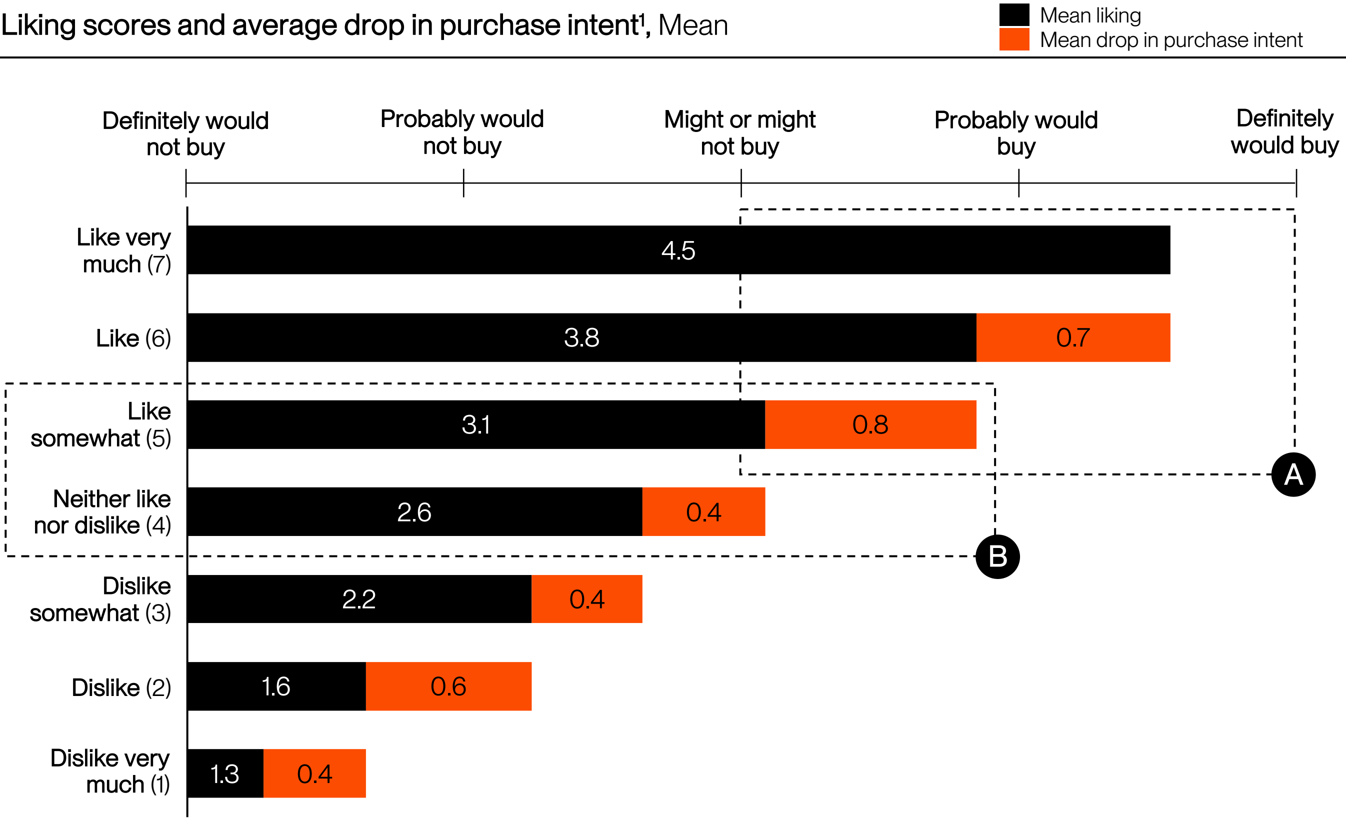
B **Blended products are still closer in liking to plant-based products than animal-based products.**

- The gap in mean liking to the animal product is 0.9pts (versus 0.5pts to the plant-based leader).

1. Aggregated across 5+ commercially available plant-based brands; includes 3 vegetarian products that contain milk and/or eggs (hot dog, bacon, and chicken nugget)

Translation from 'liking' to 'purchase intent'

Liking scores and average drop in purchase intent[1], Mean



1. Aggregates across all commercially available products tested and across 5,829 total responses

Takeaways

A Products require high levels of liking to achieve strong purchase intent.

- "Like very much" does not equate to "definitely would buy" and purchase intent drops off very quickly between "like very much" and "like somewhat".

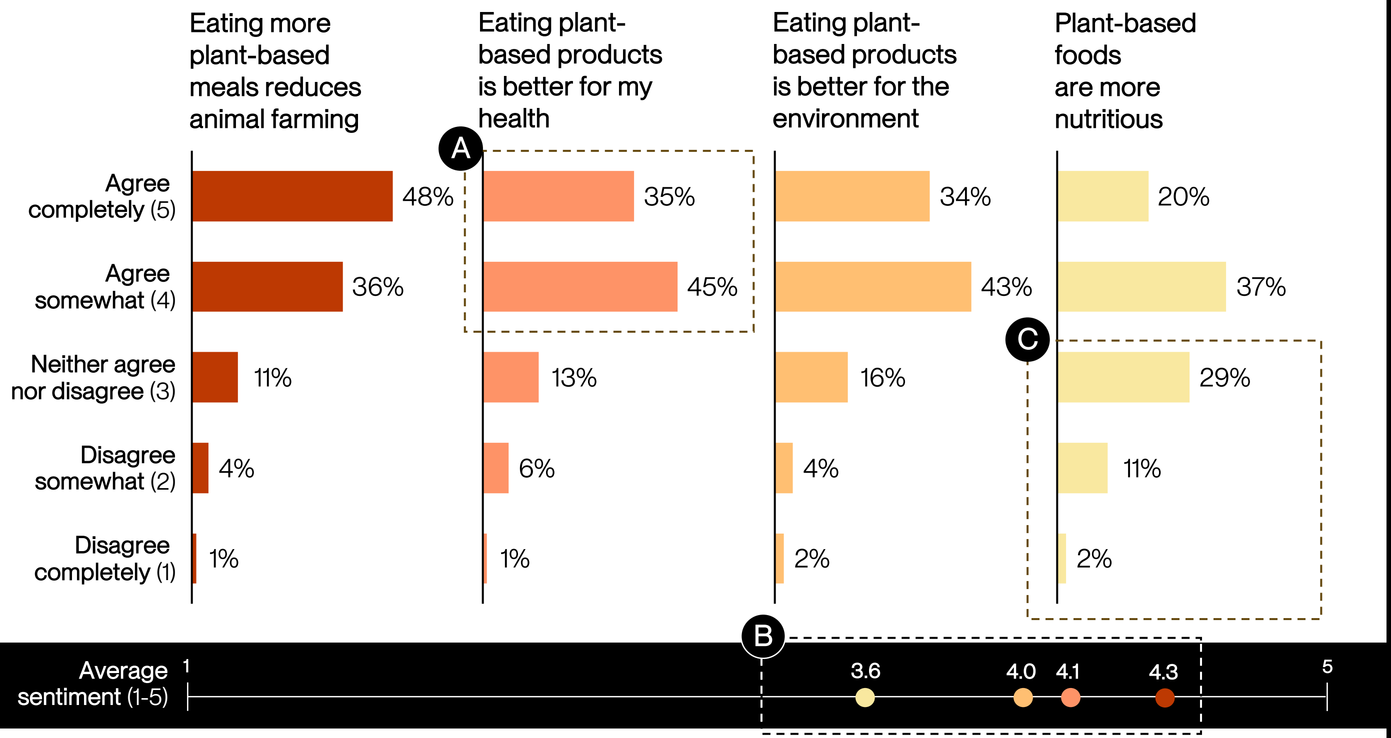
B Products with moderate liking will not attract customers.

- "Like somewhat" and "neither like nor dislike" result in neutral to negative purchase intent.

Benefits of plant-based products

Takeaways

Please tell us how much you agree or disagree with each of the following statements, % of participants



A Most consumers consider plant-based products to be healthy.

- 80% of participants ‘agree completely’ or ‘agree somewhat’ that plant-based products are better for their health.

B Consumers generally recognize the benefits of plant-based products.

- Average agreement was above ‘neither agree nor disagree’ for all statements.

C Nutrition is a less recognized as a benefit.

- 42% rated their agreement as below ‘agree somewhat’ when asked if they considered plant-based products more nutritious.

1. Aggregated across 1,212 responses
2. Calculated as the average overall satisfaction for all responses across all products (plant and animal-based) at each level of “liking” for the sensory trait

Top Performing Brands

Brands within 1pt in average liking of the animal product and rated at least ‘like somewhat’

Burger	Bacon	Chicken Nugget	Chicken Tender
BOTH [2]	hooray Foods [3]	IMPOSSIBLE™ MorningStar FARMS® Quorn rebellyous foods SIMULATE® *Listed alphabetically*	IMPOSSIBLE™

1. Not all products in market were tested; this study has a limited sample size and only included products available during testing (June-August, 2023)
2. BOTH is a blended product that uses both animal- and plant-based ingredients
3. Since conducting this survey, Hooray Foods has ceased operations

Competitive Positioning

Executive Summary > Competitive positioning

Plant-based Leader

The leading plant-based products are approaching or have exceeded parity with animal products.

- **The leading plant-based nuggets are clearly preferred to the animal** – 50% rated the plant leader 'like very much' or 'like' (versus just 33% for the animal nugget).
- **Leading plant-based bacon and tenders are closing in on the animal product** – average liking was within just one rating of the animal for these categories.
- **Animal hot dogs are still far ahead of plant-based hot dogs** – 80% rated the animal hot dog 'like very much' or 'like' (versus just 11% for the plant-based leader).

Plant-based Average

Animal-based products are still generally preferred over the average plant-based product (excluding nuggets).

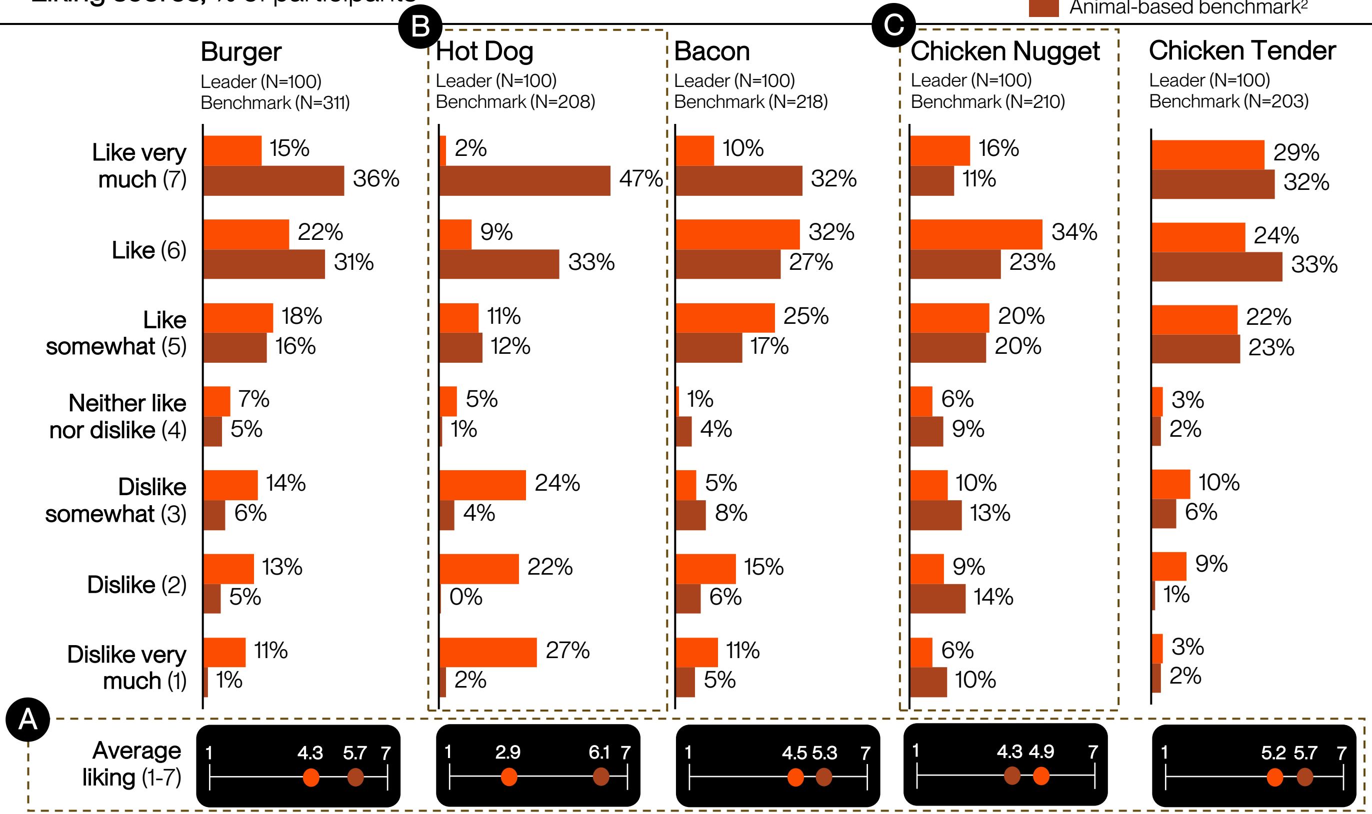
- **Plant-based nuggets are at parity with animal nuggets** – the distribution of liking scores for the average plant-based nugget was extremely similar to the animal nugget.
- **The average plant-based burger, bacon, or tender has a meaningful gap in liking to the animal product** – average liking for these plant-based products was two ratings beneath the animal product (e.g., 'like very much' -> 'like somewhat').

Delta in satisfaction within plant-based leader

→ Takeaways

Liking scores, % of participants

Plant-based leader[1]
Animal-based benchmark[2]



A **The best plant-based products are approaching parity with animal products.**

- Tenders and bacon are within 1 liking score of the animal product
- Burgers have an average liking 1.5pts beneath the animal burger.

B **The largest gap in the market is hot dogs.**

- The best plant-based hot dog underperformed by over 3 rating points on average compared to animal hot dogs.

C **Plant-based chicken nuggets are better than animal nuggets and can still improve further.**

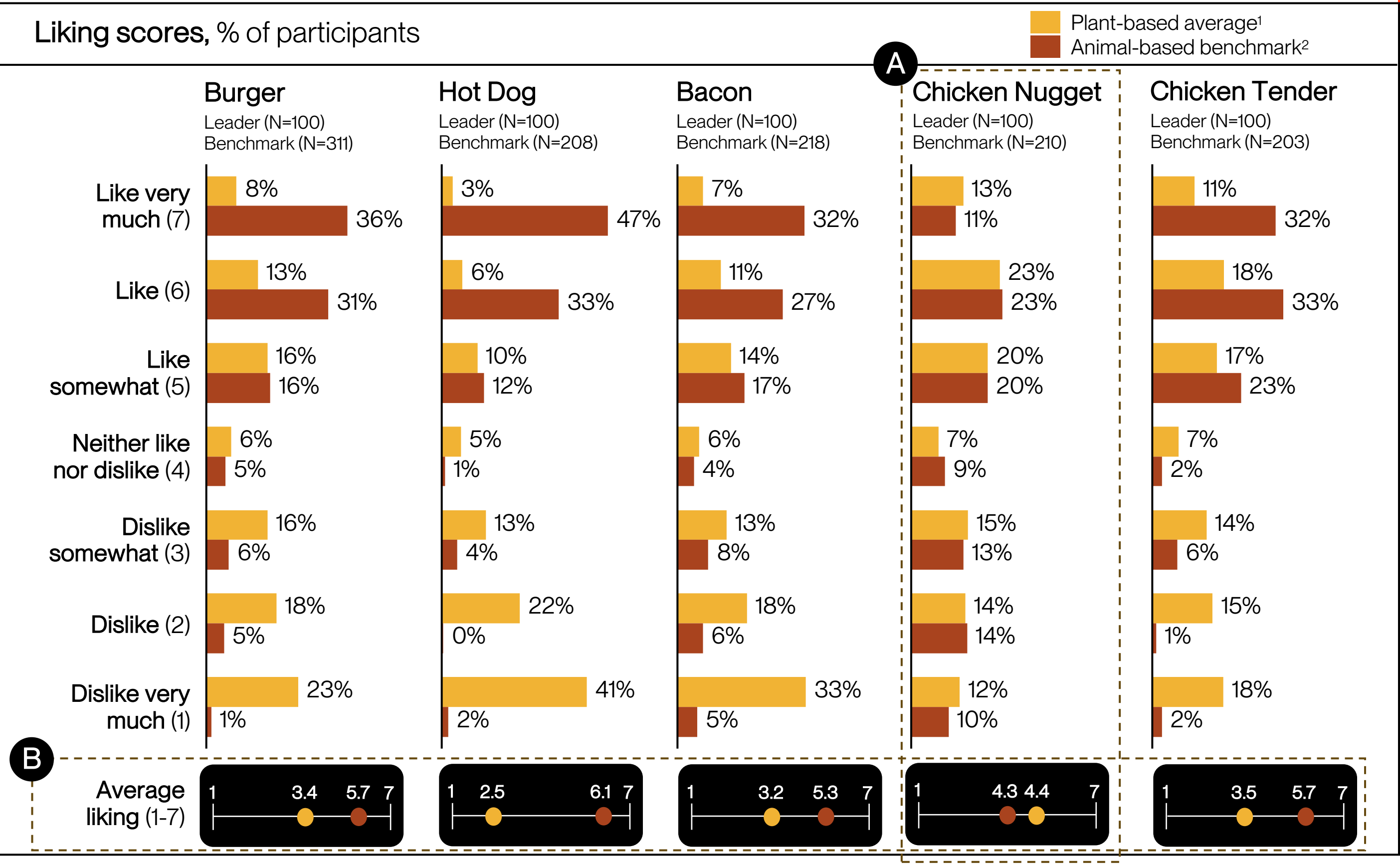
- Purchase intent increases dramatically from a rating of 'like' to 'like very much'.

1. Top performing plant-based product amongst 5+ commercially brands in each category
2. Animal-based product available in retail

NECTAR

Delta in satisfaction within plant-based products

Liking scores, % of participants



Takeaways

A Plant-based nuggets are at parity with animal nuggets.

- The distribution of liking scores for the average plant-based nugget was extremely similar to the animal nugget.
- Average liking was higher for plant-based nuggets.

B Plant-based products (excluding nuggets) have a meaningful gap in liking to the animal product.

- Liking for the average plant-based tender, bacon, and burger was 2 ratings beneath the animal product (e.g., 'like' -> 'neither like nor dislike').
- Liking for the average plant-based hot dog was 3.5 ratings lower (e.g. 'like' -> between 'dislike' and 'dislike somewhat').

1. Aggregated across 5+ commercially available plant-based brands; includes 3 vegetarian products that contain milk and/or eggs (hot dog, bacon, and chicken nugget)
2. Animal-based product available in retail

Category-Specific Deep Dive

Burger

Burger > Executive summary of R&D opportunities

Performance Overview

Liking gaps were primarily driven by flavor and, secondarily, texture.

- **Flavor is the biggest opportunity** – the gaps in average liking between the plant-based average, leader and animal burger were bigger than for texture or appearance and had the biggest impact on overall liking.
- **Texture should still be an emphasis** – while not as important a flavor, there were still large performance gaps on texture that led to meaningful declines in overall liking.
- **Improvements are clearly possible** – the average plant-based burger was rated 'like very much' or 'like' only 57% as often as the plant-based leader and disliked nearly 2x as often.

Top Sensory Opportunities

Bolder profiles can lead to higher overall liking.

- **Meatiness should be the top priority** – 45% of participants found the burgers to not be meaty enough and it had a larger impact on overall liking than any other trait.
- **Participants wanted a bolder profile from the burgers** – participants were far more likely to state that burgers were not meaty, salty, spicy, juicy, or sweet enough and these mild profiles were strongly associated with declines in 'meatiness' ratings.
- **Plant-based burgers have an opportunity to differentiate on textural consistency** – only 59% of participants rated the animal burger 'just about right', the lowest score across all sensory attributes tested and smallest gap to the plant-based leader.
- **Blends could unlock parity with animal products** – The blend leader achieved higher liking than the plant-based leader despite limited R&D in the category ($p<0.1$).

Burgers Tested

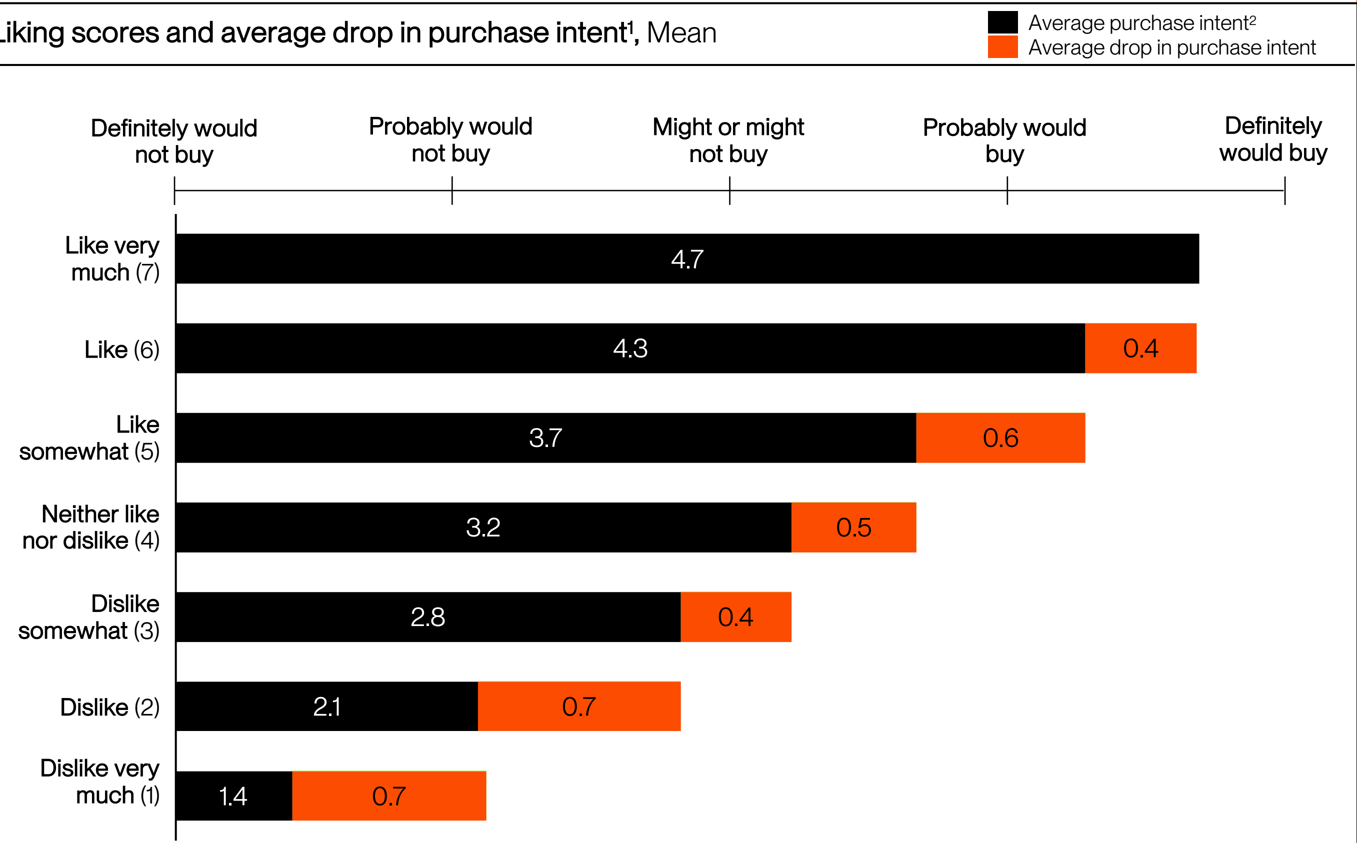
Burgers from 9 commercially available plant-based brands and 2 burgers blends were prepared according to manufacturer instructions and compared against animal burgers.

Product **506** 	Product **511** 	Product **516** 	Product **523** 	Product **538** 	Product **540** 
Product **555** 	Product **562** 	Product **569** 	Product **573** 	Product **594** 	Product **501** Animal-based burger 

Burger: Translation from 'liking' to 'purchase intent'

Takeaways

Liking scores and average drop in purchase intent[1], Mean



Overall liking is a relatively good indicator of purchase intent for burgers.

- Positive levels of satisfaction are more strongly associated with positive purchase intent (PI) compared to other categories.

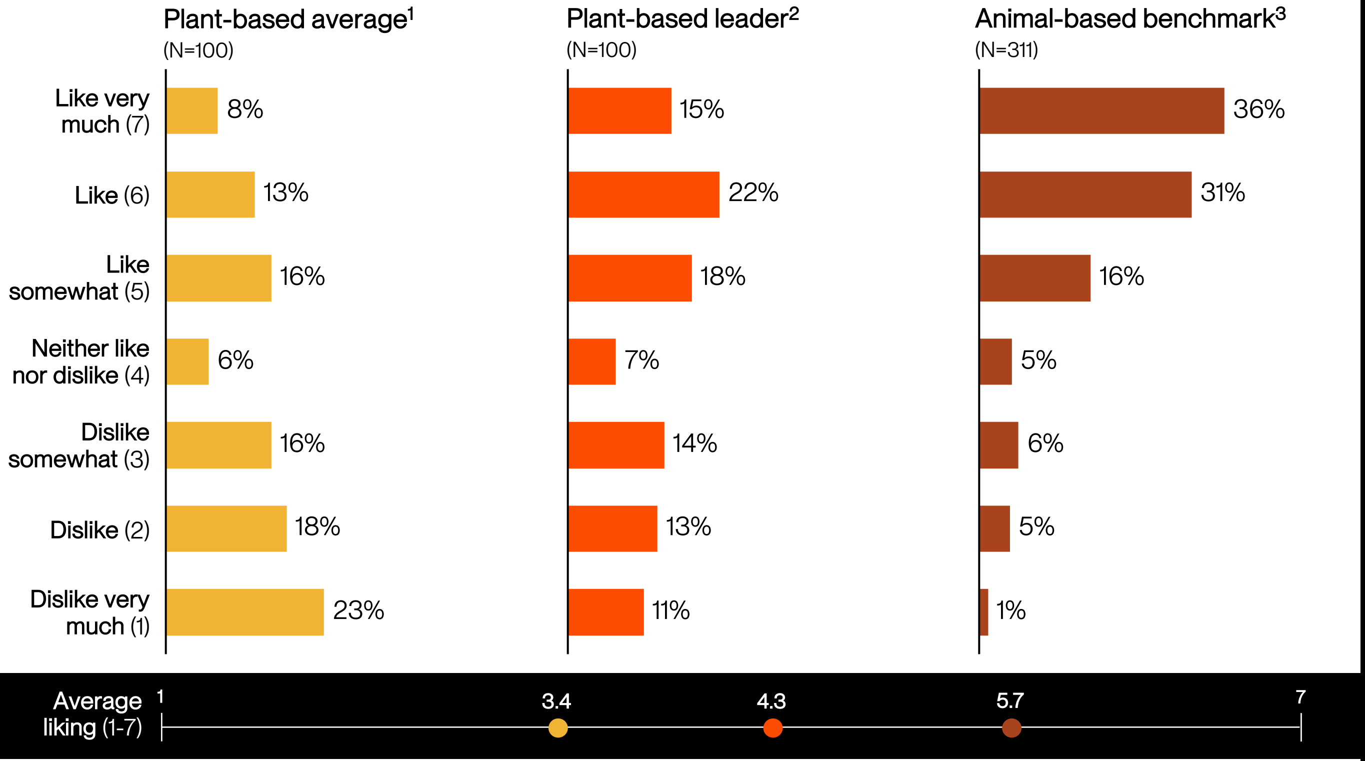
Ratings of 'like somewhat' 'neither like nor dislike', and 'dislike somewhat' have a strong association.

- All three are within 1 purchase intent rating of each other.

1. Aggregated across 1,512 responses
2. Calculated as the average purchase intent for all responses across all products (plant and animal-based) at each level of 'liking

Burger: Satisfaction

Liking scores, % of participants



Takeaways

The plant-based leader clearly separates itself from the crowd.

- The plant-based leader achieved significantly higher liking than the average plant-based product.

The average plant-based burger has clear and impactful opportunities to improve.

- The average plant-based burger rated 'like very much' or 'like' only 57% as often as the plant leader and disliked nearly 2x as often.

The average plant-based burger has clear and impactful opportunities to improve.

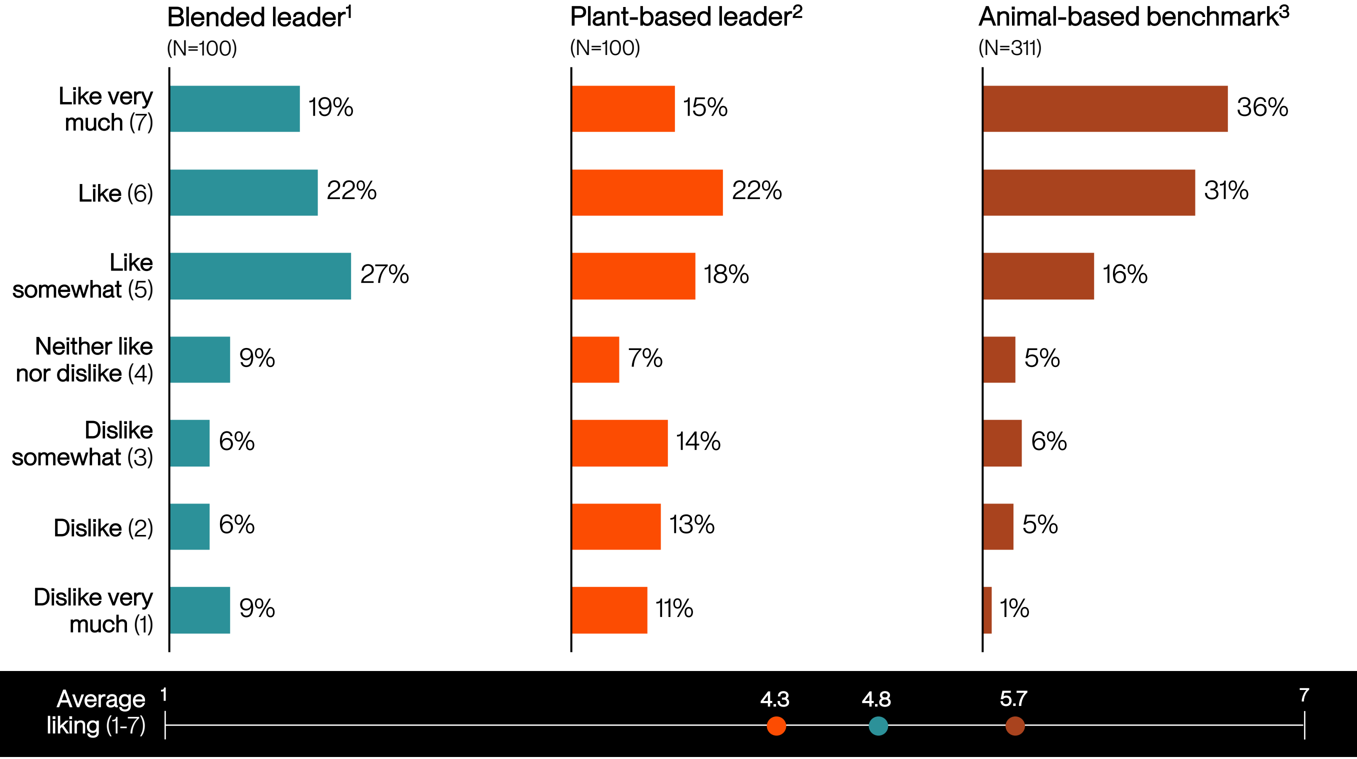
- The animal burger was rated 'like' or 'like very much' 2x as often.

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Deep Dive: Potential of blended products

Takeaways

Liking scores, % of participants



The blended leader outperforms the plant-based leader.

- The blended leader achieved significantly higher liking than the leading plant-based product, despite limited R&D for the category ($p < 0.1$).

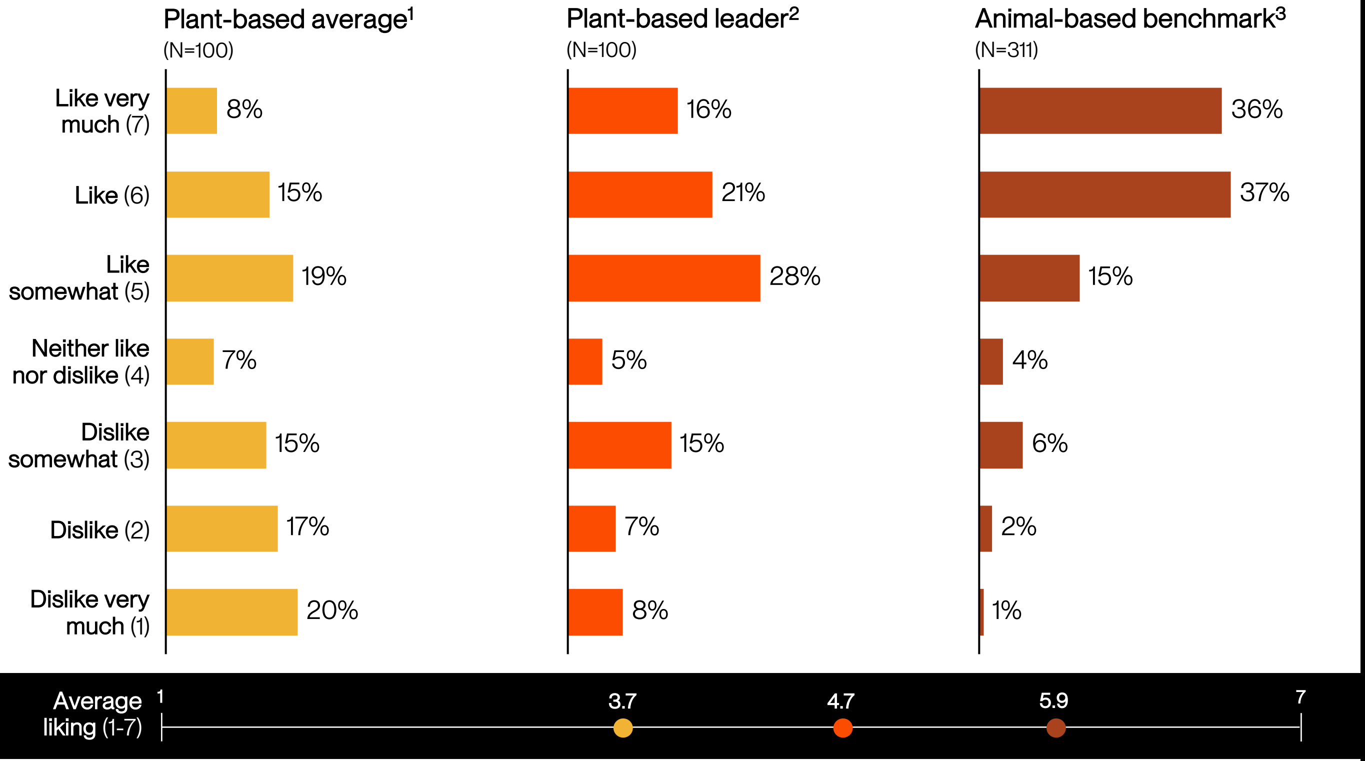
Blended products are still closer in liking to plant-based products than animal-based products.

- The gap in mean liking to the animal product is 0.9pts (versus 0.5pts to the plant-based leader).

1. Top performing blended product amongst 2 commercially available burger blends
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Flavor

Liking scores, % of participants



Takeaways

The average plant-based burger needs to improve on flavor.

- More than 50% of participants 'disliked' the flavor to some degree.

Flavor is the biggest improvement opportunity for the plant-based leader.

- The gap in average liking to the animal burger is bigger than for texture or appearance.

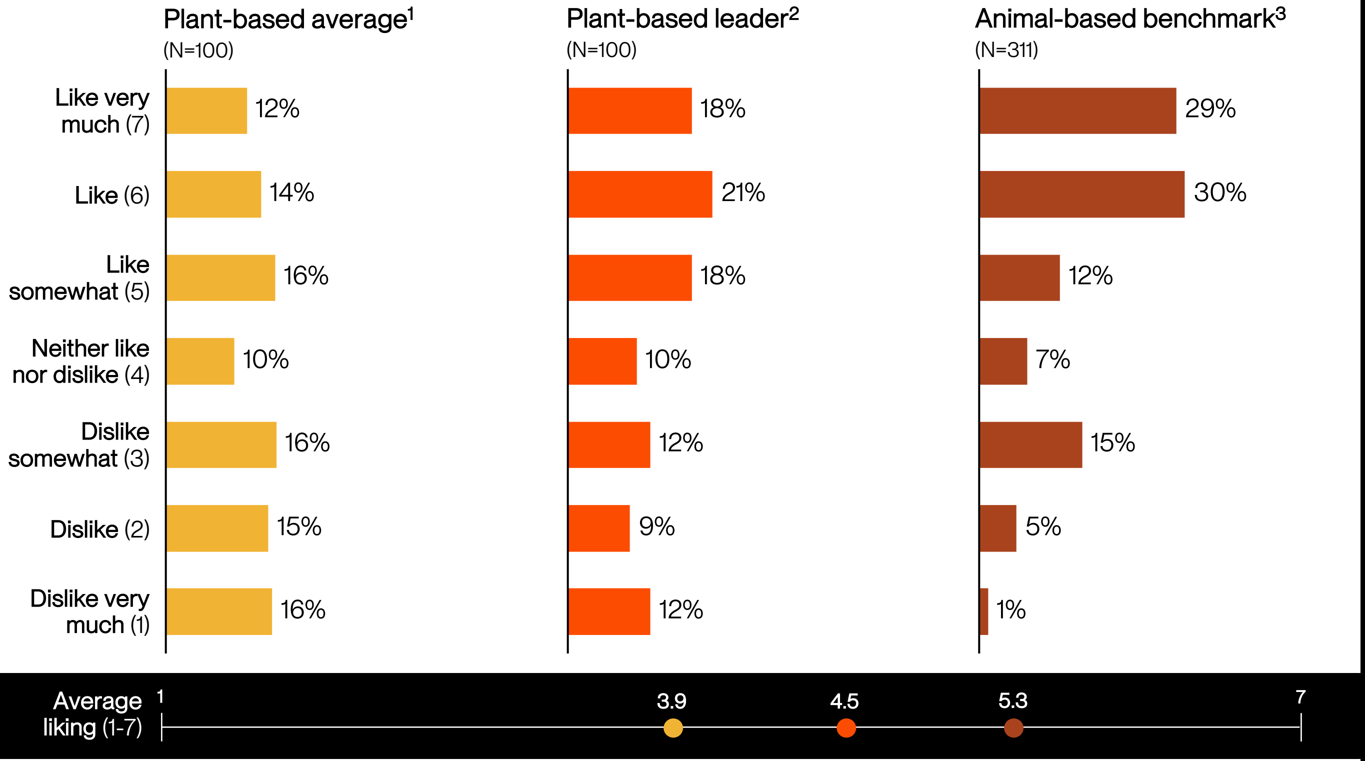
Animal-based burgers showed relative strength on flavor.

- 73% rated the flavor as 'like very much' or 'like' (versus 59% on texture and 47% on appearance).

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Texture

Liking scores, % of participants



Takeaways

There was less consensus amongst participants on the texture of the average plant-based burger.

- The distribution of responses on texture is more evenly distributed than on flavor.

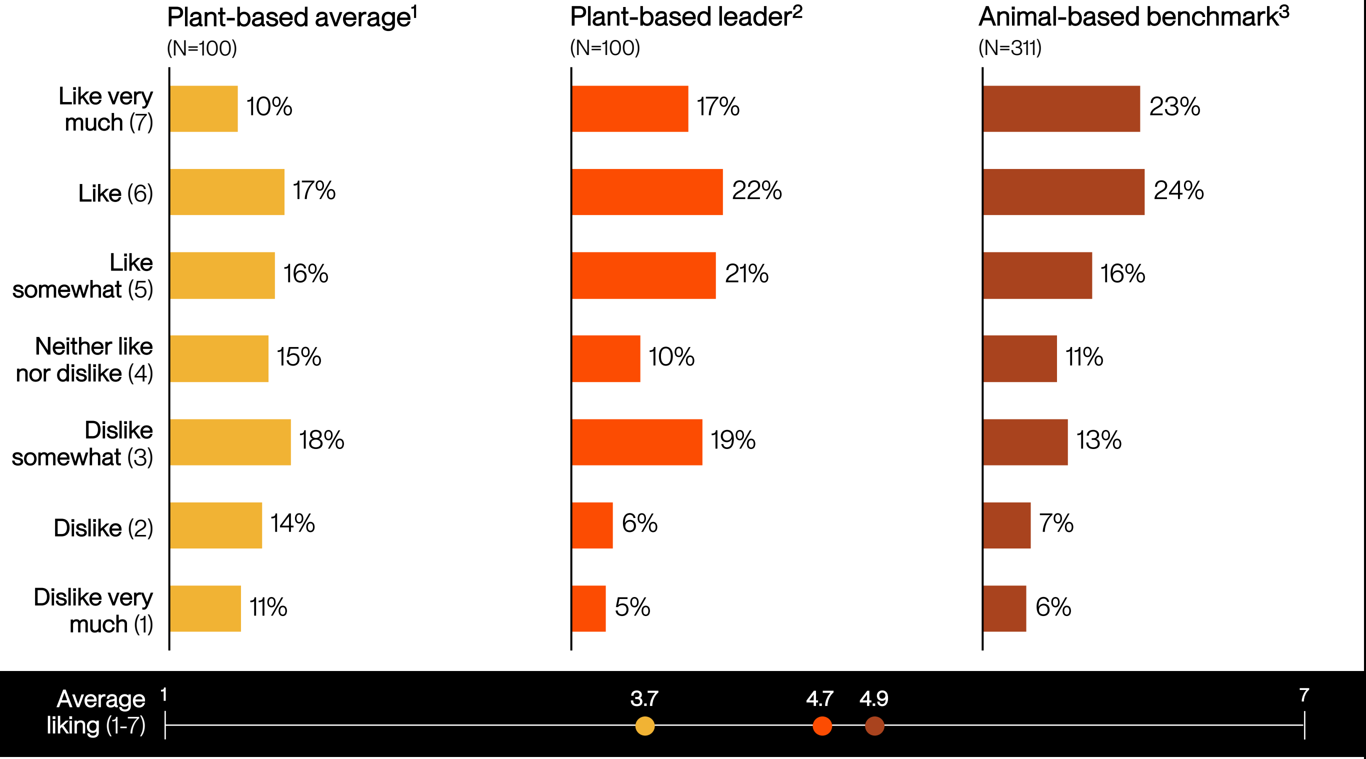
Texture is a weakness for the plant-based leader.

- 21% of participants rated the texture 'dislike' or 'dislike very much' (versus 15% on flavor and 11% on appearance).

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Appearance

Liking scores, % of participants



Takeaways

The plant-based leader performed very similarly to the animal burger on appearance.

- 39% of participants rated the appearance as 'like very much' or 'like' compared to 47% for the animal burger.

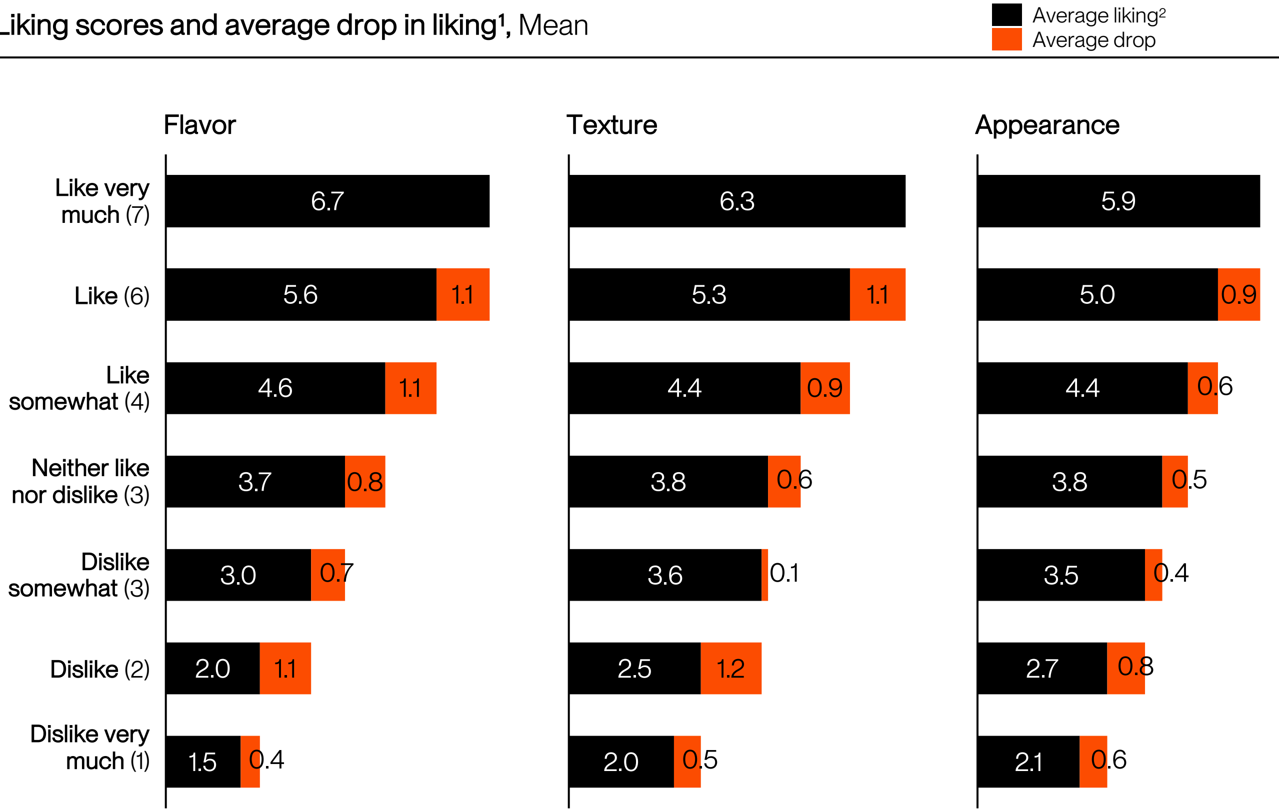
The average plant-based burger still has meaningful opportunity to improve on appearance.

- It performed significantly worse than both the plant-based leader and animal burger.

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Importance of key sensory traits to overall satisfaction → Takeaways

Liking scores and average drop in liking[1], Mean



There are key performance thresholds for achieving high overall liking.

- Some drops in general liking are bigger than others (e.g., between 'like very much' and 'like').

Flavor is the strongest indicator of overall liking.

- Average liking is higher for ratings of 'like very much' on flavor than it is on texture or appearance.

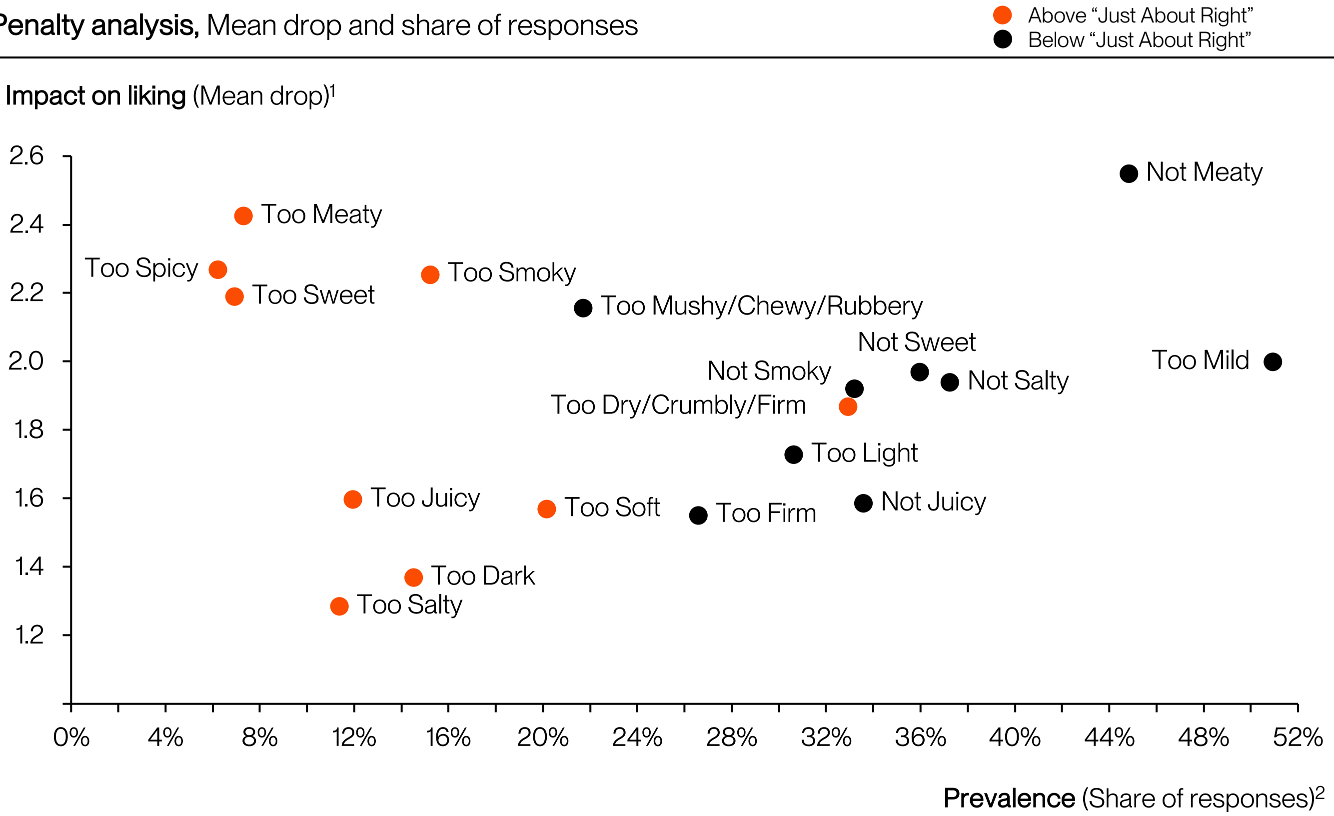
Appearance has smallest impact on overall liking.

- The range of general liking ratings for appearance is tighter than for flavor or texture.

