

U.S. CONSUMER SURVEY

Perceptions and Preferences of Soy Products

Economic Impact of Competing
Soy Investment Alternatives

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In partnership with:



Survey structure

- Selection Tasks:
 - 1-pound package of burger patties varying by the source of protein/ingredient
 - 32-ounce bottle of soybean oil varying by label
- Consumer Perceptions
 - Taste, Protein Content, Healthfulness and Environmental Friendliness

Sample details & demographics

Variable	Level	Proportion of the sample
Gender	Female	52.42
	Male	47.58
Generation Age	Silent (1928-45)	6.50
	Boomers (1946-64)	30.67
	Generation X (1965-80)	24.67
	Millennials (1981-96)	23.50
	Generation Z (1997-2012)	14.67
Income	\$34,999 and below	30.17
	\$35,000 - \$99,999	44.33
	\$100,000 and above	25.50
Region of residence	Northeast	18.67
	Midwest	19.00
	South	35.00
	West	27.33

Data were collected from an online sample of 1,200 U.S. consumers in January 2023

First Selection Task:

**1-pound package of
burger patties**

Experimental Design: 1-pound package of burger patties

- Types of protein/ingredient:
 - 100% Beef
 - 100% Soy
 - 100% Pea
 - 50% Beef / 50% Soy
 - 50% Beef / 50% Pea
 - 25% Beef / 75% Soy
 - 25% Beef / 75% Pea
 - Black Bean & Mushroom
- Prices varied from \$7 to \$16 per pound to represent prices for beef patties to plant-based alternatives

Experimental Design: 1-pound package of burger patties

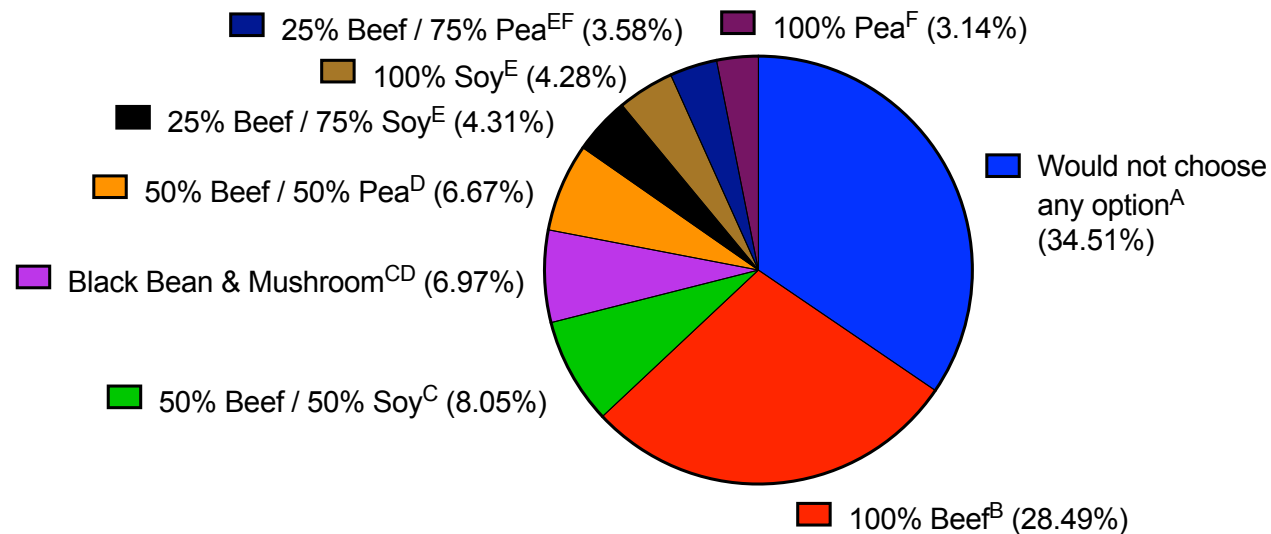
Imagine you are grocery shopping for a **1-pound package of burger patties**, and there are several types of burger patties to choose from.

In the following questions, you will be asked to select which package of burger patties you would choose if grocery shopping. The packages will vary by the type of burger patties and price.

Which 1-pound package of burger patties would you choose to purchase?