1. Aggregated across 1,557 responses
2. Calculated as the average overall satisfaction for all responses across all products (plant and animal-based) at each level of "liking" for the sensory trait

Burger: Impact of key sensory traits on liking

Penalty analysis, Mean drop and share of responses



Takeaways

Meatiness should be prioritized for product development.

- 45% of participants found the burgers to not be meaty enough and it had a larger impact on overall liking than any other trait.

Participants wanted a bolder profile from the burgers.

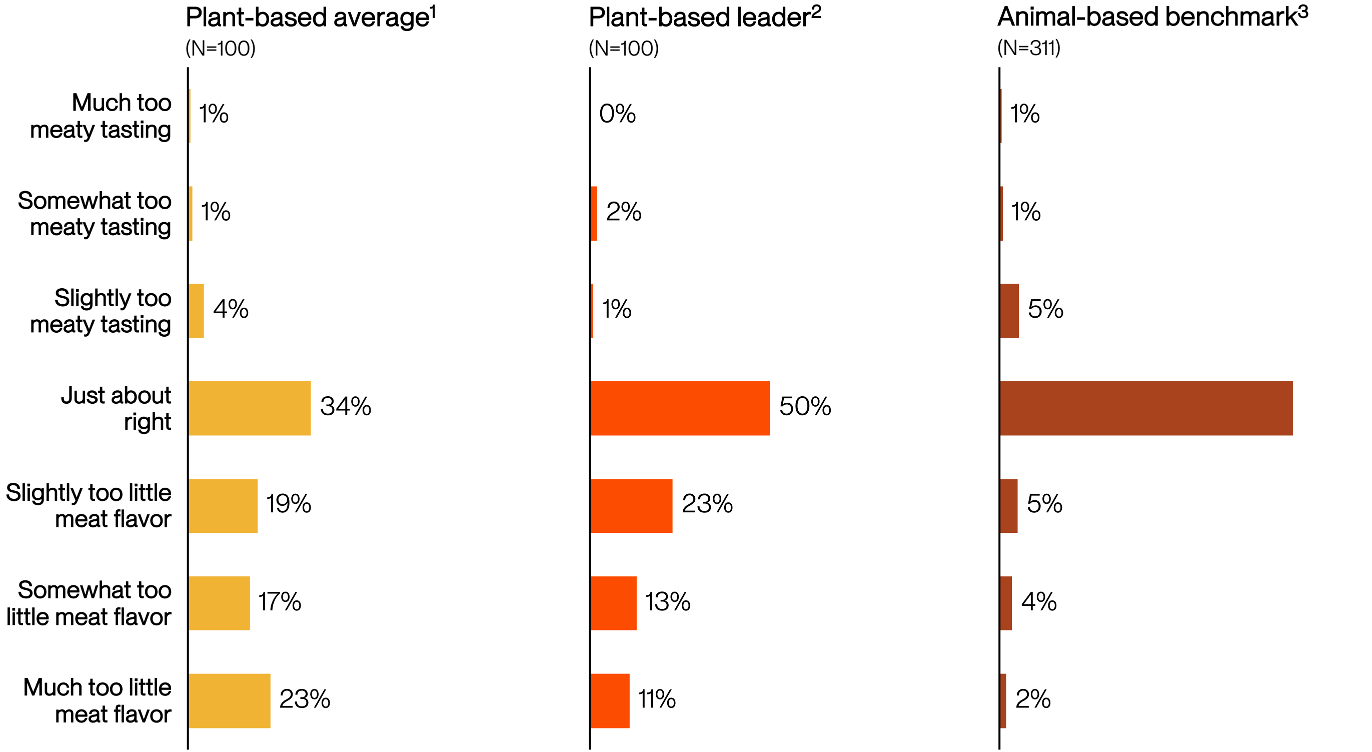
- Participants were far more likely to state that burgers were not meaty, salty, spicy, juicy, or sweet enough.

1. Calculated as the average drop in overall liking for products with the associated response
2. Share of responses for all products (animal and plant) in each direction for each trait, across 1,557 responses

Burger: Meatiness

Takeaways

How would you rate the meatiness?, % of participants



Participants clearly indicated that they felt plant-based burgers were not 'meaty' enough.

- 59% of participants found the plant-based burgers not meaty enough (versus 6% who found them 'too meaty').

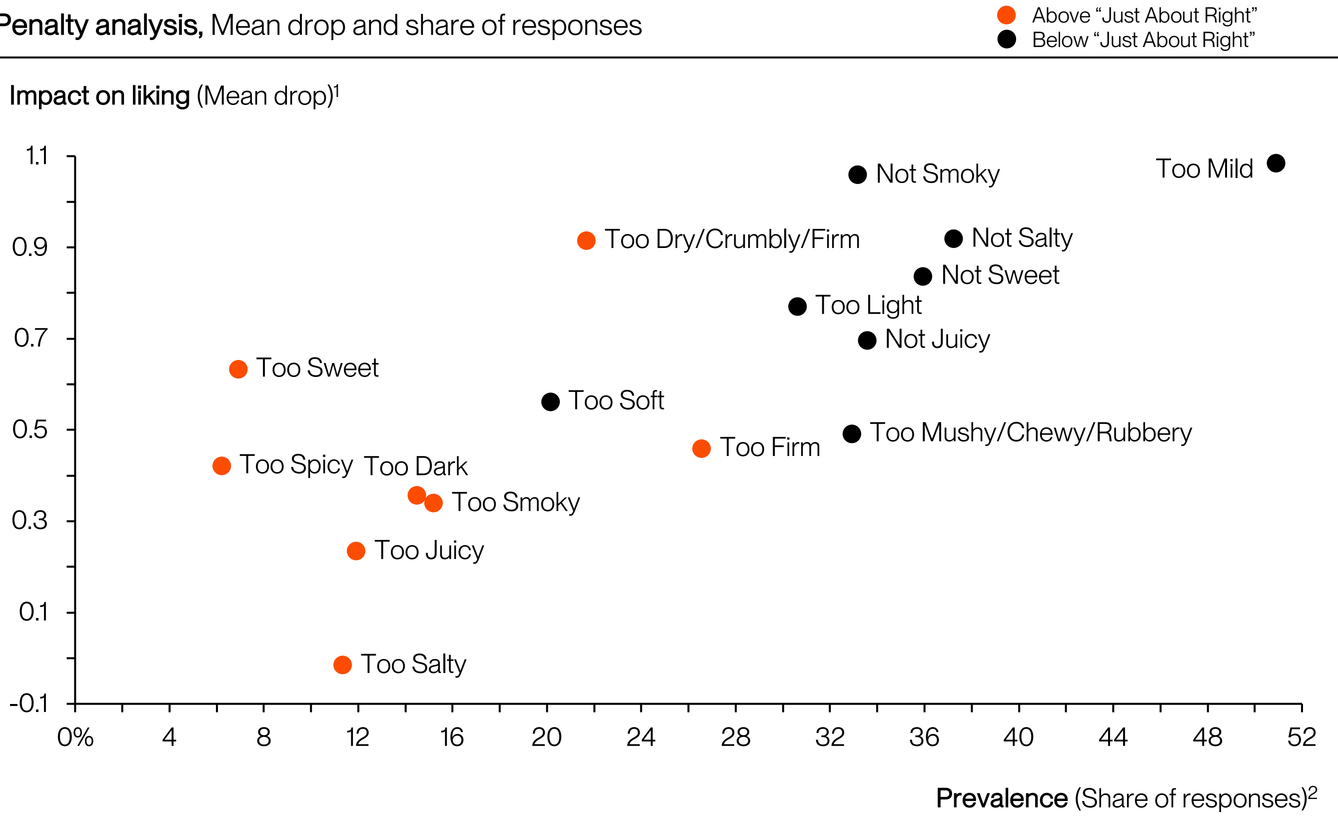
Animal burgers are much more likely to be considered 'just about right' (JAR) on meatiness.

- 82% of participants rated the meatiness JAR compared to just 50% for the plant-based leader and 34% for the plant-based average.

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Impact of key sensory traits on meatiness

Penalty analysis, Mean drop and share of responses



Takeaways

Declines in meatiness were most strongly associated with a lack of smokiness and mildness (vs spiciness).

- These attributes were tied to the largest drops in meatiness.

Bolder profiles are generally associated with more meatiness.

- Spicier, smokier, saltier, sweeter, darker, juicier products were all associate with greater meatiness.

Increases in saltiness universally contributed to more meatiness.

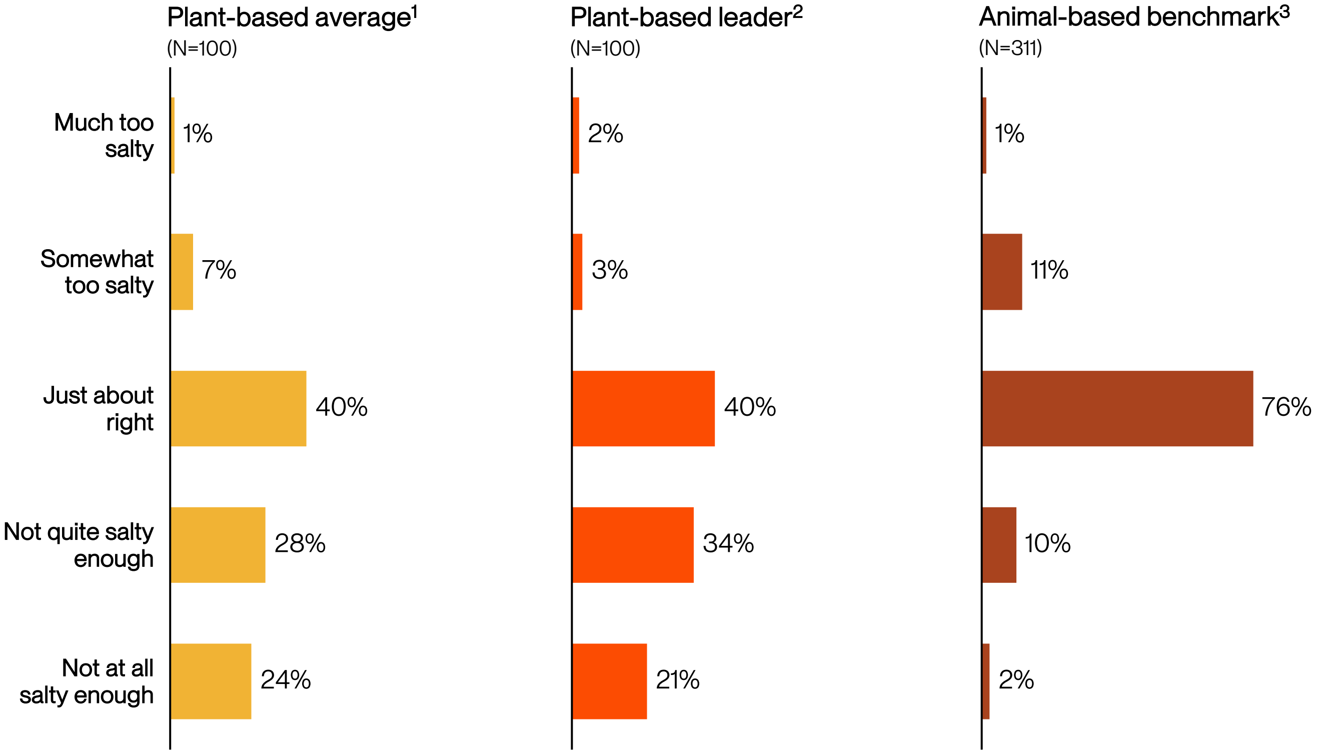
- Products that were 'too salty' were slightly more likely to be considered meatier than products that were JAR.

1. Calculated as the average drop in meatiness for products with the associated response
2. Share of responses for all products (animal and plant) in each direction for each trait, across 1,557 responses

Burger: Saltiness

Takeaways

How would you describe saltiness?, % of participants



Saltiness was a clear weakness for plant-based burgers.

- Just 40% found it to be 'just about right' (versus 76% for the animal burger).

The plant-based average should be saltier.

- 52% of participants found it to be not salty enough (versus just 12% for the animal burger).

The plant-based leader did not differentiate itself on saltiness.

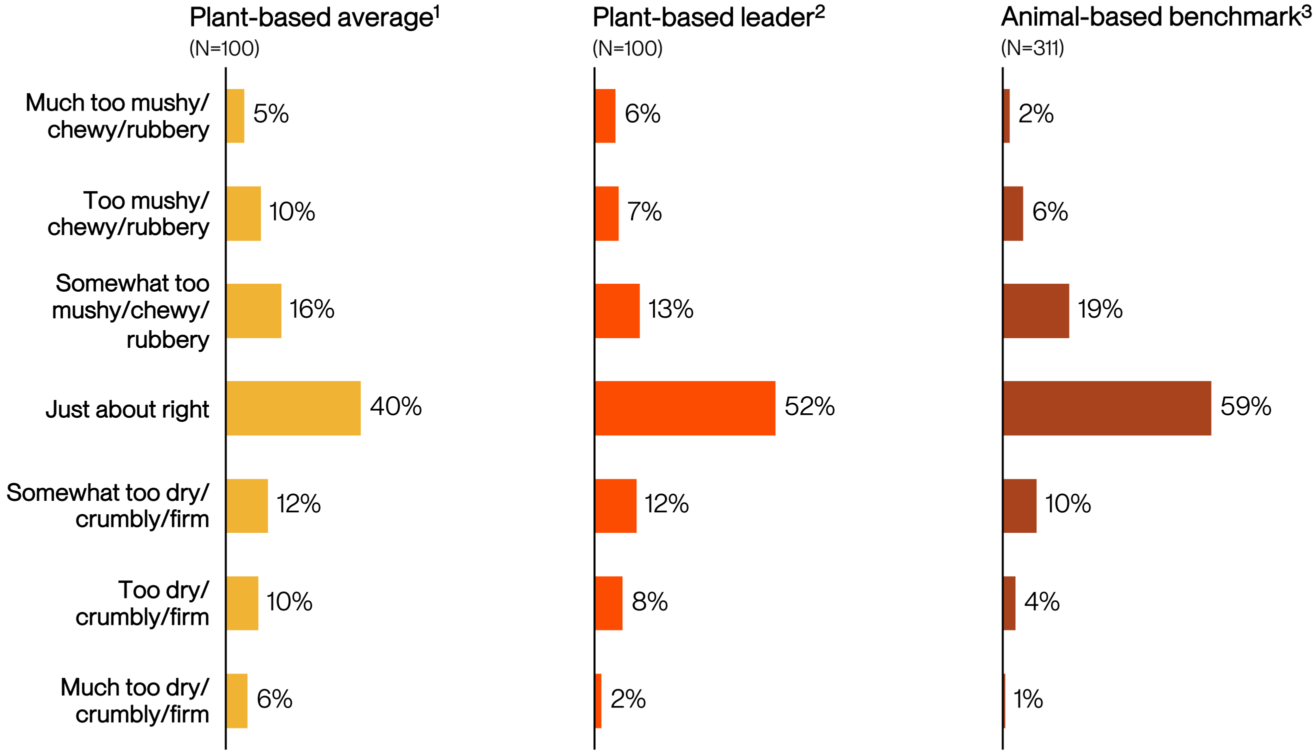
- Participants rated the saltiness of the plant-based leader very similarly for both the average and leading plant-based burger.

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Consistency

Takeaways

How would you describe the texture overall?, % of participants



The average plant-based burger leaned towards being mushy/chewy/rubbery.

- Just 40% found it to be 'just about right' (versus 59% for the animal burger).

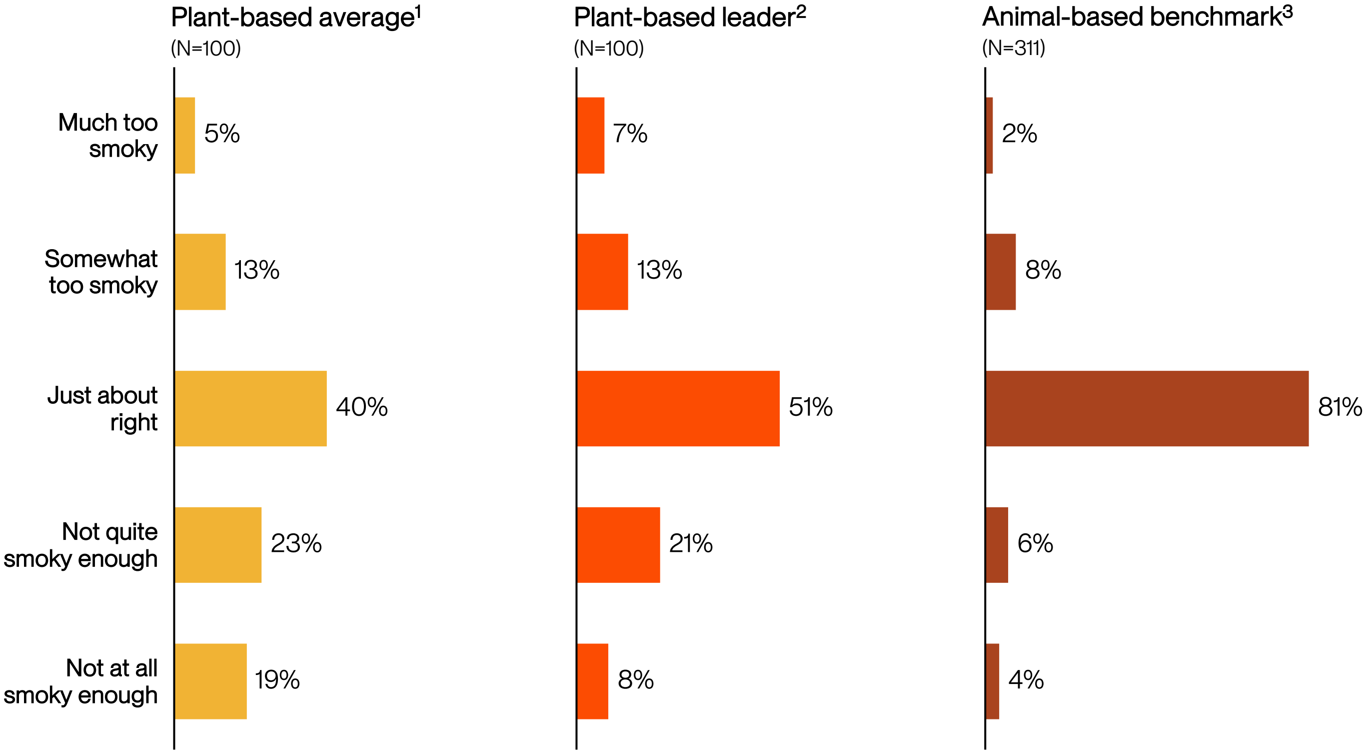
Plant-based burgers have an opportunity to differentiate on consistency.

- Just 59% of participants rated the animal burger 'just about right', the lowest score across all sensory attributes tested.

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Smokiness

How would you describe the smokiness?, % of participants



Takeaways

Animal burgers achieved the right levels of smokiness.

- 81% of participants found the smokiness to be 'just about right', higher than on any other sensory attribute.

Plant-based burgers leaned towards not being smoky enough.

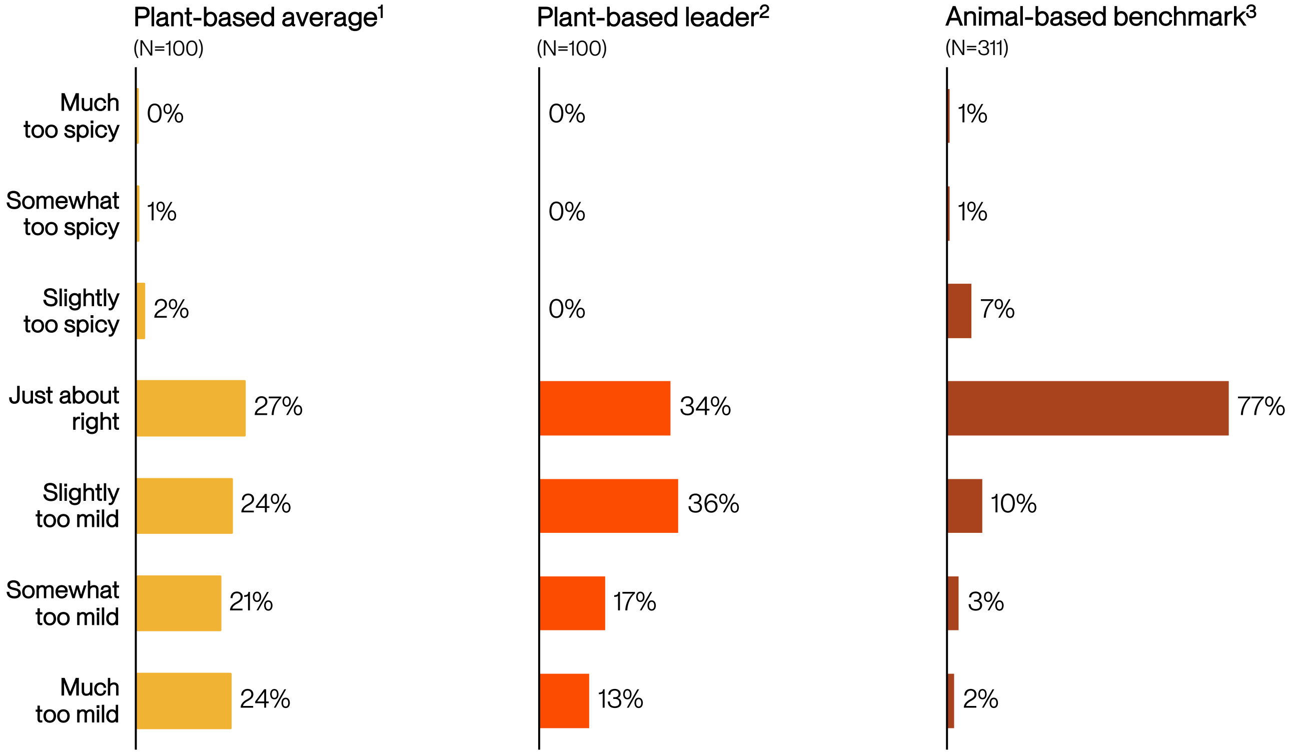
- Participants were 2.5x more likely to find the average plant-based burger not smoky enough than they were to find it too smoky (1.5x for the plant-based leader).

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Spiciness

Takeaways

How would you describe the spiciness?, % of participants



Plant-based burgers were universally considered too mild.

- Both the plant-based leader and average were far more likely to be rated too mild than too spicy.

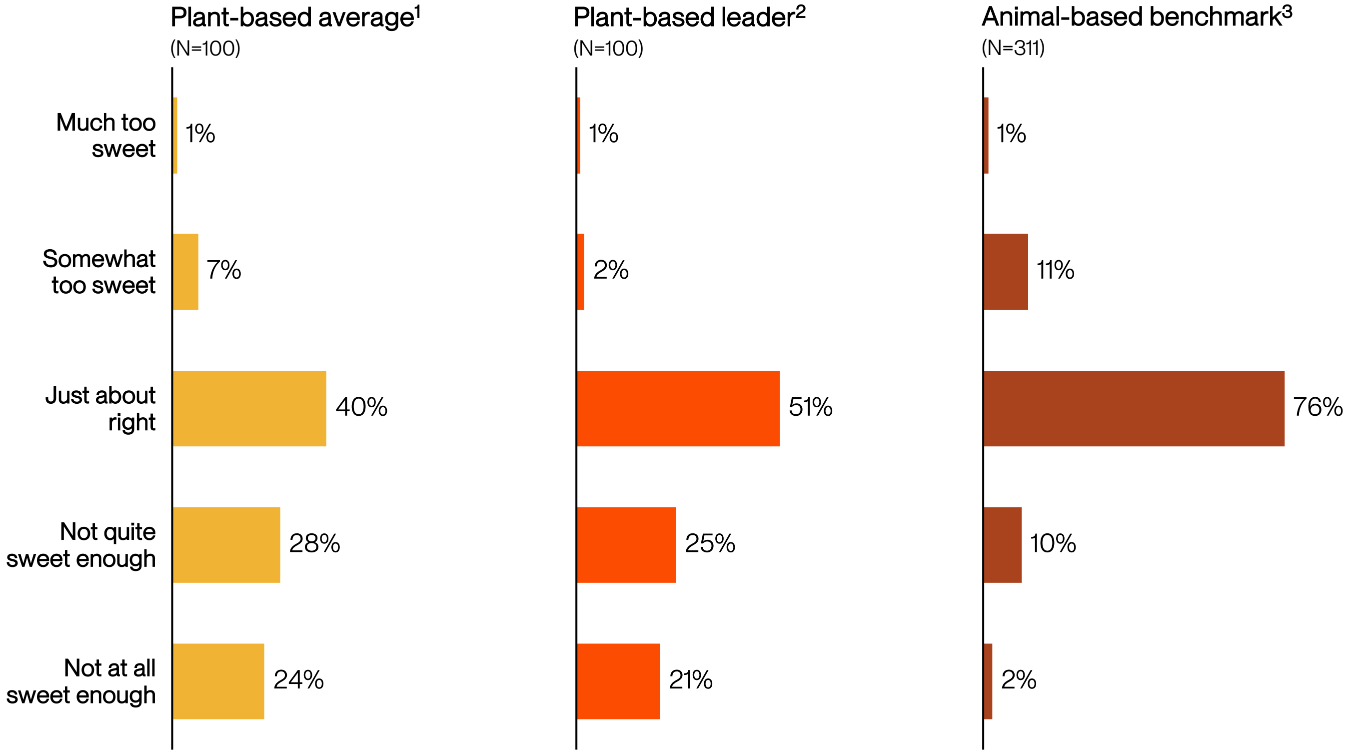
Spiciness was a clear weakness for plant-based burgers.

- Just 27-34% rated the spiciness as 'just about right', a lower share than for any other sensory attribute.

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Sweetness

How would you describe the sweetness?, % of participants



Takeaways

Plant-based burgers were generally considered to be not sweet enough.

- 46-52% of participants found them to be not sweet enough while just 3-8% found them to be too sweet.

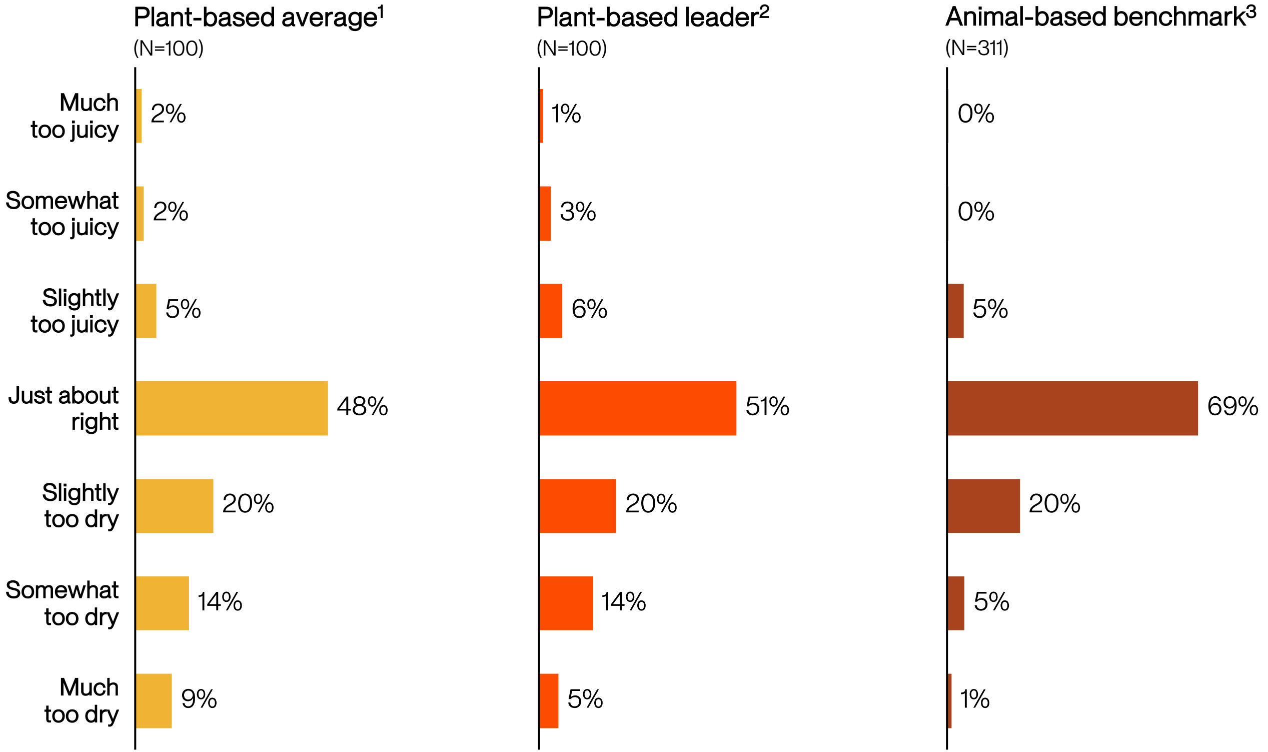
Animal burgers strike a clear balance on sweetness.

- 76% of participants found them to be ‘just about right’ and the remaining 24% were evenly split between ‘too sweet’ and ‘not sweet enough’.

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Juiciness

How would you describe the juiciness?, % of participants



Takeaways

Burgers were generally considered to be not juicy enough.

- The plant-based average, plant-based leader, and animal burger were all rated ‘too dry’ far more often than ‘too juicy’.

The plant-based average and plant-based leader performed very similarly on juiciness.

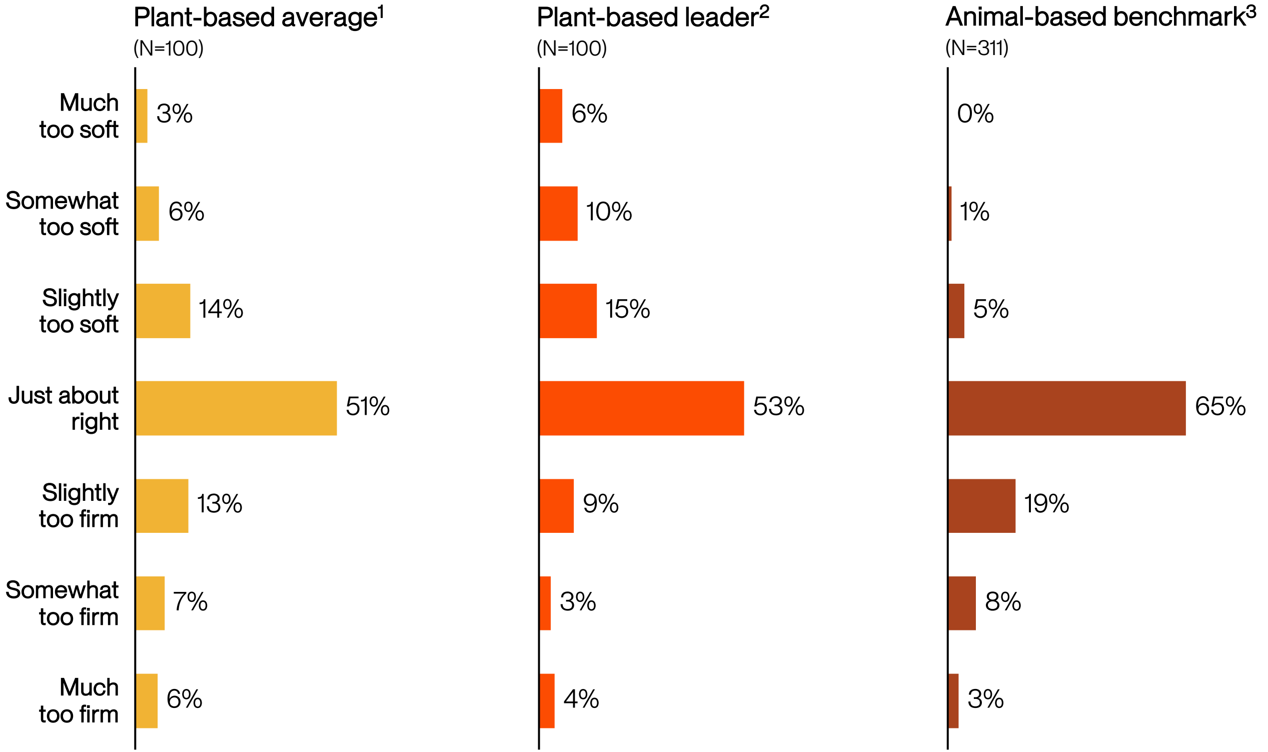
- The distribution of responses on juiciness was nearly identical.

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Firmness

Takeaways

How would you describe the firmness?, % of participants



Plant-based burgers have an opportunity to outperform animal burgers on firmness.

- Just 65% of participants found the animal product to be 'just about right' with a strong lean towards being 'too firm'.

The plant-based leader should reduce its firmness.

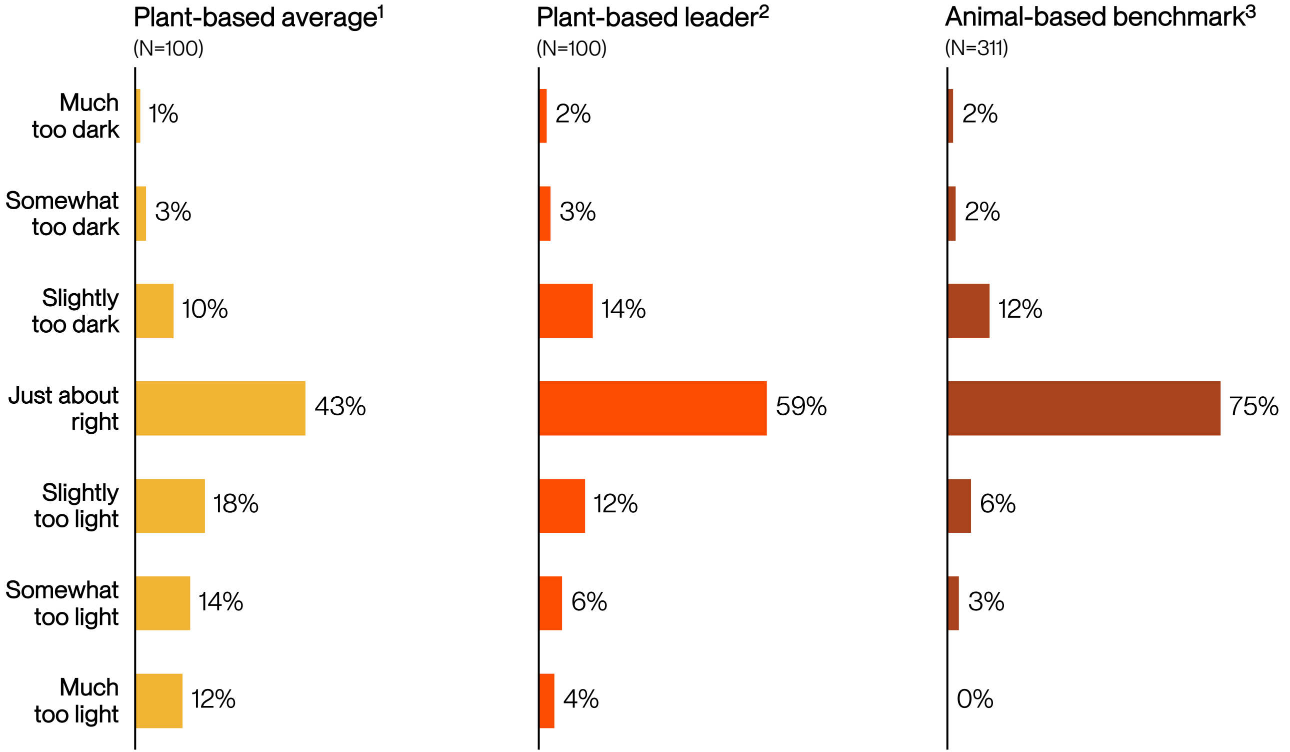
- Participants were 2x as likely to find the burger 'too soft' than they were to find it ' too firm'.

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Color

Takeaways

How would you describe the color?, % of participants



Plant-based burgers should generally strive to be darker in color.

- 44% of participants found the plant-based average 'too light'.

Color is an area of strength for the plant-based leader.

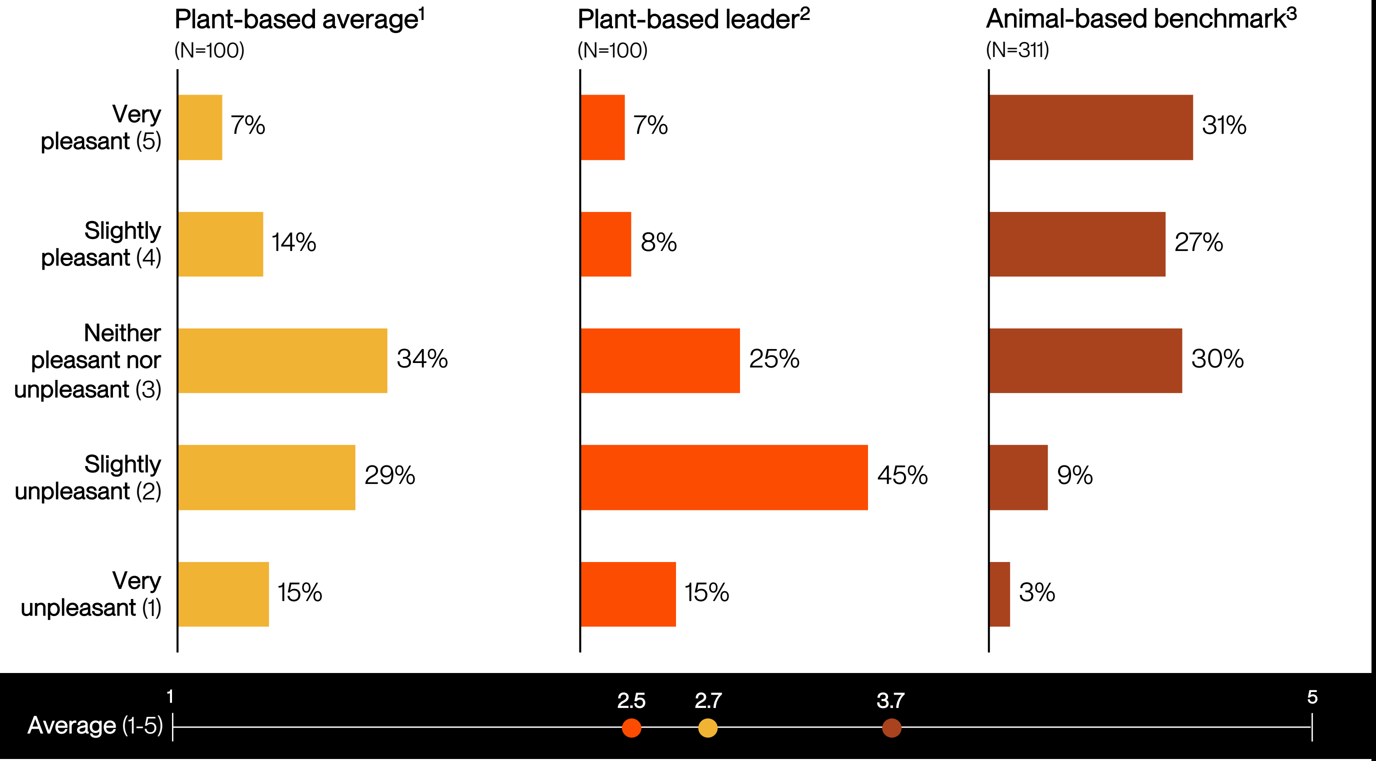
- 59% found the color to be 'just about right', a higher share than on any other sensory attribute.

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Aftertaste

Takeaways

How would you describe the aftertaste?, % of participants



The plant-based leader has a clear opportunity to overcoming its weakness in aftertaste pleasantness.

- 60% found it to be some form of unpleasant, worse performance than the plant-based average.

Plant-based burgers in general have a weakness in aftertaste pleasantness.

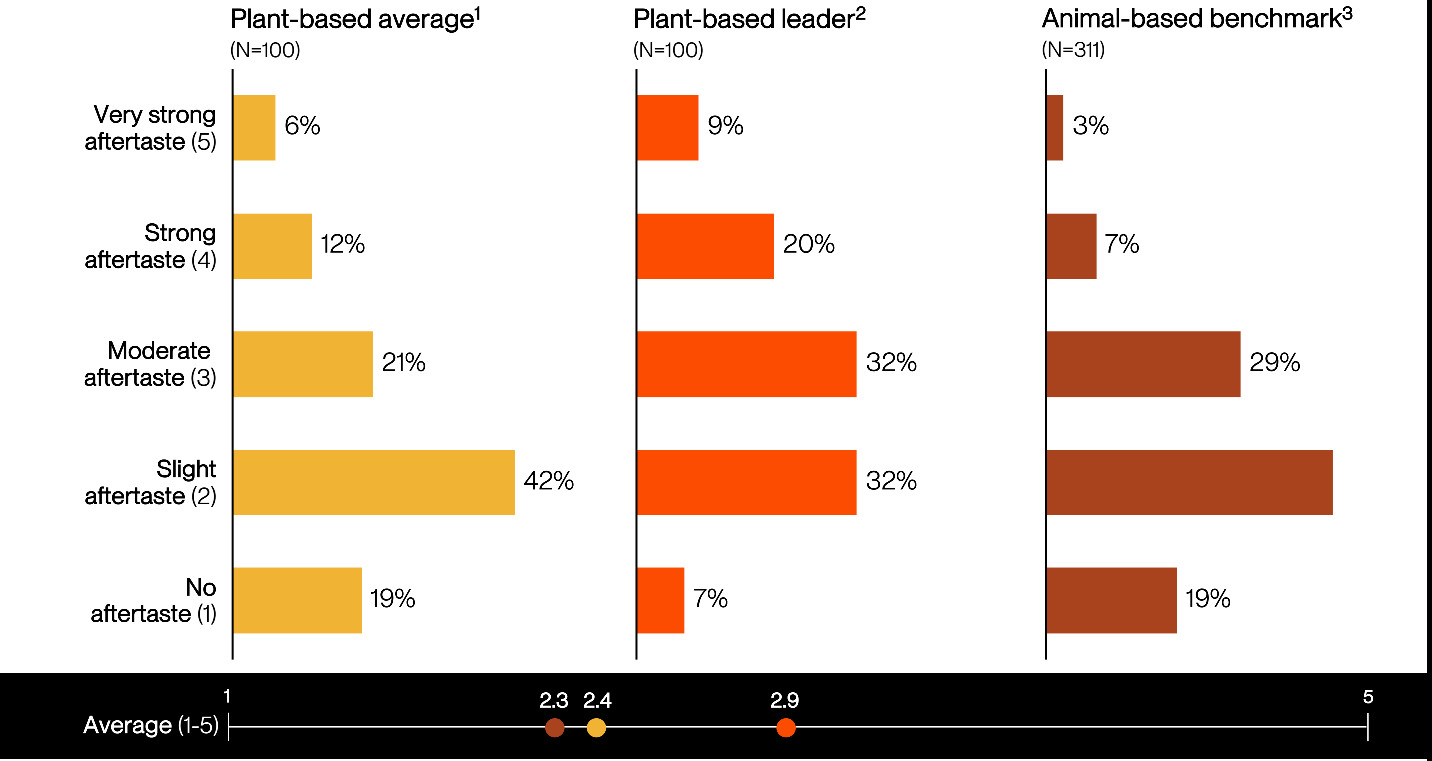
- Just 21% of participants found it to be pleasant (versus 58% for the animal burger).

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Aftertaste

Takeaways

How would you describe the strength of the aftertaste?, % of participants



Animal-based burgers and the plant-based average have a similar aftertaste strength.

- The distribution of responses was very similar for animal and plant-based burgers.

The plant-based leader had a significantly stronger aftertaste.

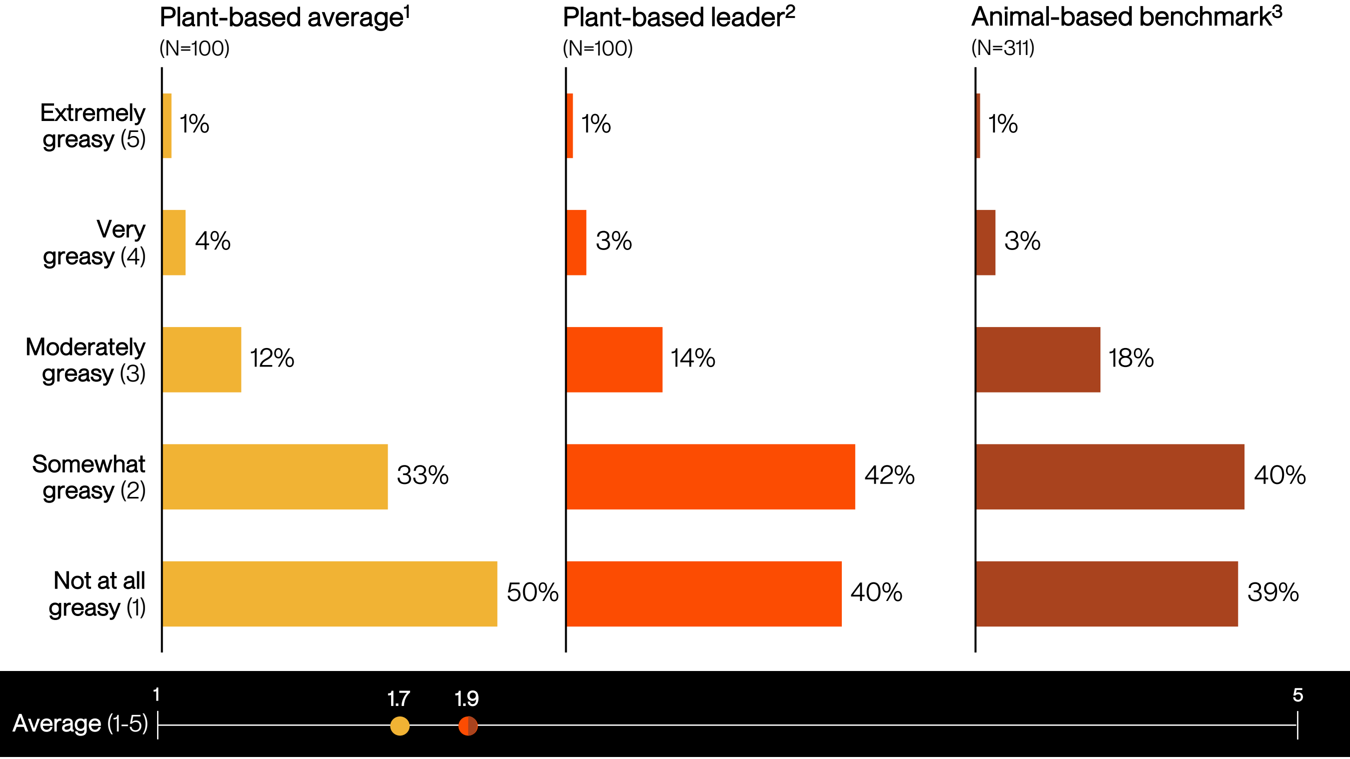
- 29% of participants found it to be ‘very strong’ or ‘strong’ (versus just 10% for the animal burger).

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Burger: Greasiness

Takeaways

How would you describe the overall greasiness?, % of participants



The plant-based leader and animal burger were considered to have very similar level of greasiness by participants.

- The distribution of responses for these burgers was very similar.

Plant-based burgers can become slightly greasier to match the profile of animal burgers.

- The average plant-based burger was rated slightly less greasy.

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Category-Specific Deep Dive

Hot Dog

Hot Dog > Executive summary of R&D opportunities

Priority Attributes

There is whitespace for a leader to emerge in hot dogs.

- **There is little variation in the performance of hot dogs** – Plant-based average and plant-based leader scored within 0.3 rating points of each other on overall liking.
- **The gap to animal product was large** – Plant-based hot dogs were 'disliked' or 'somewhat disliked' while the animal hot dog achieved an average rating of 'like'.
- **There are major opportunities across flavor, texture, and appearance** – the gap to the animal hot dog was large for each attribute and strongly linked to overall liking.

Top Sensory Opportunities

Animal-based products still preferred by consumers.

- **Participants wanted bolder profile from the hot dogs** – participants often stated that hot dogs were not meaty, juicy, spicy, sweet, or smoky enough.
- **Participants wanted bolder profile from the hot dogs** – 91% of participants rated the animal hot dog 'just about right' versus just 18% for the plant-based leader and plant-based average, the largest gap on any attribute tested in our research.
- **Products should be careful not to overcorrect** – being too salty, meaty or juicy had a greater negative impact on overall liking than being 'not enough'.

Hot Dogs Tested

Hot dogs from 7 commercially available plant-based brands were prepared according to manufacturer instructions and compared against animal hot dogs.