50% beef / 50% pea \$10 <input type="radio"/>	25% beef / 75% soy \$13 <input type="radio"/>	Black bean & mushroom \$7 <input type="radio"/>	100% beef \$16 <input type="radio"/>	I would not choose any of these <input type="radio"/>
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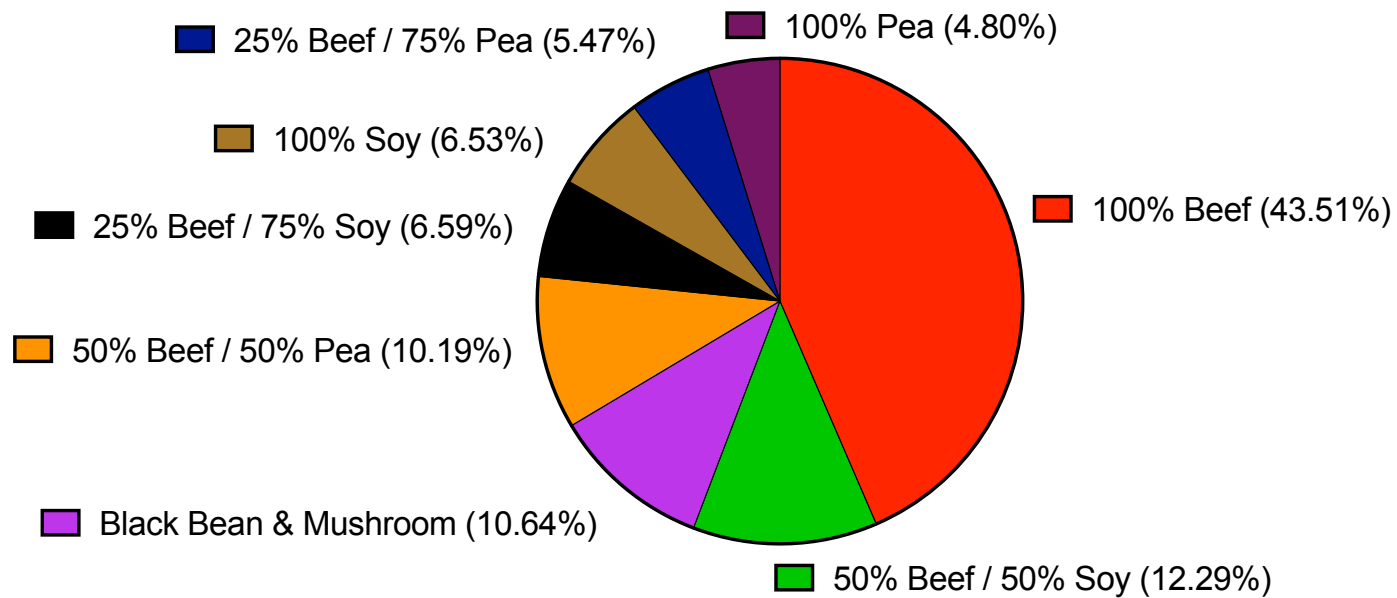
Unconditional market shares



- Combined, products containing Soy had more than 16% of the total market share
- The market share for 50% Beef / 50% Soy was significantly higher than any other product containing Soy or Pea protein
 - It was not significantly higher than Black Bean & Mushroom
- The market share for 100% Soy was significantly higher than 100% Pea
- There was not a significant difference between market shares for 100% Soy & 25% Beef / 75% Soy
- “Would not choose any option” had the highest market share
 - Likely due to price sensitivity at the prices associated with plant-based alternatives