Product **294**

Product **243**

Product **276**

Product **201**

Product **204**

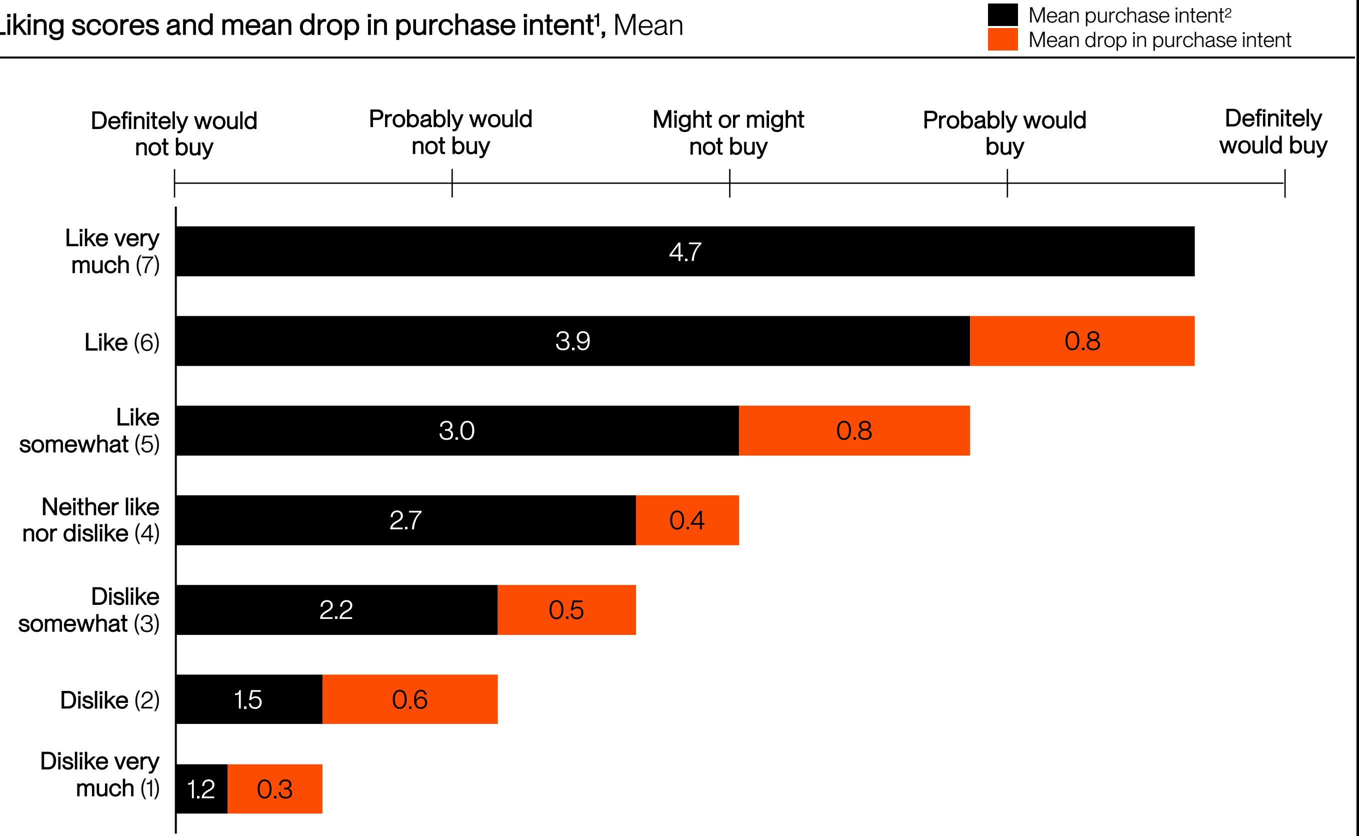
Product **288**

Product **234**

Product **226**
Animal-based hot dog

Hot Dog: Translation from 'liking' to 'purchase intent'

Liking scores and mean drop in purchase intent[1], Mean



Takeaways

Products need high levels of satisfaction to win over consumers.

- Purchase intent (PI) is only positive when overall satisfaction is "Like very much" or "Like".

Consumers demand an especially high level of satisfaction for hot dogs.

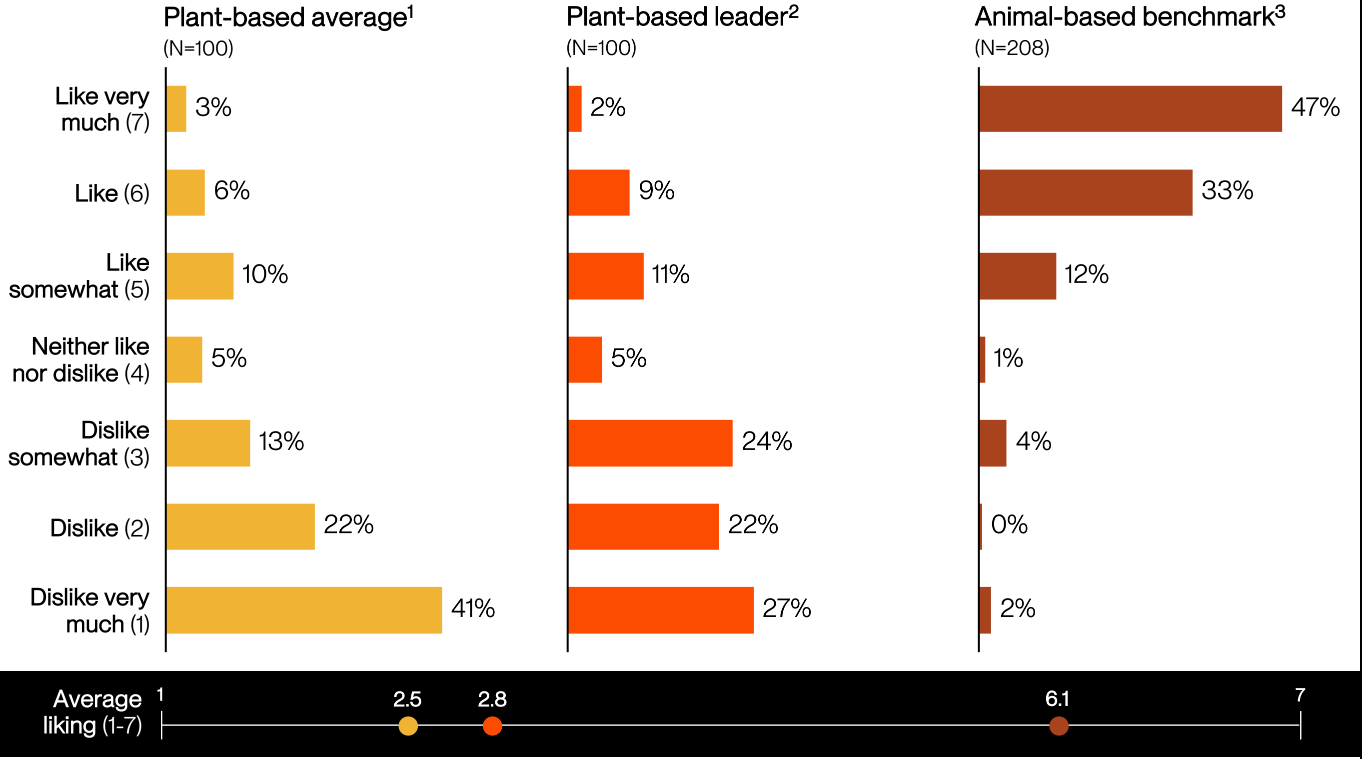
- "Like somewhat" corresponds to a neutral PI (3), the lowest across all categories.

1. Aggregated across 932 responses
2. Calculated as the average purchase intent for all responses across all products (plant and animal-based) at each level of 'liking

Hot Dog: Satisfaction

Takeaways

Liking scores, % of participants



Participants strongly enjoy and prefer the animal-based product over plant-based products.

- Participants strongly enjoy and prefer the animal-based product over plant-based products.

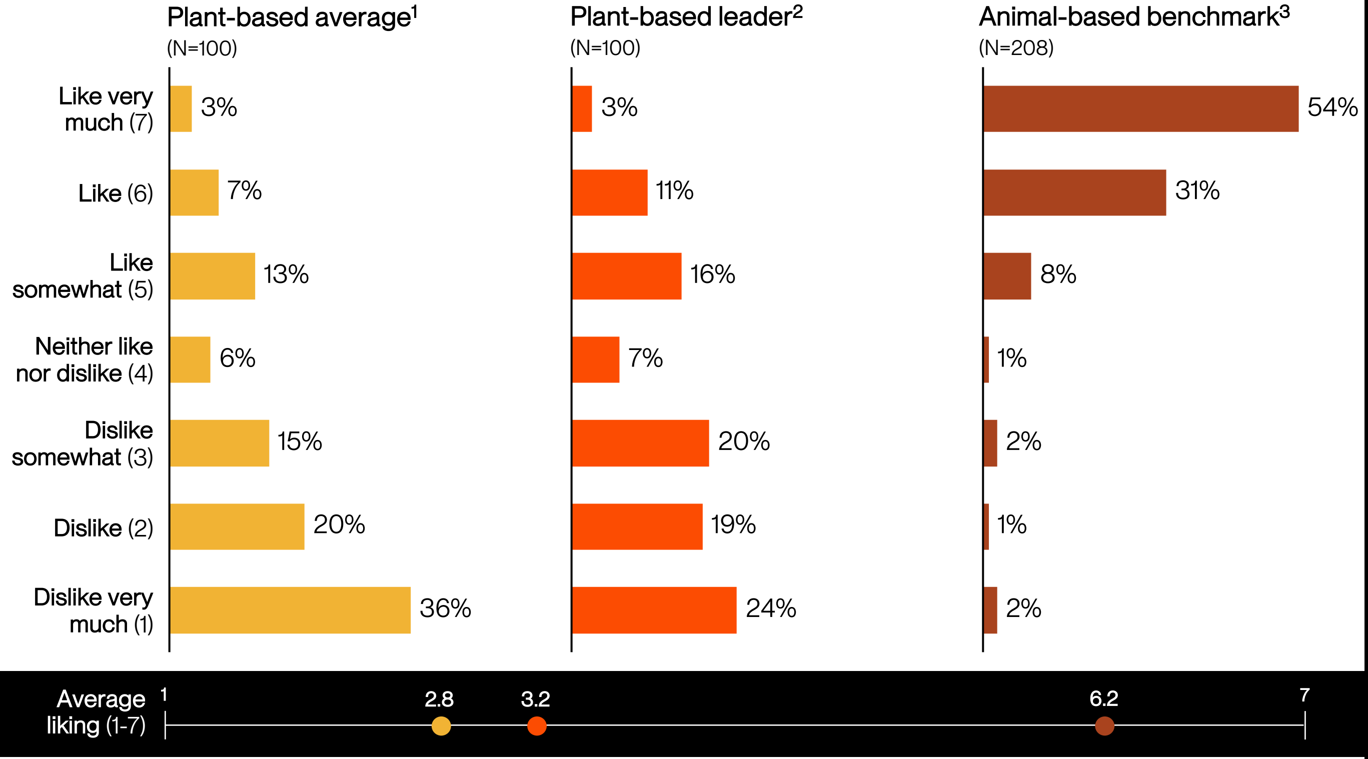
There is little variation in liking amongst plant-based hot dogs.

- Plant-based average and plant-based leader scored within 0.3 rating points of each other on overall liking.

1. Aggregated across 7 commercially plant-based available hot dog brands' Includes 1 vegetarian brand that contains milk and/or eggs
2. Top performing plant-based product amongst 7 commercially available hot dogs
3. Animal-based hot dog available in retail

Hot Dog: Flavor

Liking scores, % of participants



Takeaways

Flavor is the biggest improvement opportunity for plant-based hot dogs.

- The gap in average liking to the animal hot dog is bigger than for texture or appearance.

The flavor of plant-based hot dogs often led to strong negative reactions to flavor.

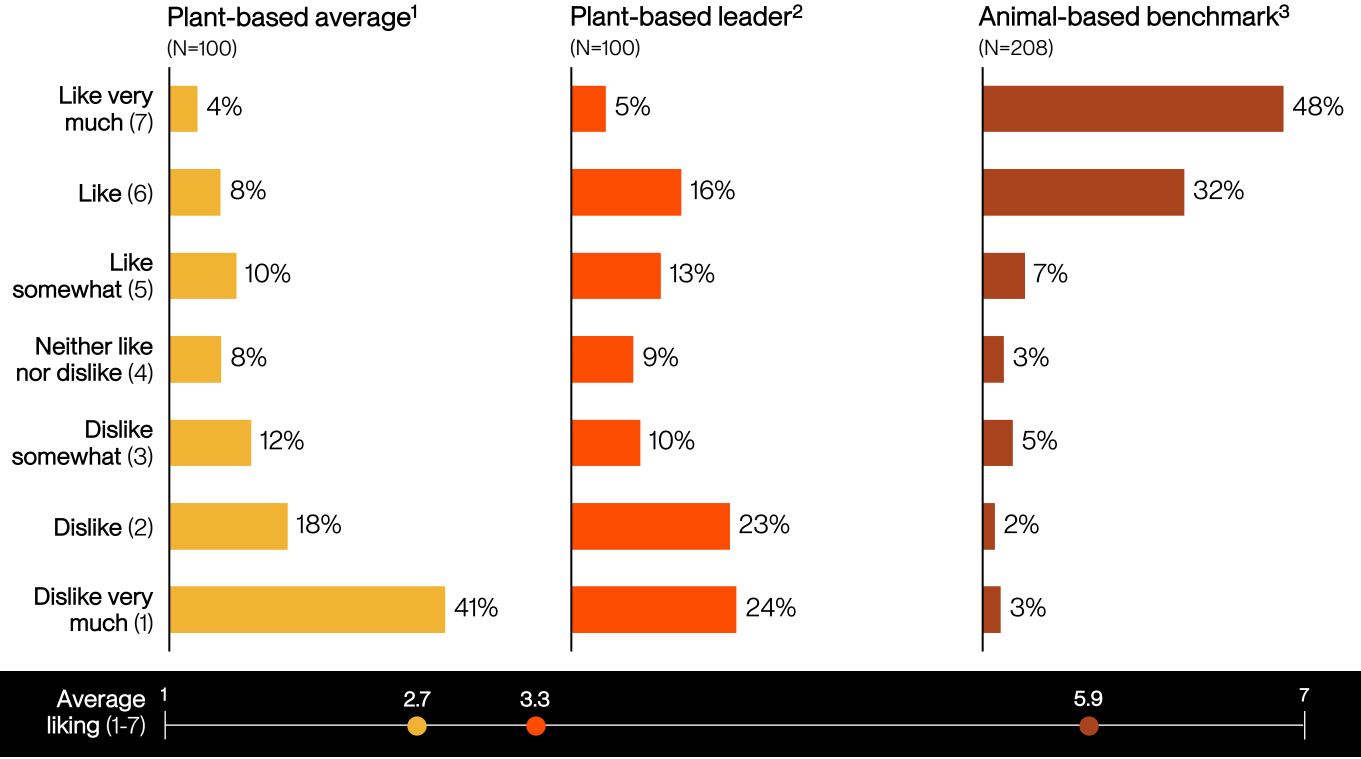
- 71% of participants disliked the flavor of the plant-based hot dogs (versus just 5% for animal hot dogs).

1. Aggregated across 7 commercially plant-based available hot dog brands' Includes 1 vegetarian brand that contains milk and/or eggs
2. Top performing plant-based product amongst 7 commercially available hot dogs
3. Animal-based hot dog available in retail

Hot Dog: Texture

Takeaways

Liking scores, % of participants



Texture improvements are the second largest opportunity for plant-based hot dogs.

- The average plant-based hot dog had a gap in mean liking of 3.2pts (versus 3.4pts for flavor).

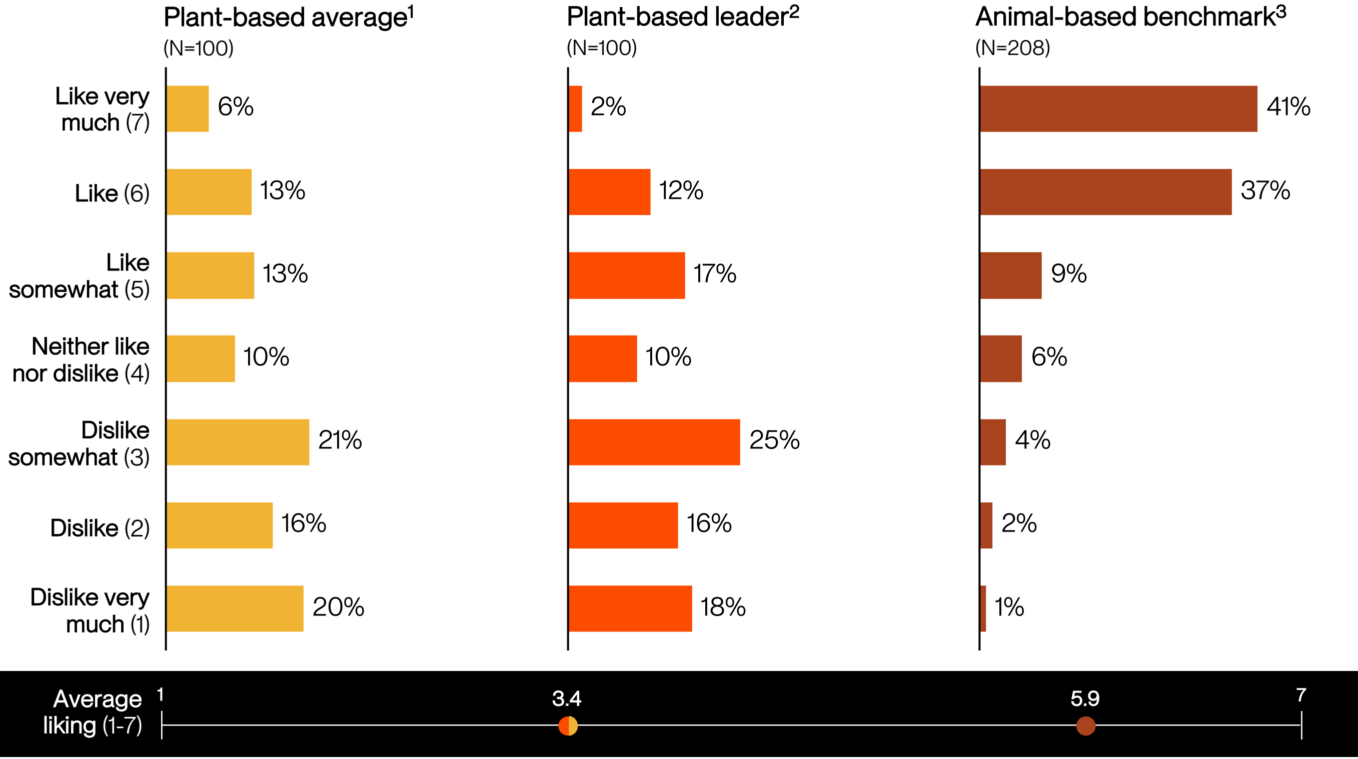
Plant-based products should focus on preventing strong negative reactions to texture.

- The average plant-based hot dog had a mean liking of 2.7pts, the lowest average score across flavor, texture, and appearance.
- 41% of participants rated the texture as ‘dislike very much,’ the highest recorded across flavor, texture, and appearance.

1. Aggregated across 7 commercially plant-based available hot dog brands’ Includes 1 vegetarian brand that contains milk and/or eggs
2. Top performing plant-based product amongst 7 commercially available hot dogs
3. Animal-based hot dog available in retail

Hot Dog: Appearance

Liking scores, % of participants



Takeaways

The plant-based average and plant-based leader performed very similarly on appearance.

- The distribution of responses on appearance was nearly identical.

Appearance is an area of relative strength for plant-based hot dogs.

- Plant-based hot dogs had a mean liking of 3.4pts (vs 2.7pts on texture and 2.8pts on flavor).

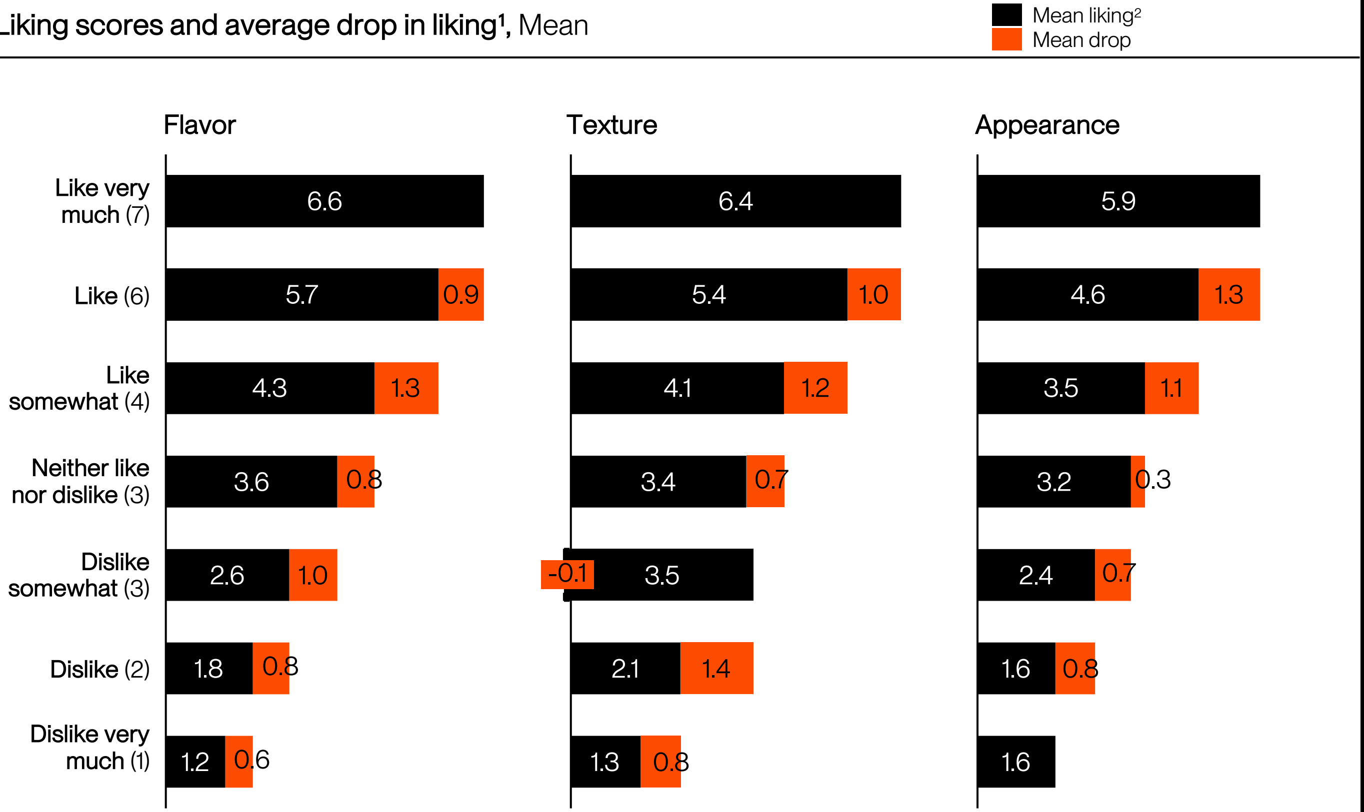
Appearance is still a major improvement area for plant-based hot dogs.

- Just 19% rated the appearance as 'like very much' or 'like' vs 78% for the animal hot dog.

1. Aggregated across 7 commercially plant-based available hot dog brands' Includes 1 vegetarian brand that contains milk and/or eggs
2. Top performing plant-based product amongst 7 commercially available hot dogs
3. Animal-based hot dog available in retail

Hot Dog: Importance of key sensory traits to overall satisfaction → Takeaways

Liking scores and average drop in liking[1], Mean



Flavor is the strongest indicator of overall satisfaction.

- Average liking is higher for ratings of 'like very much' on flavor than it is on texture or appearance.

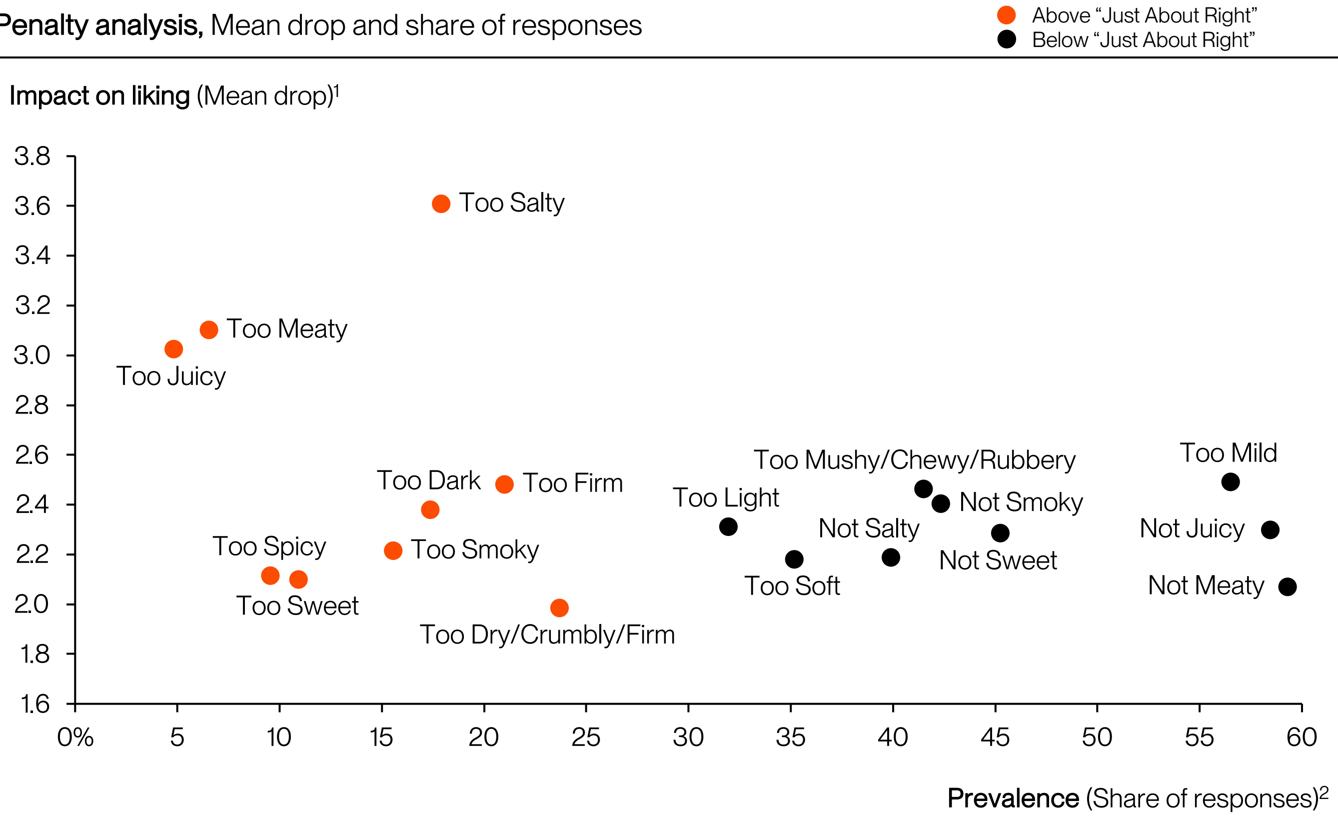
Appearance has the smallest impact on overall liking.

- The range of general liking ratings for appearance is tighter than for flavor or texture.

1. Aggregated across 932 responses
2. Calculated as the average overall satisfaction for all responses across all products (plant and animal-based) at each level of "liking" for the sensory trait

Hot Dog: Impact of key sensory traits on liking

Penalty analysis, Mean drop and share of responses



Takeaways

Participants wanted bolder profile from hot dogs.

- Participants were far more likely to state that hot dogs were not meaty, juicy, spicy, sweet, firm, or smoky enough.

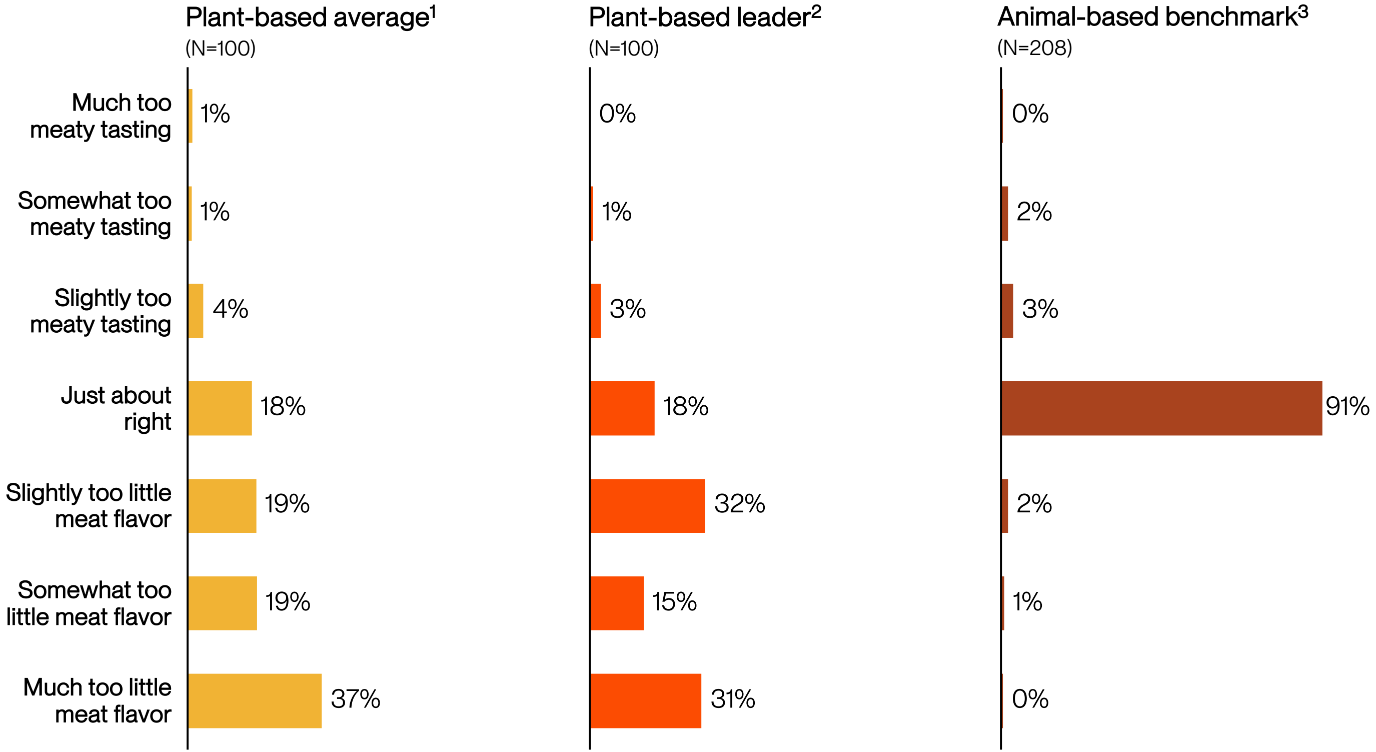
Products should be careful not to overcorrect, especially on saltiness.

- Being too salty, meaty or juicy had an outsized negative impact on overall satisfaction.
- Being too salty lowered overall satisfaction by 3.6pts, the largest drop across categories.

1. Calculated as the average drop in meatiness for products with the associated response
2. Share of responses for all products (animal and plant) in each direction for each trait, across 932 responses

Hot Dog: Meatiness

How would you rate the meatiness?, % of participants



Takeaways

Animal-based hot dogs were much more likely to be considered 'just about right' (JAR) on meatiness.

- 91% of participants rated the meatiness JAR compared to just 18% for the plant-based leader and plant-based average (the largest recorded gap for any sensory attribute or product included in this research).

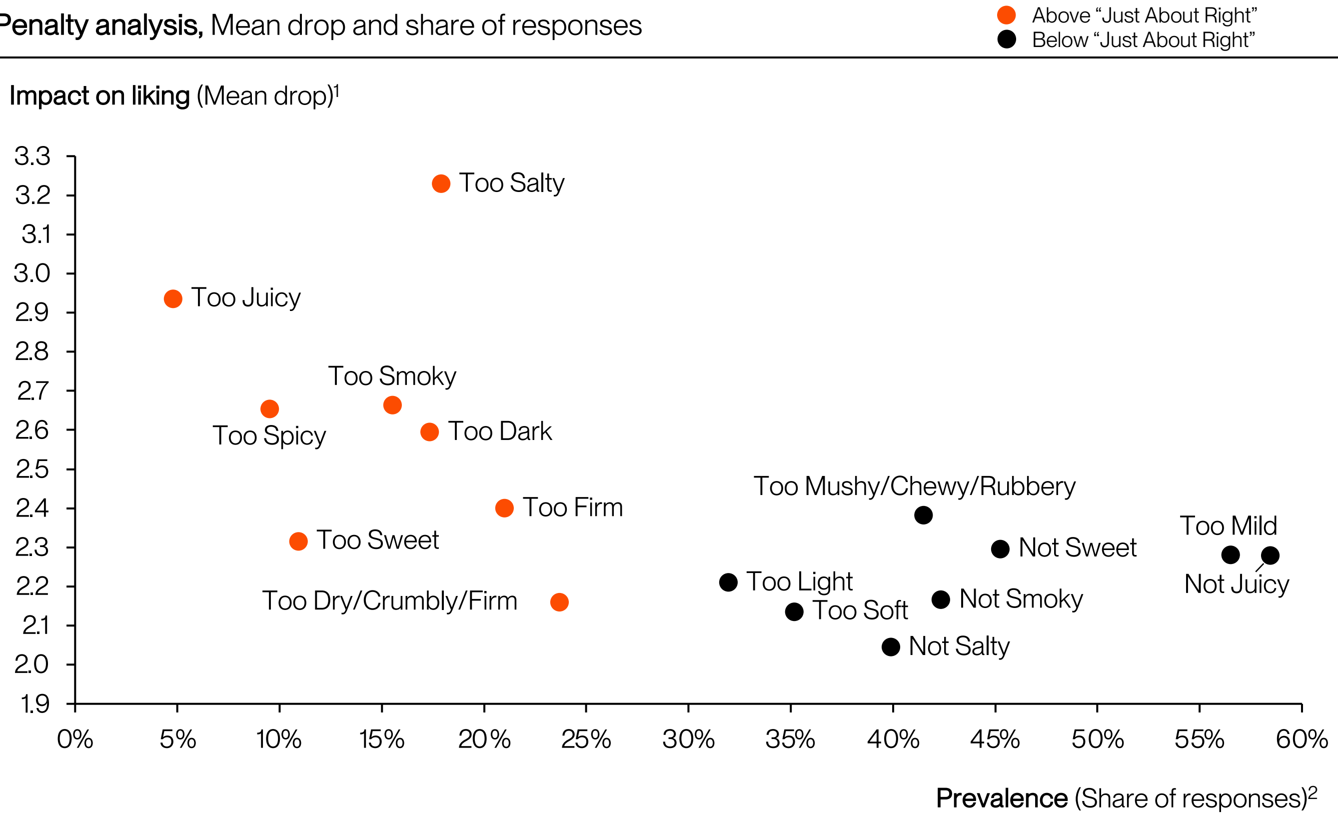
Participants clearly indicated that they felt plant-based hot dogs were not 'meaty' enough.

- 75% of participants rated the plant-based hot dogs 'not meaty enough' while only 6% found them 'too meaty'.

1. Aggregated across 7 commercially plant-based available hot dog brands' Includes 1 vegetarian brand that contains milk and/or eggs
2. Top performing plant-based product amongst 7 commercially available hot dogs
3. Animal-based hot dog available in retail

Hot Dog: Impact of key sensory traits on meatiness

Penalty analysis, Mean drop and share of responses



Takeaways

Most plant-based hot dogs should increase their flavor intensity and juiciness to create a meatier product.

- Being too mild and not juicy enough were cited by the majority of respondents and contributed significantly to meatiness.

Being too strong in flavor had the largest negative impact to meatiness.

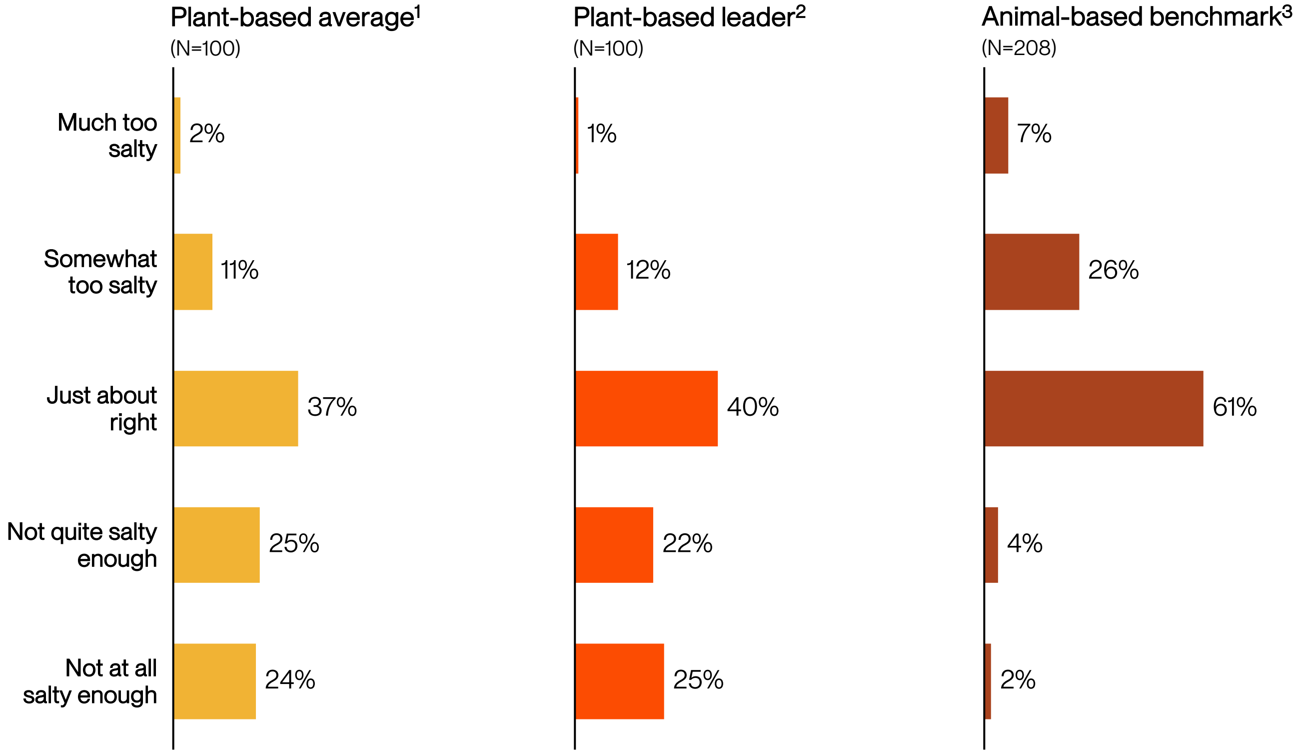
- While cited less frequently, responses that cited products being too salty, juicy, smoky, and spicy were associated with the largest drops in average liking (within hot dogs and across categories).

1. Calculated as the average drop in meatiness for products with the associated response
2. Share of responses for all products (animal and plant) in each direction for each trait, across 932 responses

Hot Dog: Saltiness

Takeaways

How would you rate the saltiness?, % of participants



Plant-based hot dogs should increase saltiness to catch up to animal-based.

- 49% of participants rated the plant-based average as 'not salty enough' while just 13% found them to be 'too salty'.

Opportunity to surpass animal hot dogs by striking the right saltiness balance.

- 33% of participants still found the animal-based product to be too salty.

Saltiness is an area of relative strength for plant-based.

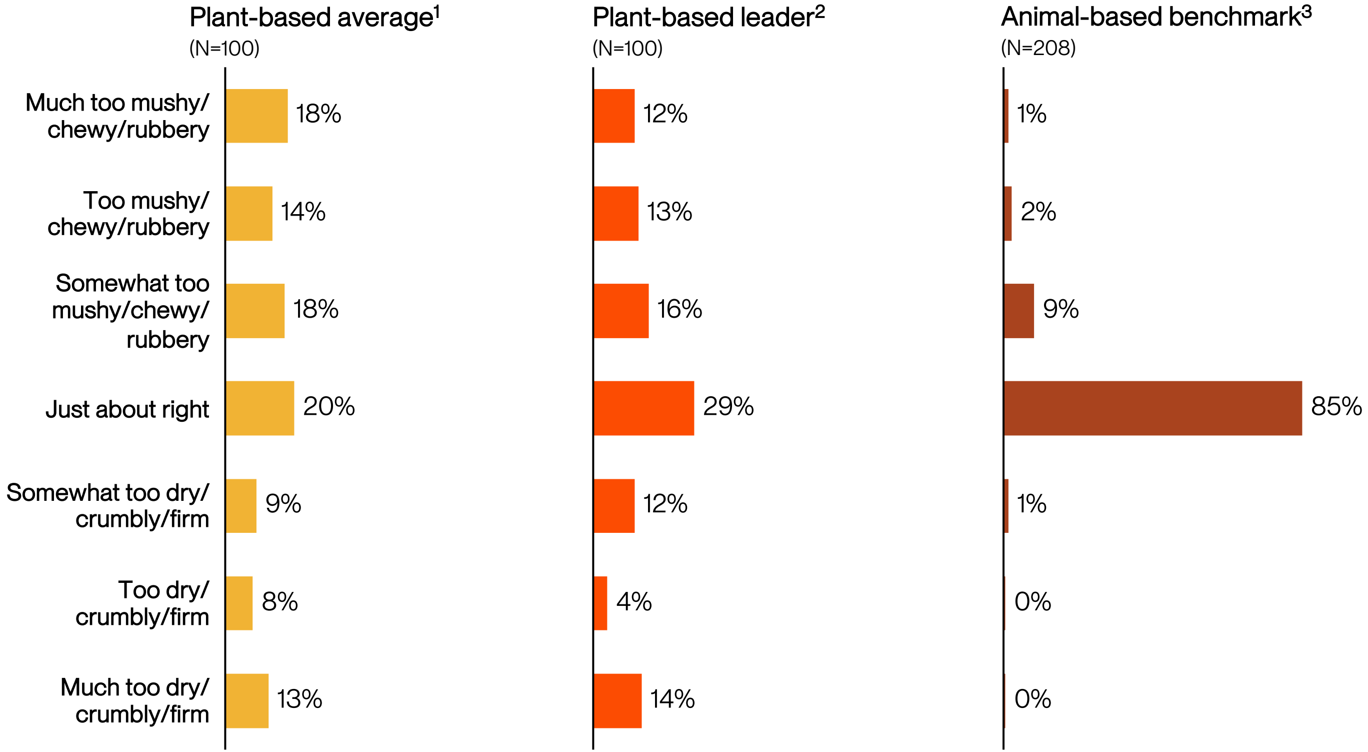
- 37% rated the saltiness as 'just about right', higher than most other sensory traits.

1. Aggregated across 7 commercially plant-based available hot dog brands' Includes 1 vegetarian brand that contains milk and/or eggs
2. Top performing plant-based product amongst 7 commercially available hot dogs
3. Animal-based hot dog available in retail

Hot Dog: Consistency

Takeaways

How would you describe the texture overall?, % of participants



There was not clear consensus amongst participants on how to improve consistency.

- 30% of participants found the plant-based leader to be 'too dry/crumbly/firm' while 41% found it tot be 'too mushy/dry/rubbery'.

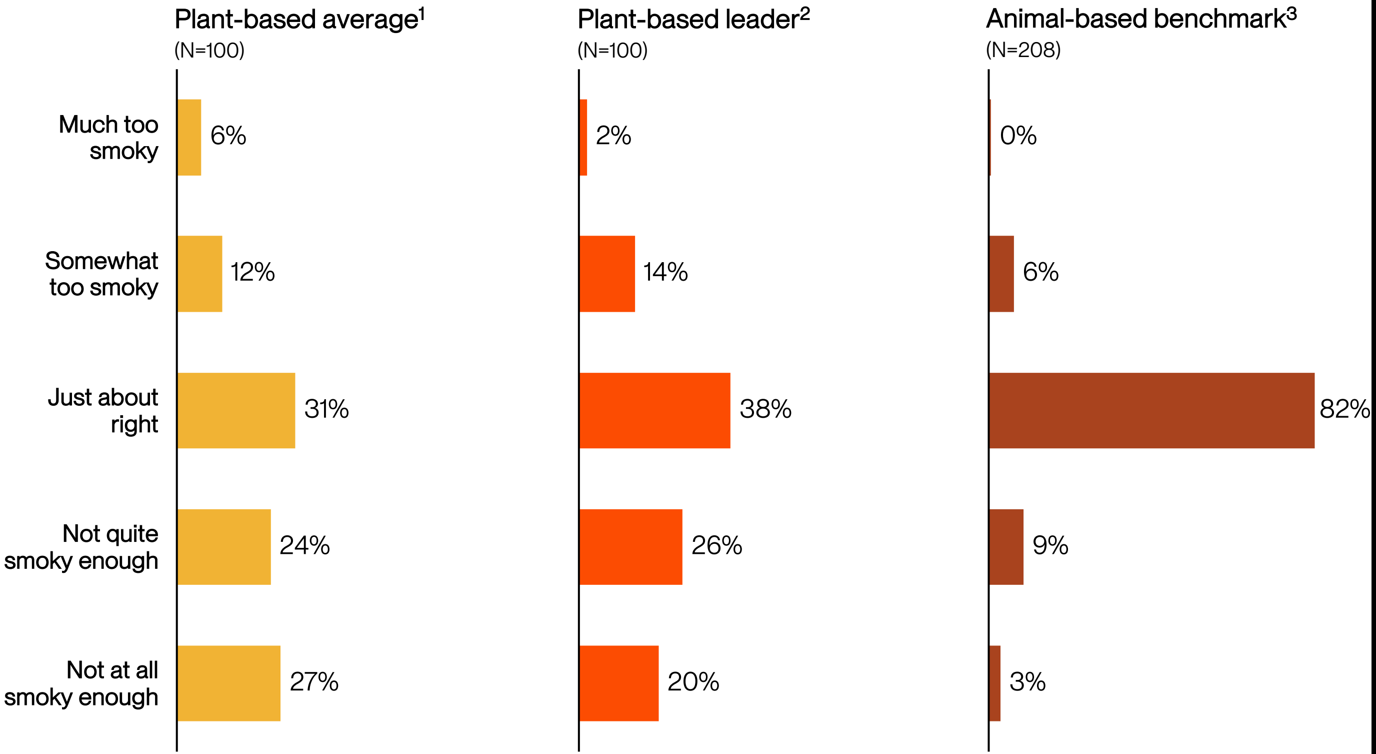
Consistency should be a major focus area for plant-based hot dogs.

- 20% rated the plant-based hot dogs 'just about right' versus 85% for animal hot dogs.

1. Aggregated across 7 commercially plant-based available hot dog brands' Includes 1 vegetarian brand that contains milk and/or eggs
2. Top performing plant-based product amongst 7 commercially available hot dogs
3. Animal-based hot dog available in retail

Hot Dog: Smokiness

How would you describe the smokiness?, % of participants



Takeaways

Plant-based hot dogs should be smokier.

- 51% of participants found plant based hot dogs to be 'not smoky enough' while just 18% rated them 'too smoky'.

Both the plant-based leader and average performed far below the animal hot dog on 'smokiness'.

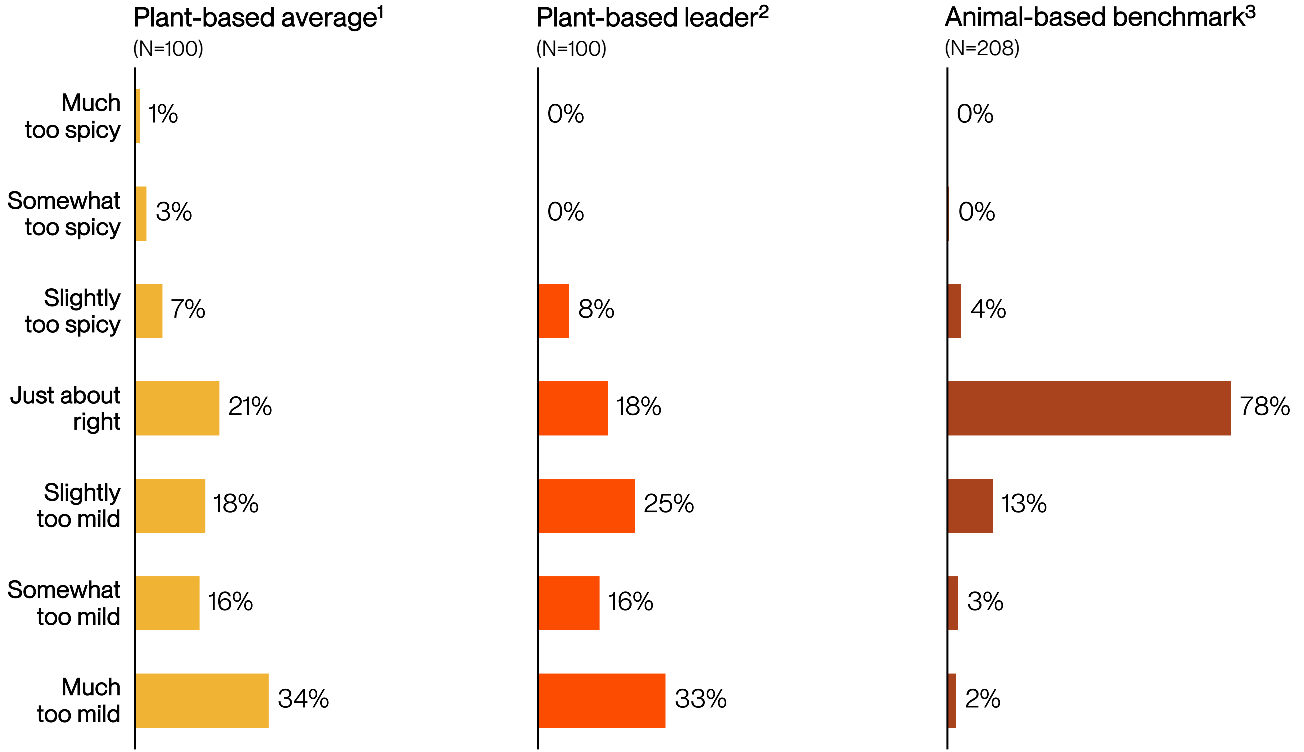
- 31% of participants rated the plant-based hot dog as 'just about right' (38% for the plant leader) while animal-based hot dogs were rated 'just about right' 82% of the time.

1. Aggregated across 7 commercially plant-based available hot dog brands' Includes 1 vegetarian brand that contains milk and/or eggs
2. Top performing plant-based product amongst 7 commercially available hot dogs
3. Animal-based hot dog available in retail

Hot Dog: Spiciness

Takeaways

How would you describe the spiciness?, % of participants



Spiciness is one of the areas of lowest satisfaction amongst all plant-based hot dogs.

- 18% of participants considered the plant-based leader to be ‘just about right’ on spiciness (joint lowest amongst all traits).
- 21% rated the plant-based average ‘just about right’.

Plant-based hot dogs should be less mild.

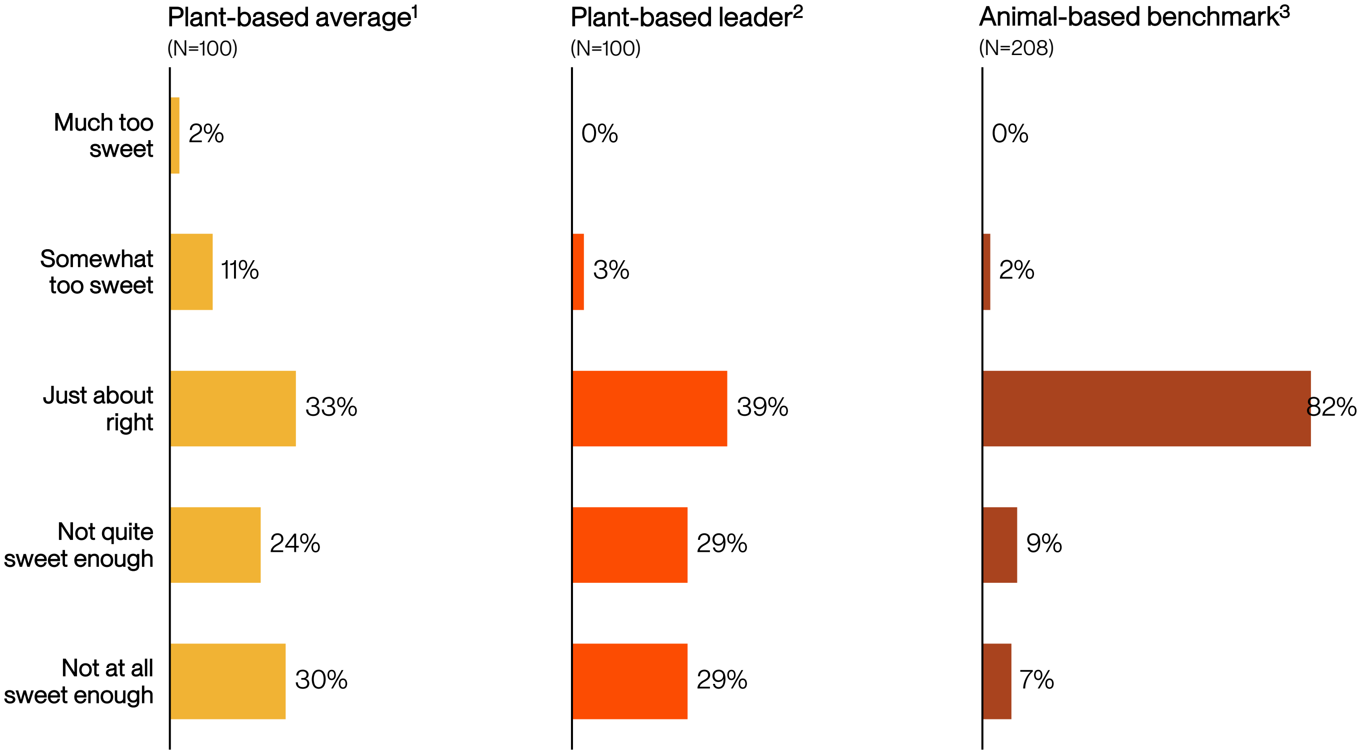
- 68% of participants found plant based hot dogs to be ‘too mild’ while just 11% rated them ‘too spicy’.

1. Aggregated across 7 commercially plant-based available hot dog brands’ Includes 1 vegetarian brand that contains milk and/or eggs
2. Top performing plant-based product amongst 7 commercially available hot dogs
3. Animal-based hot dog available in retail

Hot Dog: Sweetness

Takeaways

How would you describe the sweetness?, % of participants



Plant-based hot dogs should aim for a sweetness profile that's slightly sweeter than that of the animal-based benchmark.

- 16% of participants rated the animal-based product as 'not sweet enough' while just 2% considered it 'too sweet'

The entire hot dog category should be sweeter.

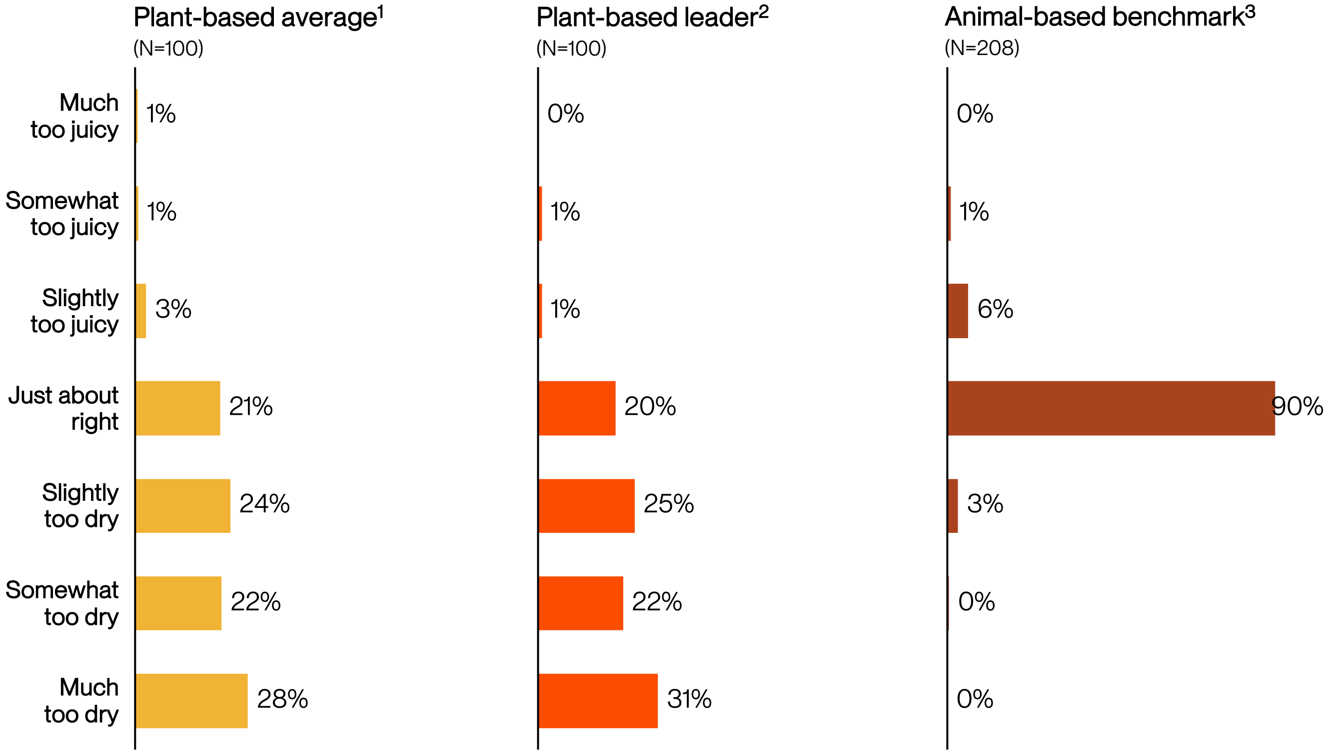
- Participants were far more likely to rate plant-based or animal-based products as 'not sweet enough' rather than 'too sweet'.

1. Aggregated across 7 commercially plant-based available hot dog brands' Includes 1 vegetarian brand that contains milk and/or eggs
2. Top performing plant-based product amongst 7 commercially available hot dogs
3. Animal-based hot dog available in retail

Hot Dog: Juiciness

Takeaways

How would you describe the juiciness?, % of participants



Juiciness is one of the largest improvement areas for plant-based hot dogs.

- Just 21% of participants rated the plant-based hot dogs as 'just about right' while 90% rated the animal hot dogs as 'just about right'.

Plant-based products should be juicier.

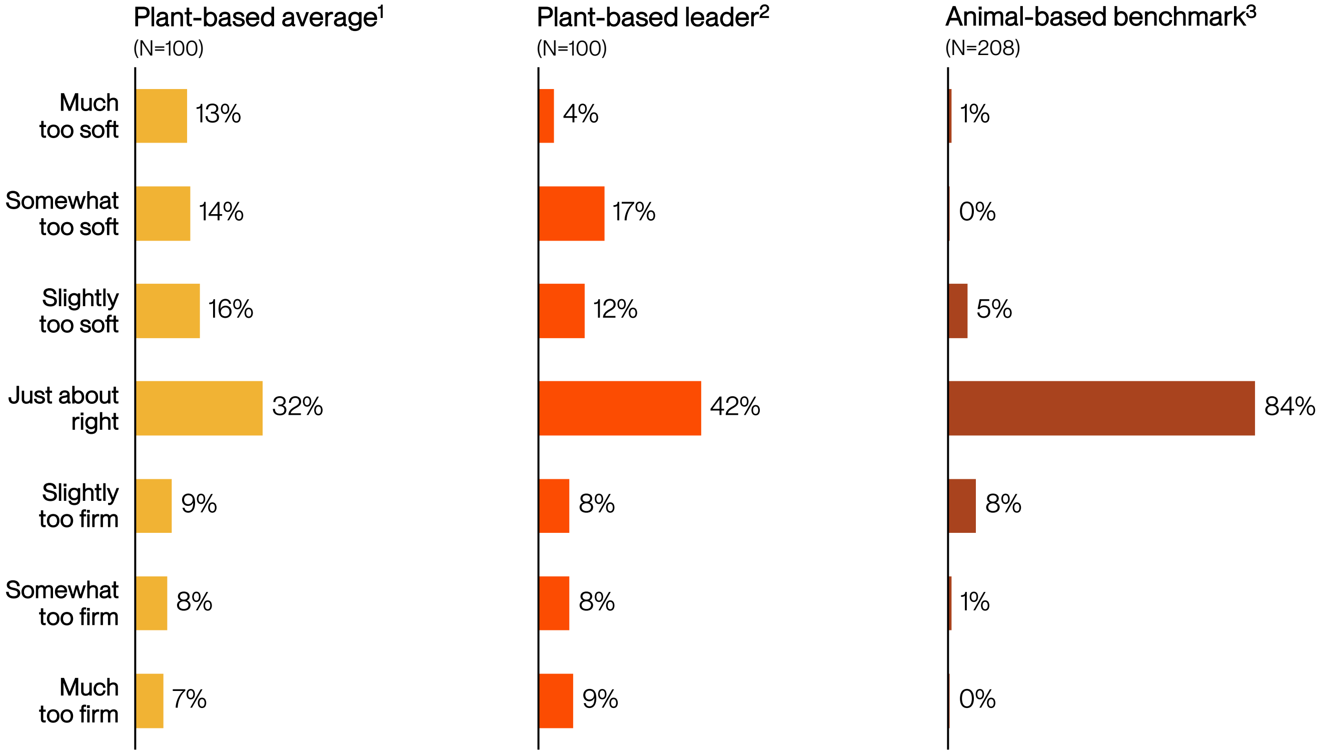
- More than 70% of participants rated the average and leading plant-based hot dogs as ' too dry'.

1. Aggregated across 7 commercially plant-based available hot dog brands' Includes 1 vegetarian brand that contains milk and/or eggs
2. Top performing plant-based product amongst 7 commercially available hot dogs
3. Animal-based hot dog available in retail

Hot Dog: Firmness

Takeaways

How would you describe the firmness?, % of participants



Participants generally wanted firmer plant-based hot dogs but there was not clear consensus.

- 43% of participants found the average plant-based hot dog to be 'too soft' while 24% considered it to be 'too firm'.

Opportunity for plant-based product to learn from plant-based leader.

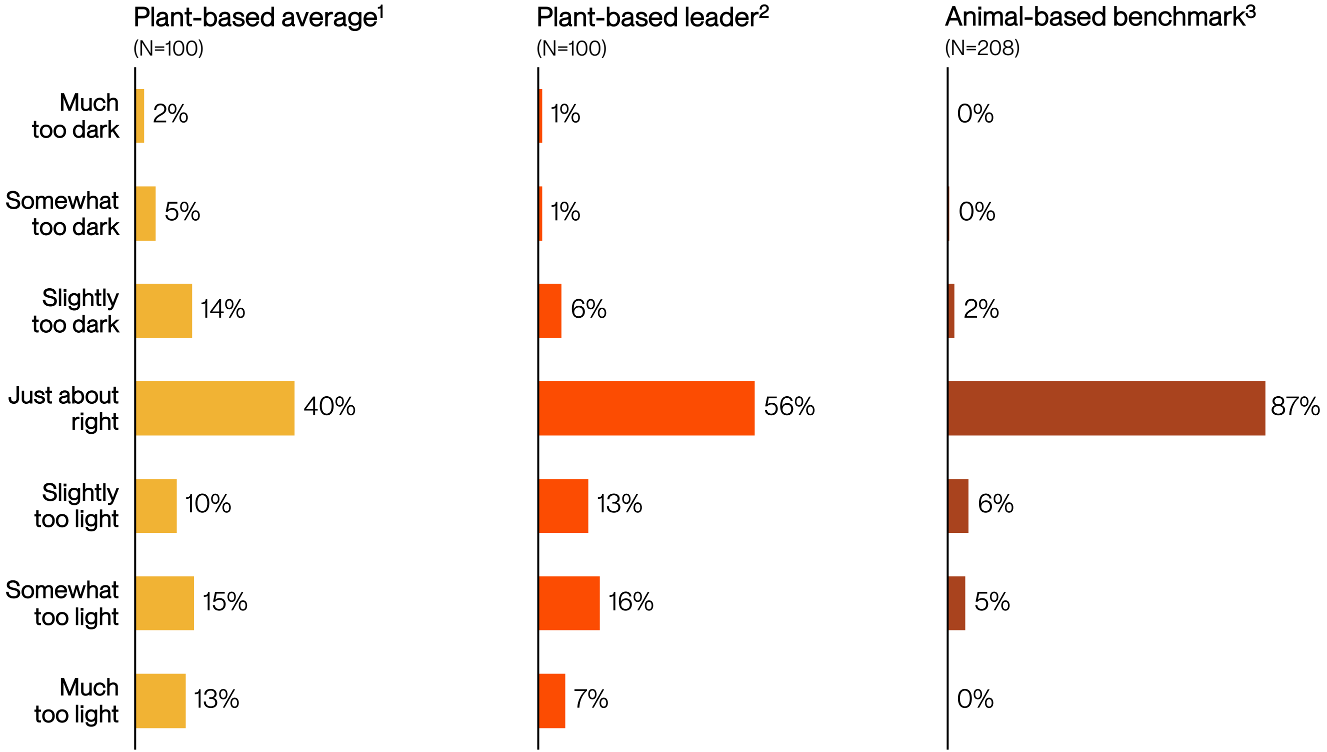
- 42% of participants rated the plant-based leader as 'just about right' (versus just 32% for the plant-based average).

1. Aggregated across 7 commercially plant-based available hot dog brands' Includes 1 vegetarian brand that contains milk and/or eggs
2. Top performing plant-based product amongst 7 commercially available hot dogs
3. Animal-based hot dog available in retail

Hot Dog: Color

Takeaways

How would you describe the color?, % of participants



Largest opportunity for plant-based product to learn from plant-based leader.

- 16% more participants rated the color of the plant-based leader as 'just about right' than the plant-based average – one of the largest area of relative outperformance.

Plant-based products should be darker.

- 38% of participants rated the plant-based average as 'too light' while 21% rated them as 'too dark'.

Color is an area of strength for plant-based hot dogs.

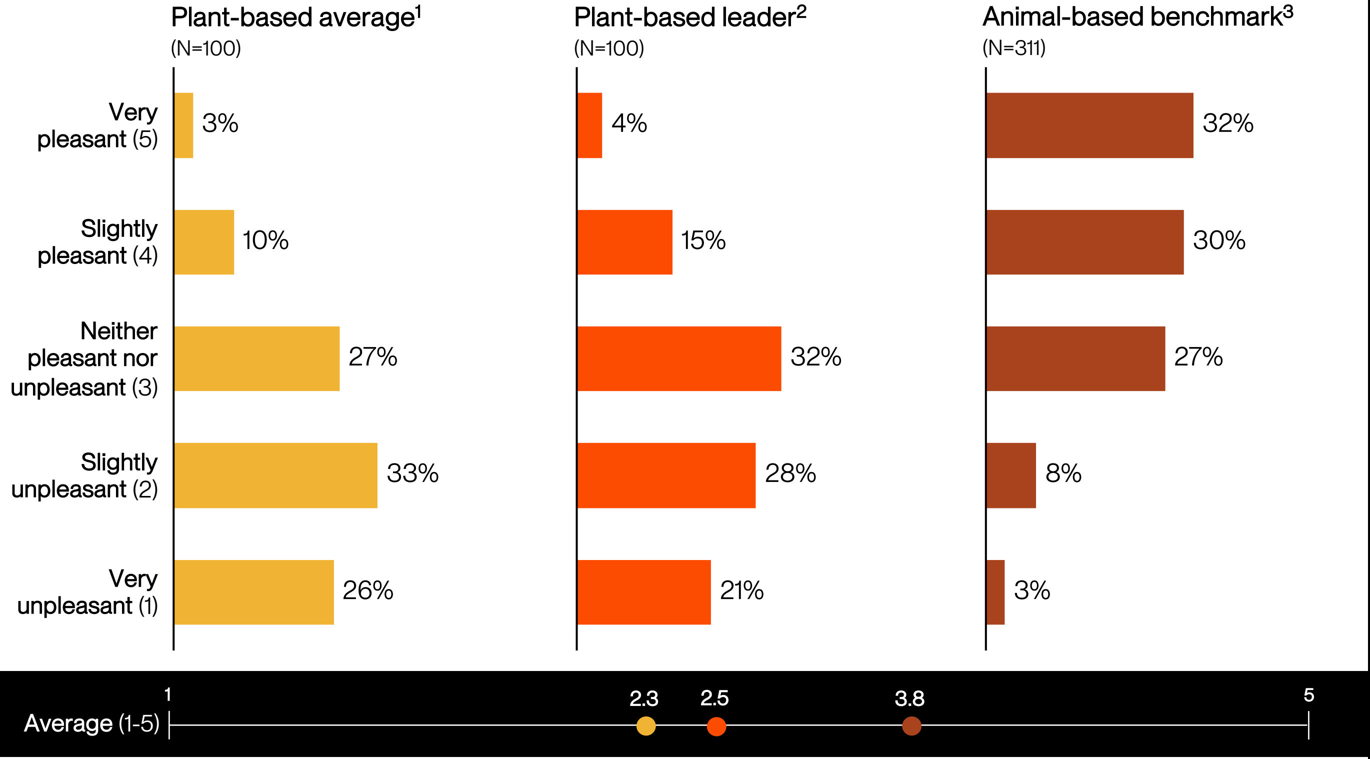
- 40%-56% rated the color as 'just about right', higher than most other traits.

1. Aggregated across 7 commercially plant-based available hot dog brands' Includes 1 vegetarian brand that contains milk and/or eggs
2. Top performing plant-based product amongst 7 commercially available hot dogs
3. Animal-based hot dog available in retail

Hot Dog: Aftertaste

Takeaways

How would you describe the aftertaste?, % of participants



Plant-based hot dogs in general have a weakness in aftertaste pleasantness.

- Just 13% of participants found it to be pleasant versus 62% for the animal hot dog.

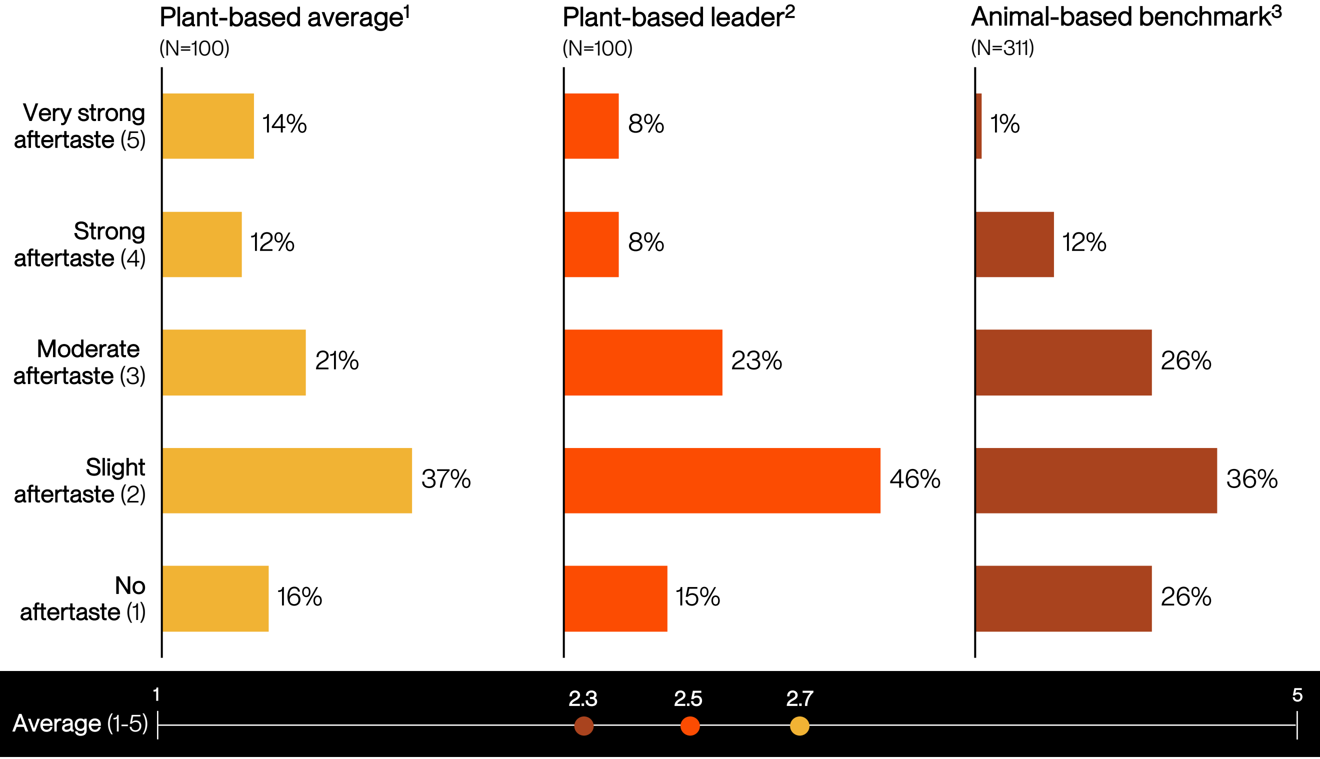
Plant-based products overall can catch up to animal-based by addressing strong negative reactions.

- 21%-26% of participants rated the aftertaste of the plant-based leader and average as 'very unpleasant' (versus just 3% for the plant-based leader).

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Hot Dog: Aftertaste

How would you describe the strength of the aftertaste?, % of participants



Takeaways

Plant-based products overall can catch up to animal-based by reducing their aftertaste.

- 14% of participants rated the aftertaste strength of the plant-based average as ‘very strong aftertaste’ (versus just 8% for the plant-based leader and 1% for the animal hot dog).

Aftertaste strength is an area of relative strength for plant-based products.

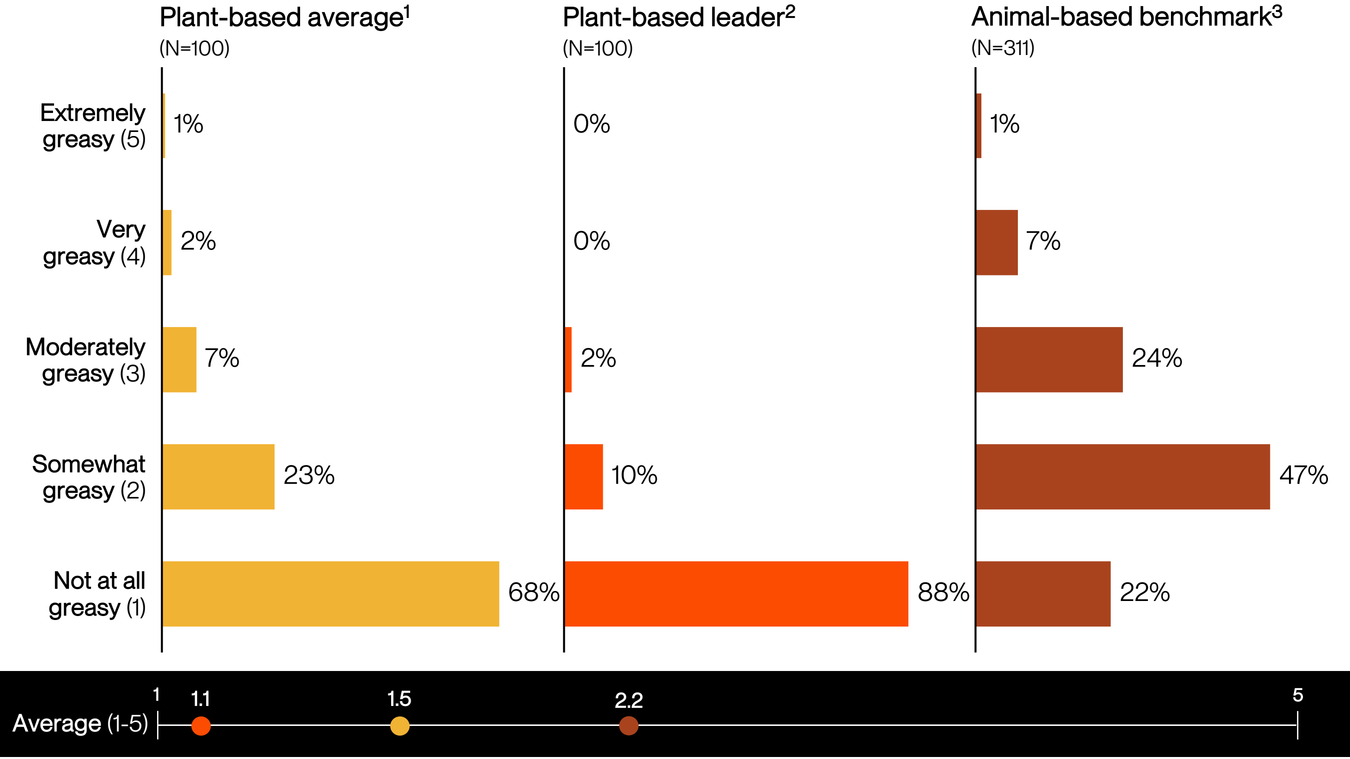
- Overall average ratings are within 0.5pt of the animal-based hot dog.

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Hot Dog: Greasiness

Takeaways

How would you describe the overall greasiness?, % of participants



Plant-based products should be greasier to be more similar to the animal-based product.

- The average greasiness rating for the plant-based average and leader were much lower than that of the animal-based product.

Greasiness is an area of relative weakness for the plant-based leader.

- The average greasiness rating for the plant-based leader is 1.1pts rating points away from the animal-based hot dog (versus just 0.7pts for the the plant-based average).

1. Aggregated across 9 commercially plant-based available burger brands
2. Top performing plant-based product amongst 9 commercially available burger
3. Animal-based burger available in retail

Category-Specific Deep Dive

Bacon

Bacon > Executive summary of R&D opportunities

Priority Attributes

The plant-based leader shows the potential for large improvements.

- **The plant-based leader clearly separates itself from the crowd** – the plant-based leader is closer in liking to the animal bacon than the average plant-based bacon.
- **Better flavors are needed to propel the category forward** – just 8% rated the flavor of the leader 'like very much' (versus 15% on texture).

Top Sensory Opportunities

Plant-based bacon has opportunities to surpass animal bacon.

- **The plant-based leader has an opportunity to build on its relative strength in consistency** – just 10% fewer participants rated the plant-based leader 'just about right' than the animal bacon which is typically considered to be too dry/crumbly/firm.
- **Plant-based bacon should increase its meatiness to outperform animal bacon** – 59-66% found it not meaty enough (versus 38% for animal bacon).
- **Plant-based and animal bacon were universally considered too mild** – both the plant-based leader and average were far more likely to be rated too mild than too spicy.
- **The plant-based bacon can surpass animal bacon with a crispier profile** – animal bacon was considered 'too crispy' while the plant-based bacon was 'too soft / chewy'.

Bacons Tested

Bacons from 6 commercially available plant-based brands were prepared according to manufacturer instructions and compared against animal bacon.

Product 102

Product 107

Product 118

Product 135

Product 146

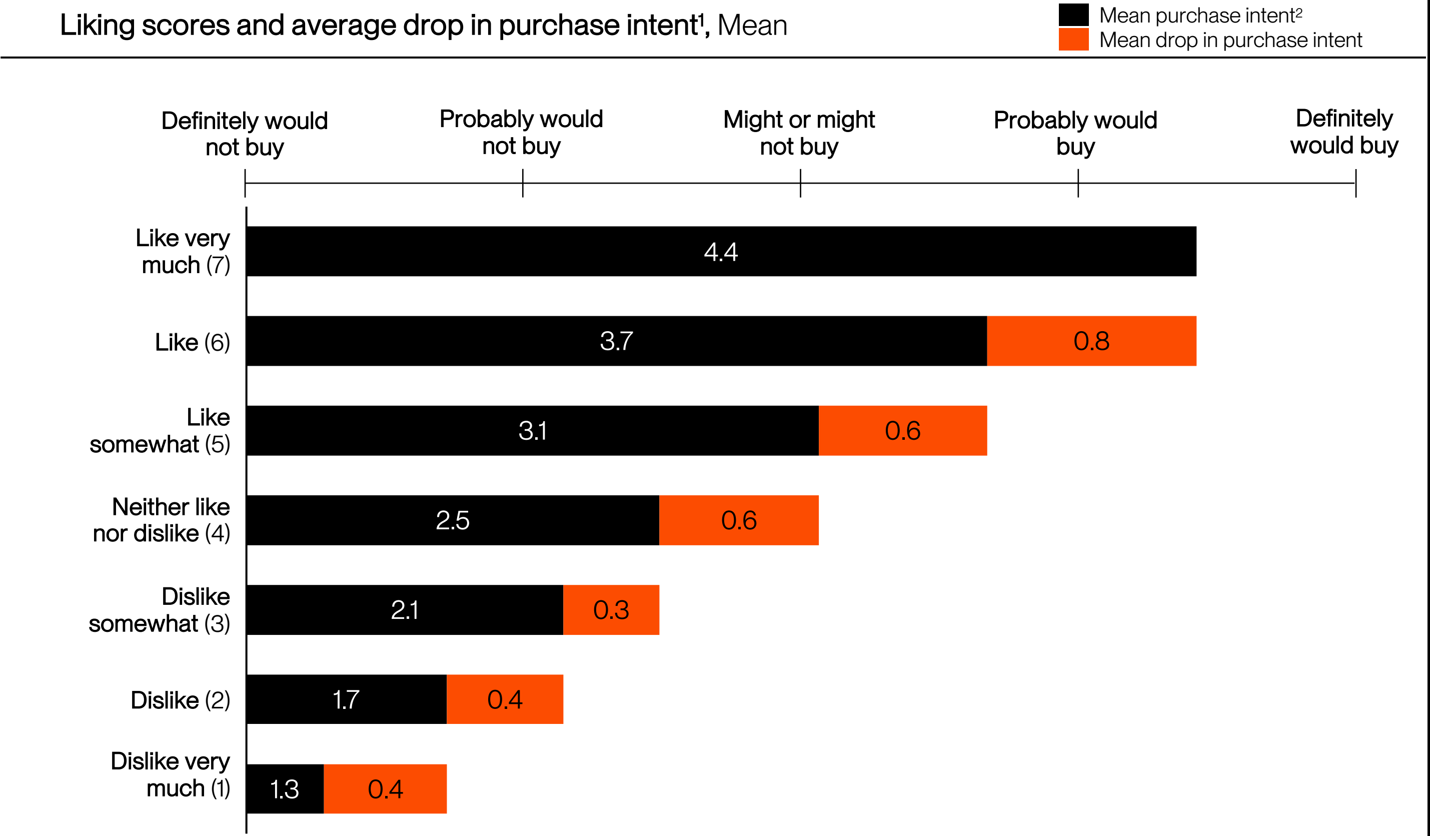
Product 163

Product 179
Animal-based bacon

Bacon: Translation from 'liking' to 'purchase intent'

Takeaways

Liking scores and average drop in purchase intent[1], Mean



The liking threshold to translate into strong purchase intent is high in the bacon category.

- Purchase intent falls below 'probably would buy' when moving from 'like very much' to 'like'.

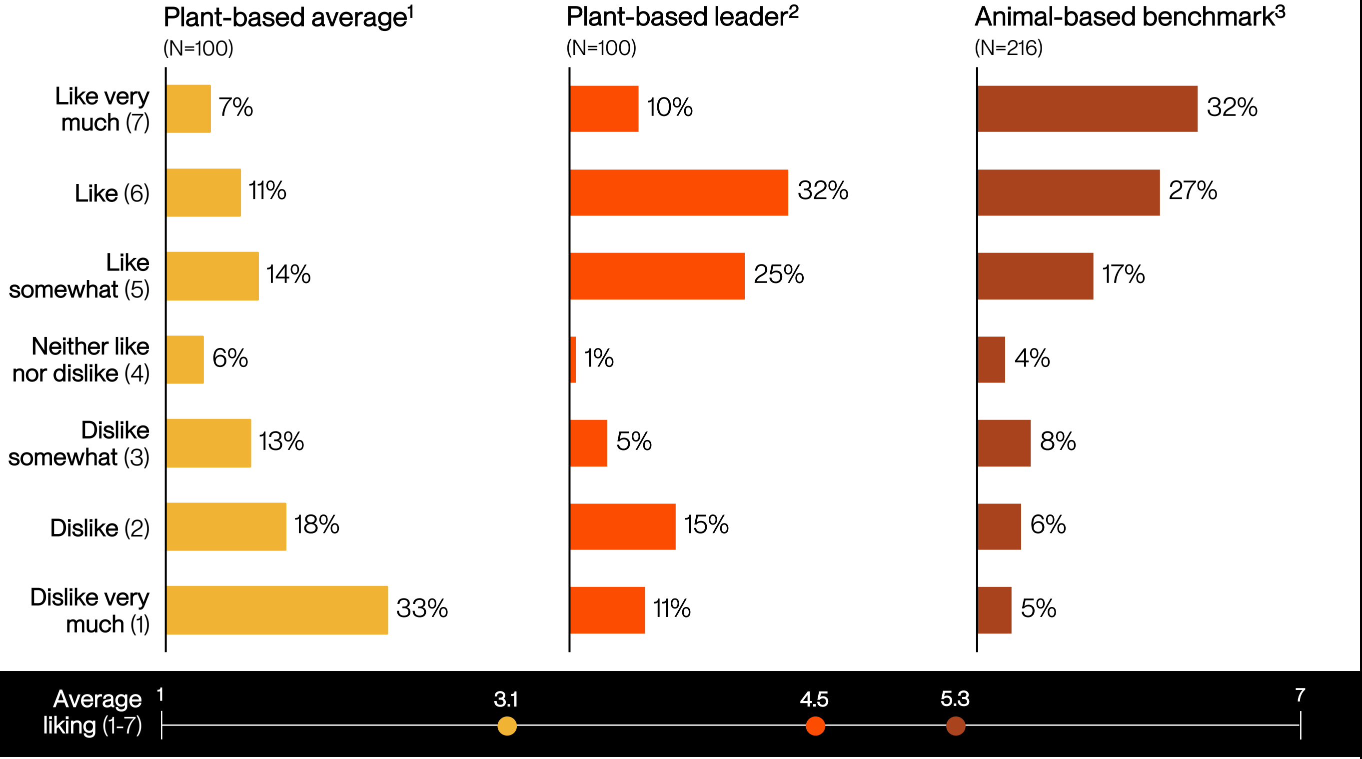
There is little benefit to increasing 'liking' if the bacon is still disliked to some degree.

- Purchase intent only increases 0.8pts when moving from 'dislike very much' to 'dislike somewhat'.

1. Aggregated across 1,512 responses
2. Calculated as the average purchase intent for all responses across all products (plant and animal-based) at each level of 'liking'

Bacon: Satisfaction

Liking scores, % of participants



Takeaways

The plant-based leader clearly separates itself from the crowd.

- The plant-based leader is closer in liking to the animal bacon than the average plant-based bacon.

The average plant-based bacon has clear and impactful opportunities to improve.

- The average plant-based bacon rated 'like very much' or 'like' only 18% of the time (versus 59% for the animal bacon).

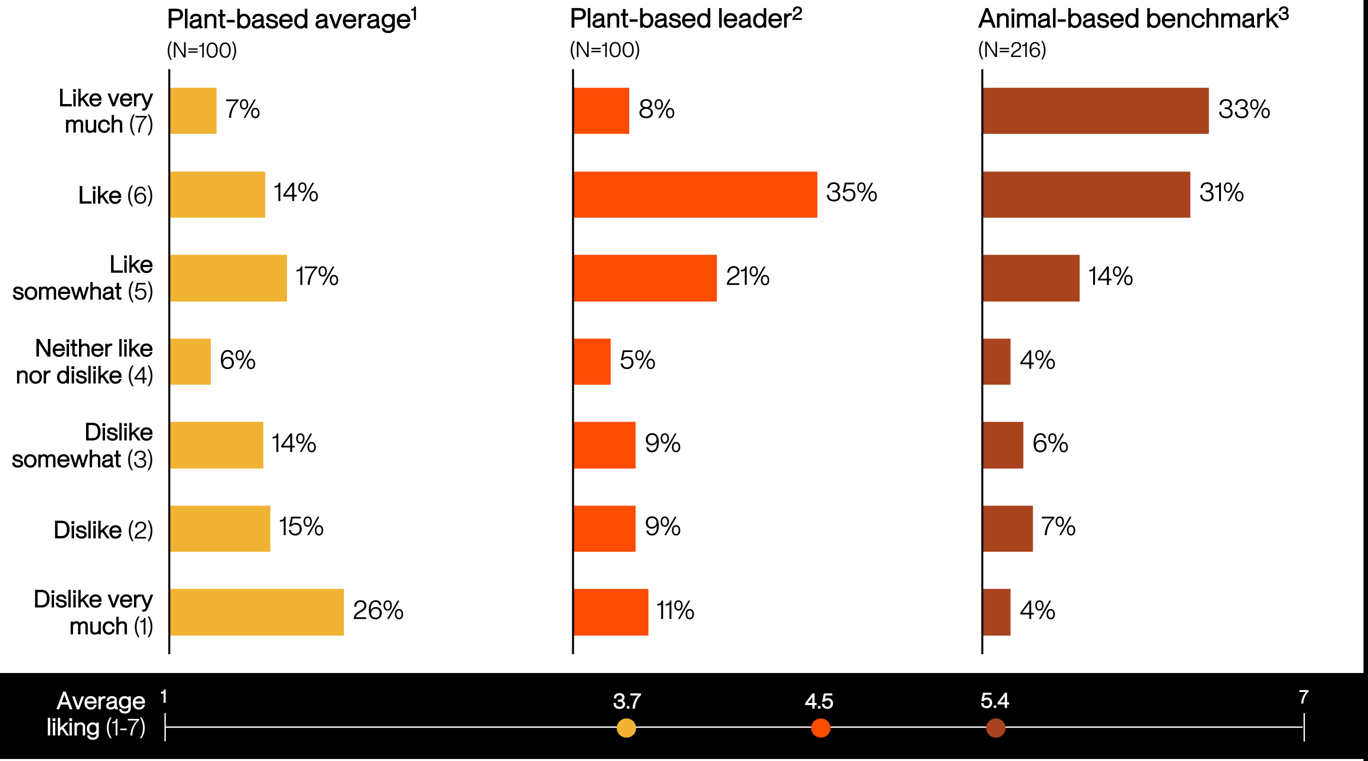
The plant-based leader can still improve.

- The average plant-based bacon rated 'like very much' or 'like' only 18% of the time (versus 59% for the animal bacon).

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing plant-based product amongst all 6 bacons tested
3. Animal-based bacon available in retail

Bacon: Flavor

Liking scores, % of participants



Takeaways

Flavor is a strong point for the plant-based average relative to appearance or texture.

- The gap in average 'liking' to the plant-based leader and animal-based product was smallest for flavor.

The average plant-based bacon needs to improve on flavor.

- 55% of participants 'disliked' the flavor to some degree.

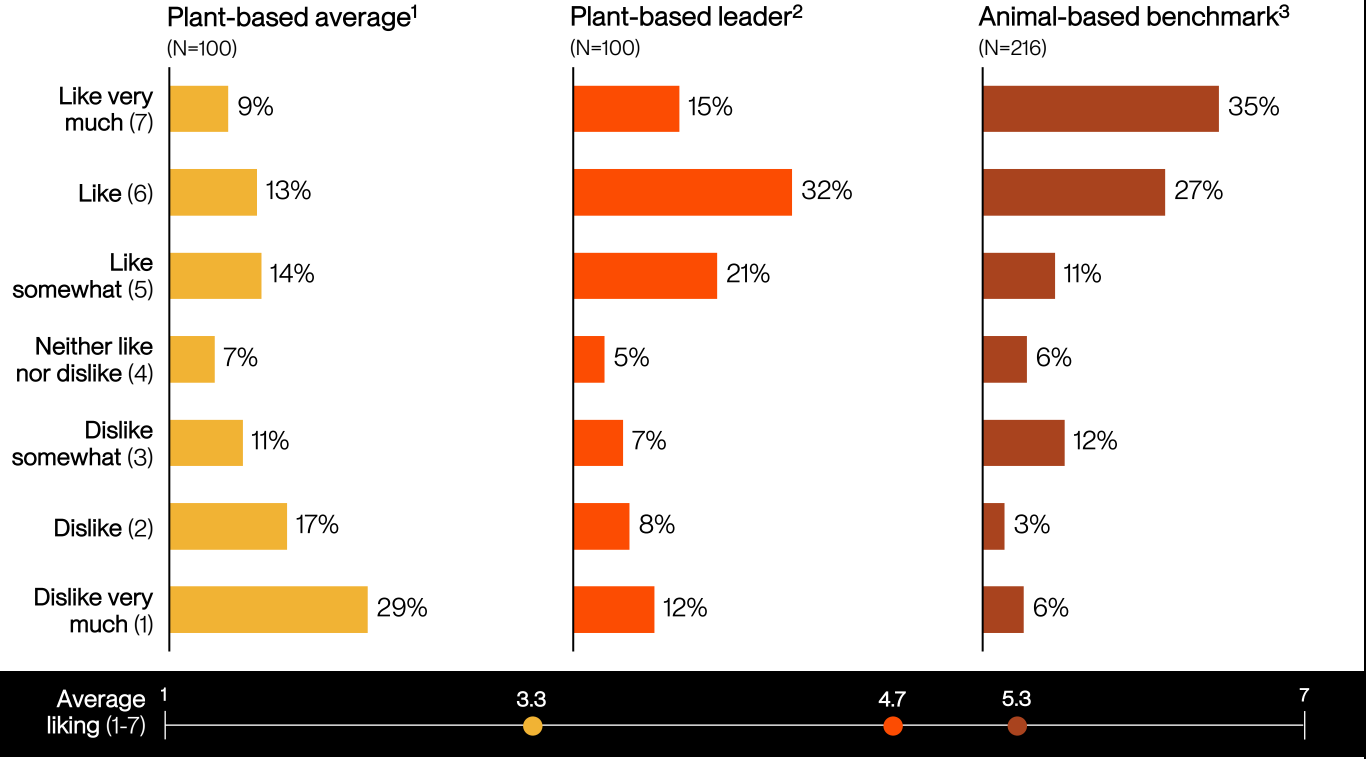
The plant-based leader is on the cusp of achieving very high liking on flavor.

- 56% of participants rated it 'like' or 'like somewhat' but just 8% rated it 'like very much'.

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing plant-based product amongst all 6 bacons tested
3. Animal-based bacon available in retail

Bacon: Texture

Liking scores, % of participants



Takeaways

Texture is the biggest improvement opportunity for the plant-based average to catch up to the leader.

- The gap in average liking to the plant-based leader is 1.4pts (versus 0.8pts for flavor and 1.1pts for appearance).

Texture is the biggest strength of the plant-based leader.

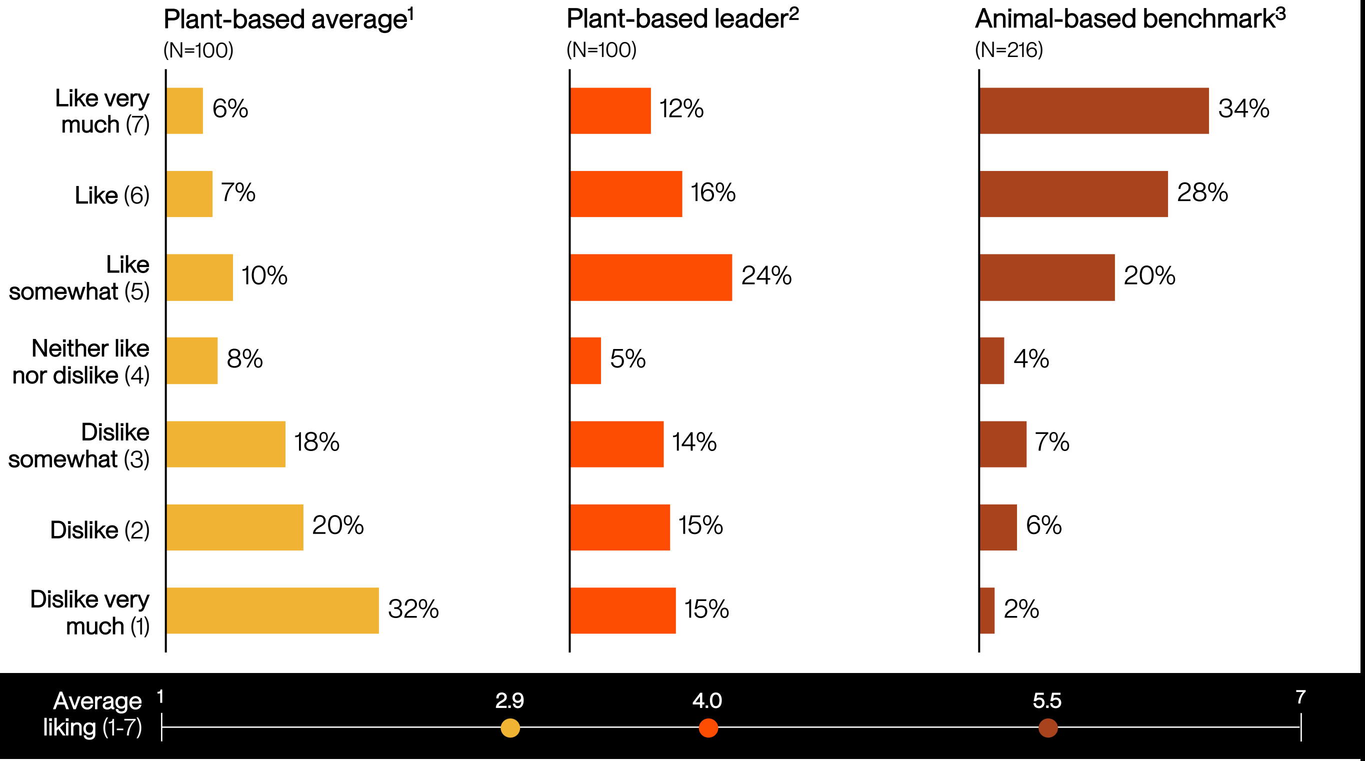
- The gap in average liking to the animal bacon was only 0.6pts.
- 15% rated the texture as 'like very much' while just 8% rated the flavor 'like very much'.

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing plant-based product amongst all 6 bacons tested
3. Animal-based bacon available in retail

Bacon: Appearance

Takeaways

Liking scores, % of participants



Appearance is the biggest opportunity for the plant-based leader.

- The average liking for animal bacon was 1.5-2x larger than on texture or flavor.

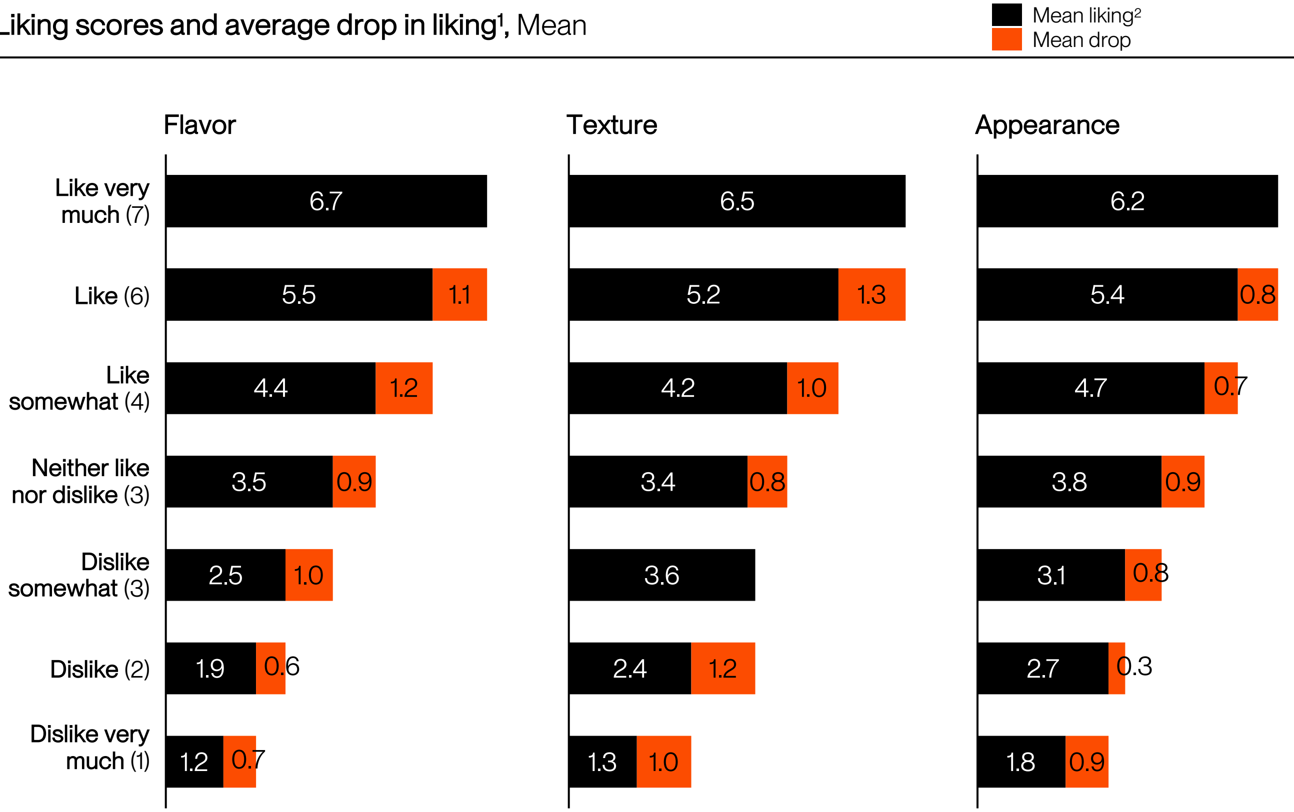
Appearance is a weakness for plant-based bacon across the board.

- The average liking for the appearance of plant-based bacon is just 2.9pts, lower than on texture (3.3pts) or flavor (3.7pts).