Note: Significant differences discussed indicate a p -value < 0.05

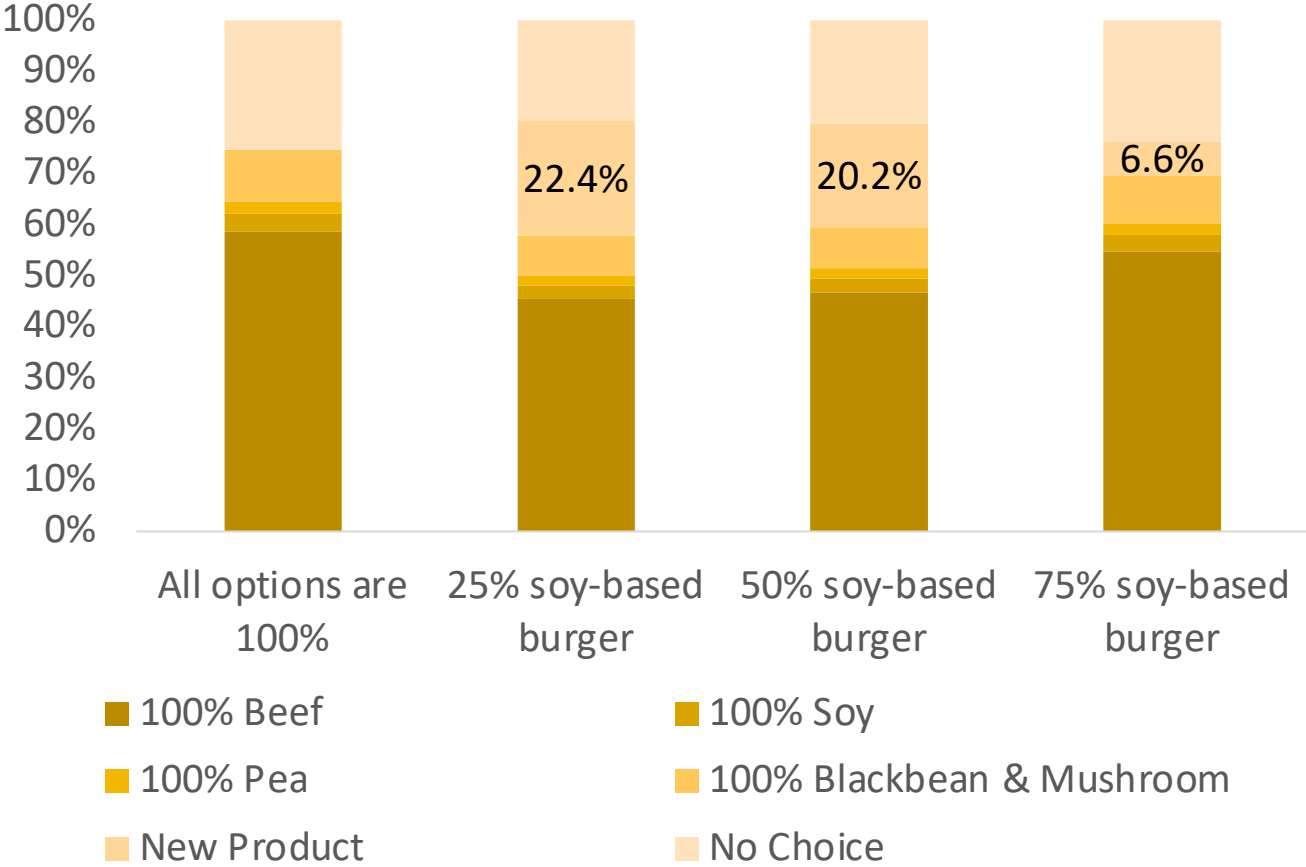
Conditional market shares



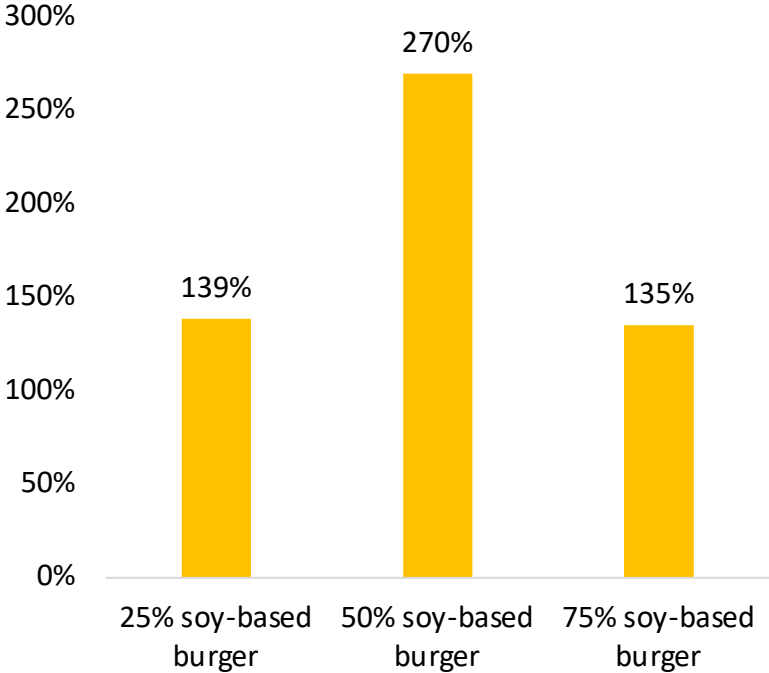
- These market shares are 'conditional' on selecting a product
 - Selections of "Would not choose any option" are removed
- Combined, products containing Soy had more than 25% of the total 'conditional' market share