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing plant-based product amongst all 6 bacons tested
3. Animal-based bacon available in retail

Bacon: Importance of key sensory traits to overall satisfaction → Takeaways

Liking scores and average drop in liking[1], Mean



Declines in flavor and texture have a similar impact on overall liking.

- The average drop in overall liking associated with declines in liking on texture and flavor were very similar.

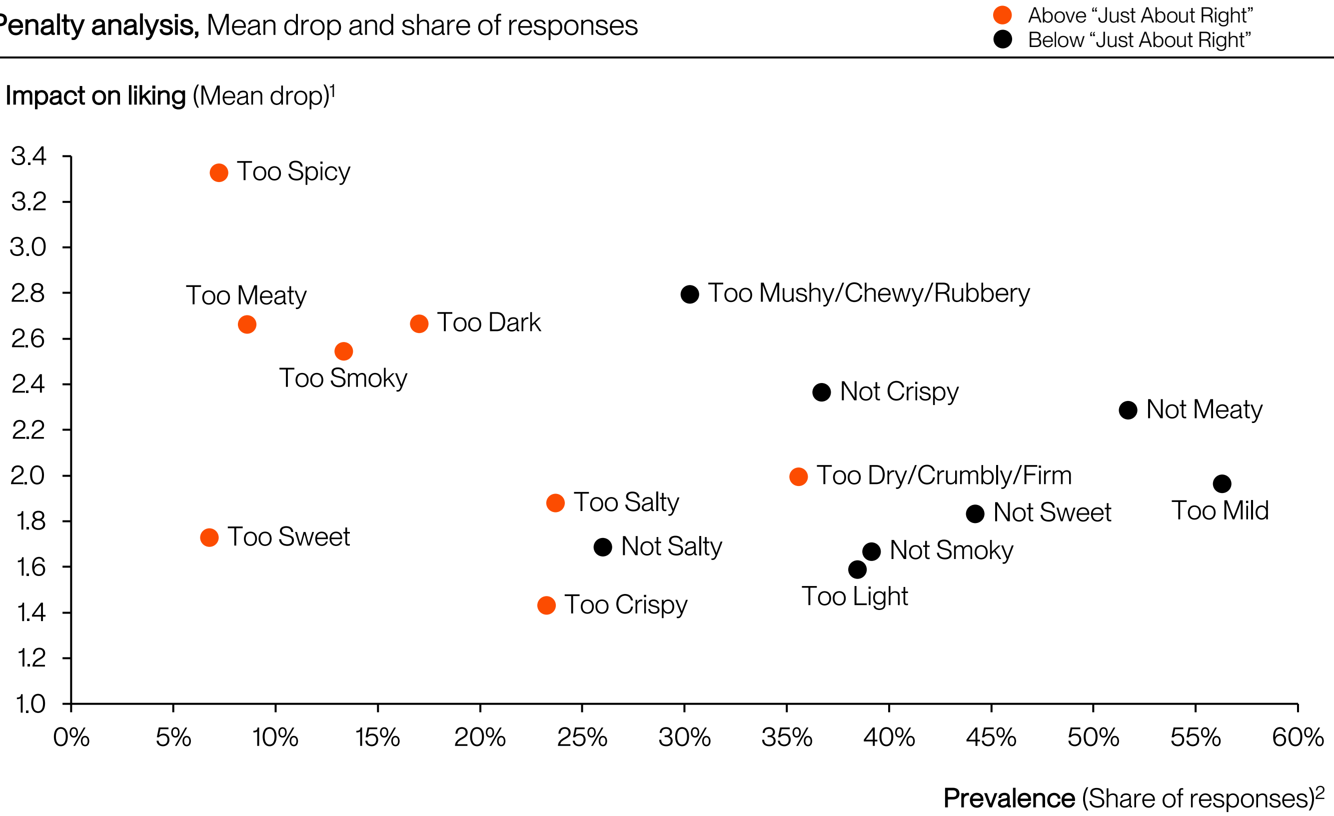
Participants were most willing to tolerate lower performance on appearance.

- The average drop in overall liking was 35% smaller when going from 'like very much' to 'like somewhat' than on texture or flavor.

1. Aggregated across 1,557 responses
2. Calculated as the average overall satisfaction for all responses across all products (plant and animal-based) at each level of "liking" for the sensory trait

Bacon: Impact of key sensory traits on liking

Penalty analysis, Mean drop and share of responses



Takeaways

Low meatiness and mildness should be the top R&D priorities.

- These responses occurred more than 50% of the time and were associated with drops in average liking of 2-2.3pts.

Low crispiness and mushy/chewy/rubberiness were high impact but less frequent criticisms.

- 30-35% of responses cited this and were associated with drop in liking of 2.4-2.8pts.

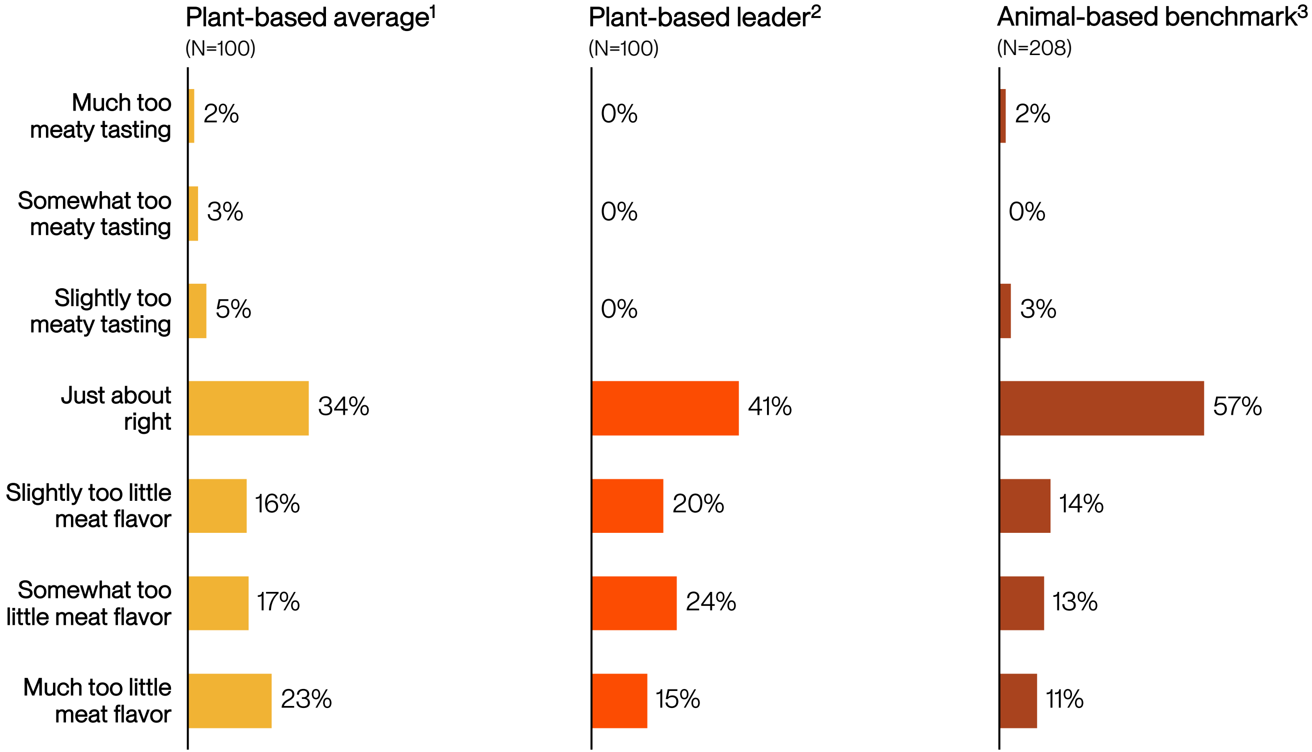
Light color, low sweetness, and low smokiness were frequent complaints with lower impact on liking.

- 44% of responses cited this and were associated with drops in average liking of 1.6-1.8pts.

1. Calculated as the average drop in overall liking for products with the associated response
2. Share of responses for all products (animal and plant) in each direction for each trait, across 1,557 responses

Bacon: Meatiness

How would you rate the meatiness?, % of participants



Takeaways

Participants clearly indicated that they felt plant-based bacon was not 'meaty' enough.

- 59-66% of participants found plant-based bacon not meaty enough.

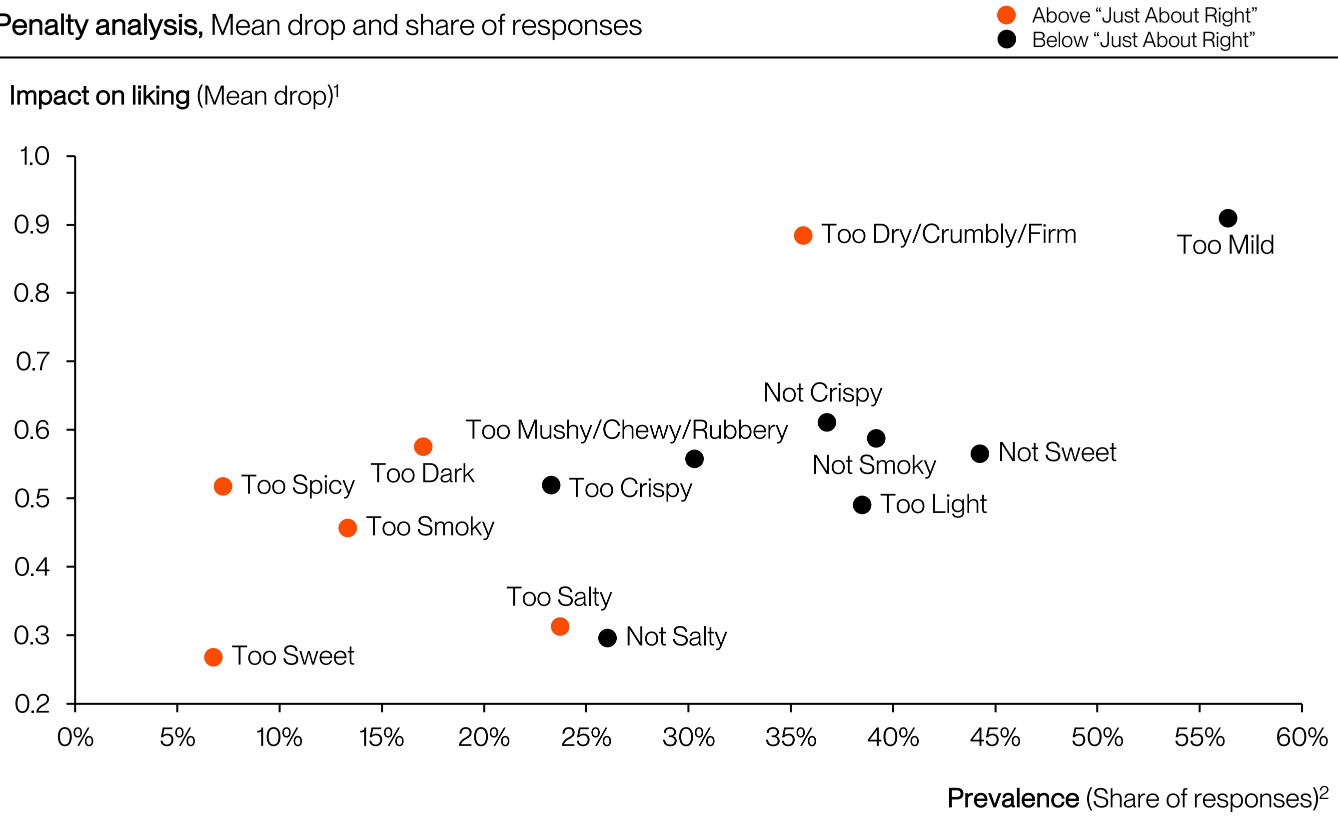
Opportunity to exceed animal bacon by outperforming on meatiness.

- 38% of participants rated the animal bacon as not meaty enough while just 5% found it too meaty.

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing product amongst all 6 plant-based and vegetarian bacons tested
3. Animal-based bacon available in retail

Bacon: Impact of key sensory traits on meatiness

Penalty analysis, Mean drop and share of responses



Takeaways

Declines in meatiness were most strongly associated with being 'too dry/crumbly/firm' and mildness (vs spiciness).

- These attributes were tied to the largest average drops in meatiness and highly prevalent.

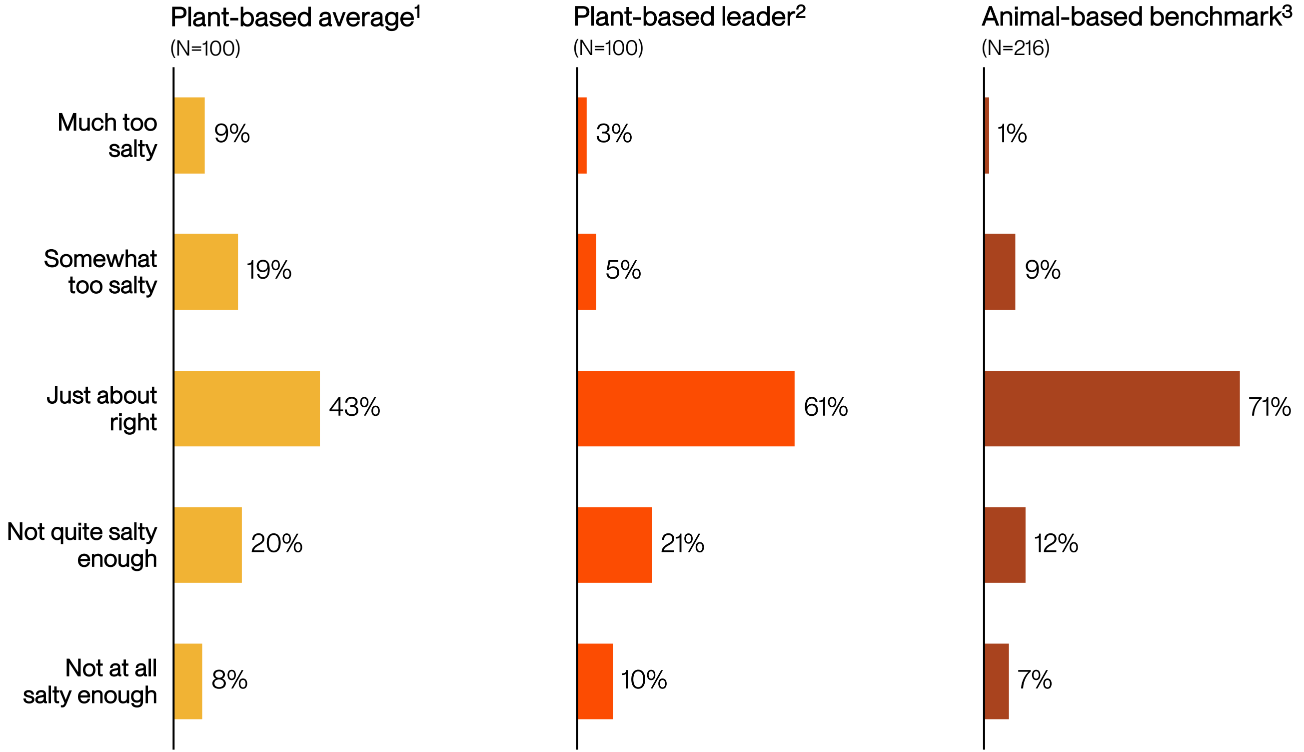
Plant-based bacon should generally lean towards bolder profiles.

- It was both rarer and had a reduced impact on meatiness if products were above 'just about right' (e.g., too juicy, too salty, too smoky, too spicy)

1. Calculated as the average drop in overall liking for products with the associated response
2. Share of responses for all products (animal and plant) in each direction for each trait, across 1,557 responses

Bacon: Saltiness

How would you rate the saltiness?, % of participants



Takeaways

Saltiness was a clear weakness for plant-based bacon.

- Just 43% found it to be 'just about right' (versus 71% for the animal bacon).

The plant-based leader should be saltier.

- 31% of participants found it to be not salty enough while just 8% found it to be too salty.

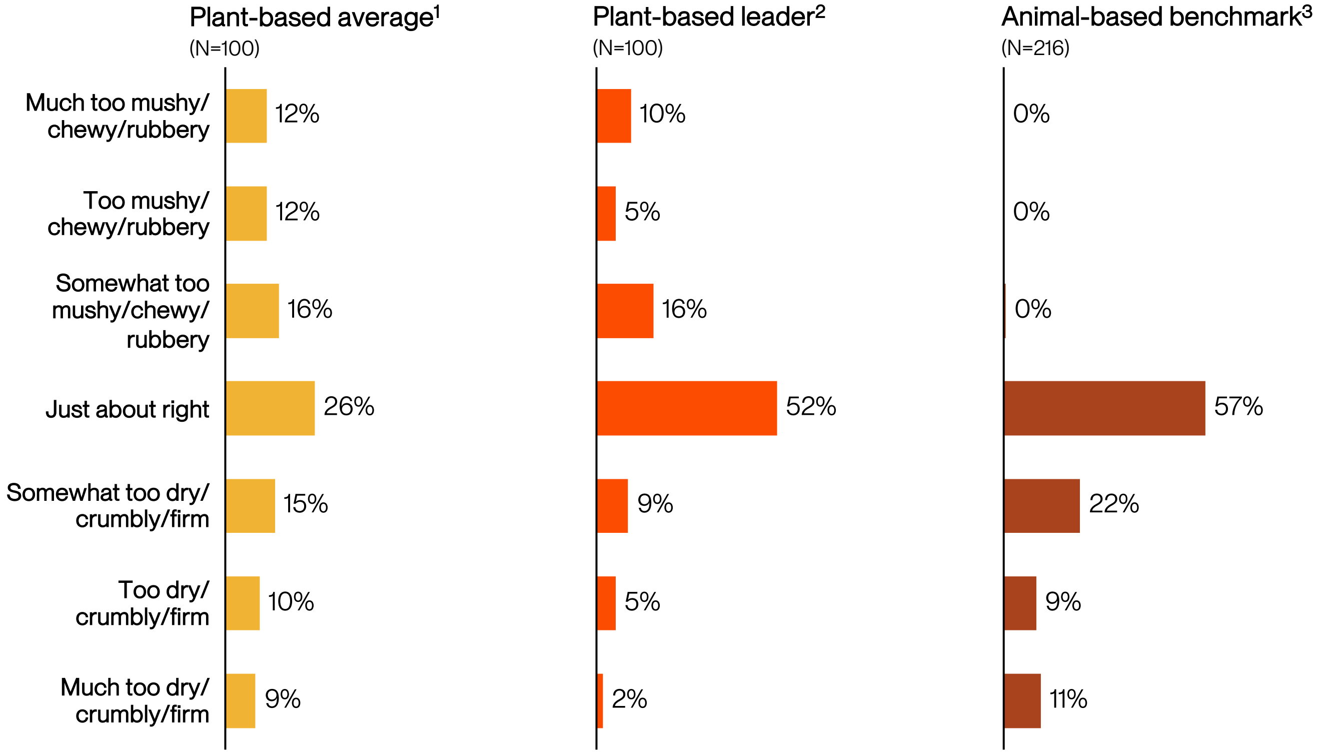
The plant-based leader was differentiated versus the average bacon on saltiness

- 61% found the saltiness of the leader to be 'just about right' (versus just 43% for the plant-based average).

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing product amongst all 6 plant-based and vegetarian bacons tested
3. Animal-based bacon available in retail

Bacon: Consistency

How would you describe the texture overall?, % of participants



Takeaways

There was not clear consensus amongst participants on how to improve consistency.

- 16% of participants found the plant-based leader to be 'too dry/crumbly/firm' while 31% found it tot be 'too mushy/dry/rubbery'.

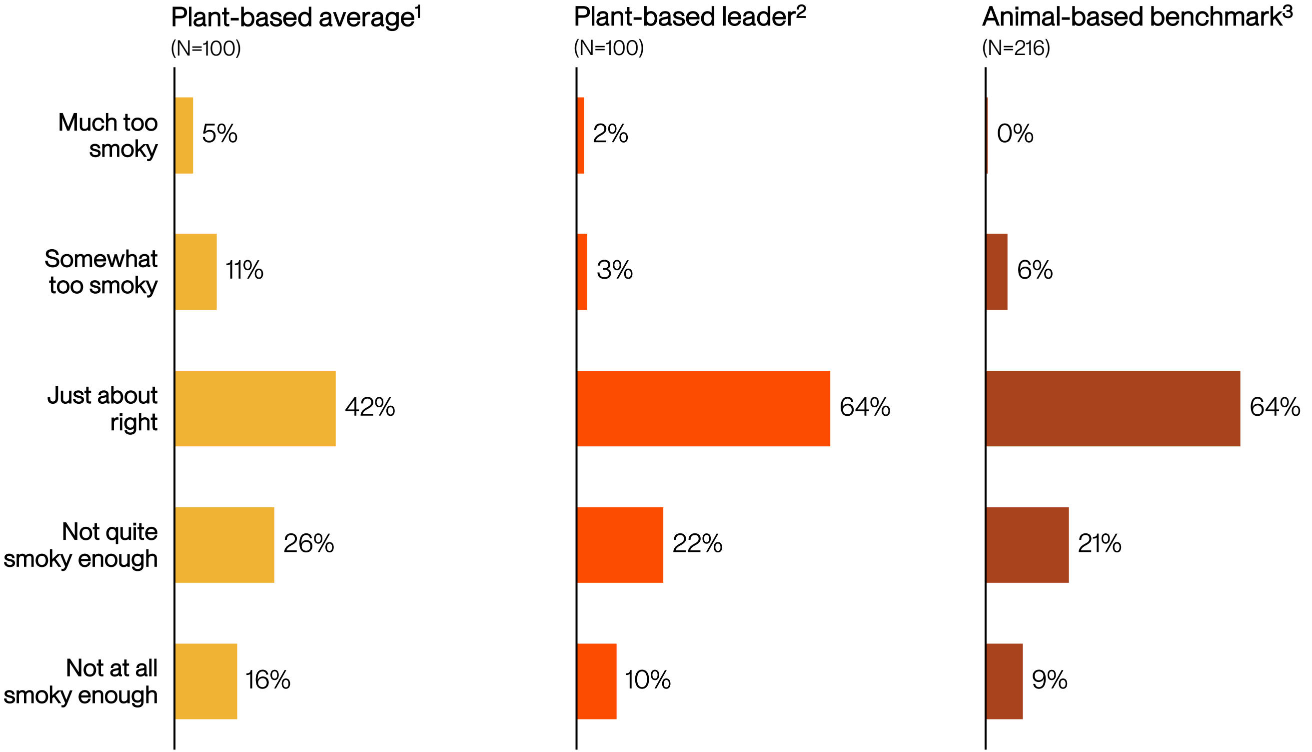
Consistency should be a major focus area for plant-based bacon.

- 26% rated the bacon 'just about right' versus 57% for animal bacon.

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing product amongst all 6 plant-based and vegetarian bacons tested
3. Animal-based bacon available in retail

Bacon: Smokiness

How would you describe the smokiness?, % of participants



Takeaways

The plant-based leader achieved parity with the animal bacon on smokiness.

- The bacons had nearly identical distributions of responses on smokiness.

The bacon generally leaned towards not being smoky enough.

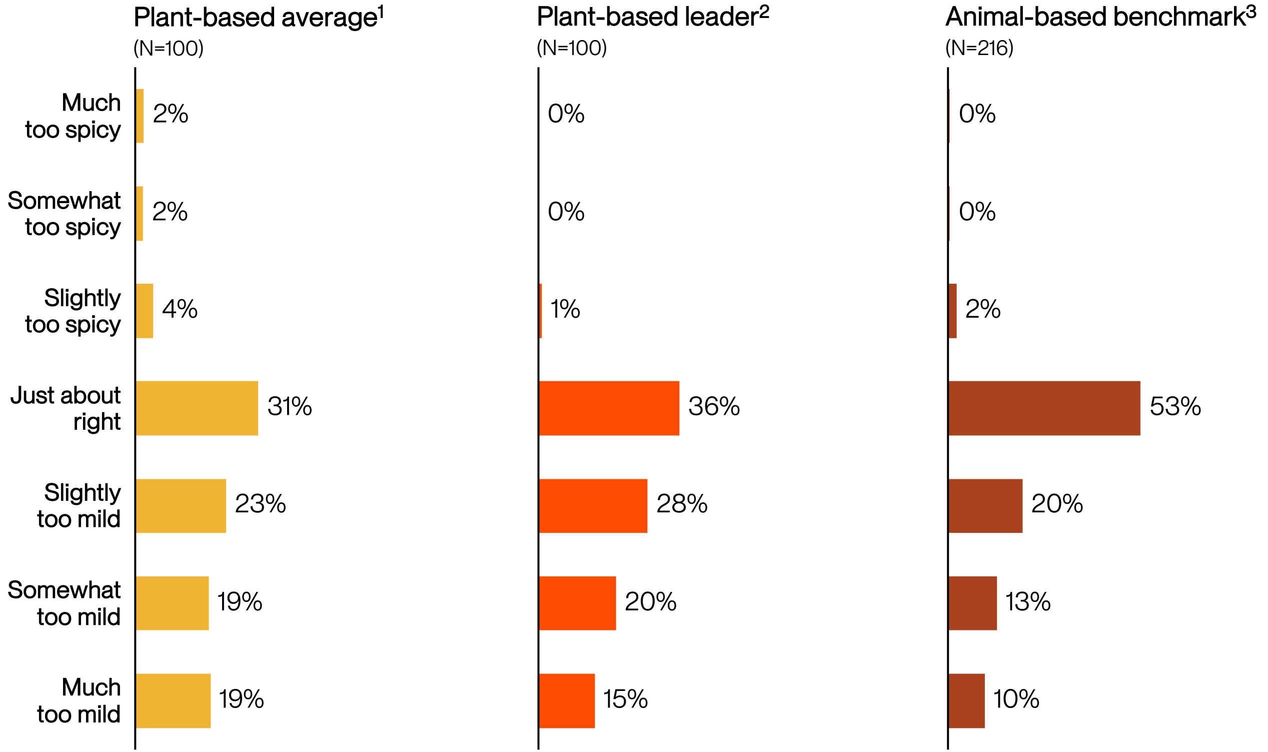
- Participants were 2.5-5x more likely to find the bacon 'not smoky enough' than 'too smoky'.

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing product amongst all 6 plant-based and vegetarian bacons tested
3. Animal-based bacon available in retail

Bacon: Spiciness

Takeaways

How would you describe the spiciness?, % of participants



Plant-based and animal bacon were universally considered too mild.

- Both the plant-based leader and average were far more likely to be rated too mild than too spicy.

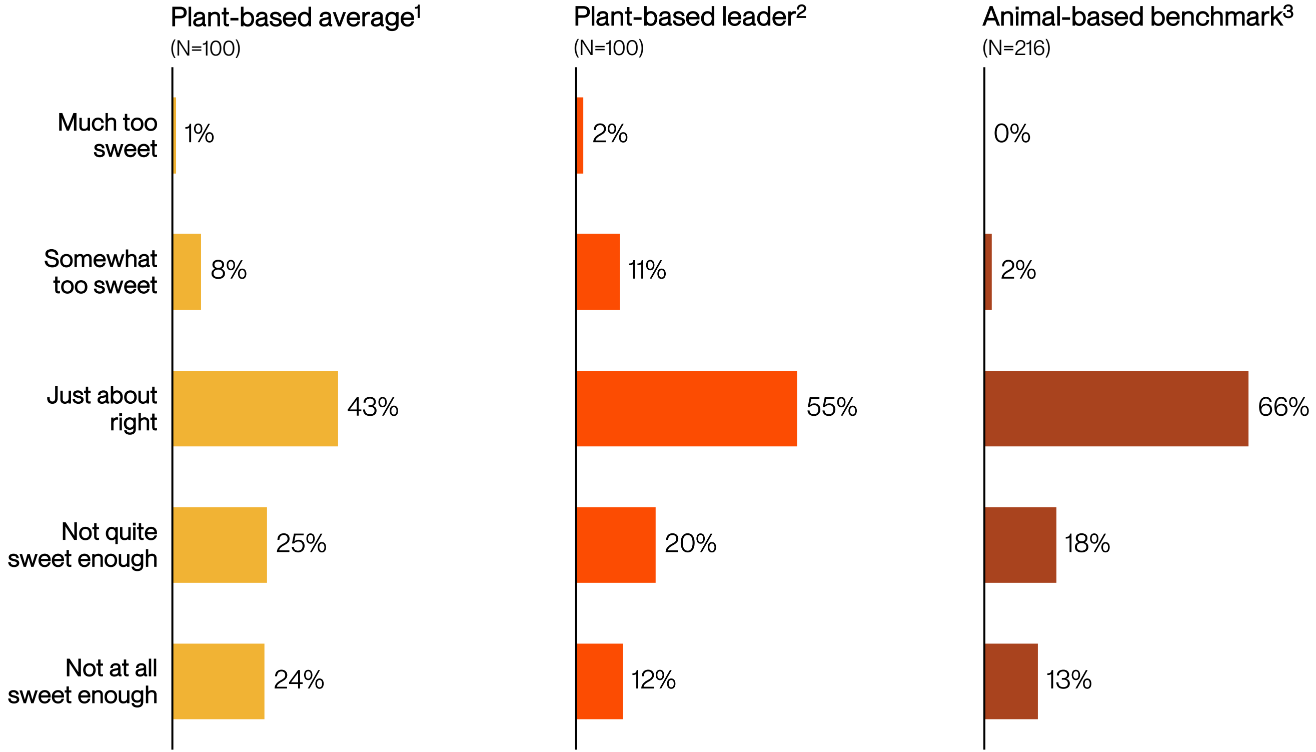
The leader has not differentiated itself within the plant-based category on spiciness.

- Just 36% found it 'just about right' versus 31% for the plant-based average.

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing product amongst all 6 plant-based and vegetarian bacons tested
3. Animal-based bacon available in retail

Bacon: Sweetness

How would you describe the sweetness?, % of participants



Takeaways

Plant-based bacon was generally considered to be not sweet enough.

- Participants were 5x more likely to consider them 'not sweet enough' than 'too sweet'.

Plant-based bacon has an opportunity to differentiate from animal bacon on sweetness.

- 31% of participants found animal bacon to be 'not sweet enough' while just 2% found it to be 'too sweet'.

Animal bacon is outperforming on sweetness

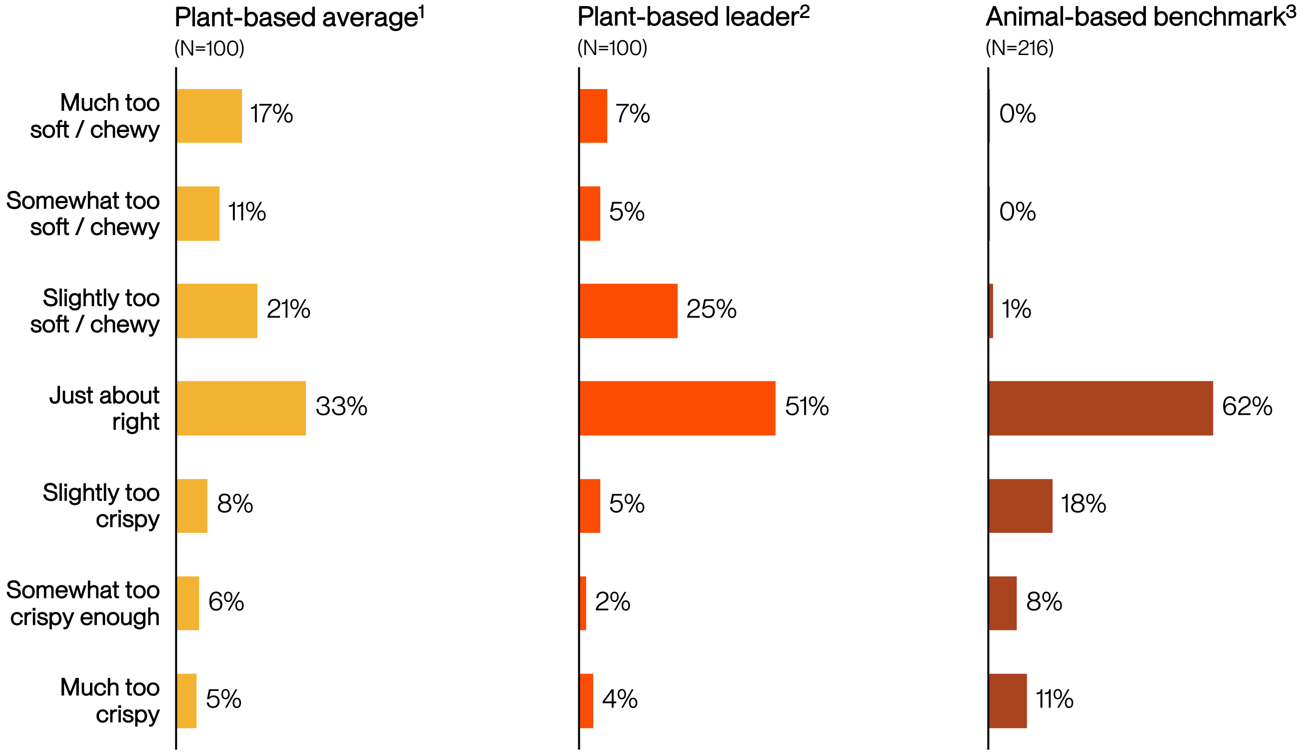
- 20% more participants rated it 'just about right' than the plant leader.

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing product amongst all 6 plant-based and vegetarian bacons tested
3. Animal-based bacon available in retail

Bacon: Crispiness

Takeaways

How would you describe the crispiness?, % of participants



The animal bacon had a dramatically different crispiness to the plant-based.

- Animal bacon was generally considered 'too crispy' while the plant-based bacon was considered 'too soft / chewy'.

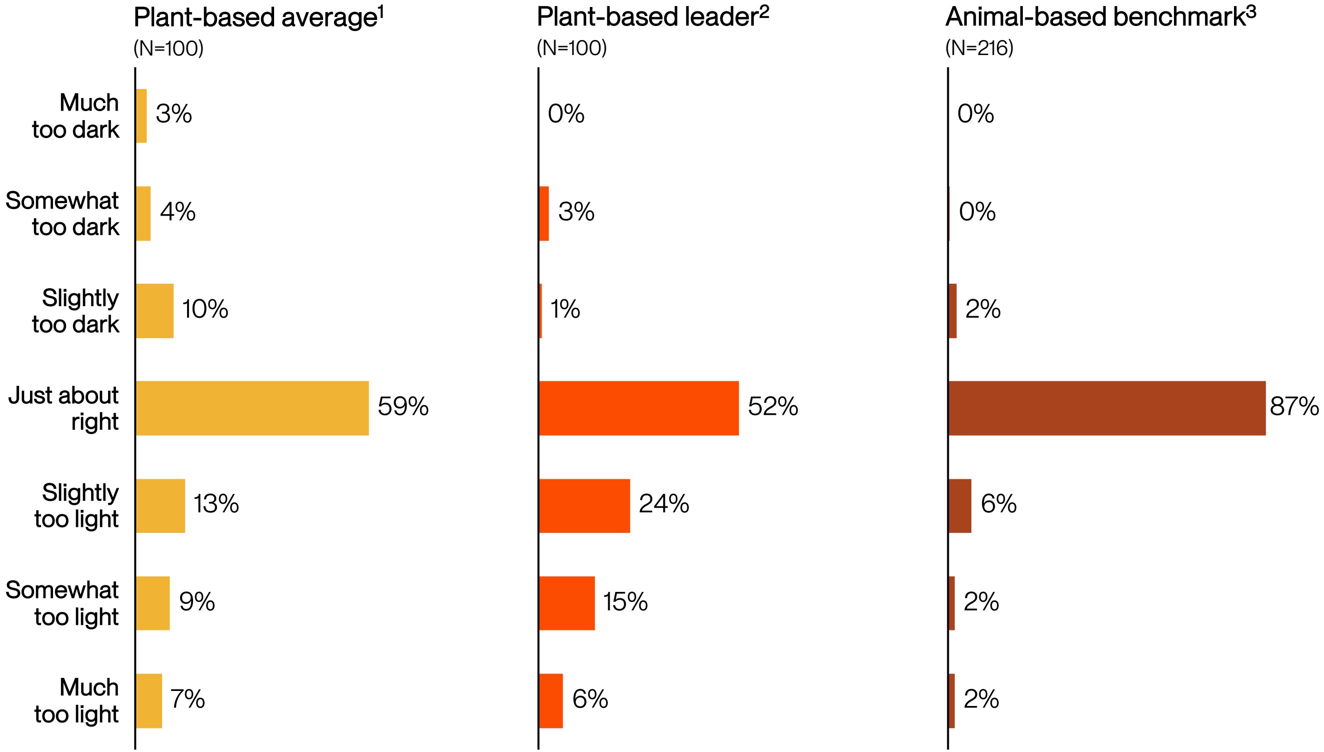
The plant-based bacons should increase their crispiness.

- Participants were 2-3x as likely to find the bacon 'too soft / chewy' than they were to find it 'too crispy'.

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing product amongst all 6 plant-based and vegetarian bacons tested
3. Animal-based bacon available in retail

Bacon: Color

How would you describe the color?, % of participants



Takeaways

The plant-based leader can overcome its weakness in color with a darker profile.

- 45% of participants found the plant-based leader 'too light'.

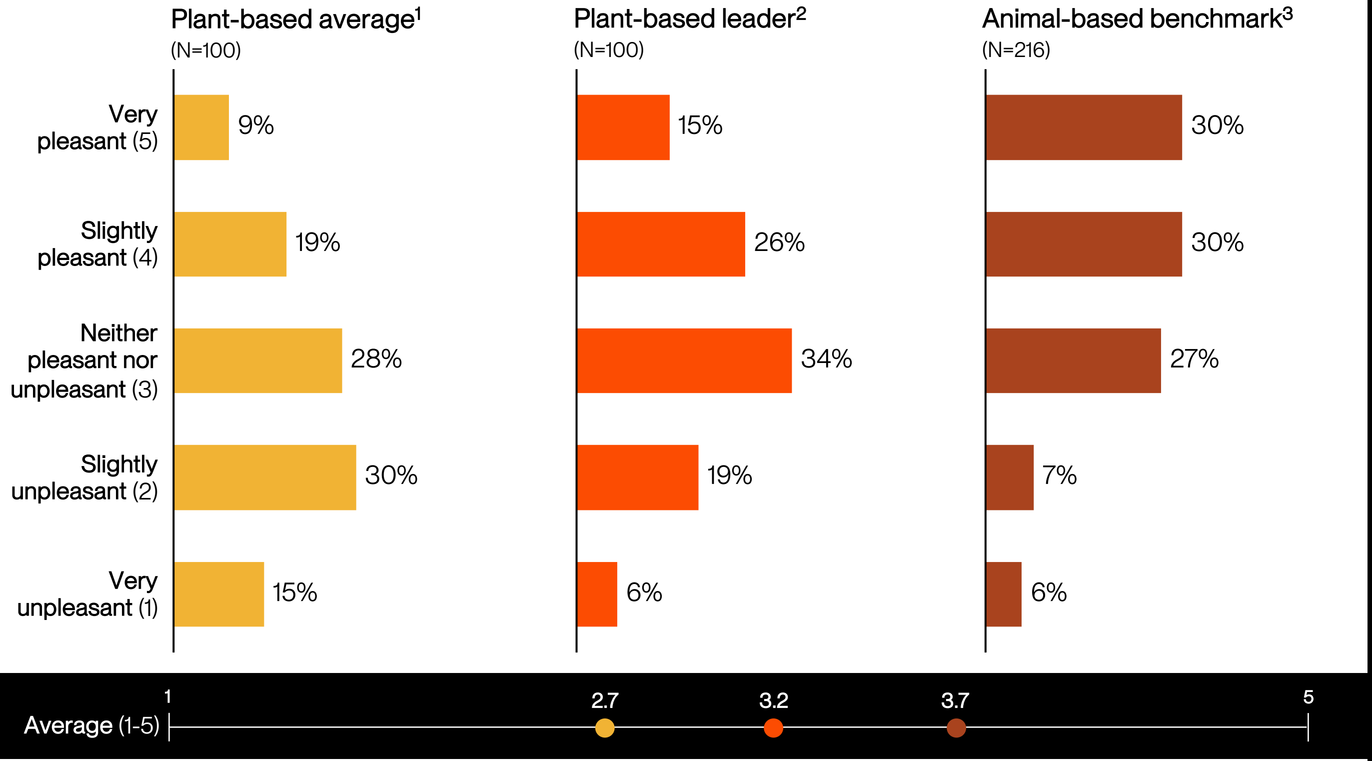
Color is an area of strength for the animal bacon.

- 87% found the color to be 'just about right', a higher share than on any other sensory attribute.

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing product amongst all 6 plant-based and vegetarian bacons tested
3. Animal-based bacon available in retail

Bacon: Aftertaste

How would you describe the aftertaste?, % of participants



Takeaways

The plant-based leader is outperforming its peers on aftertaste pleasantness but still has room to catch up to the animal bacon.

- 25% of participants rated it some degree on unpleasant (versus 45% for the plant-based average and 13% for the animal bacon).

Plant-based bacon in general has a weakness in aftertaste pleasantness.

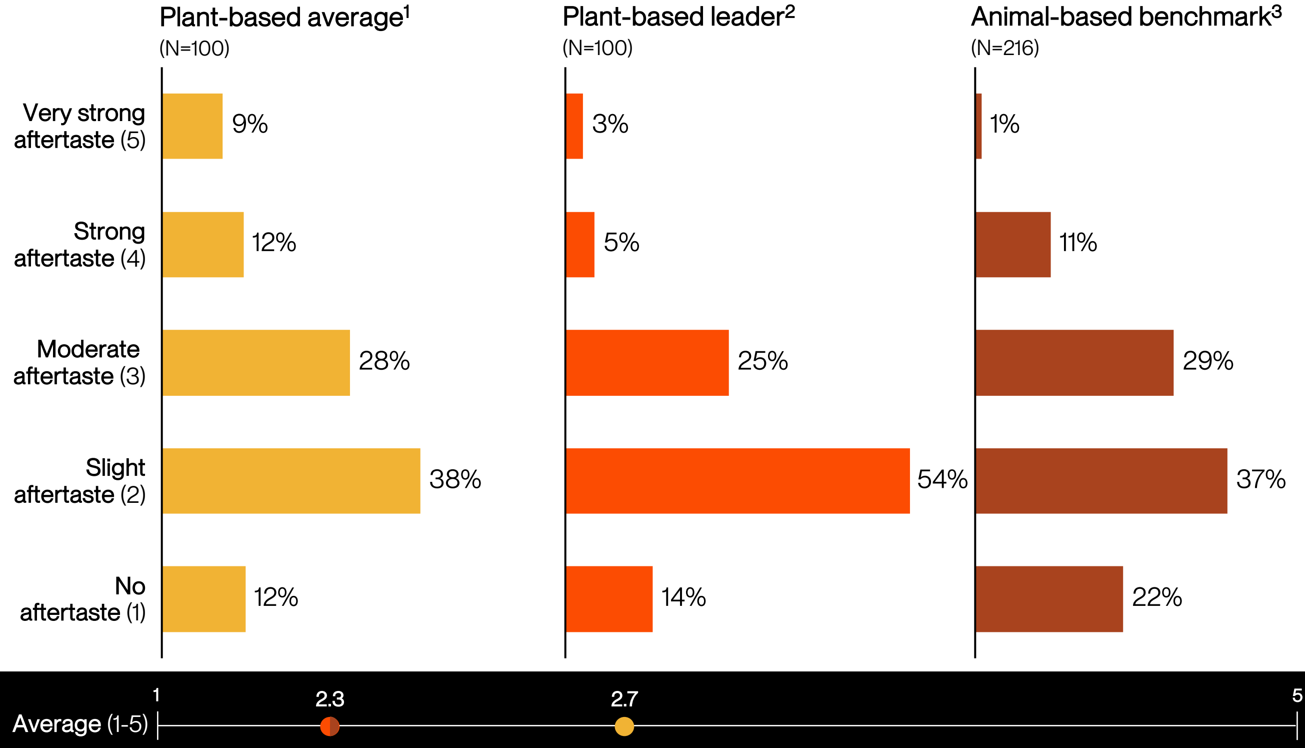
- Just 28% of participants found it to be pleasant versus 60% for the animal bacon.

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing product amongst all 6 plant-based and vegetarian bacons tested
3. Animal-based bacon available in retail

Bacon: Aftertaste

Takeaways

How would you describe the strength of the aftertaste?, % of participants



Plant-based products overall can catch up to animal-based by reducing their aftertaste.

- 9% of participants rated the aftertaste strength of the plant-based average as 'very strong aftertaste' (versus just 3% for the plant-based leader and 1% for the animal bacon).

Aftertaste strength is an area of relative strength for plant-based products.

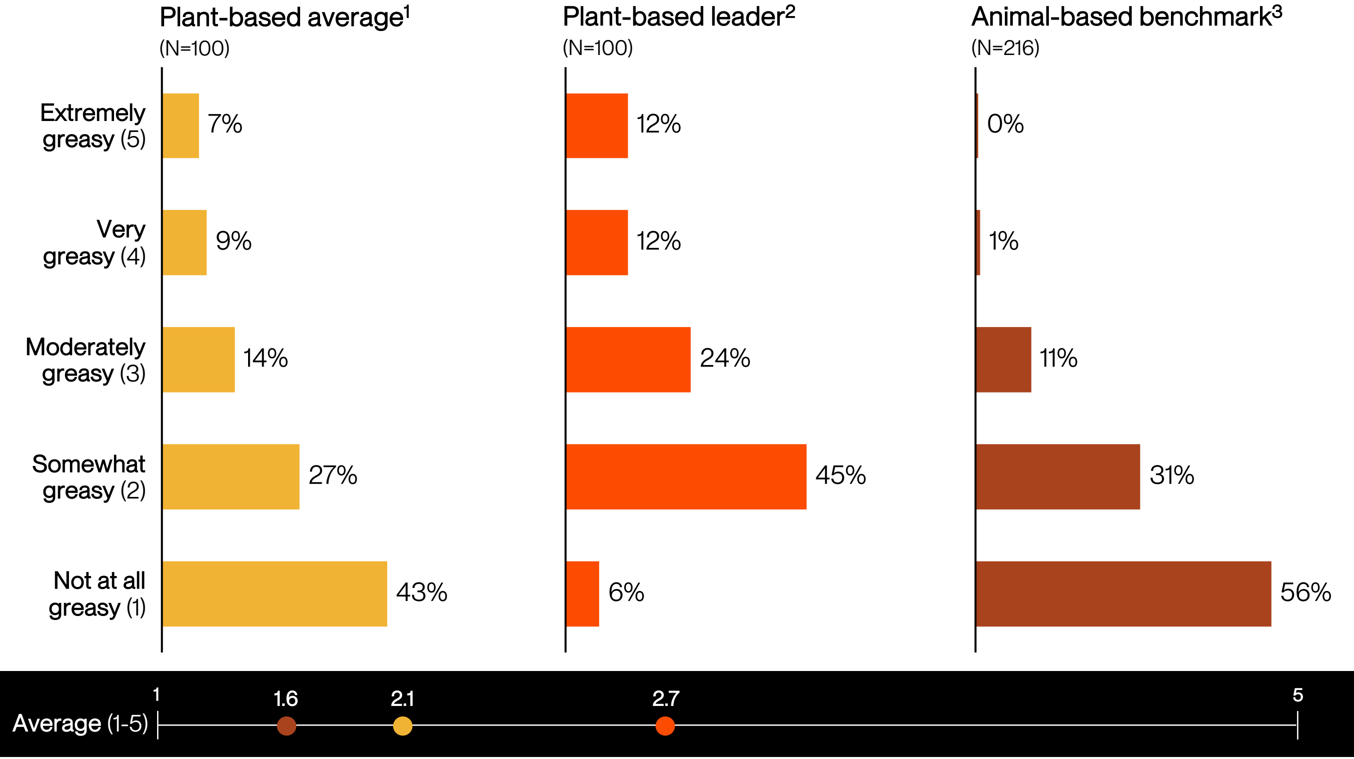
- Overall average ratings are within 0.5pt of the animal-based bacon.

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing product amongst all 6 plant-based and vegetarian bacons tested
3. Animal-based bacon available in retail

Bacon: Greasiness

Takeaways

How would you describe the overall greasiness?, % of participants



The plant-based leader has a distinctly greasy profile.

- Just 6% rated it 'not at all greasy' (versus 43% for the plant-based average and 56% for the animal bacon).

Animal bacon does not derive high liking from a greasy profile.

- 87% found it to be just 'somewhat greasy' or 'not at all greasy'.

1. Aggregated across 5 commercially available plant-based bacon brands plus one vegetarian bacon brand
2. Top performing product amongst all 6 plant-based and vegetarian bacons tested
3. Animal-based bacon available in retail

Category-Specific Deep Dive

Tenders

Tenders › Executive summary of R&D opportunities

Priority Attributes

Plant-based tenders can surpass the animal with flavor improvements.

- **The plant-based leader is already at or beyond parity with the animal tender on texture** – there was no significant difference in average liking of the texture.
- **Flavor improvements should be prioritized for the category** – 18% disliked the flavor of the plant-based tenders to some degree (versus 5% for animal tenders).

Top Sensory Opportunities

Improvements in target areas can drive higher overall liking.

- **Meatiness is key to overall liking** – being 'too meaty' or 'not meaty enough' led to bigger declines in liking than any other sensory attributes.
- **Meatiness should generally be increased** – 44% rated the average plant-based tenders as 'not meaty enough' (versus 8% who found them 'too meaty').
- **Consistency can be a strength for plant-based tenders** – 63% found the texture of the plant-based leader 'just about right' (versus 55% for the animal tender).
- **Spiciness should be increased** – 52% found the plant-based tenders 'too mild' while just 8% found them too spicy.
- **Juiciness and saltiness are current weaknesses** – animal tenders were more likely to be considered 'just about right' on both juiciness and saltiness.
- **Breading flavor should be a focus** – animal tenders outperformed on breading despite no inherent advantage for animal products on that attribute.

Tenders Tested

Chicken tenders from 10 commercially available plant-based brands were prepared according to manufacturer instructions and compared against animal tenders.

Product **303**

Product **309**

Product **316**

Product **319**

Product **324**

Product **352**
Animal-based tender

Product **332**

Product **341**

Product **366**

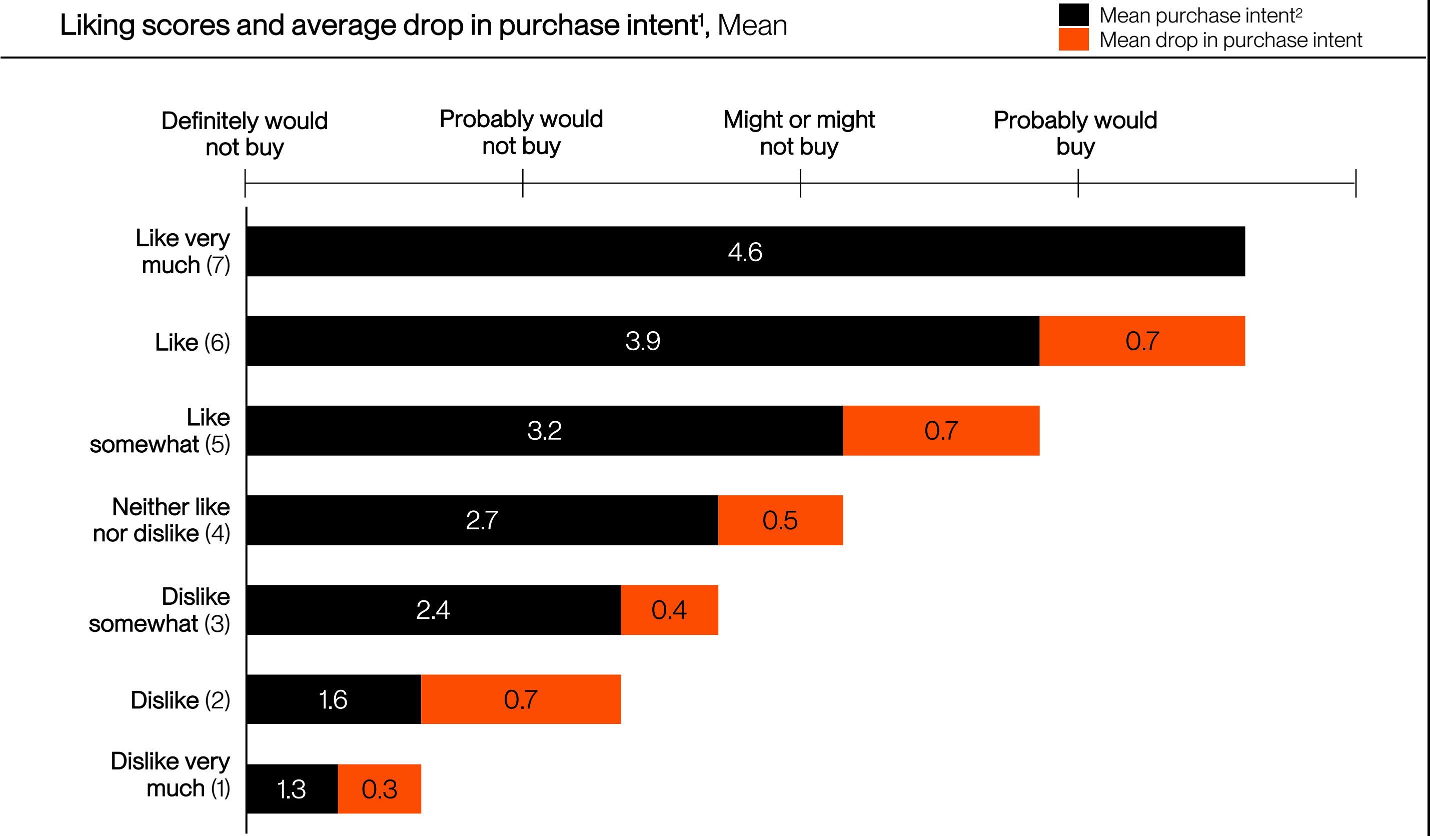
Product **371**

Product **386**

Tenders: Translation from 'liking' to 'purchase intent'

Takeaways

Liking scores and average drop in purchase intent[1], Mean



Products can dramatically improve purchase intent by continuing to optimize satisfaction.

- Purchase intent (PI) increases dramatically from "Like somewhat" to "Like very much".

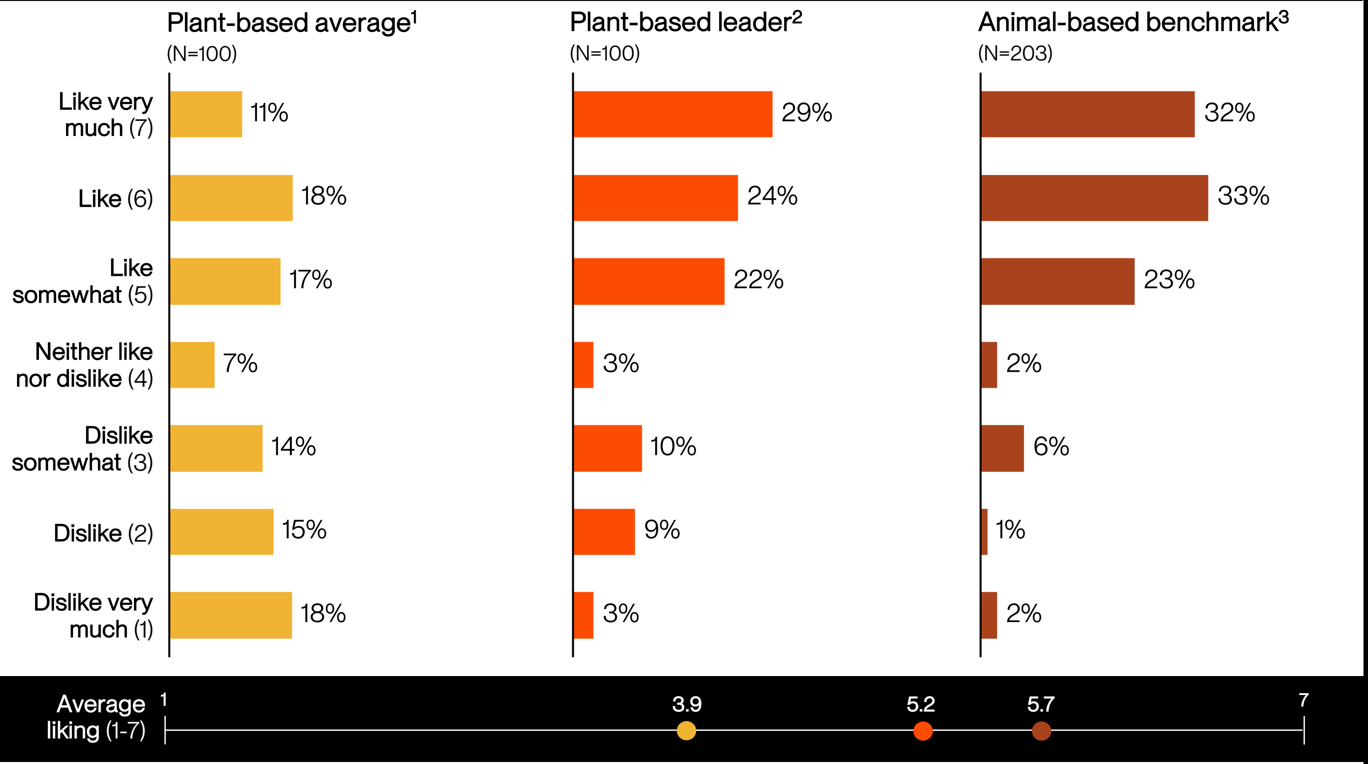
Rating of 'dislike somewhat' and 'neither like nor dislike' have a strong association.

- Both tie to a purchase intent between 'Probably would not buy' and 'Might or might not buy' and are within 0.3 rating points.

1. Aggregated across 1,212 responses
2. Calculated as the average purchase intent for all responses across all products (plant and animal-based) at each level of 'liking'

Tenders: Satisfaction

Liking scores, % of participants



Takeaways

Plant-based leader can catch up to animal-based with slight modifications and by addressing 'red flags'.

- Average liking ratings are within 0.5pts.
- Only 3% more participants rated the animal tenders as 'like very much'.
- 12% rated them as 'dislike' or 'dislike very much' (versus just 3% for the animal leader).

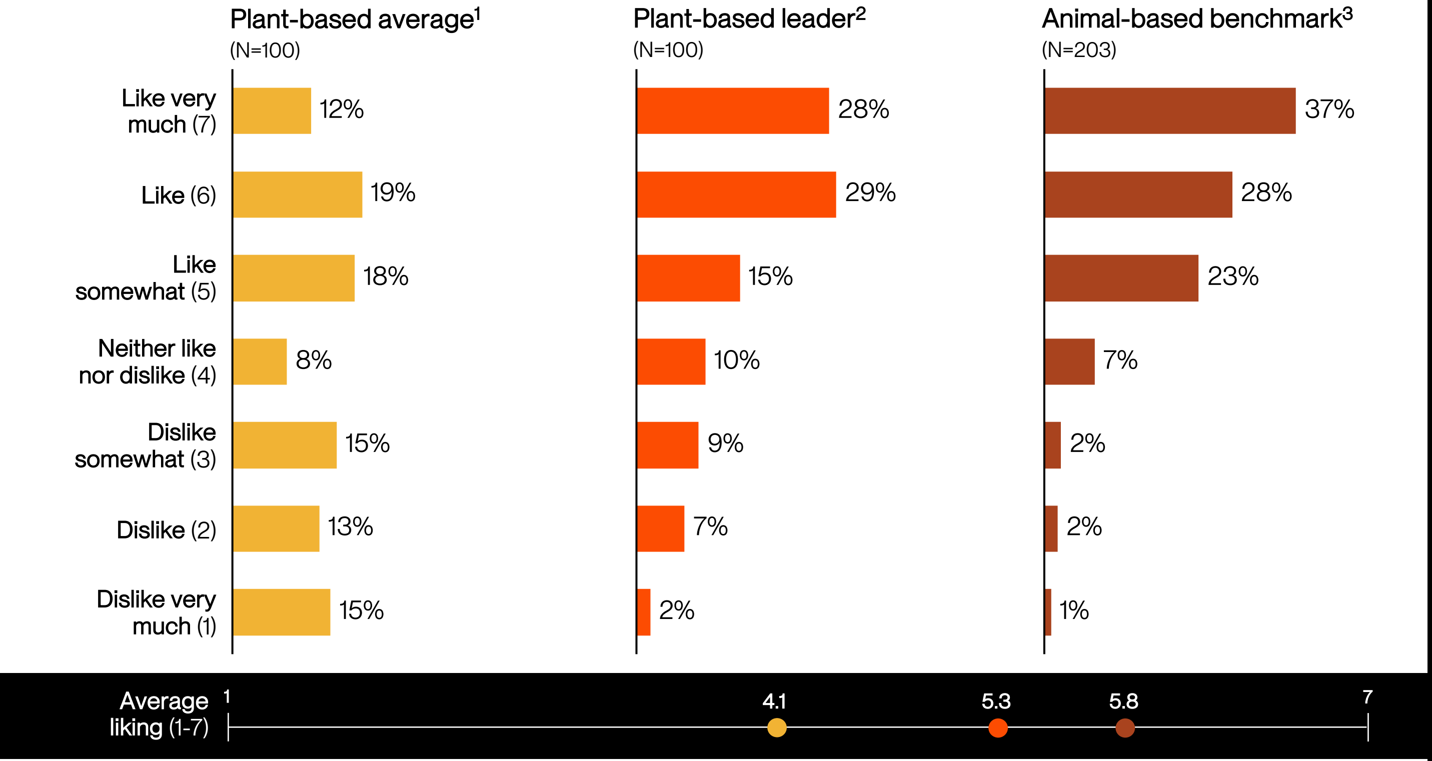
Plant-based tenders can catch up to leader by addressing strong negative reactions.

- 33% of participants rated their overall satisfaction as 'dislike' or 'dislike very much' (versus just 3% for the animal leader).

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Flavor

Liking scores, % of participants



Takeaways

Flavor is the only major gap in sensory performance between the plant-based leader and animal tenders.

- The gap in average liking to the animal tender is 0.5pts.
- The plant leader outperforms the animal tender on texture and is only 0.1pts behind on appearance.
- The differences in liking are concentrated in 'dislike somewhat' and 'dislike' ratings.

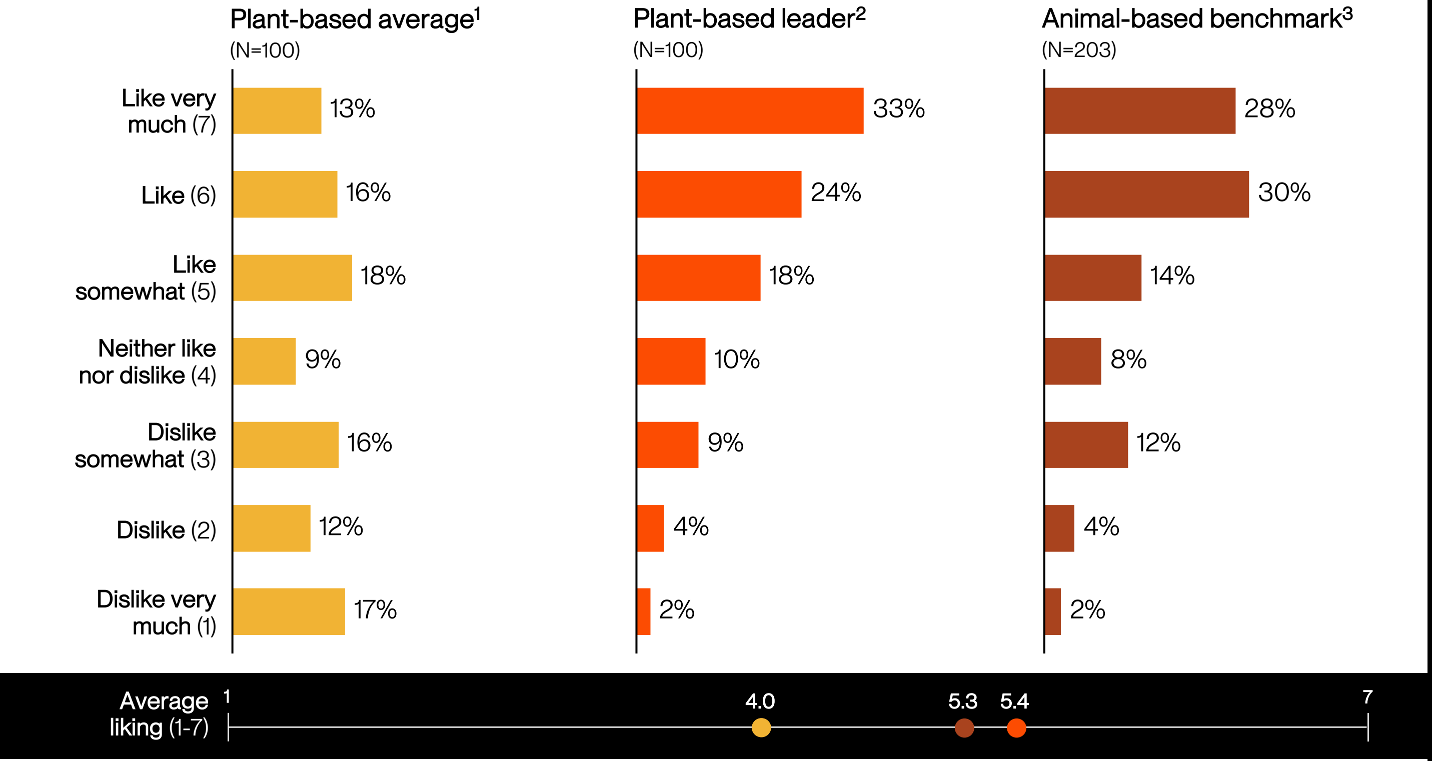
Plant-based tenders should focus on addressing flavor 'red flags'.

- 28% of participants rated the flavor as 'dislike' or 'dislike very much' (versus just 3% for the animal leader).

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Texture

Liking scores, % of participants



Takeaways

Plant-based leader has surpassed the animal tender on texture, indicating an opportunity for rest of plant-based products to learn and catch up.

- Plant-based leader outscored the animal-based by 0.1pts on average texture rating while the average plant-based product still lags behind by 1.3pts.

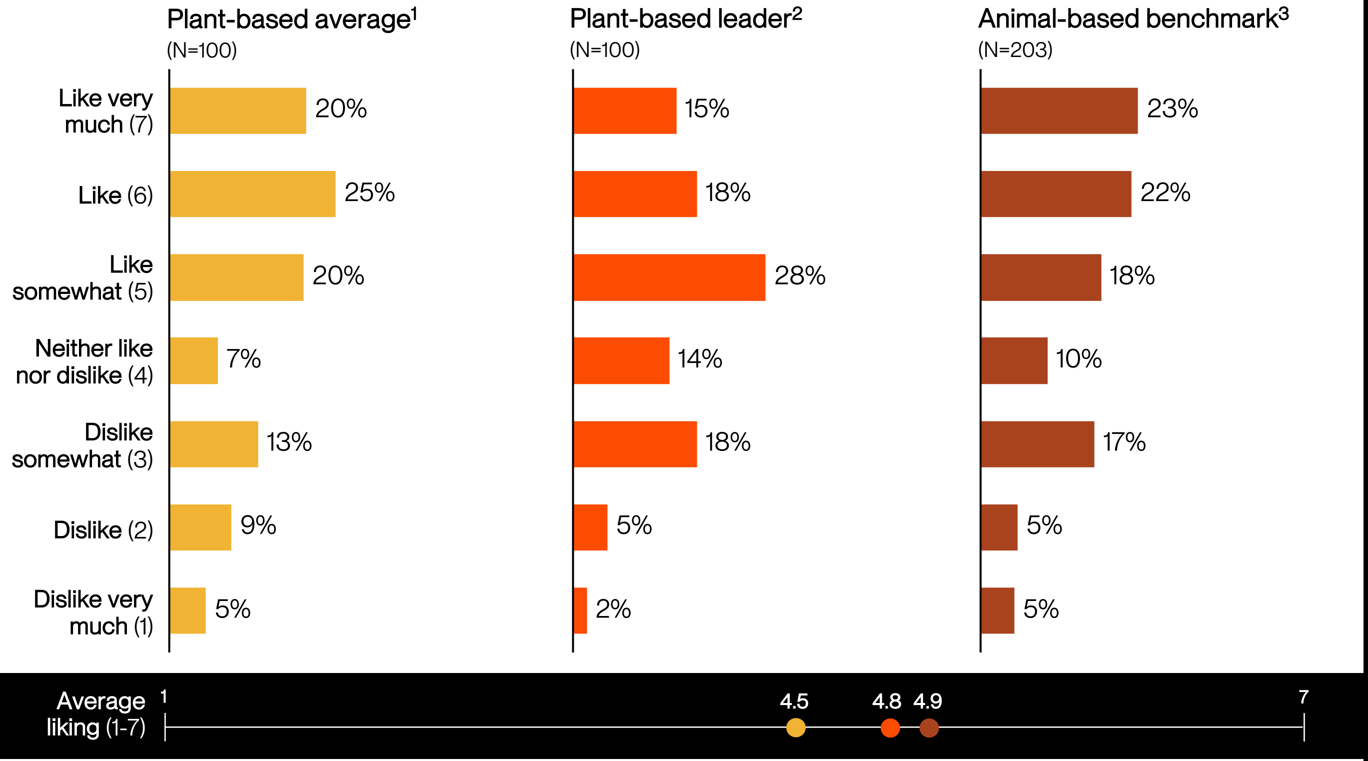
Opportunity for plant-based leader to push the category further and raise overall satisfaction.

- 43% of participants still rated the texture below 'like'.

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Appearance

Liking scores, % of participants



Takeaways

Appearance is a weakness for the entire chicken tender category.

- Average liking ratings are between 4.5pts – 4.9pts, the lowest out of all the liked traits (flavor, texture, appearance, breading flavor).

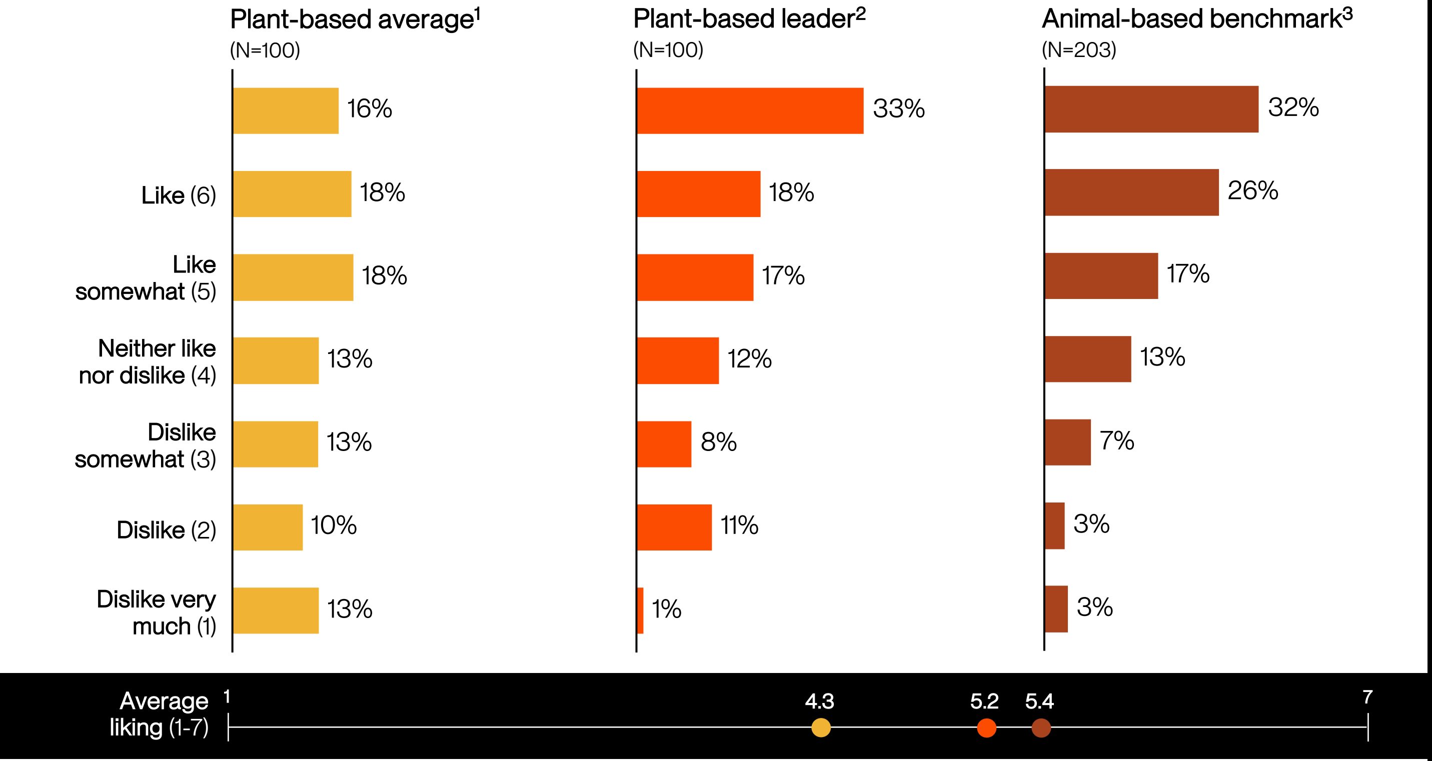
Appearance is a relative strength for plant-based products.

- Plant-based leader has almost reached parity with animal-based and plant-based average is within 0.4 liking points.

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Breading flavor

Liking scores, % of participants



Takeaways

Breading flavor should be a focus for plant-based products.

- Animal tenders outperformed on breading despite the lack of inherent advantage for animal products on that attribute.

The plant-based leader differentiates on breading flavor relative to the plant-based average.

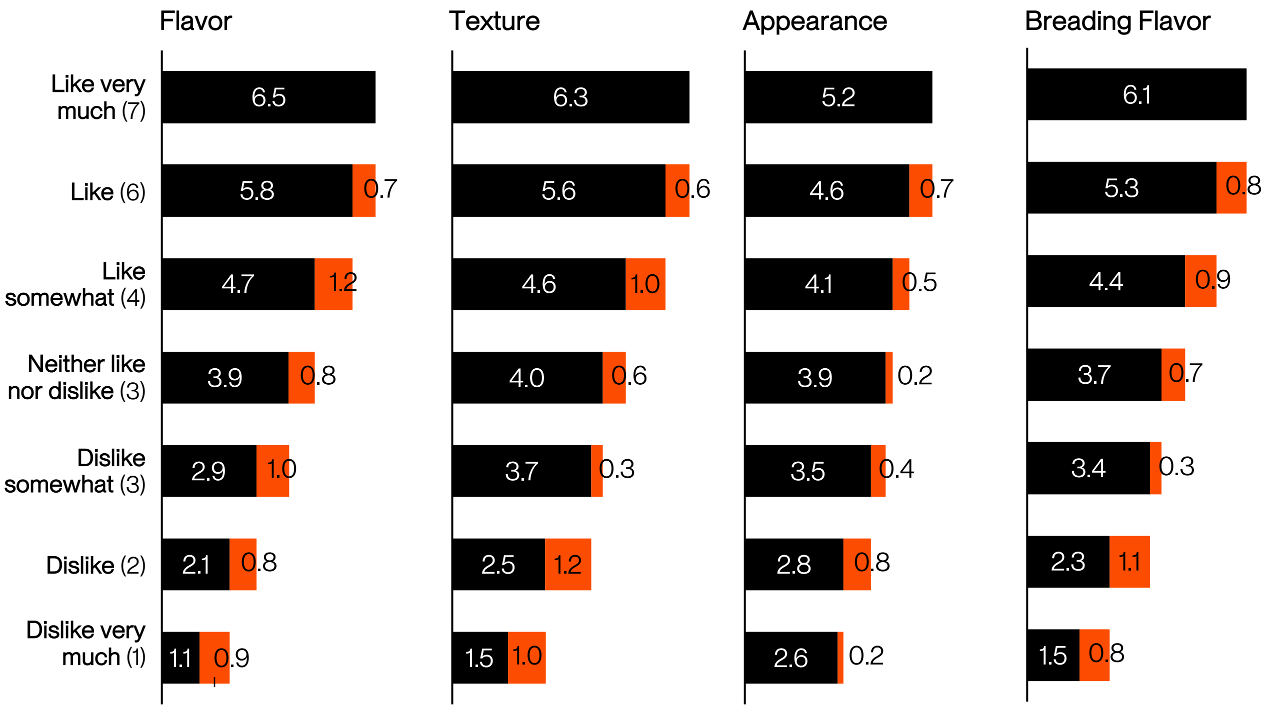
- 33% rated it 'like very much' versus just 16% for the plant-based average.

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Importance of key sensory traits to overall satisfaction → Takeaways

Liking scores and average drop in liking[1], Mean

Mean liking[2]
Mean drop



Flavor is the strongest indicator of overall satisfaction followed by texture.

- Average liking is higher for ratings of 'like very much' on flavor and texture than it is on appearance or breading flavor.

Appearance has smallest impact on overall liking.

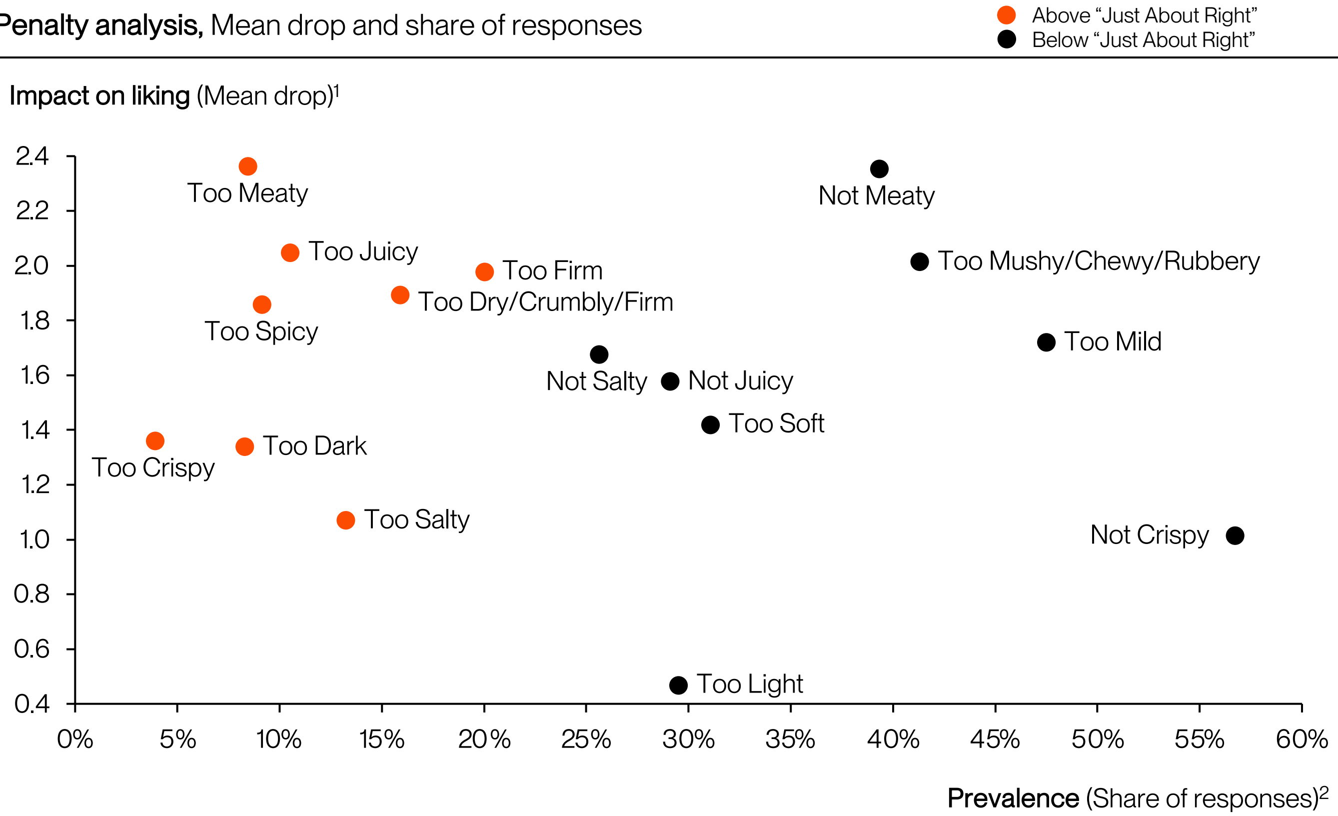
- High ratings on appearance do not correspond as closely to high ratings of overall satisfaction as they do with other traits.

1. Aggregated across 1,212 responses
2. Calculated as the average overall satisfaction for all responses across all products (plant and animal-based) at each level of "liking" for the sensory trait

Tenders: Impact of key sensory traits on liking

Takeaways

Penalty analysis, Mean drop and share of responses



Products should focus on striking the right balance of meatiness.

- Being too meaty or not meaty enough caused the largest drop in overall satisfaction.

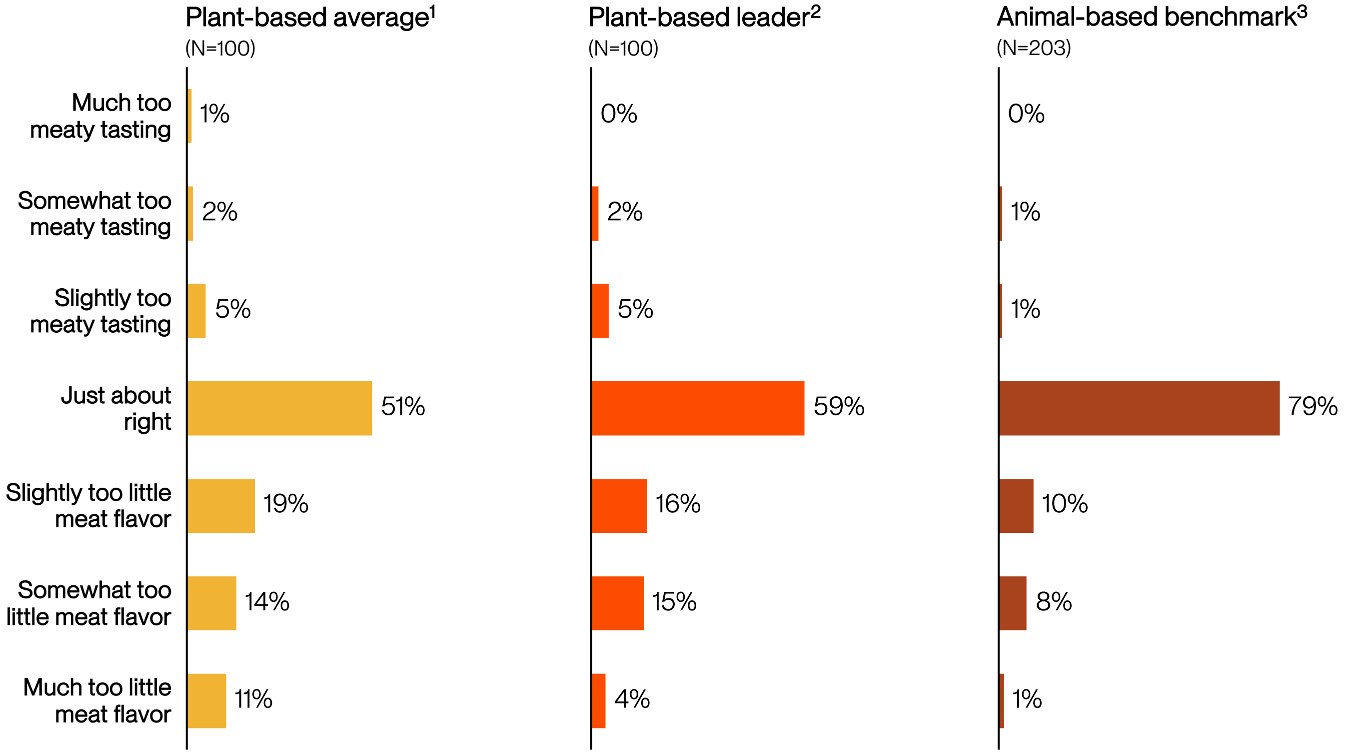
Plant-based tenders should carefully refine mildness and mushiness / chewiness / rubberiness.

- Being too mild or mushy / chewy / rubbery occurred more than 40% of the time and were associated with relatively large drops in average liking.
- However, being too spicy or dry/crumbly/firm also had large negative impacts on overall satisfaction.

1. Calculated as the average drop in overall liking for products with the associated response
2. Share of responses for all products (animal and plant) in each direction for each trait, across 1,212 responses

Tenders: Meatiness

How would you rate the meatiness?, % of participants



Takeaways

Plant-based tenders should increase their meatiness.

- 44% found them 'not meaty enough' while just 8% found them 'too meaty'.

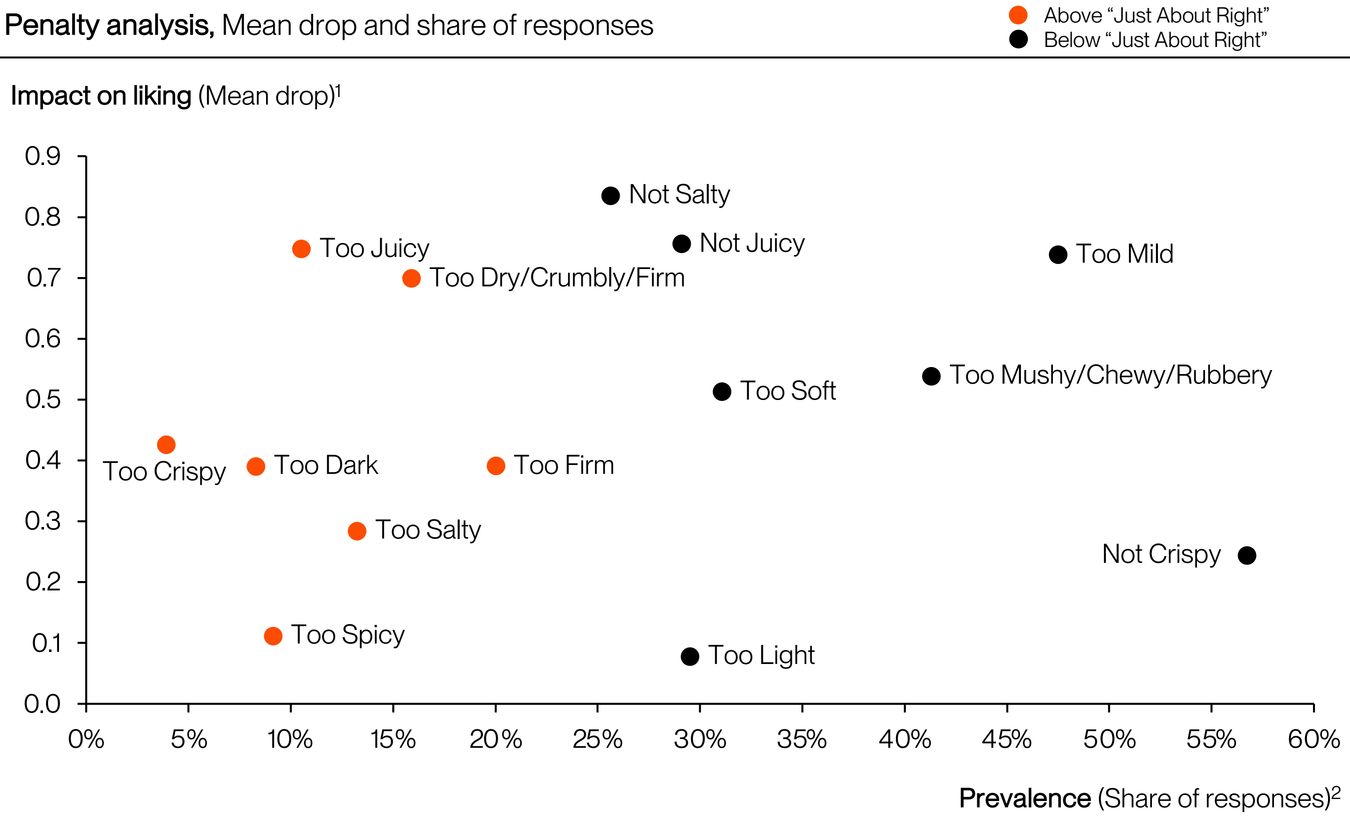
Animal tenders are outperforming plant-based products on meatiness.

- 79% of participants cited the meatiness of the animal-based product as 'just about right' (versus 59% for the plant-based leader and 51% for the plant-based average).

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Impact of key sensory traits on liking

Penalty analysis, Mean drop and share of responses



Takeaways

Mildness was associated with large declines in meatiness

- Being too mild occurred 50% of the time and was associated with a large drop in average meatiness compared to products being too spicy, which had a very small impact on average meatiness.

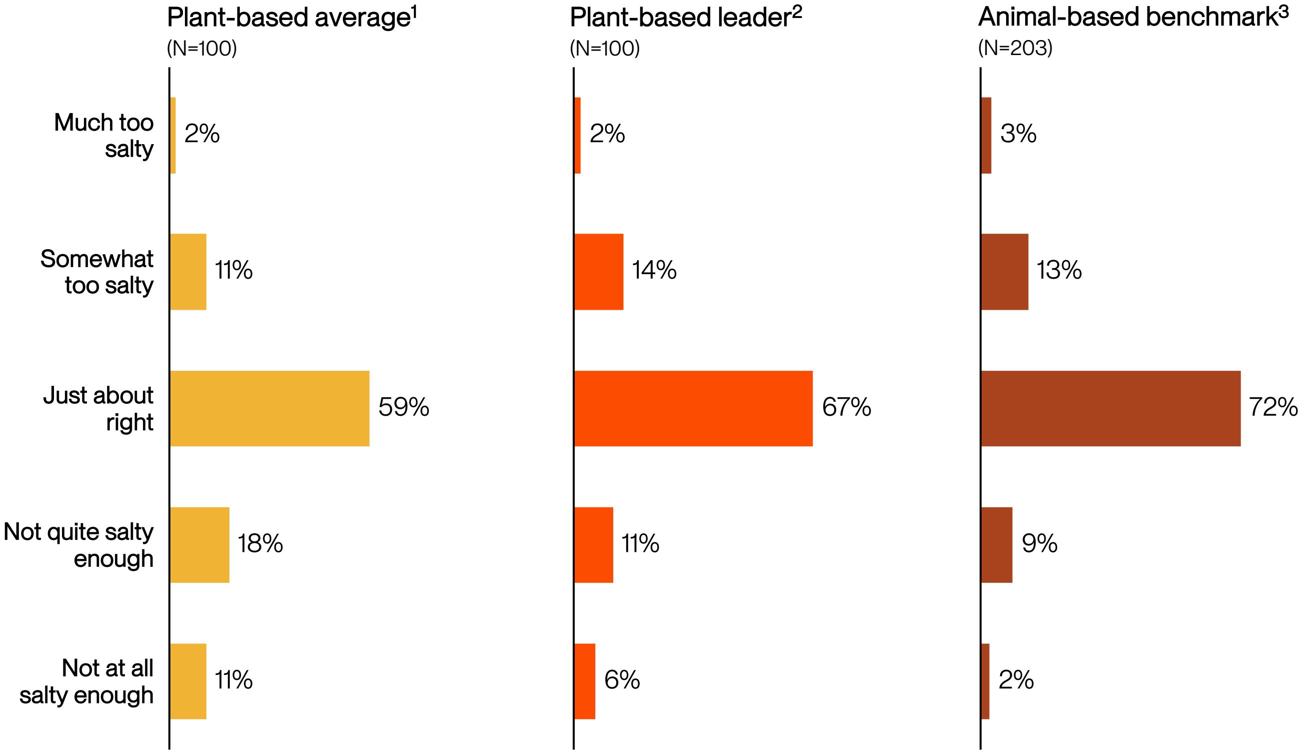
Saltiness can be increased to improve meatiness

- Low saltiness had the largest impact of meatiness, especially compared to products that were 'too salty' which led to smaller declines in meatiness.

1. Calculated as the average drop in meatiness for products with the associated response
2. Share of responses for all products (animal and plant) in each direction for each trait, across 1,212 responses

Tenders: Saltiness

How would you rate the saltiness?, % of participants



Takeaways

Saltiness is an area of relative strength for plant-based tenders.

- 59% - 67% rated the saltiness as 'just about right', higher than most other traits.

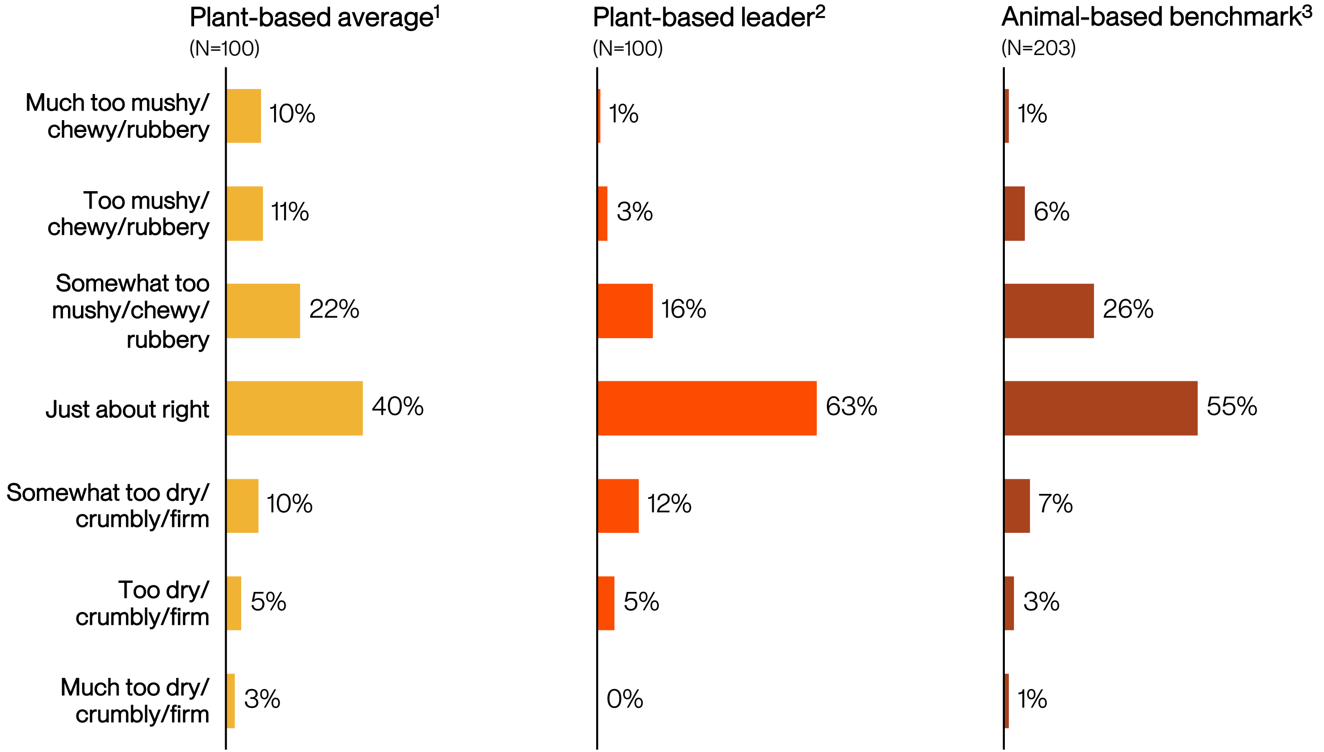
There was not clear consensus amongst participants on whether to increase or decrease saltiness.

- Relatively equal number of participants felt chicken tender products were too salty or not salty enough.

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Consistency

How would you describe the texture overall?, % of participants



Takeaways

Plant-based leader has surpassed animal-based on consistency which presents a large opportunity for the rest of plant-based products to learn and catch up.

- Plant-based leader had 8% more participants rate its consistency as 'just about right' compared to animal-based while the average plant-based product underperformed by 15%.

Plant-based products should make their product more dry/crumbly/firm.

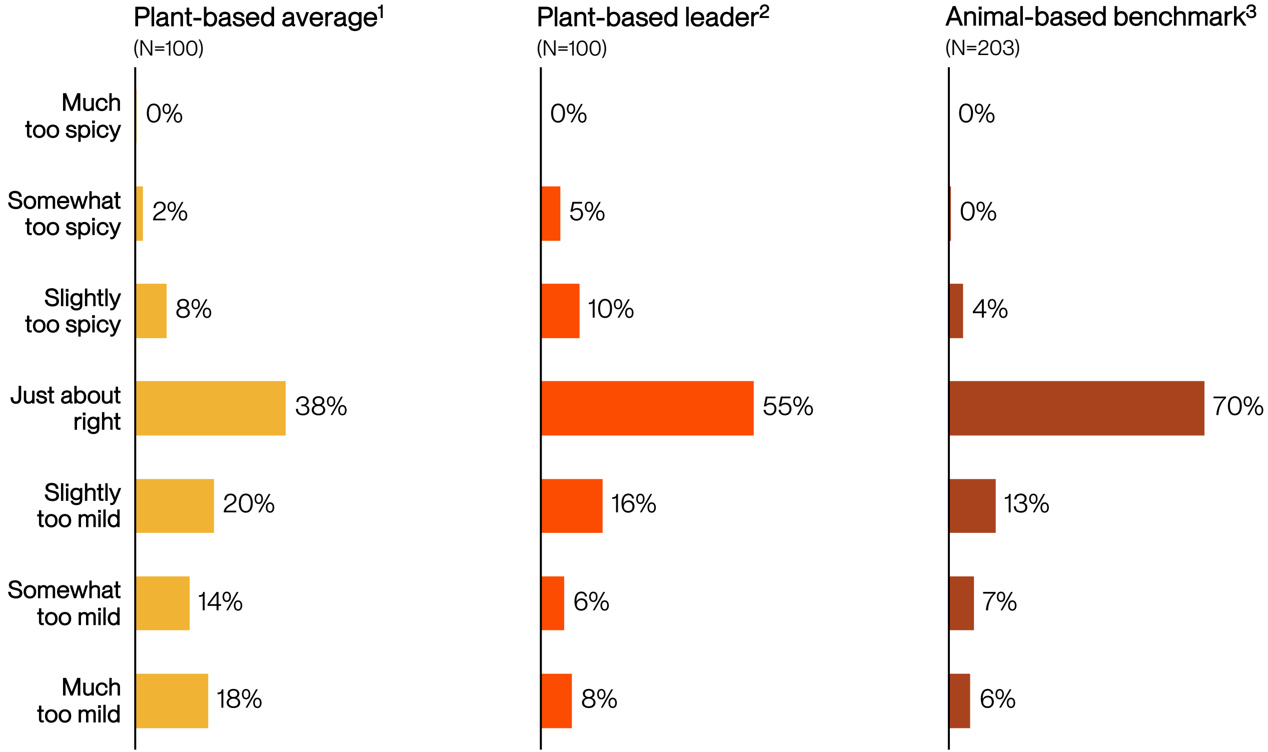
- Most participants that were unhappy with the consistency of the average plant-based product considered it too mushy/chewy/rubbery.

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Spiciness

Takeaways

How would you describe the spiciness?, % of participants



Spiciness was a clear weakness for plant-based chicken tenders.

- Just 38-55% rated the spiciness as 'just about right', a lower share than any other attribute.

Plant-based tenders overall should be spicier.

- Both the plant-based average and leader underperformed compared to the animal-based on spiciness.

Opportunity for plant-based products to differentiate from animal tenders by creating a spicier profile.