New Product Introduction

Market Score Scenarios



Forecasted increase in soy protein consumption (%)



Selection of products by gender

- Percentages for a Gender is the proportion of respondents who selected a product within that gender (e.g., 28.60% of Female respondents selected 100% Beef & 7.47% selected 50% Beef / 50% Soy – so the percentages along a row will not sum to 100%)
- The letters next to the percentages denote significant differences (at p -value <0.05) between Genders within a row (i.e., there is only a significant difference for Black Bean & Mushroom: there is an A next to the percentage for Female and a B next to the percentage for Male)

Product	Gender	
	Female	Male
100% Beef	28.60 ^A	28.24 ^A
50% Beef / 50% Soy	8.60 ^A	7.47 ^A
Black Bean & Mushroom	7.97 ^A	5.80 ^B

Selection of products by gender *(continued)*

Product	Gender	
	Male	Female
50% Beef / 50% Pea	6.81 ^A	6.48 ^A
25% Beef / 75% Soy	4.62 ^A	3.99 ^A
100% Soy	4.25 ^A	4.23 ^A
25% Beef / 75% Pea	3.85 ^A	3.28 ^A
100% Pea	3.15 ^A	3.08 ^A
Would not choose any option	34.90 ^A	34.68 ^A

Selection of products by generation age

- Percentages for a Generation Age is the proportion of respondents who selected a product within that generation (e.g., 31.46% of Generation Z respondents selected 100% beef & 13.28% selected 50% Beef / 50% Soy – so the percentages along a row will not sum to 100%)
- The letters next to the percentages denote significant differences (at p -value<0.05) between generations within a row (e.g., for 100% Beef: the A next to the percentages for Generation Z, Boomers, and Generation X indicates that those are not significantly different; there is a significant difference between Generation Z and Millennials because Generation Z's percentage does not have a B & Millennial's percentage doesn't have an A)

Product	Generation Ages				
	Generation Z	Boomers	Generation X	Millennials	Silent
100% Beef	31.46 ^A	29.38 ^{AB}	28.55 ^{ABC}	26.51 ^{BC}	23.56 ^C
50% Beef / 50% Soy	13.28 ^A	10.68 ^B	8.02 ^C	5.29 ^{CD}	4.01 ^D
Black Bean & Mushroom	9.04 ^A	8.53 ^A	7.46 ^{AB}	4.38 ^B	4.17 ^B

Selection of products by generation age *(continued)*

Product	Generation Ages				
	Generation Z	Millennials	Generation X	Boomers	Silent
50% Beef / 50% Pea	9.87 ^A	9.84 ^A	7.01 ^B	3.23 ^C	2.40 ^C
25% Beef / 75% Soy	Millennials 6.83 ^A	Generation Z 6.53 ^A	Generation X 4.39 ^B	Boomers 1.77 ^C	Silent 1.60 ^C
100% Soy	Millennials 7.09 ^A	Generation Z 5.26 ^{AB}	Generation X 4.43 ^B	Silent 2.08 ^C	Boomers 1.87 ^C
25% Beef / 75% Pea	Millennials 5.94 ^A	Generation X 4.14 ^B	Generation Z 4.05 ^B	Boomers 1.60 ^C	Silent 0.80 ^C
100% Pea	Millennials 5.19 ^A	Generation Z 4.12 ^A	Generation X 3.63 ^A	Boomers 1.19 ^B	Silent 0.48 ^B
Would not choose any option	Silent 59.62 ^A	Boomers 52.58 ^B	Generation X 31.29 ^C	Millennials 18.88 ^D	Generation Z 17.97 ^D