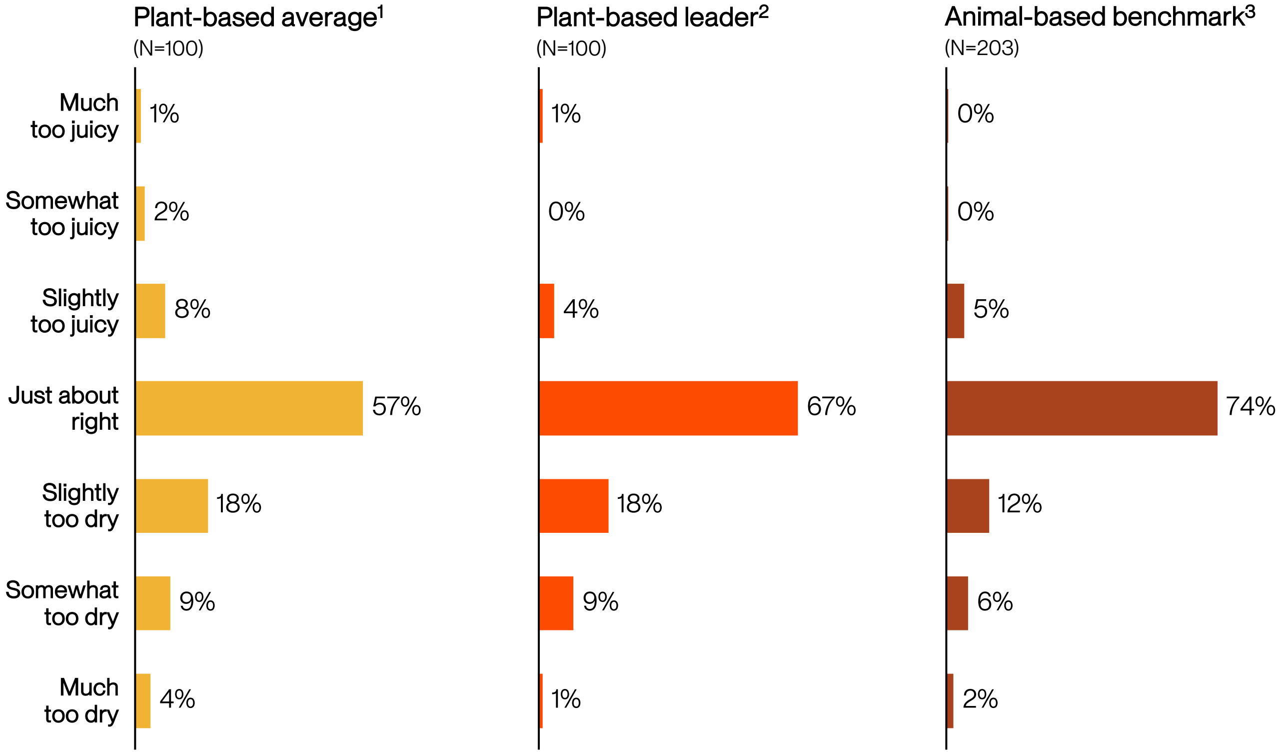
- 26% of participants still felt the animal-based product was too mild while only 4% rated it as too spicy.

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Juiciness

Takeaways

How would you describe the juiciness?, % of participants



Tenders were generally considered to be too dry.

- The plant-based average, plant-based leader, and animal chicken tenders were all rated 'too dry' far more often than 'too juicy'.

The plant-based average and plant-based leader performed very similarly on juiciness.

- The distribution of responses on juiciness was nearly identical.

Juiciness is an area of relative strength for plant-based tenders.

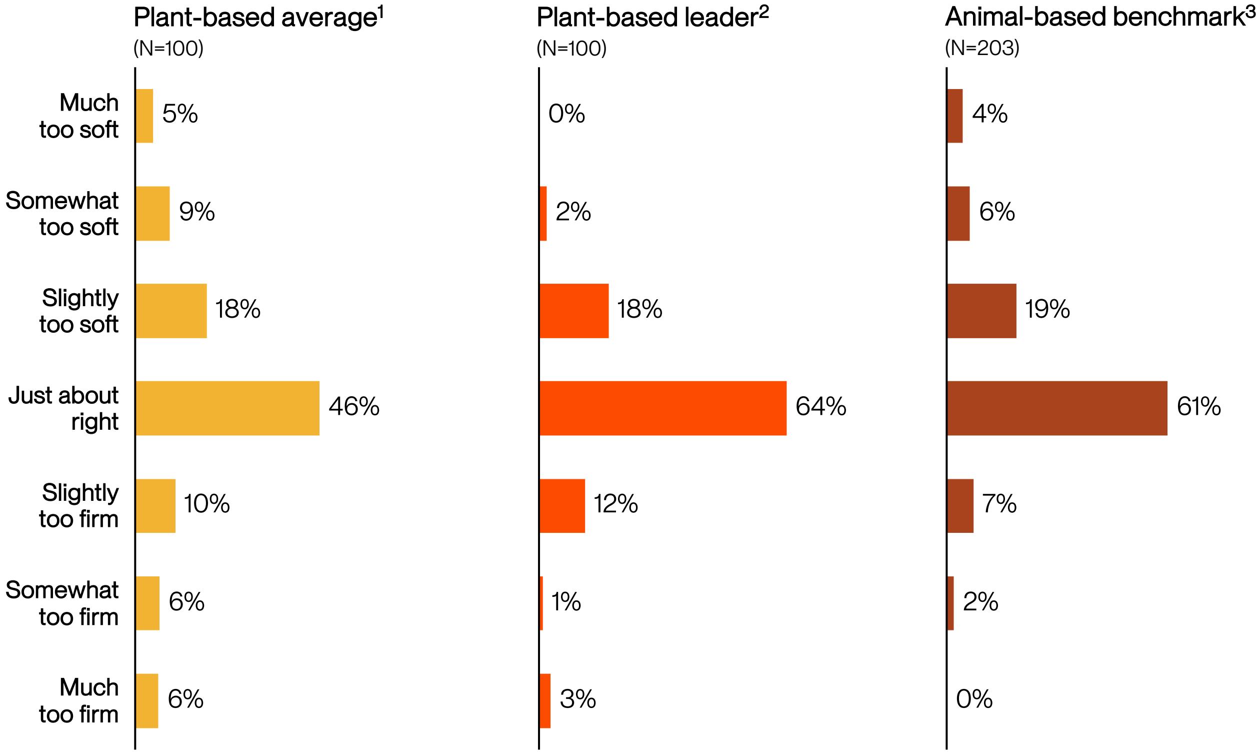
- 57% - 67% rated the juiciness as 'just about right', higher than most other traits.

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Firmness

Takeaways

How would you describe the firmness?, % of participants



Plant-based leader is outperforming the animal tender on firmness, indicating an industry-wide opportunity.

- Plant-based leader had 3% more participants cite its consistency as 'just about right' compared to animal tender while the average plant-based product underperformed by 15%.

Plant-based products should make their product firmer.

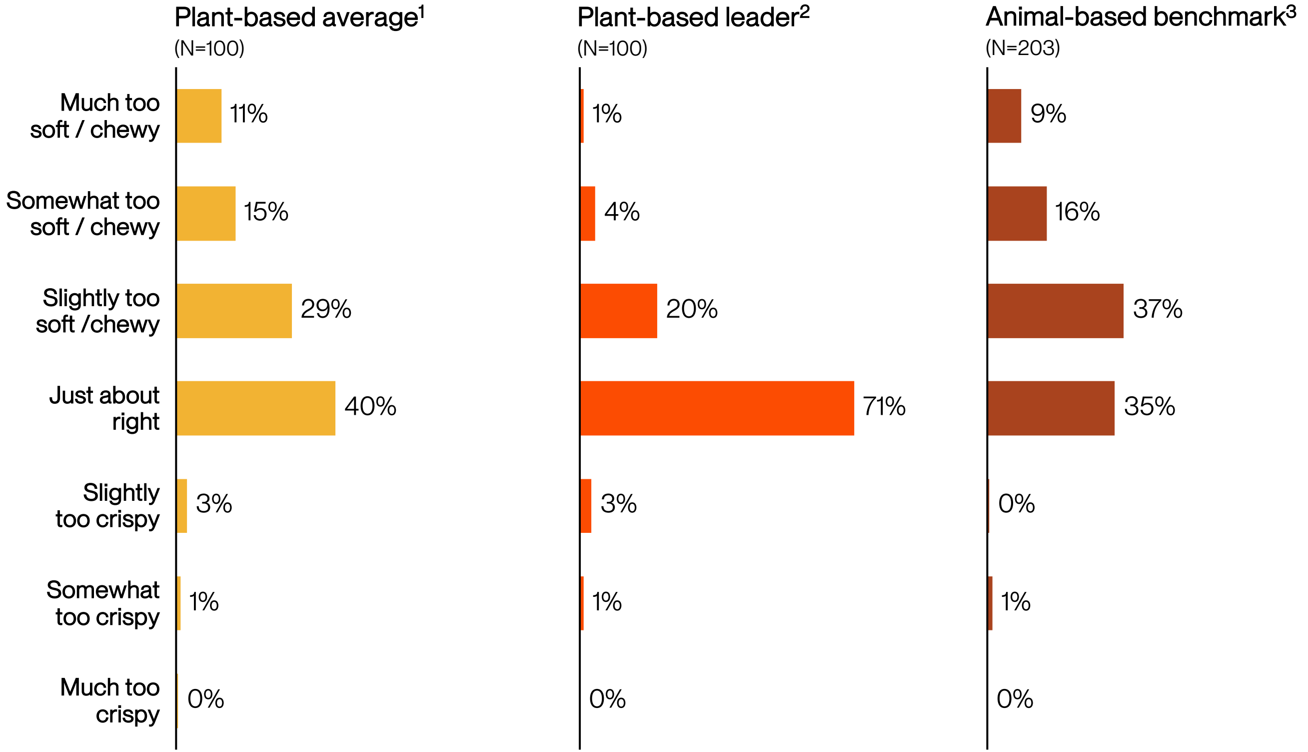
- Most participants that were unhappy with the consistency of the average plant-based product considered it too soft.

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Crispiness

Takeaways

How would you describe the crispiness?, % of participants



Crispiness is one of the largest areas of strength for plant-based products relative to animal-based.

- Both the plant-based average and leader had more participants cite their crispiness as 'just about right' than the animal tender.

Plant-based products should make their products crispier to push the category even further.

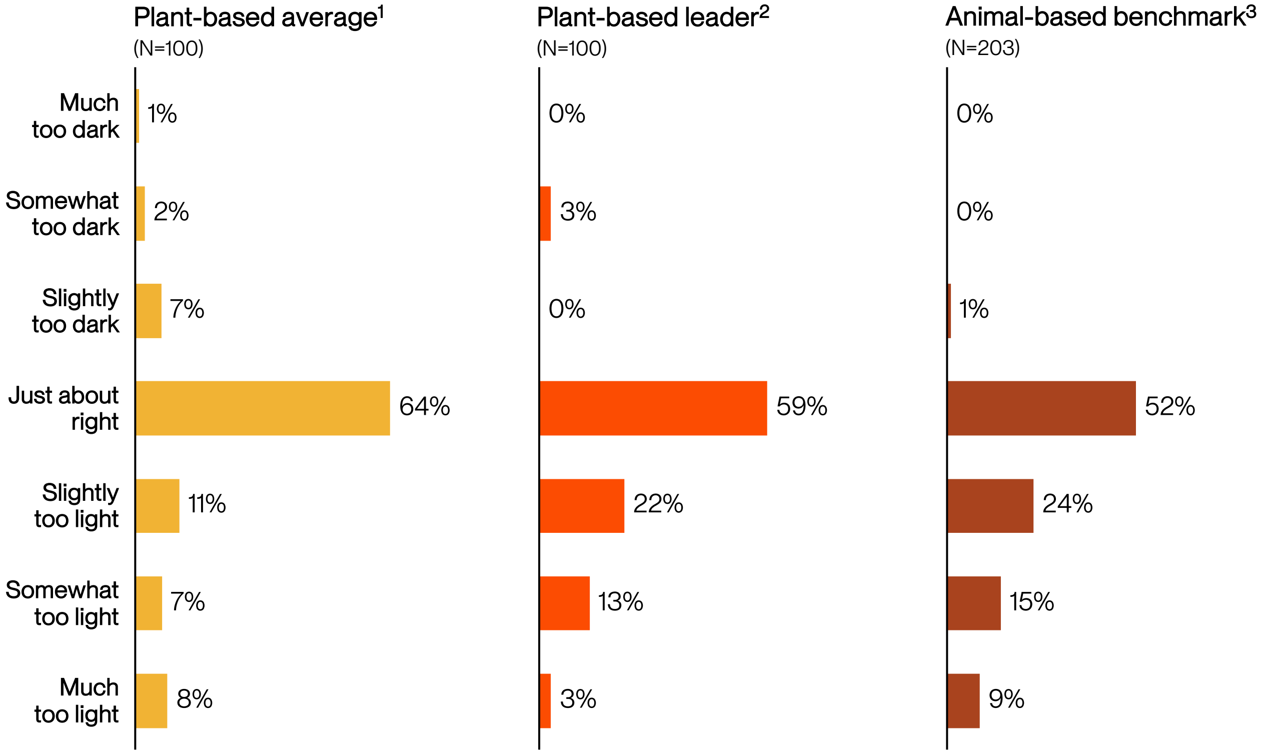
- Participants were far more likely to cite plant-based products as too soft / chewy rather than too crispy.

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Color

Takeaways

How would you describe the color?, % of participants



Color is one of the largest areas of strength for plant-based tenders.

- Both the plant-based average and leader were rated on color 'just about right' more than the animal tenders.

Plant-based products should make their products darker to push the category even further.

- Participants were far more likely to cite plant-based products as too light than too dark.

Plant-based products should make their products darker to push the category even further.

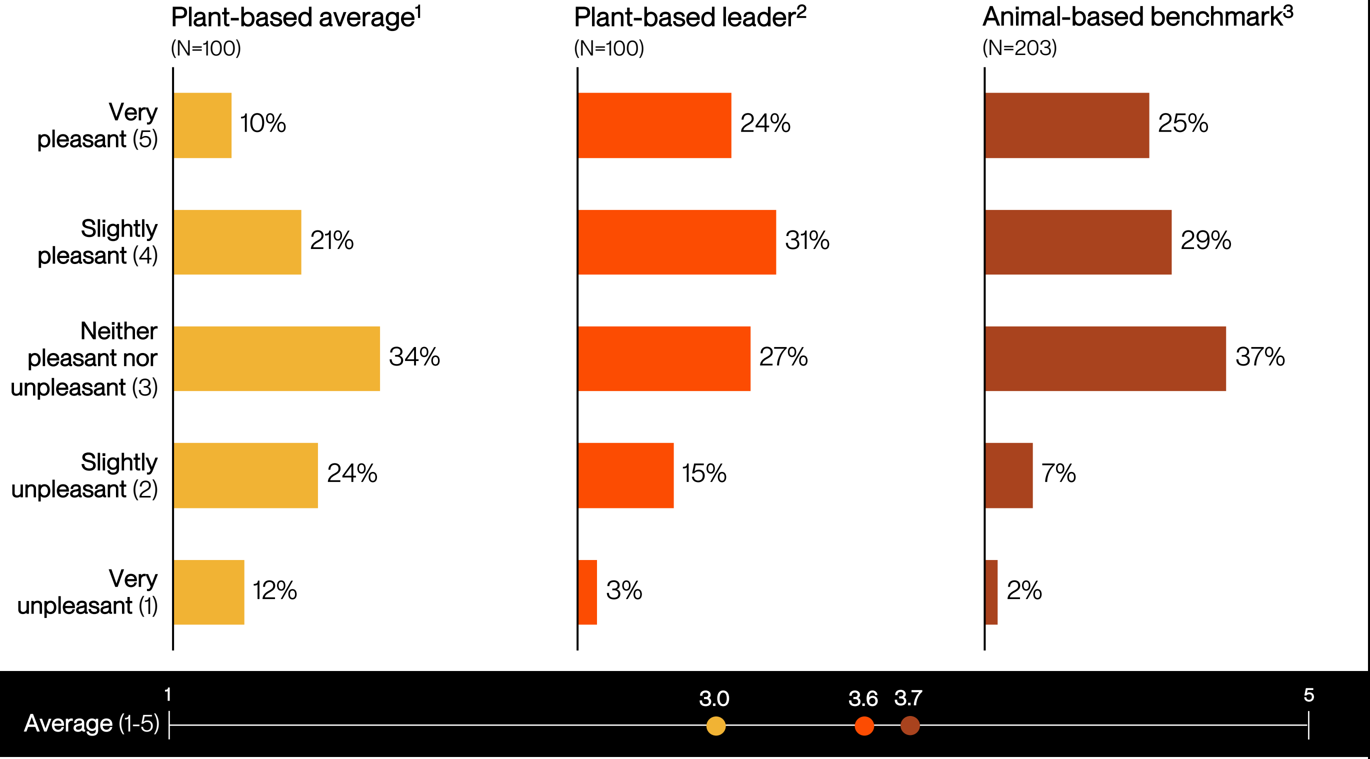
- More participants cited the average plant-based products' color as 'just about right'.

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Aftertaste

Takeaways

How would you describe the aftertaste?, % of participants



Plant-based leader is similar to animal-based on aftertaste pleasantness with opportunity to differentiate further.

- Most participants are neutral or just slightly positive on the aftertaste of animal-based chicken tenders.

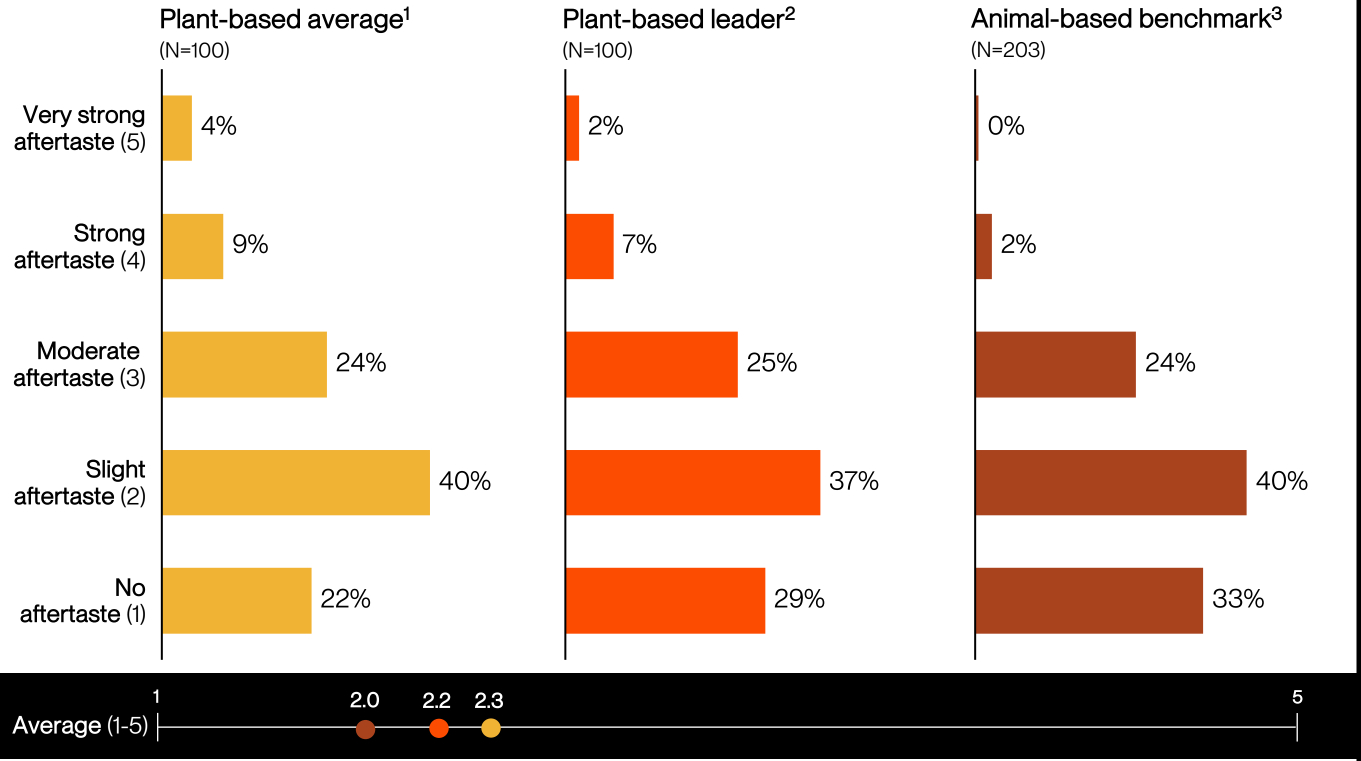
The average plant-based tenders in general have a weakness in aftertaste pleasantness.

- Just 31% of participants found it to be pleasant versus 54% for the animal tenders.

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Aftertaste

How would you describe the strength of the aftertaste?, % of participants



Takeaways

The category overall has a similar aftertaste strength.

- The distribution of responses was very similar for animal and plant-based tenders.

Plant-based tenders have a slightly stronger aftertaste than animal-based tenders.

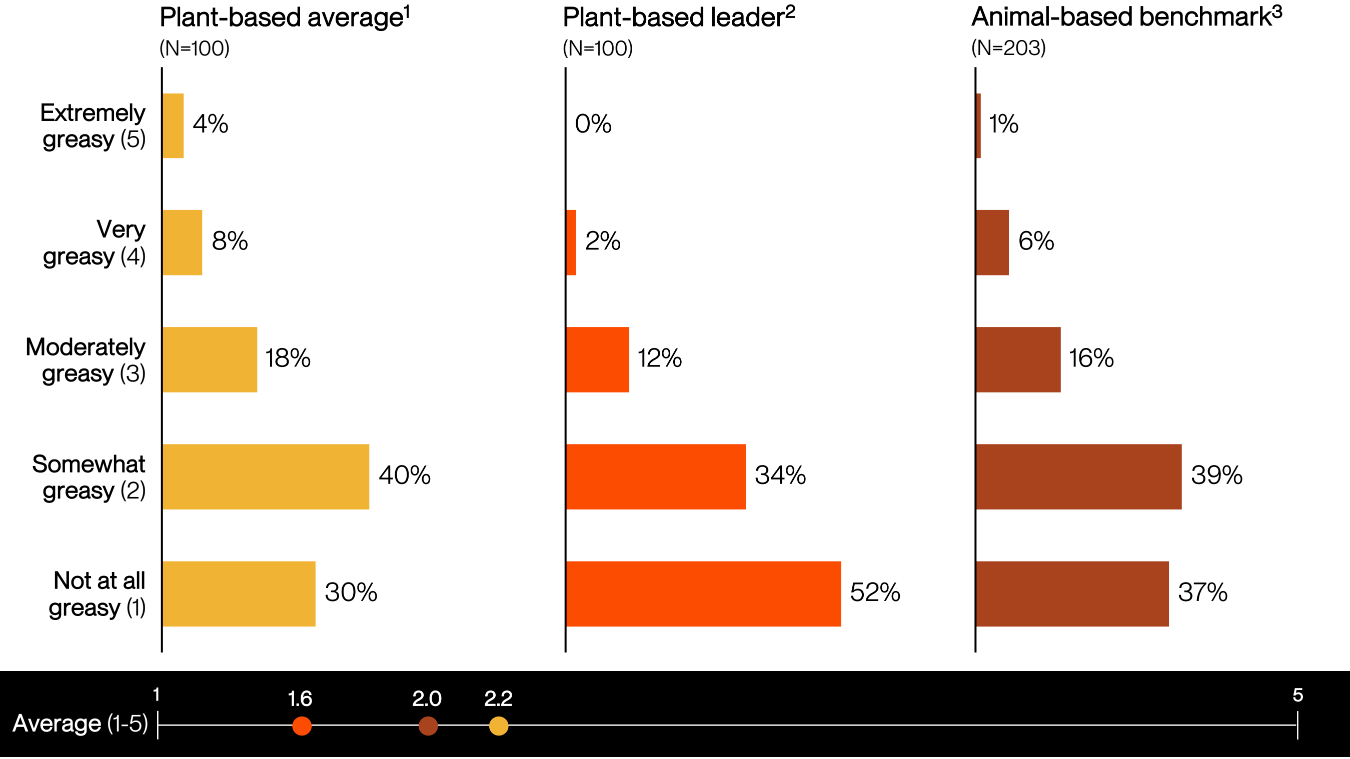
- Both the plant-based average and leader scored a higher average on aftertaste strength than animal-based.

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Tenders: Greasiness

Takeaways

How would you describe the overall greasiness?, % of participants



Plant-based products are very similar to animal-based on greasiness.

- The average plant-based product scored within 0.2pts rating points of the animal-based.

Plant-based leader has a clear opportunity to increase greasiness.

- The average greasiness rating for the plant-based leader is 0.6pts away from the animal tender (versus just 0.2pts for the plant-based average).

1. Aggregated across 10 commercially plant-based available chicken tender brands
2. Top performing plant-based product amongst all 6 chicken tenders tested
3. Animal-based chicken tender available in retail

Category-Specific Deep Dive

Nuggets

Nuggets > Executive summary of R&D opportunities

Priority Attributes

Plant-based nuggets should focus on flavor for further improvement.

- **Flavor is most central to overall liking** – a rating of 'like very much' was associated with higher general liking than for texture, appearance, or breading flavor.
- **Plant-based should improve to ensure they outperform all animal nuggets** – while plant-based nuggets were more 'liked' on all key sensory traits, other animal nuggets might achieve greater 'liking' than the benchmark used in this study.

Top Sensory Opportunities

Plant-based can achieve clear superiority with focused R&D.

- **Meatiness and consistency should be prioritized for product development** – more than 40% of participants found the nuggets to be 'not meaty' or 'too mushy/rubbery/chewy', leading to a 2pt drop in average liking on average (e.g., 'like very much' -> 'like somewhat).
- **Declines in meatiness were most strongly associated with a lack of juiciness, saltiness, and mildness (vs spiciness)** – these attributes were tied to the largest average drops (0.55-0.65pts) and occurred frequently (25-60% of the time).
- **Mild flavor or low crispiness nuggets were frequent but lower impact complaints** – ratings of 'too mild' or 'not crispy' occurred >50% of the time and led to a 1.2-1.3pt average drop in 'general liking'.

Nuggets Tested

Chicken nuggets from 9 commercially available plant-based brands were prepared according to manufacturer instructions and compared against animal nuggets.

Product **404**

Product **413**

Product **431**

Product **449**

Product **457**

Product **464**

Product **470**

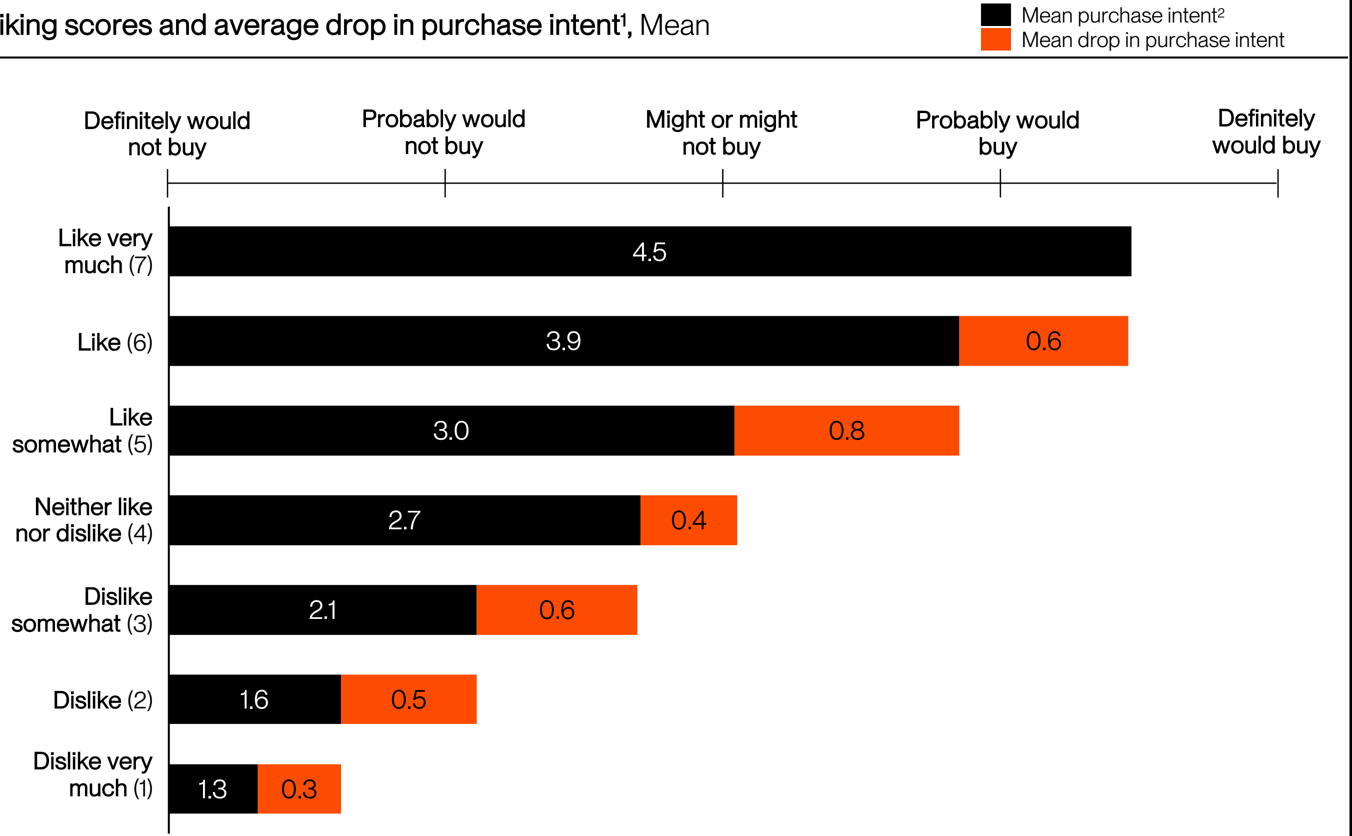
Product **482**

Product **499**

Product **492**
Animal-based nugget

Nuggets: Translation from 'liking' to 'purchase intent'

Liking scores and average drop in purchase intent[1], Mean



Takeaways

Products should strive for ratings of 'like very much' or 'like'.

- Purchase intent (PI) falls very quickly when moving from 'Like very much' to 'Like somewhat'.

Ratings of 'like somewhat', 'neither like nor dislike', and 'dislike somewhat' have a strong association.

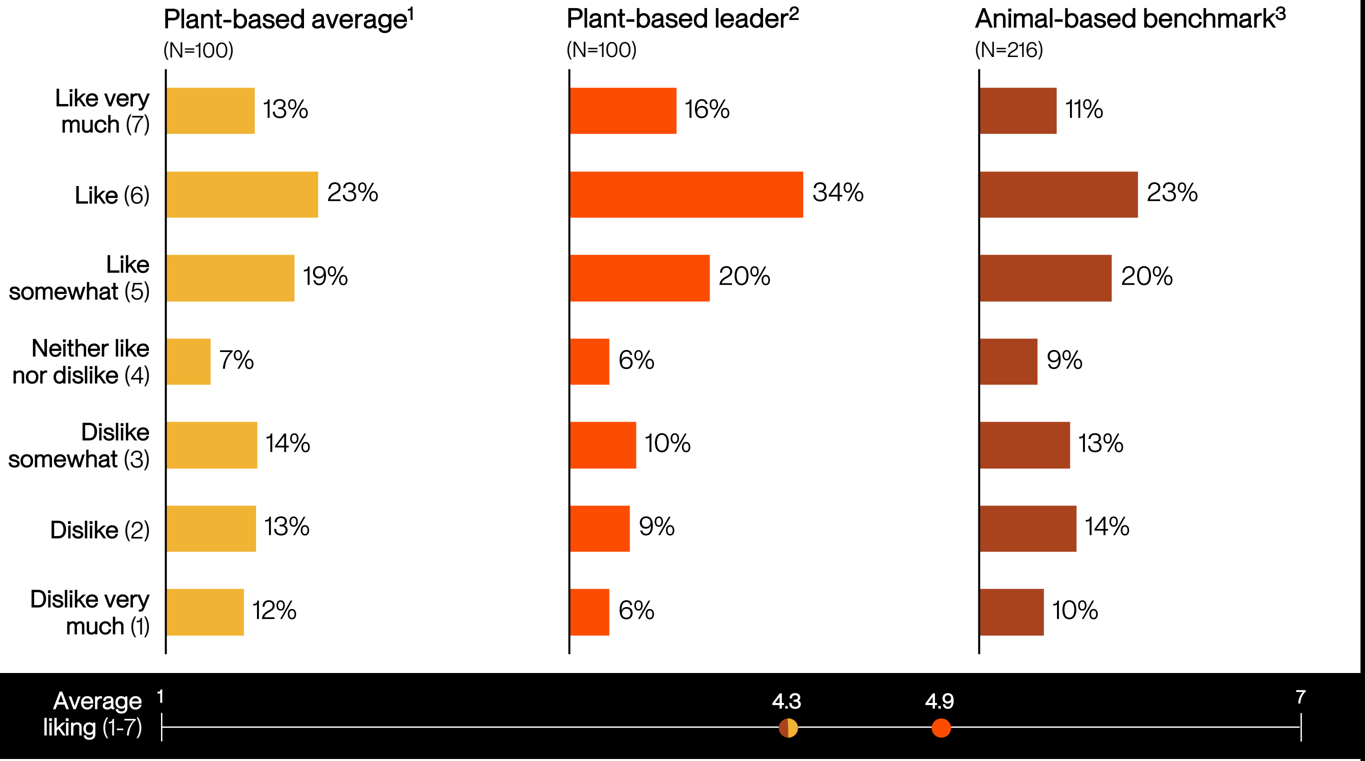
- All 3 tie to a purchase intent between and 'Probably would not buy' and 'Might or might not buy".

1. Aggregated across 1,512 responses
2. Calculated as the average purchase intent for all responses across all products (plant and animal-based) at each level of 'liking

Nuggets: Satisfaction

Takeaways

Liking scores, % of participants



The average plant-based nugget has achieved parity with animal chicken nuggets.

- The distribution of 'liking' responses is very similar and both categories have the same average 'liking'.

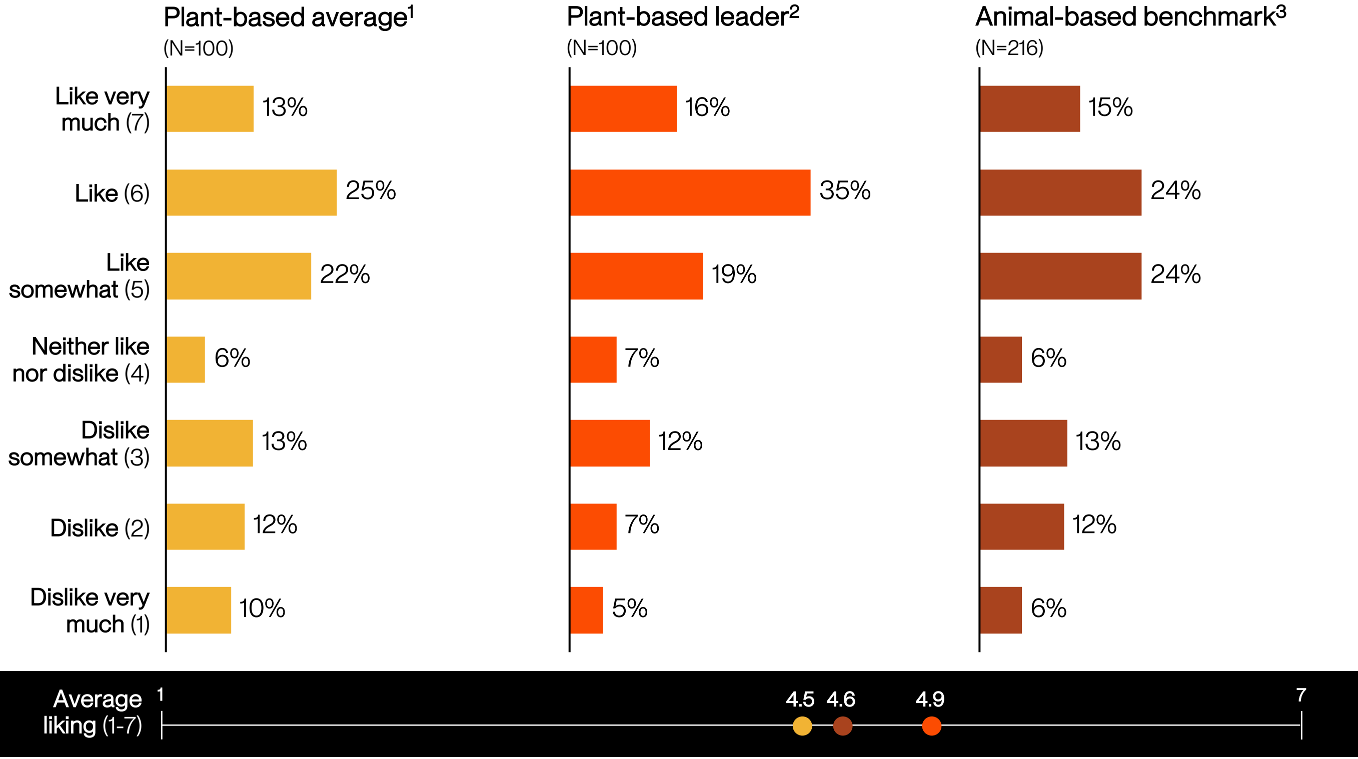
The plant-based leader clearly outperforms the animal chicken nugget.

- The plant-based leader achieved was rated 'like very much' or 'like' about 50% more often.

1. Aggregated across 9 commercially plant-based available nugget brands
2. Top performing plant-based product amongst all 6 nuggets tested
3. Animal-based nugget available in retail

Nuggets: Flavor

Liking scores, % of participants



Takeaways

There is little differentiation on flavor in nuggets.

- All three categories were only separated by average 'liking' rating of 0.4pts.

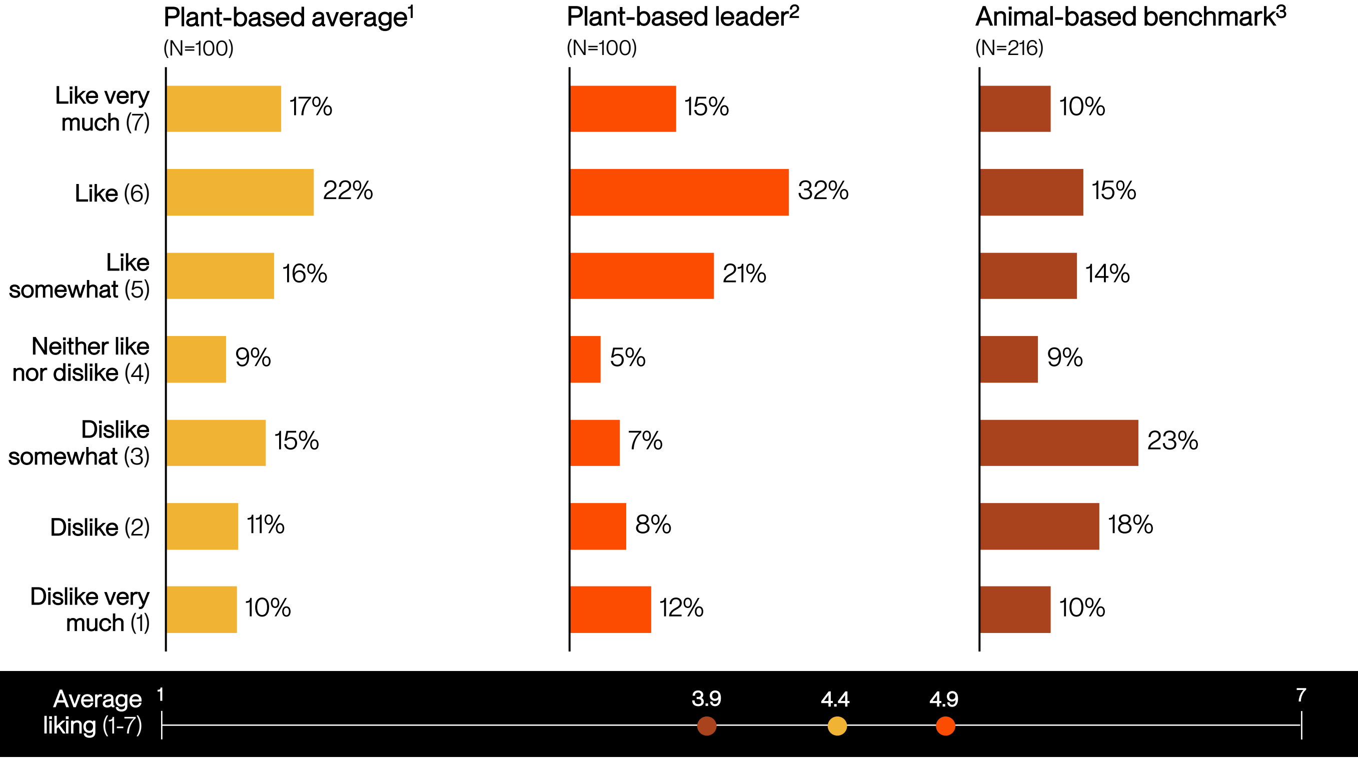
Flavor is less likely to be disliked than texture.

- All three categories were relatively disliked less than they were on texture.

1. Aggregated across 5 commercially available plant-based nugget brands plus one vegetarian nugget brand
2. Top performing plant-based product amongst all 6 nuggets tested
3. Animal-based nugget available in retail

Nuggets: Texture

Liking scores, % of participants



Takeaways

Plant-based nuggets differentiate themselves against animal nuggets on texture.

- Both the plant-based leader and average were rated significantly than the animal product.

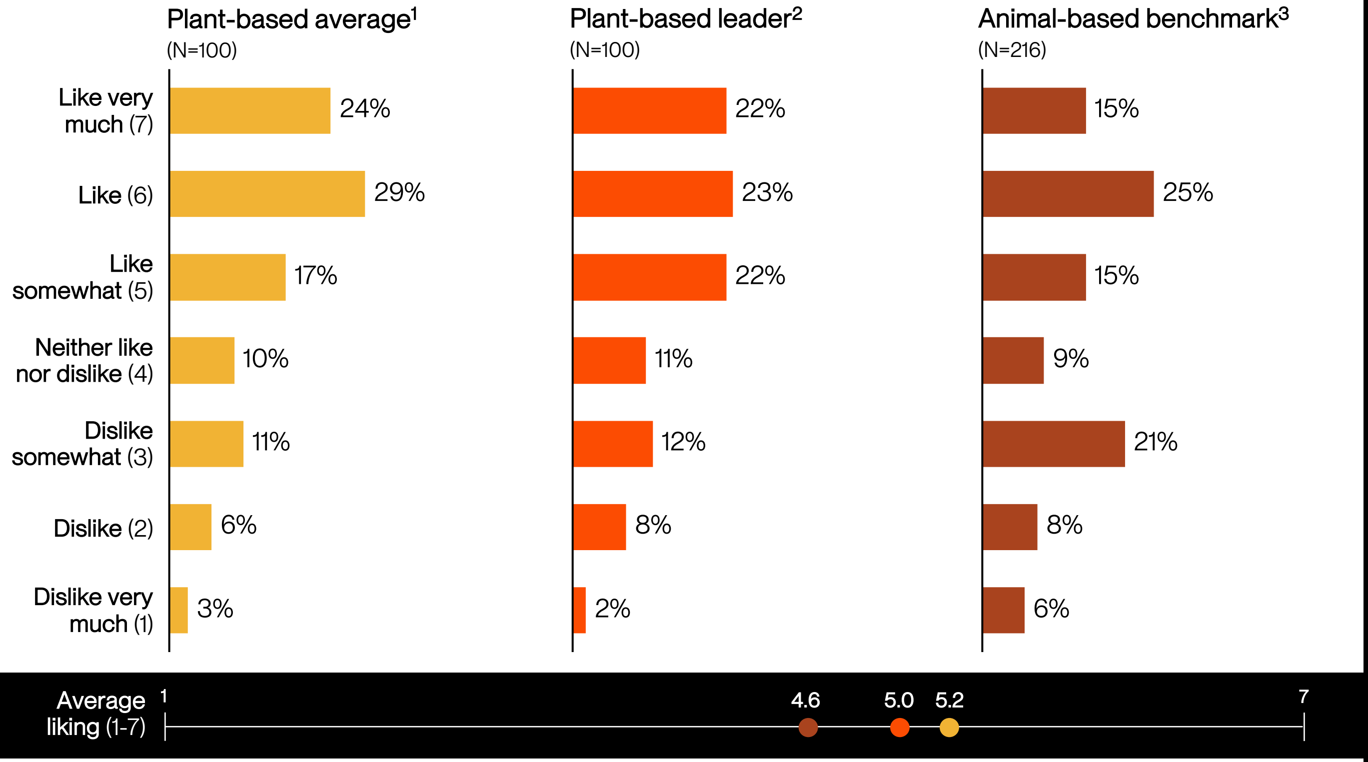
Texture is the key weakness for the animal nugget.

- More than 50% of participants disliked the texture to some degree, 1.7x more than on flavor and 1.4x more than on appearance.

1. Aggregated across 5 commercially available plant-based nugget brands plus one vegetarian nugget brand
2. Top performing plant-based product amongst all 6 nuggets tested
3. Animal-based nugget available in retail

Nuggets: Appearance

Liking scores, % of participants



Takeaways

Plant-based nuggets differentiate themselves against animal nuggets on appearance.

- Both the plant-based leader and average were rated significantly higher than the animal nugget.

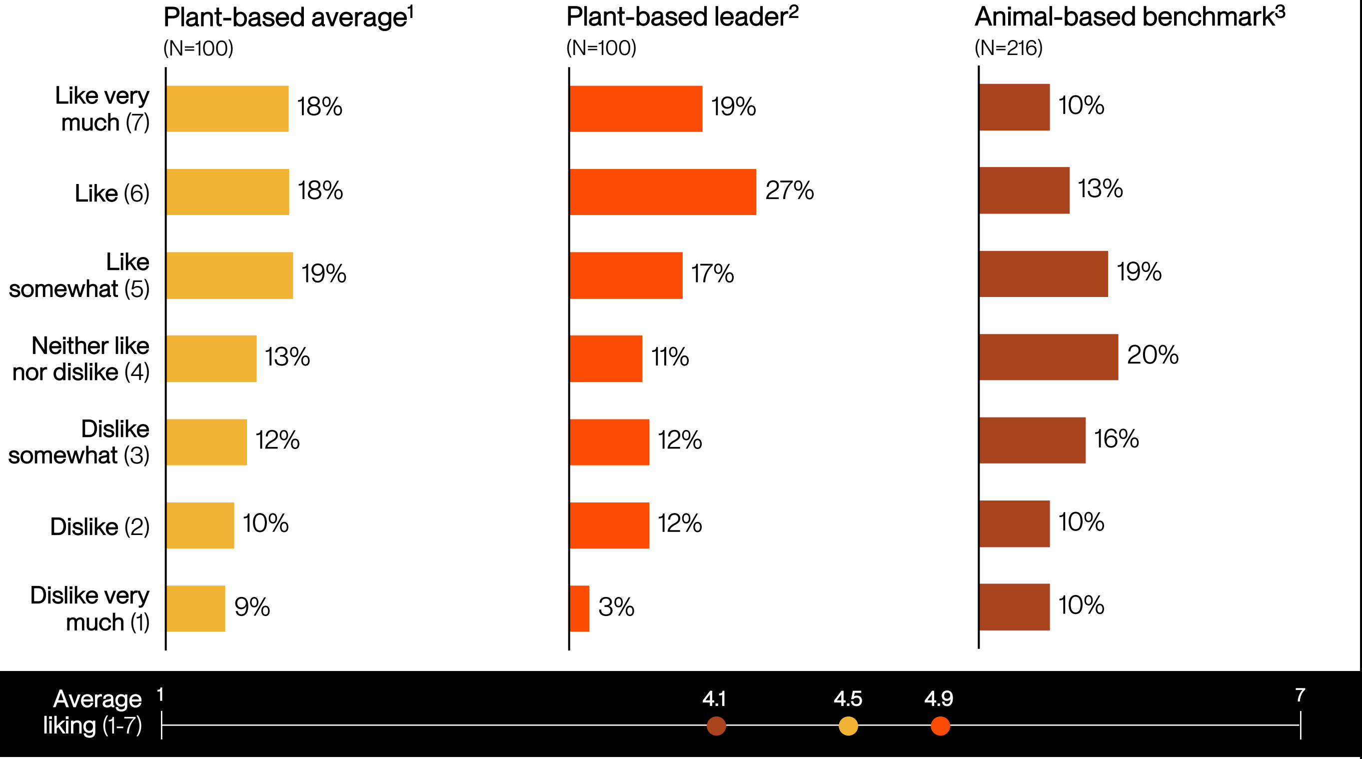
The leading plant-based nugget has a relative weakness in appearance.

- It had a lower average liking than the average plant-based nugget despite outperforming on flavor and texture.

1. Aggregated across 5 commercially available plant-based nugget brands plus one vegetarian nugget brand
2. Top performing plant-based product amongst all 6 nuggets tested
3. Animal-based nugget available in retail

Nuggets: Breading flavor

Liking scores, % of participants



Takeaways

Plant-based nuggets differentiate themselves against animal nuggets on appearance.

- Both the plant-based leader and average were rated significantly than the animal product.

Plant-based brands can differentiate amongst each other on breading flavor.

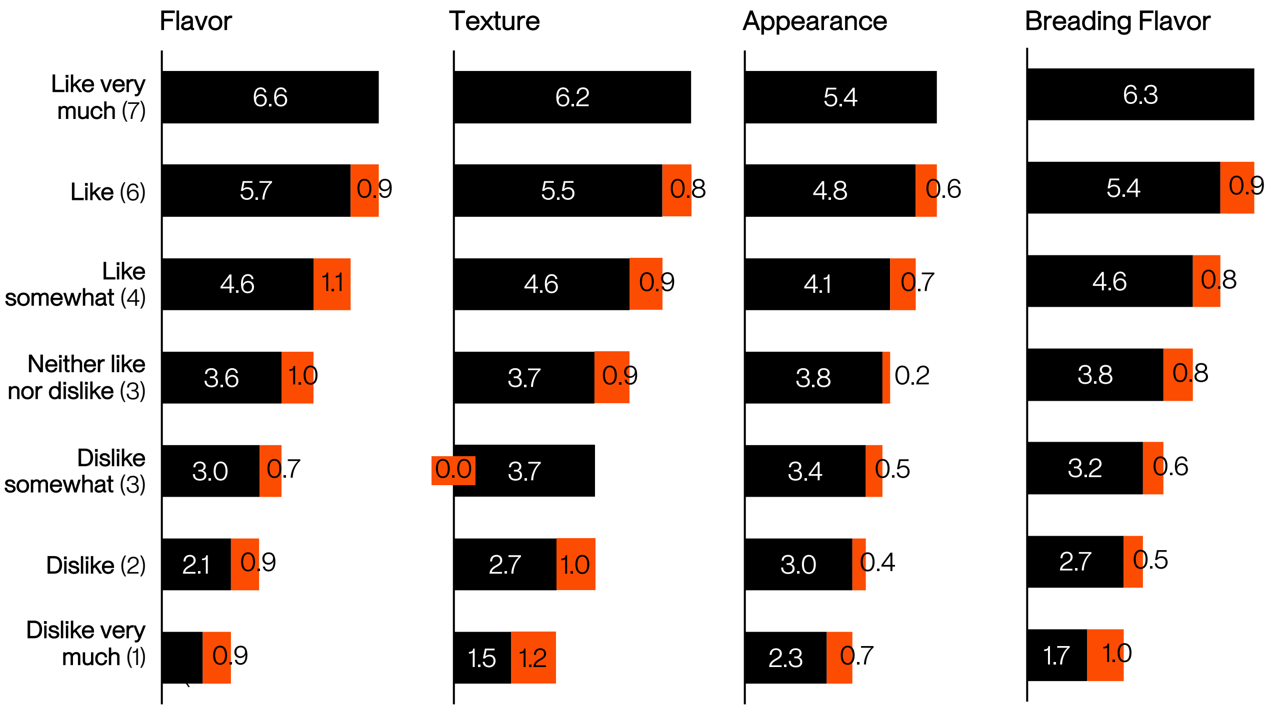
- Participants demonstrated a wide range of 'liking' ratings on breading flavor for all categories, indicating the potential for different groups of consumer preference on breading flavor.

1. Aggregated across 5 commercially available plant-based nugget brands plus one vegetarian nugget brand
2. Top performing plant-based product amongst all 6 nuggets tested
3. Animal-based nugget available in retail

Nuggets: Importance of key sensory traits to overall satisfaction → Takeaways

Liking scores and average drop in liking[1], Mean

Mean liking[2]
Mean drop



Flavor is most critical to overall liking.

- A rating of 'like very much' was associated with higher general liking than for texture, appearance, or breading flavor.

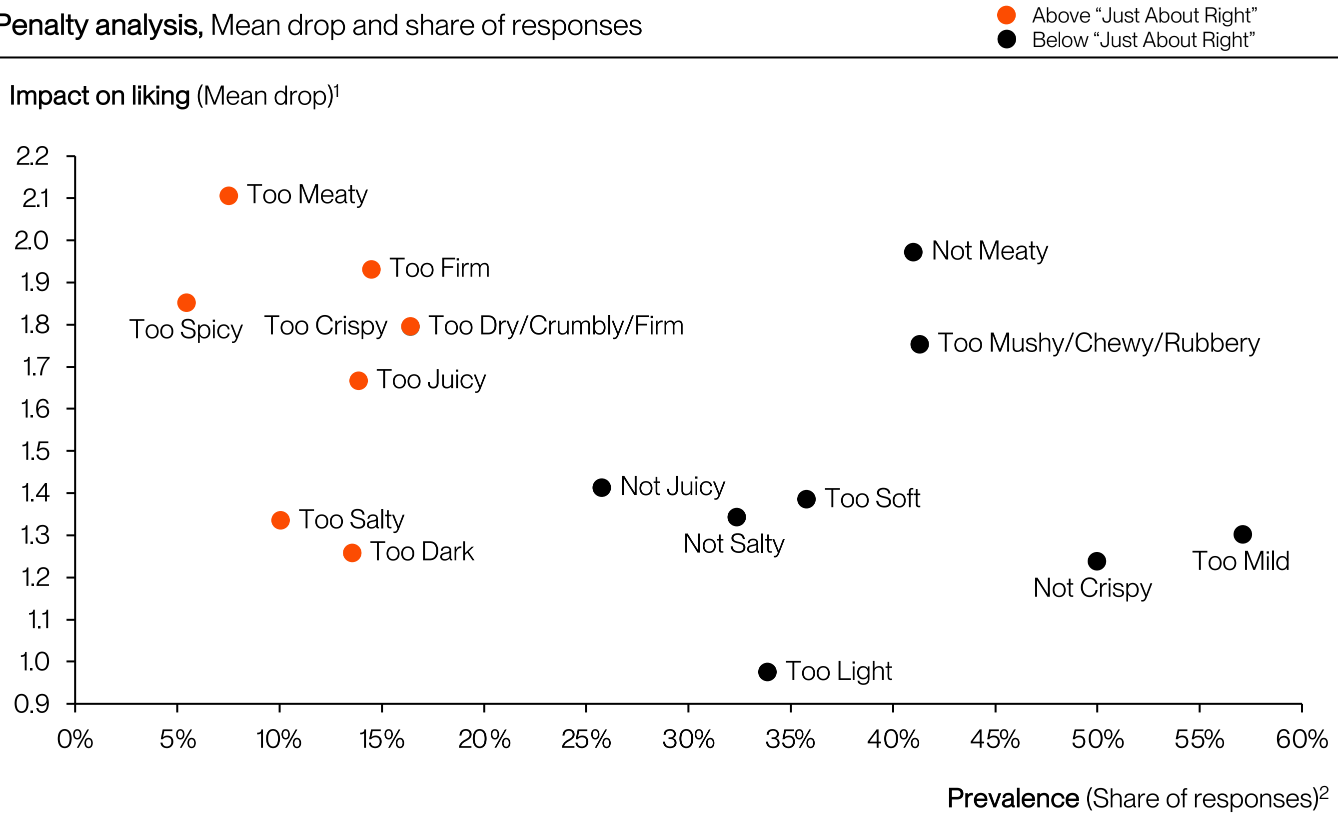
Appearance has smallest impact on overall liking.

- The range of general liking ratings for appearance is tighter than for flavor or texture.

1. Aggregated across 1,557 responses
2. Calculated as the average overall satisfaction for all responses across all products (plant and animal-based) at each level of "liking" for the sensory trait

Nuggets: Impact of key sensory traits on liking

Penalty analysis, Mean drop and share of responses



Takeaways

Meatiness and consistency should be prioritized for product development.

- >40% of participants found the nuggets to be 'not meaty' or 'too mushy/rubbery/chewy', leading to between a 1.8-2pt average drop in 'general liking'.

Mild flavor or low crispiness were frequent but lower impact complaints

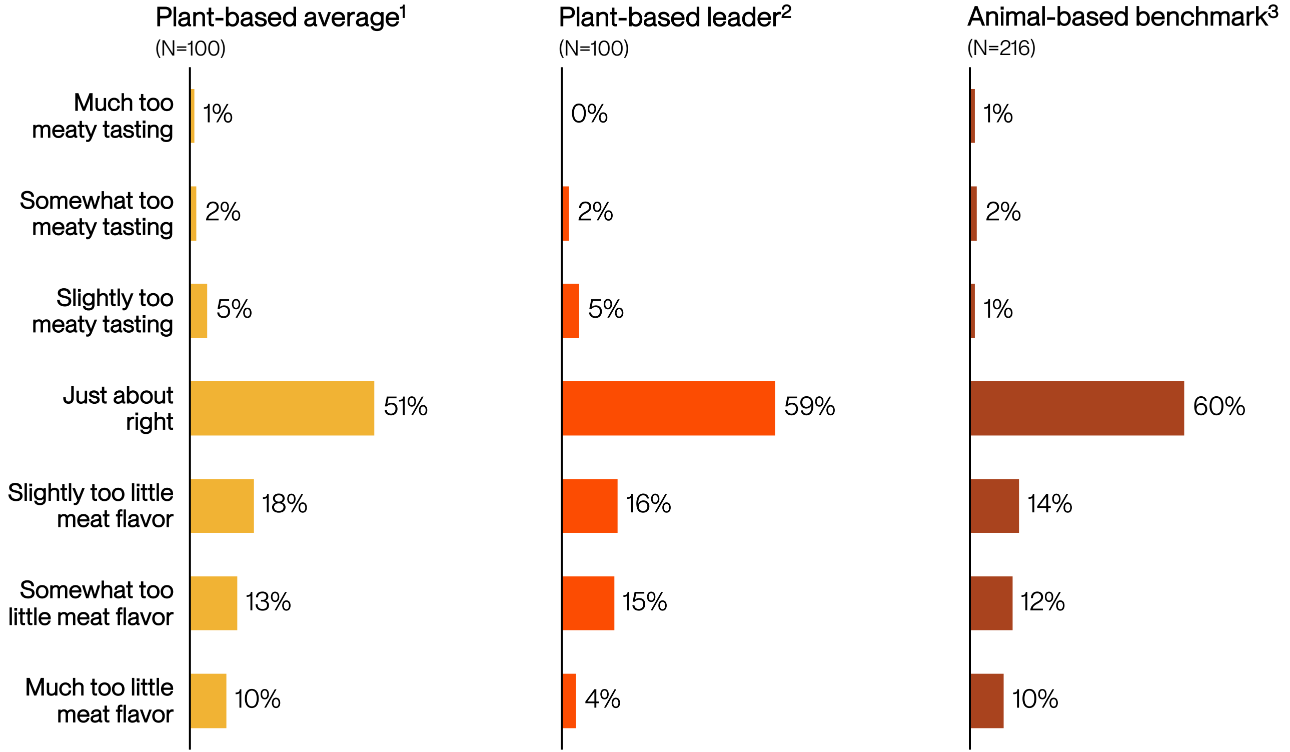
- Ratings of 'too mild' or 'not crispy' occurred >50% of the time and led to a 1.2-1.3pt average drop in 'general liking'.

1. Calculated as the average drop in overall liking for products with the associated response
2. Share of responses for all products (animal and plant) in each direction for each trait, across 1,557 responses

Nuggets: Meatiness

Takeaways

How would you rate the meatiness?, % of participants



Plant-based nuggets were far closer to achieving parity on meatiness than other categories.

- Just 10% more participants rated the animal nugget JAR than the plant-based average versus.

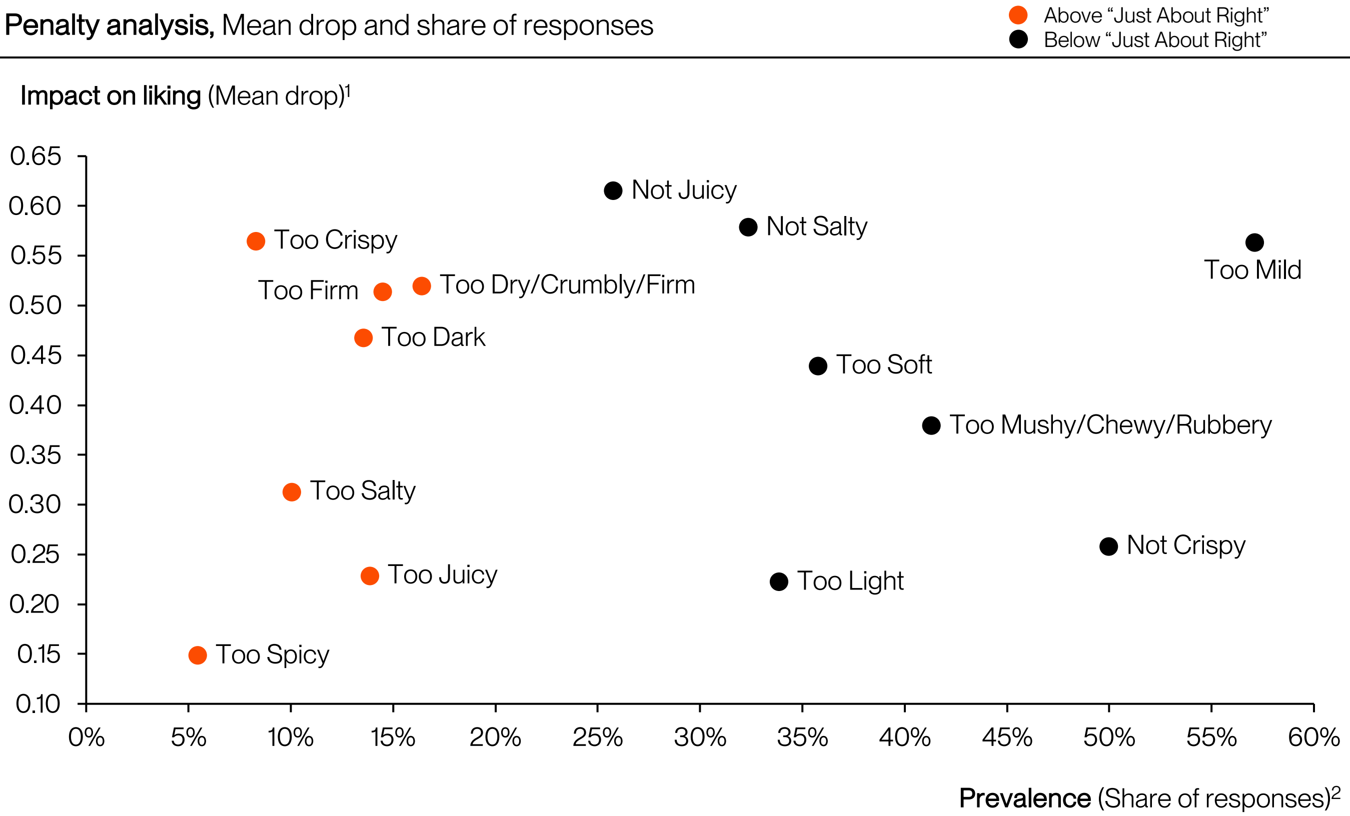
All nuggets should seek to achieve a meatier profile.

- 35-41% of participants rated the nuggets 'not meaty' enough to some degree versus just 4-8% who found them 'too meaty'.

1. Aggregated across 5 commercially available plant-based nugget brands plus one vegetarian nugget brand
2. Top performing plant-based product amongst all 6 nuggets tested
3. Animal-based nugget available in retail

Nuggets: Impact of key sensory traits on meatiness

Penalty analysis, Mean drop and share of responses



Takeaways

Declines in meatiness were most strongly associated with a lack of juiciness, crispiness, and saltiness

- These attributes were tied to the largest average (0.55-0.65pts) and occurred frequently (25-60% of the time).

Low flavor intensity (mildness rather than spiciness) was the top opportunity

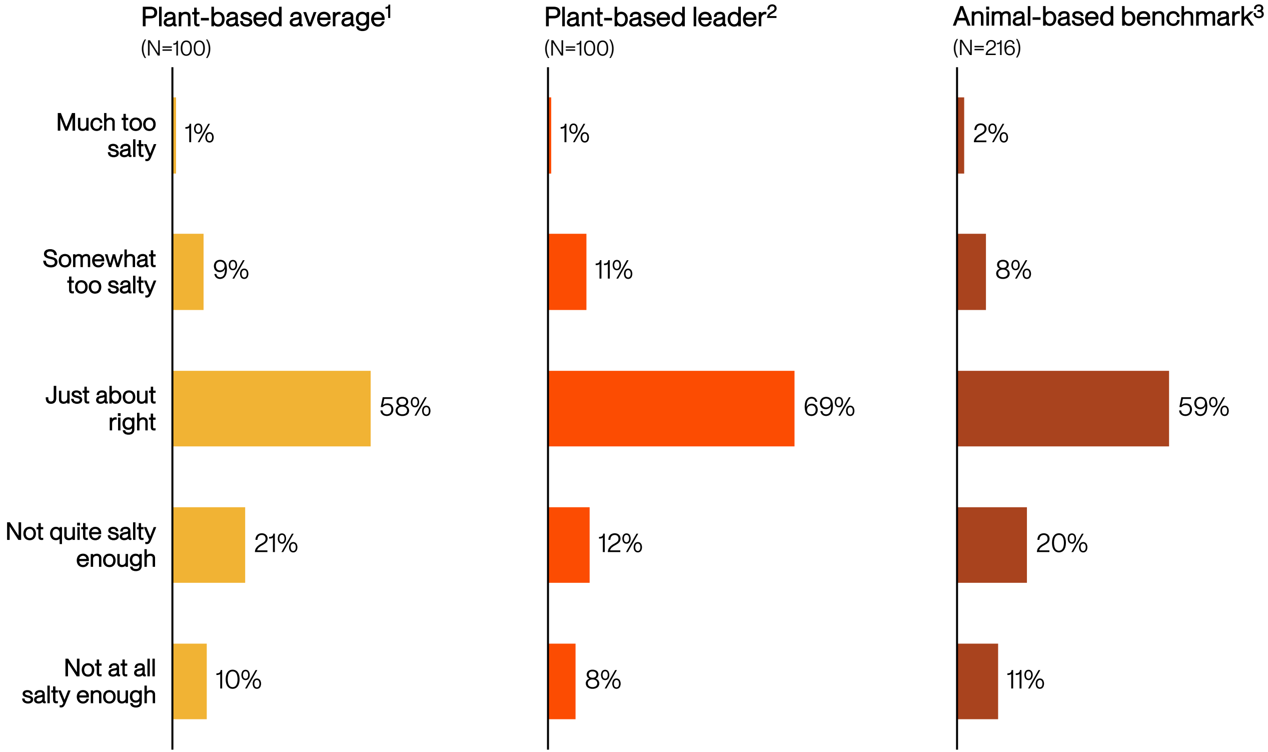
- Mildness was highly prevalent and associated with large declines in meatiness while being overly spicy had a limited impact on meatiness.

1. Calculated as the average drop in overall liking for products with the associated response
2. Share of responses for all products (animal and plant) in each direction for each trait, across 1,557 responses

Nuggets: Saltiness

Takeaways

How would you rate the saltiness?, % of participants



The plant-based leader differentiated itself on saltiness.

- 11% more participants rated the saltiness of the plant-based 'just about right' versus the plant-based average or animal nuggets.

The average plant-based nugget should be saltier.

- 3x more participants found them to be 'not salty enough' versus 'too salty'.

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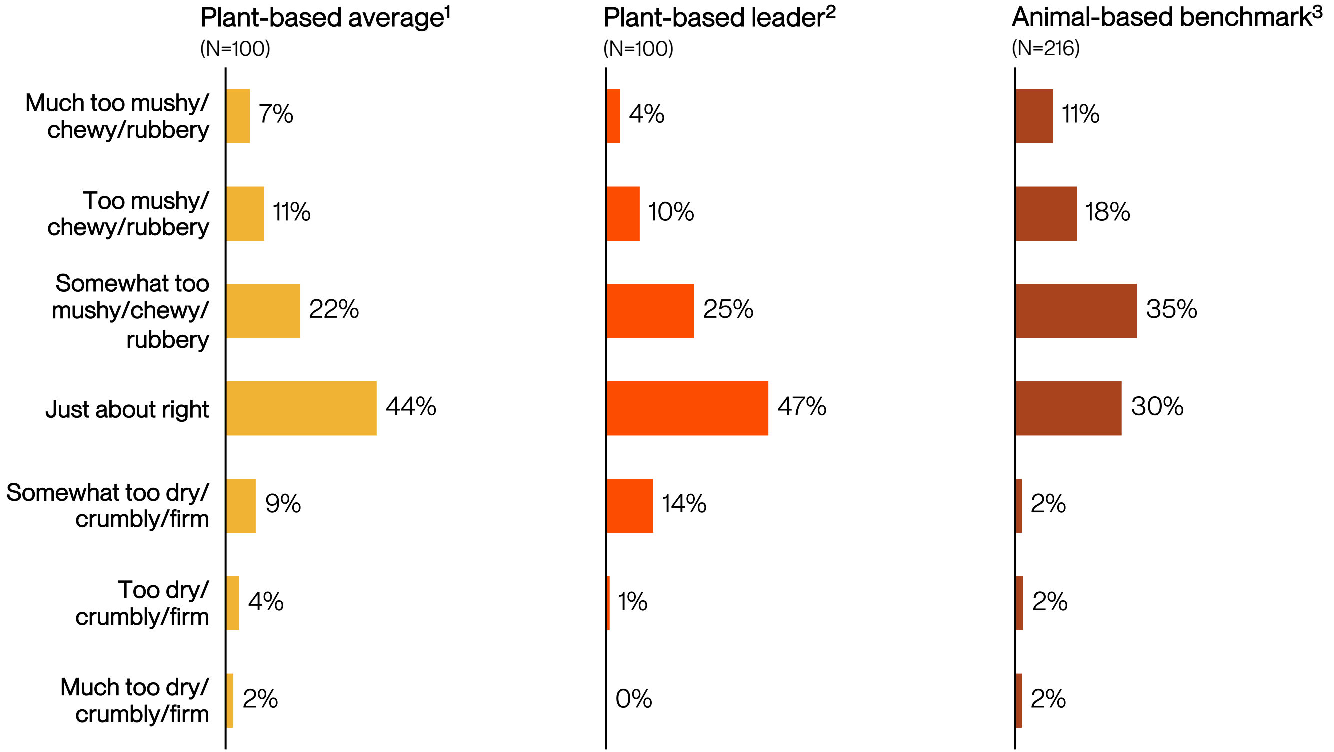
Nuggets: Consistency

Takeaways

How would you describe the texture overall?, % of participants



All nuggets leaned towards being mushy/chewy/rubbery.

- Participants were far more likely to find the nuggets to be mushy/chewy/rubbery than they were to find them dry/crumbly/firm.

Plant-based nuggets are outperforming on consistency.

- 44-47% found them 'just about right' versus only 30% for animal nuggets.

Plant-based nuggets have an opportunity to further differentiate on consistency.

- Just 30% of participants rated the animal nuggets 'just about right'.

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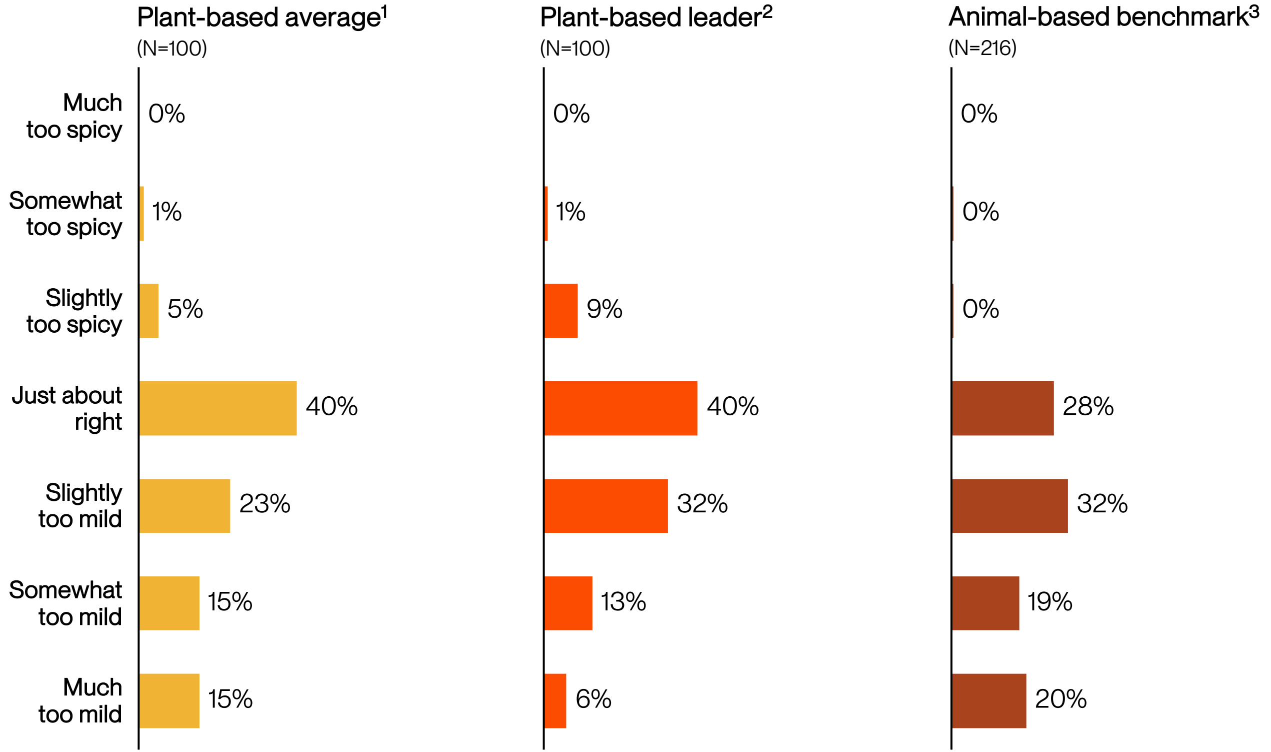
Nuggets: Spiciness

Takeaways

How would you describe the spiciness?, % of participants



Nuggets were universally considered too mild.

- The animal nugget, plant-based leader and average were far more likely to be rated too mild than too spicy.

Spiciness was a clear weakness for the animal nuggets.

- Just 28% rated the spiciness as 'just about right'.

A significant portion of the market is looking for a spicier nugget.

- 50-70% of participants found the nuggets 'too mild'.

1. Aggregated across 5 commercially available plant-based nugget brands plus one vegetarian nugget brand
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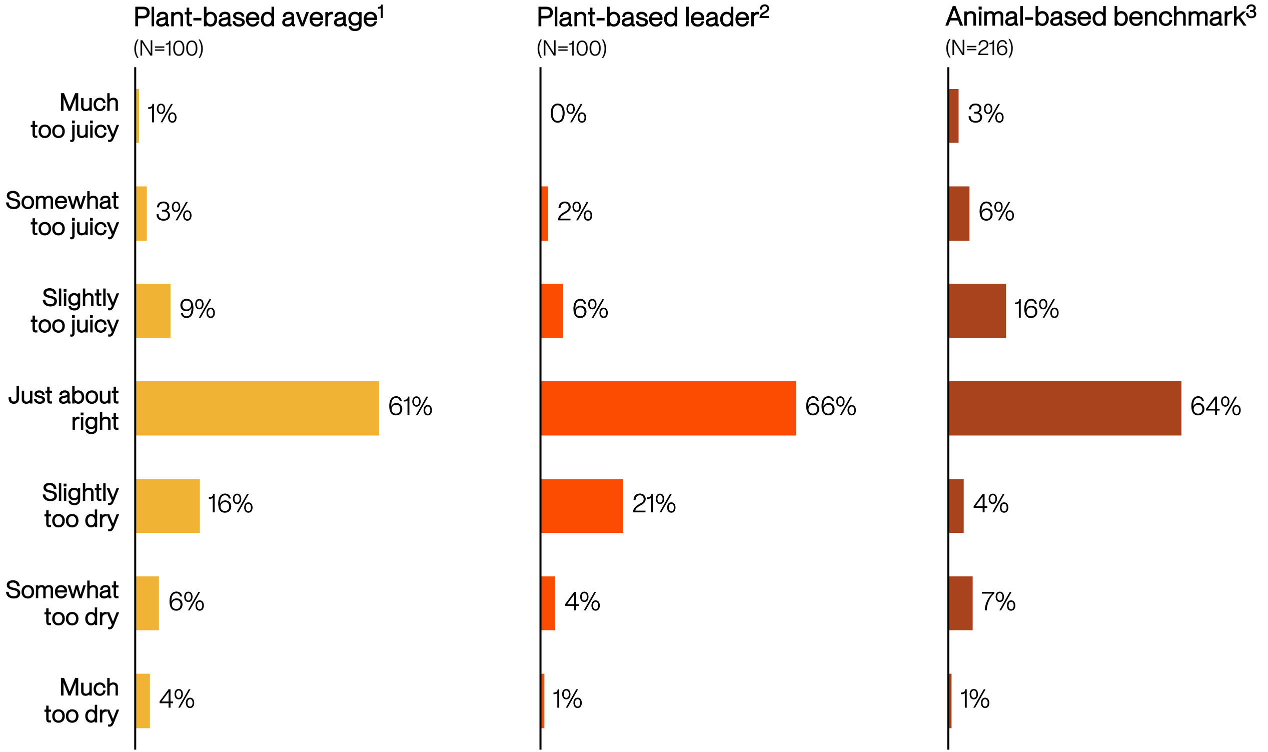
Nuggets: Juiciness

How would you describe the juiciness?, % of participants



Takeaways

Animal and plant-based nuggets achieved similar overall performance on juiciness.

- All categories achieved 'just about right' scores by 61-66% from participants.

The plant-based nuggets should seek to increase juiciness.

- 2-3x more participants found them 'too dry' than 'too juicy'.

The animal-based nuggets are considered too juicy.

- 2x more participants found them 'too juicy' than 'too dry'.

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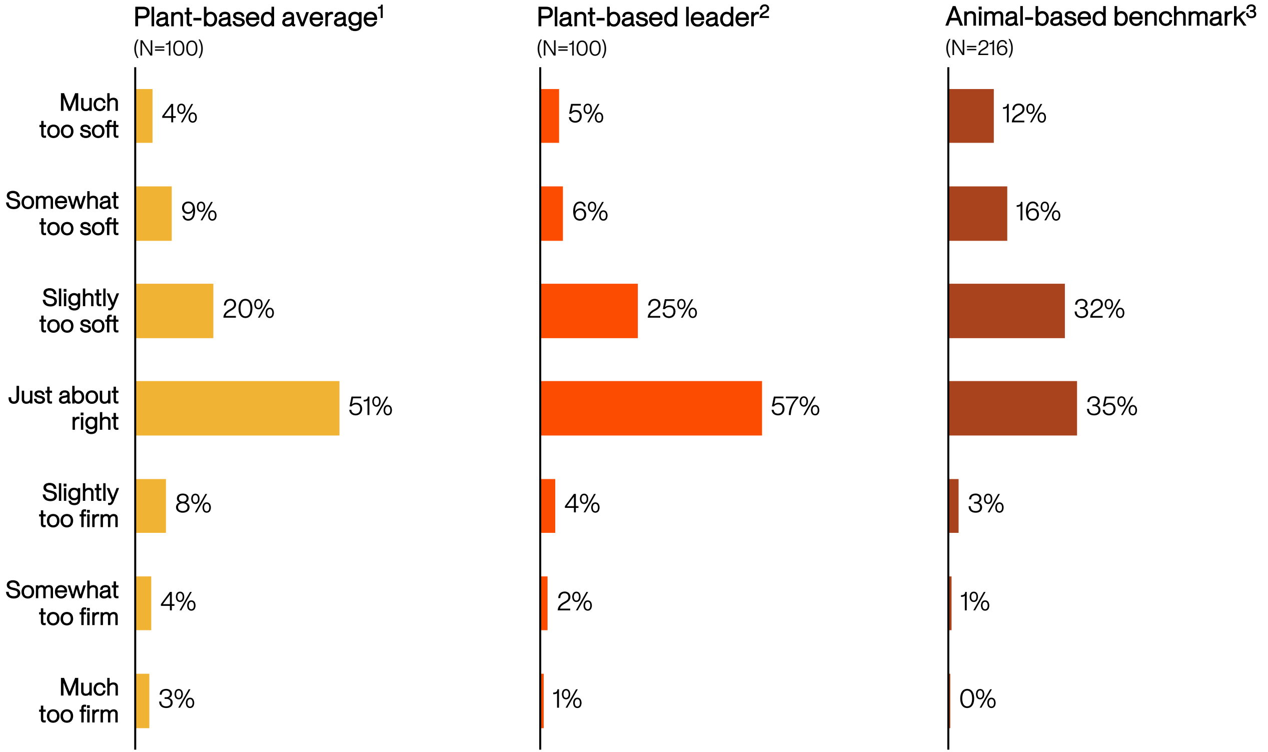
Nuggets: Firmness

→ Takeaways

How would you describe the firmness?, % of participants



Plant-based nuggets have an opportunity to outperform animal nuggets on firmness.

- Just 35% of participants found the animal product to be 'just about right' with a strong lean towards being 'too soft'.

The plant-based leader should reduce its firmness.

- Participants were 2x as likely to find the nugget 'too soft' than they were to find it 'too firm'.

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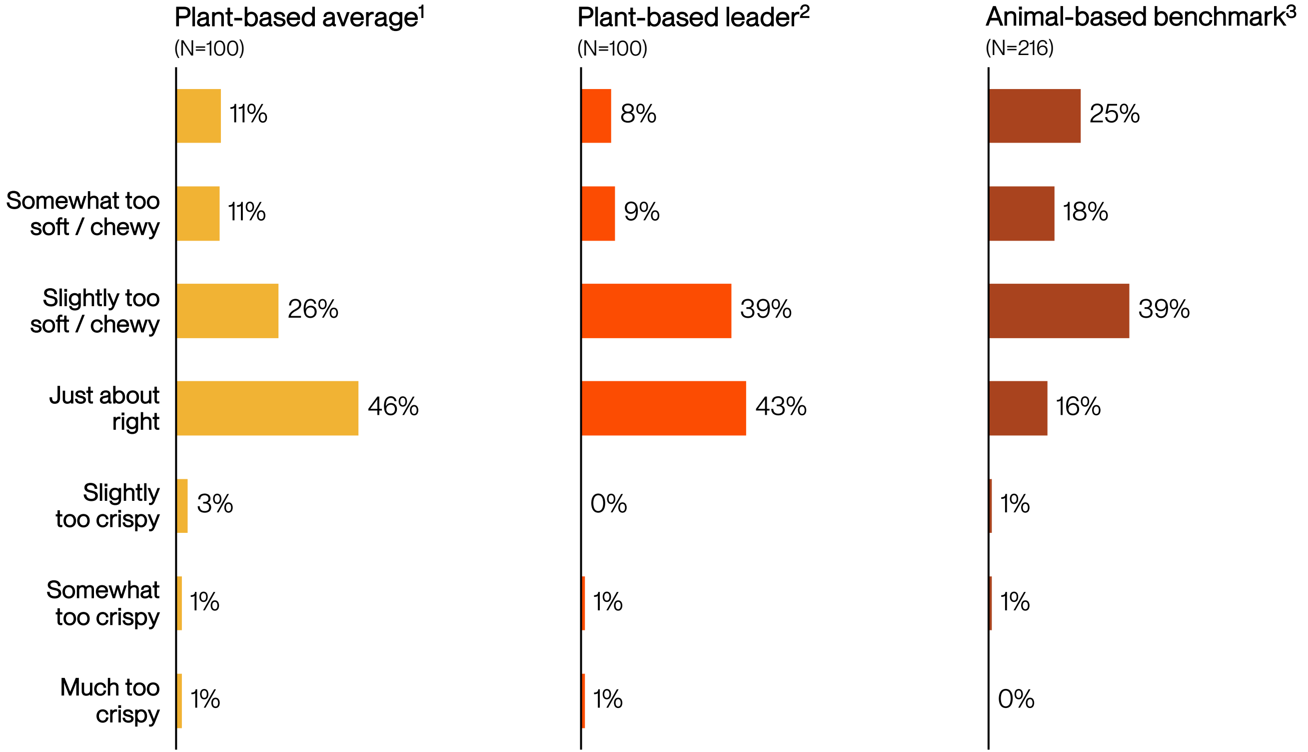
Nuggets: Crispiness

How would you describe the crispiness?, % of participants



Takeaways

Nuggets were universally considered too soft / chewy.

- The animal nugget, plant-based leader and average were far more likely to be rated too soft / chewy rather than too crispy.

Plant-based nuggets are outperforming on crispiness.

- 46% found them 'just about right' versus only 16% for animal nuggets.

Crispiness was a clear weakness for the animal nuggets.

- Just 16% rated the crispiness as 'just about right', a lower share than on any other sensory attribute.

1. Aggregated across 5 commercially available plant-based nugget brands plus one vegetarian nugget brand
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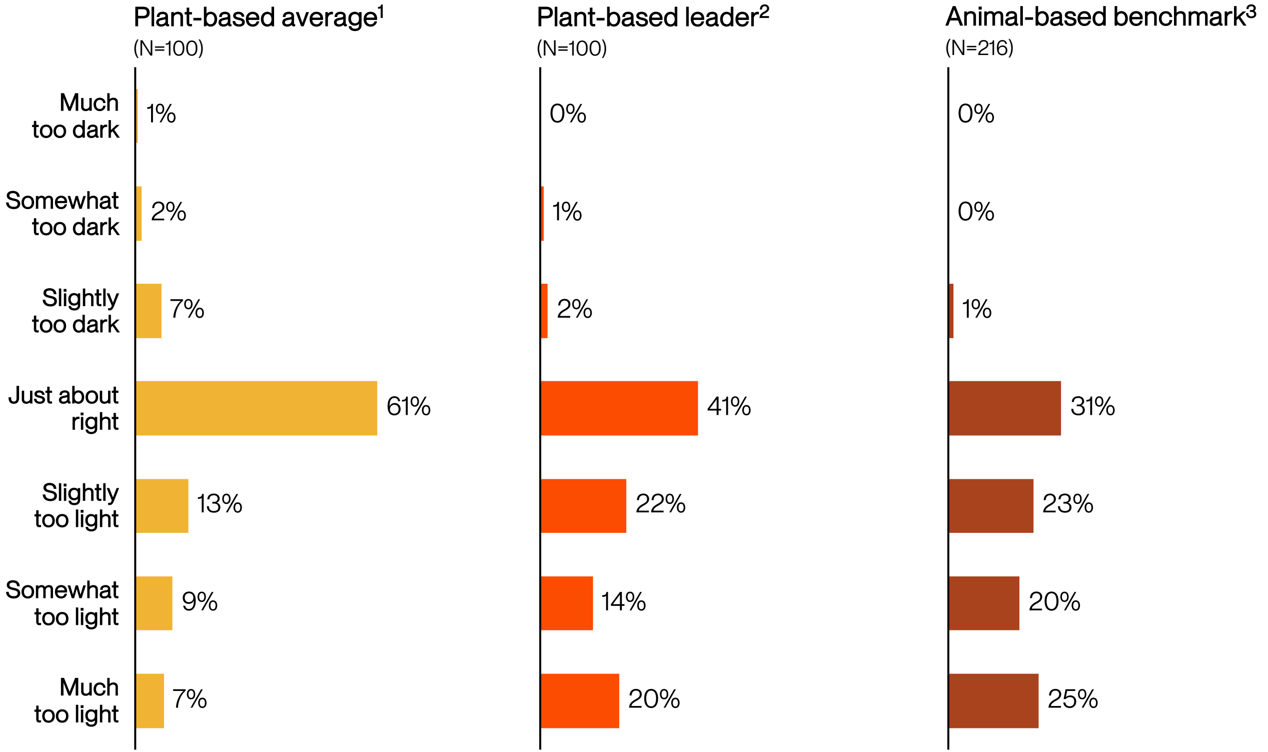
3. Animal-based nugget available in retail

Nuggets: Color

How would you describe the color?, % of participants



Takeaways

The plant-based leader and animal nugget should be darker.

- Just 31-41% found the color to be 'just about right' while 56-68% wanted the color to be darker.

The average plant-based nugget is outperforming on color.

- 61% of participants found the color to 'just about right' versus 41% for the plant leader and 31% for the animal nugget.

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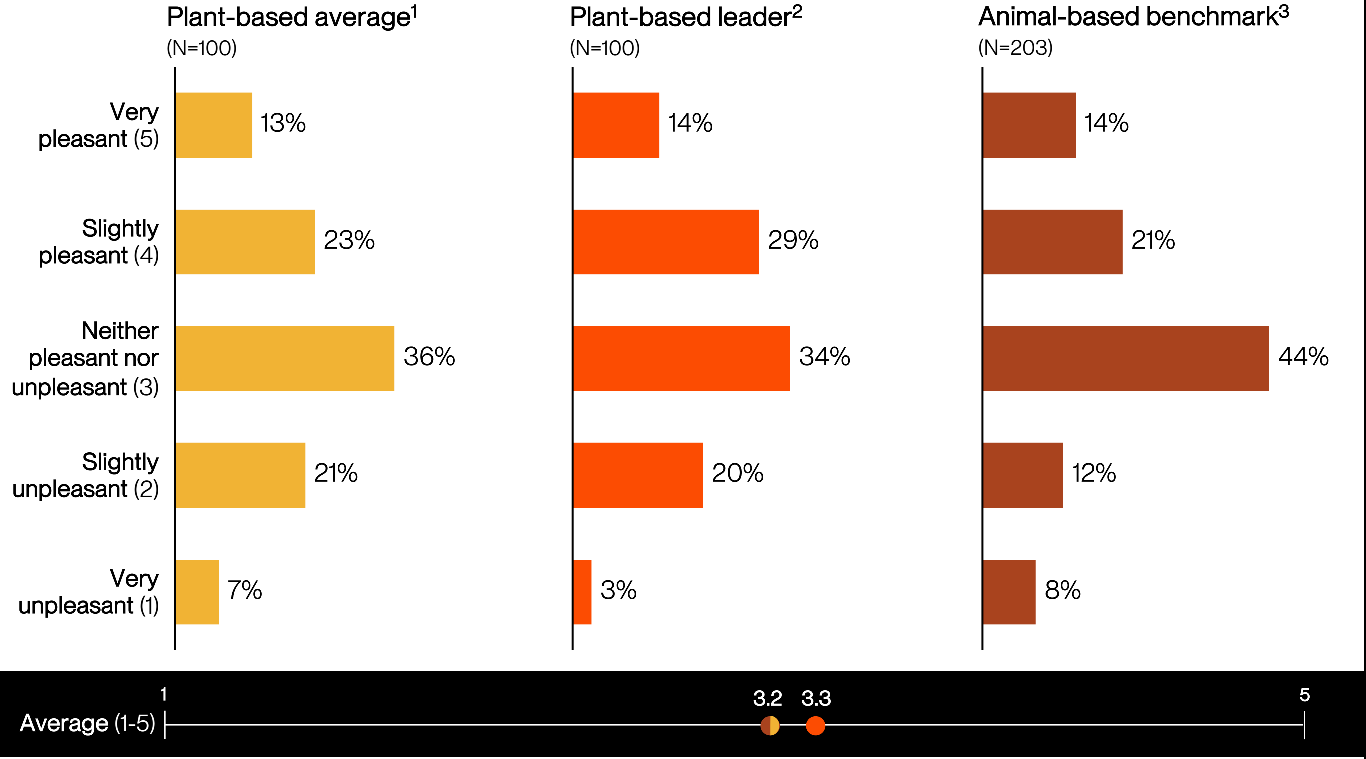
Nuggets: Aftertaste

How would you describe the aftertaste?, % of participants



Takeaways

All nuggets performed similarly on aftertaste pleasantness.

- The distribution of responses on pleasantness was very similar across categories.

Participants were split on their impression of the aftertaste across categories.

- 25-43% found it pleasant while 20-28% found it unpleasant.

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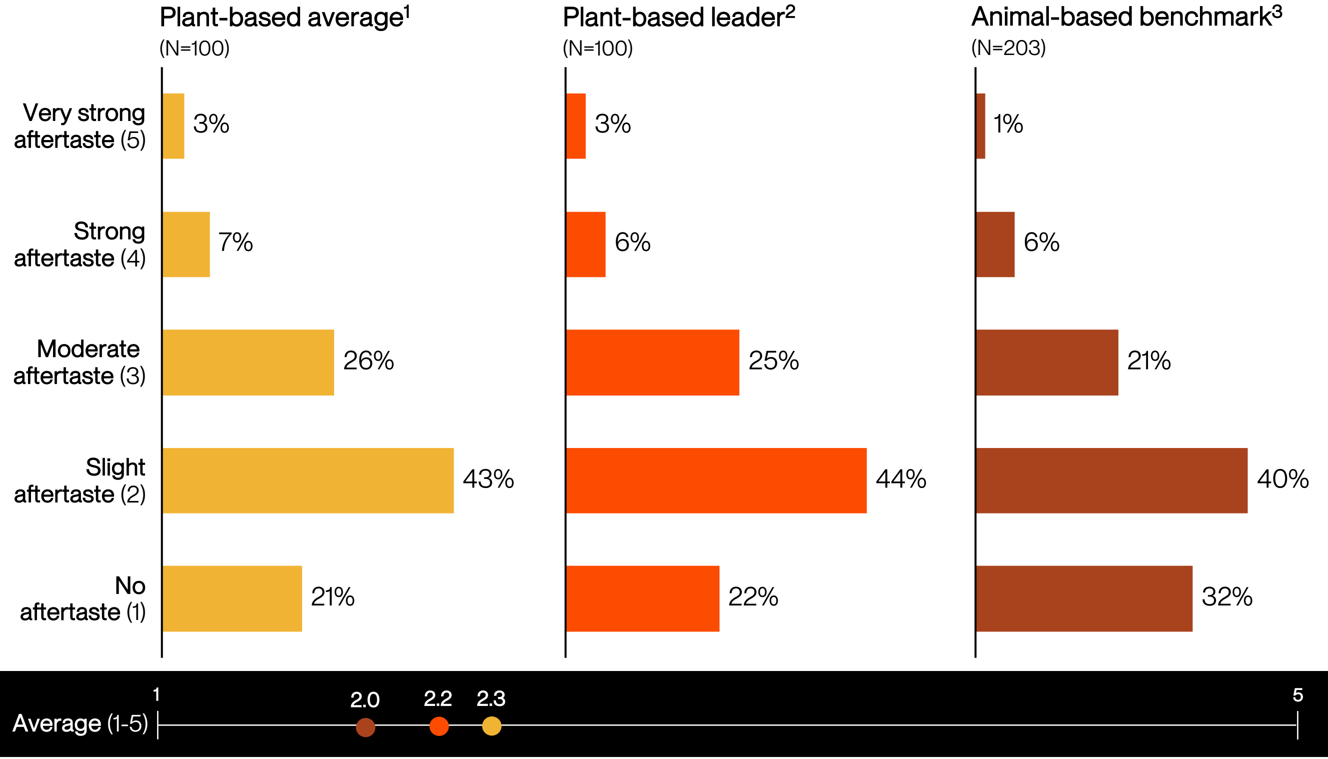
Nuggets: Aftertaste

Takeaways

How would you describe the strength of the aftertaste?, % of participants



All nuggets performed similarly on aftertaste strength.

- The distribution of responses on pleasantness was very similar across categories.

All nuggets were considered to have a generally weaker aftertaste.

- 66-72% of participants rated the nuggets as having a 'slight aftertaste' or 'no aftertaste'.

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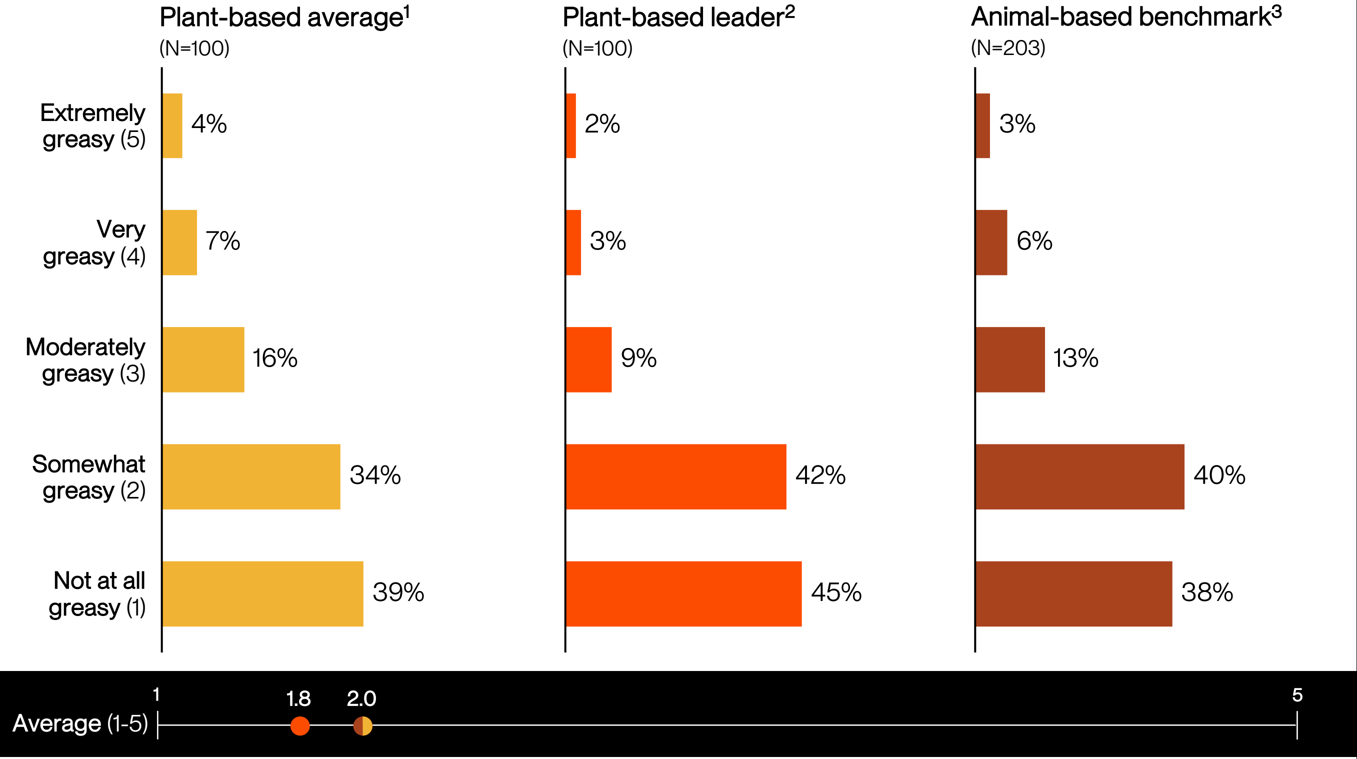
Nuggets: Greasiness

How would you describe the overall greasiness?, % of participants



Takeaways

All nuggets performed similarly on greasiness.

- The distribution of responses on greasiness was very similar across categories.

All nuggets were considered to have a generally low greasiness.

- 73-87% of participants rated the nuggets as 'somewhat greasy' or 'not at all greasy'.

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Conclusions

Making Sense of the Present

Alternative protein products are in their infancy.

- **Despite the challenging cultural and media narratives about plant-based meat, we remain optimistic about the category's taste potential** – While this report concludes that the category averages of plant-based meat products in distribution do not consistently meet consumer expectations for taste, our story is one of promise as there are some category leaders with great-tasting products. We hope this data inspires product innovators to continue reaching new heights, identifies clear calls to action for stakeholders across the alternative protein value chain, and excites consumers with the knowledge that delicious products do exist ever if they haven't yet achieved taste parity with animal-based products.

Taking Action for the Future

Actionable recommendations for a diversity of stakeholders.

- **Brands and manufacturers** – Use these insights for pre-competitive insights product improvement and new product development. Email NECTAR Director Caroline Cotto (caroline@fsi.org) about inclusion in future sensory panels.
- **Retailers and food service providers** – Use this sensory-data to make informed decisions for your retail sets and menu offerings. We'll be hosting an ongoing series of webinars at Nectar.org.
- **Academics and researchers** – Collaborate with NECTAR on new research projects that answer category level questions utilizing our novel datasets.
- **Philanthropies and funders** – Reach out to discuss ways NECTAR can scale impact with additional support and to explore future projects of interest.
- **All eaters** – Sign up on Nectar.org to lend your tastebuds to upcoming NECTAR sensory panels and share what you've learned about great tasting plant-based products with the people in your life.

NECTAR

nectar.org