Selection of products by income

- Percentages for an Income is the proportion of respondents who selected a product within that income range (e.g., 29.52% of respondents who make \$34,999 and below selected 100% Beef & 9.25% selected 50% Beef / 50% Soy – so the percentages along a row will not sum to 100%)
- The letters next to the percentages denote significant differences (at p -value<0.05) between income ranges within a row (e.g., for 100% Beef: the A next to the percentages for \$34,999 and below and \$35,000-\$99,999 indicates that those are not significantly different; there is a significant difference between those income groups and \$100,000 and above because \$100,000 and above had a B but not an A)

Product	Income		
	\$34,999 and below	\$35,000 - \$99,999	\$100,000 and above
100% Beef	29.52 ^A	29.39 ^A	25.45 ^B
50% Beef / 50% Soy	9.25 ^A	8.25 ^{AB}	7.03 ^B
Black Bean & Mushroom	7.88 ^A	6.79 ^A	6.35 ^A

Selection of products by income *(continued)*

Product	Income		
	\$100,000 and above	\$34,999 and below	\$35,000 - \$99,999
50% Beef / 50% Pea	7.97 ^A	6.77 ^{AB}	5.78 ^B
25% Beef / 75% Soy	4.86 ^A	4.52 ^A	3.81 ^A
100% Soy	5.15 ^A	4.14 ^{AB}	3.63 ^B
25% Beef / 75% Pea	4.21 ^A	3.59 ^A	3.15 ^A
100% Pea	3.76 ^A	2.97 ^A	2.84 ^A
Would not choose any option	37.08 ^A	33.39 ^A	32.48 ^A

Selection of products by region

Product	Region			
	West	South	Northeast	Midwest
100% Beef	30.68 ^A	29.32 ^{AB}	26.40 ^{BC}	25.55 ^C
50% Beef / 50% Soy	8.43 ^A	8.07 ^A	7.96 ^A	7.57 ^A
Black Bean & Mushroom	7.35 ^A	7.03 ^A	6.90 ^A	6.14 ^A

- Percentages for a Region is the proportion of respondents who selected a product within that region (e.g., 30.69% of respondents residing in the West selected 100% Beef & 7.96% selected 50% Beef / 50% Soy – so the percentages along a row will not sum to 100%)
- The letters next to the percentages denote significant differences (at p -value<0.05) between regions within a row (e.g., for 100% Beef: the A next to the percentages for West and South indicates that those are not significantly different; there is a significant difference between West and Northeast because West's percentage does not have a B & Northeast's percentage doesn't have an A)

Selection of products by region *(continued)*

Product	Region			
	Northeast	South	West	Midwest
50% Beef / 50% Pea	7.42 ^A	6.70 ^A	6.44 ^A	6.03 ^A
25% Beef / 75% Soy	Northeast 4.85 ^A	Midwest 4.82 ^A	South 4.26 ^A	West 3.58 ^A
100% Soy	Northeast 5.19 ^A	South 4.55 ^{AB}	Midwest 4.17 ^{ABC}	West 3.24 ^C
25% Beef / 75% Pea	South 3.96 ^A	Midwest 3.73 ^{AB}	Northeast 3.68 ^{AB}	West 2.82 ^B
100% Pea	Northeast 3.57 ^A	South 3.36 ^A	Midwest 2.74 ^A	West 2.74 ^A
Would not choose any option	Midwest 39.25 ^A	West 35.63 ^{AB}	Northeast 33.43 ^{AB}	South 32.44 ^B

Conclusions from the First Selection Task

Generation Z and Millennials had the highest selections of 1-pound packages of burger patties containing Soy

Silent or Boomers generally had the lowest selection of products and had the highest selection of "Would not choose any option"

There were few differences in the selection of products across genders, income groups or geographic regions

Second Selection Task:

**32-ounce bottle of
soybean oil**

Experimental Design: 32-ounce bottle of soybean oil

- **Types of labels:**
 - 0 Trans Fat
 - Cholesterol Free
 - Gluten Free
 - High Oleic
 - Made in the USA
 - Organic
- **Prices varied from \$3 to \$5 per bottle to represent prices for the various labels**

Experimental Design: 32-ounce bottle of soybean oil

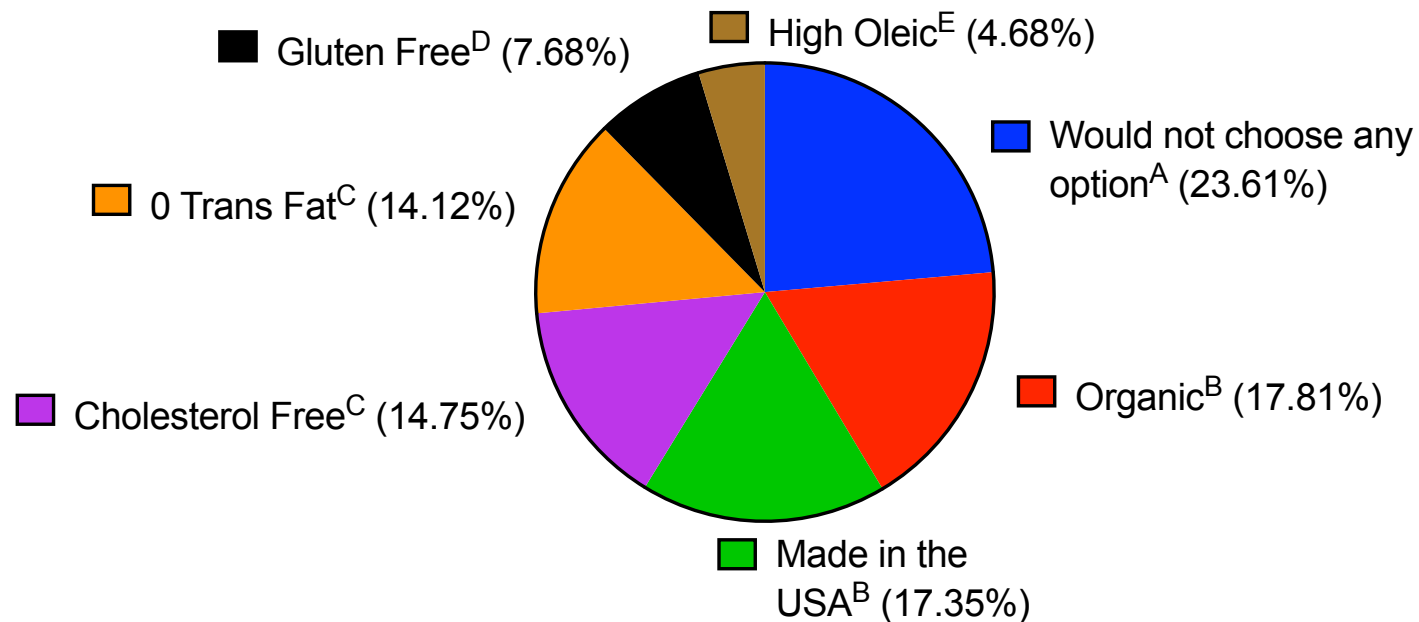
Imagine you are grocery shopping for a **32-ounce bottle of soybean oil**, and there are several bottles of soybean to choose from.

In the following questions, you will be asked to select which bottle of soybean oil you would choose if grocery shopping. The bottles will vary the product claim and price.

Which 32-ounce bottle of soybean oil would you choose to purchase?

Gluten Free \$2.99 <input type="radio"/>	0 Trans Fat \$4.99 <input type="radio"/>	Cholesterol Free \$3.99 <input type="radio"/>	I would not choose any of these <input type="radio"/>
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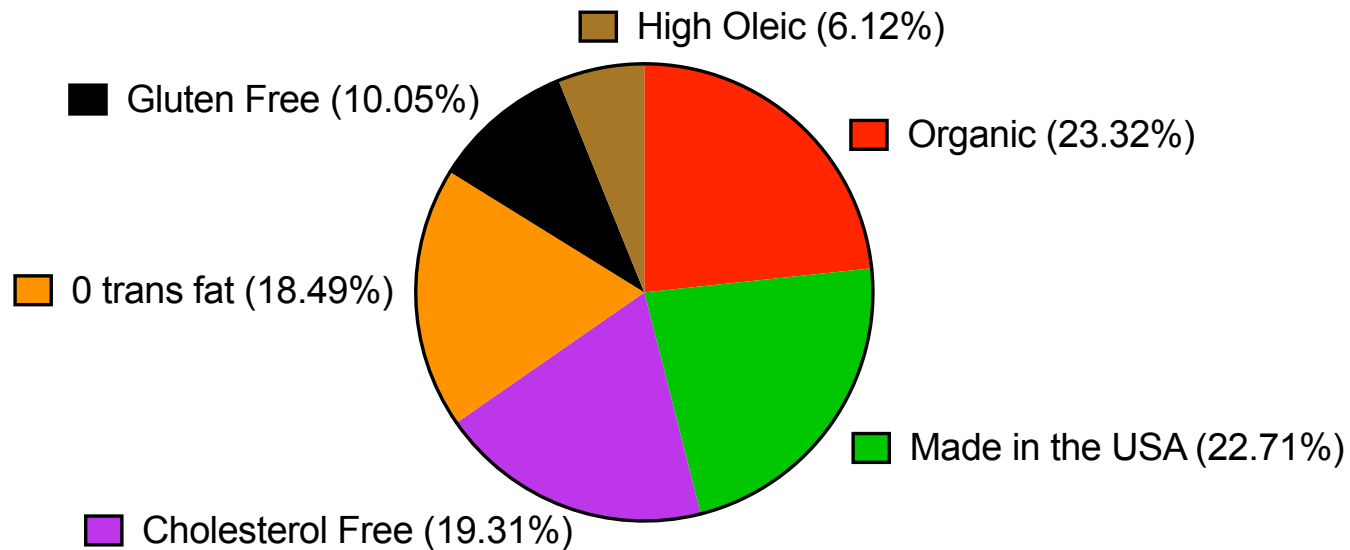
Unconditional market shares



- The Organic and Made in the USA labels were selected significantly more than the other labels, followed by Cholesterol Free and 0 Trans Fat
- High Oleic was selected the least, showing a need for public awareness campaigns

Note: Significant differences discussed indicate a p -value < 0.05

Conditional market shares



These market shares are:

- 'Conditional' on selecting a product
 - Selections of "Would not choose any option" are removed
- Combined, products containing Soy had more than 25% of the total 'conditional' market share

Elasticities

Label	Own-Price Elasticity
High Oleic	-1.2
Gluten Free	-1.1
Organic	-1.0
Made in the USA	-1.0
Cholesterol Free	-1.0
0 Trans Fat	-1.0

Selection of products by gender

- Percentages for a Gender is the proportion of respondents who selected a product within that gender (e.g., 19.69% of Female respondents selected Organic & 17.67% selected Made in the USA – so the percentages along a row will not sum to 100%)
- The letters next to the percentages denote significant differences (at p -value<0.05) between genders within a row (i.e., for Organic: the A next to the percentage for Female and B next to the percentage for Male indicates there is a significant difference; for Made in the USA: the A next to the percentages for both genders indicates there is not a significant difference)

Product	Gender	
	Female	Male
Organic	19.69 ^A	15.91 ^B
Made in the USA	17.67 ^A	17.19 ^A
Cholesterol Free	15.27 ^A	14.44 ^A

Selection of products by gender (continued)

Product	Gender	
	Male	Female
0 Trans Fat	14.83 ^A	13.62 ^A
Gluten Free	8.20 ^A	7.29 ^A
High Oleic	5.46 ^A	4.03 ^B
Would not choose any option	Female 23.26 ^A	Male 23.15 ^A

Selection of products by generation age

- Percentages for a Generation Age is the proportion of respondents who selected a product within that generation (e.g., 22.25% of Generation Z respondents selected Organic & 16.48% selected Made in the USA – so the percentages along a row will not sum to 100%)
- The letters next to the percentages denote significant differences (at p -value<0.05) between generations within a row (e.g., for Made in the USA: there was only a significant difference between Millennials & Boomers because Millennials' percentage does not have a B & Boomers' percentage doesn't have an A)

Product	Generation Ages				
	Generation Z	Millennials	Generation X	Boomers	Silent
Organic	22.25 ^A	21.51 ^{AB}	18.92 ^B	13.22 ^C	13.03 ^C
Made in the USA	Millennials 19.21 ^A	Silent 17.95 ^{AB}	Generation X 17.91 ^{AB}	Generation Z 16.48 ^{AB}	Boomers 16.08 ^B
Cholesterol Free	Generation Z 16.57 ^A	Boomers 14.86 ^A	Generation X 14.86 ^A	Millennials 14.18 ^A	Silent 13.03 ^A

Selection of products by generation age *(continued)*

Product	Generation Ages				
	Generation X	Generation Z	Millennials	Boomers	Silent
0 Trans Fat	14.81 ^A	14.58 ^A	14.18 ^A	13.72 ^A	13.25 ^A
Gluten Free	12.12 ^A	10.46 ^A	7.60 ^B	4.48 ^C	3.63 ^C
High Oleic	7.10 ^A	7.74 ^A	4.11 ^B	2.40 ^C	1.50 ^C
Would not choose any option	Silent 37.61 ^A	Boomers 35.24 ^A	Generation X 21.79 ^B	Millennials 12.71 ^C	Generation Z 10.89 ^C

Selection of products by income

- Percentages for an Income is the proportion of respondents who selected a product within that income range (e.g., 17.36% of respondents who make \$34,999 and below selected Organic & 16.85% selected Made in the USA – so the percentages along a row will not sum to 100%)
- The letters next to the percentages denote significant differences (at p -value<0.05) between income ranges within a row (e.g., for Made in the USA: there was only a significant difference between \$35,000 - \$99,999 & \$34,999 and below because the percentage for \$35,000 - \$99,999 does not have a B & the percentage for \$34,999 and below doesn't have an A)

Product	Income		
	\$35,000 - \$99,999	\$100,000 and above	\$34,999 and below
Organic	18.36 ^A	17.70 ^A	17.36 ^A
Made in the USA	18.64 ^A	16.85 ^{AB}	16.07 ^B
Cholesterol Free	15.20 ^A	15.10 ^A	14.44 ^A

Selection of products by income *(continued)*

Product	Income		
	\$35,000 - \$99,999	\$100,000 and above	\$34,999 and below
0 Trans Fat	14.85 ^A	14.54 ^A	12.94 ^A
Gluten Free	\$34,999 and below 8.29 ^A	\$35,000 - \$99,999 7.61 ^A	\$100,000 and above 7.24 ^A
High Oleic	\$100,000 and above 6.37 ^A	\$34,999 and below 4.60 ^B	\$35,000 - \$99,999 3.82 ^B
Would not choose any option	\$34,999 and below 37.08 ^A	\$100,000 and above 33.39 ^A	\$35,000 - \$99,999 32.48 ^A

Selection of products by region

- Percentages for a Region is the proportion of respondents who selected a product within that region (e.g., 19.72% of respondents residing in the West selected Organic & 19.00% selected Made in the USA – so the percentages along a row will not sum to 100%)
- The letters next to the percentages denote significant differences (at p -value<0.05) between regions within a row (e.g., for Organic: there was only a significant difference between West & Midwest because the percentage for West does not have a B & the percentage for Midwest doesn't have an A)

Product	Region			
	West	South	Northeast	Midwest
Organic	19.72 ^A	18.25 ^{AB}	16.82 ^{AB}	15.64 ^B
Made in the USA	19.00 ^A	18.20 ^A	17.26 ^{AB}	14.73 ^B
Cholesterol Free	15.87 ^A	14.73 ^A	14.40 ^A	13.87 ^A

Selection of products by region *(continued)*

Product	Region			
	South	Northeast	Midwest	West
0 Trans Fat	14.96 ^A	14.51 ^A	13.82 ^A	13.26 ^A
Gluten Free	Northeast 8.33 ^A	South 8.21 ^A	Midwest 8.04 ^{AB}	West 6.45 ^B
High Oleic	Northeast 5.28 ^A	South 5.00 ^{AB}	Midwest 4.68 ^{ABC}	West 3.96 ^C
Would not choose any option	Northeast 25.60 ^A	Midwest 25.22 ^A	West 23.73 ^A	South 20.44 ^A

Conclusions from the Selection Task

32-ounce bottle of soybean oil

Oil labeled Organic was more popular among Females, Generation Z, Millennials and Generation X

Oil labeled Gluten Free was more popular among Generation Z and Millennials

Oil labeled High Oleic was more popular among Generation Z, Millennials and those with an income greater than \$100,000

Consumer Perceptions:

Taste, Protein Content,
Healthfulness and
Environmental Friendliness

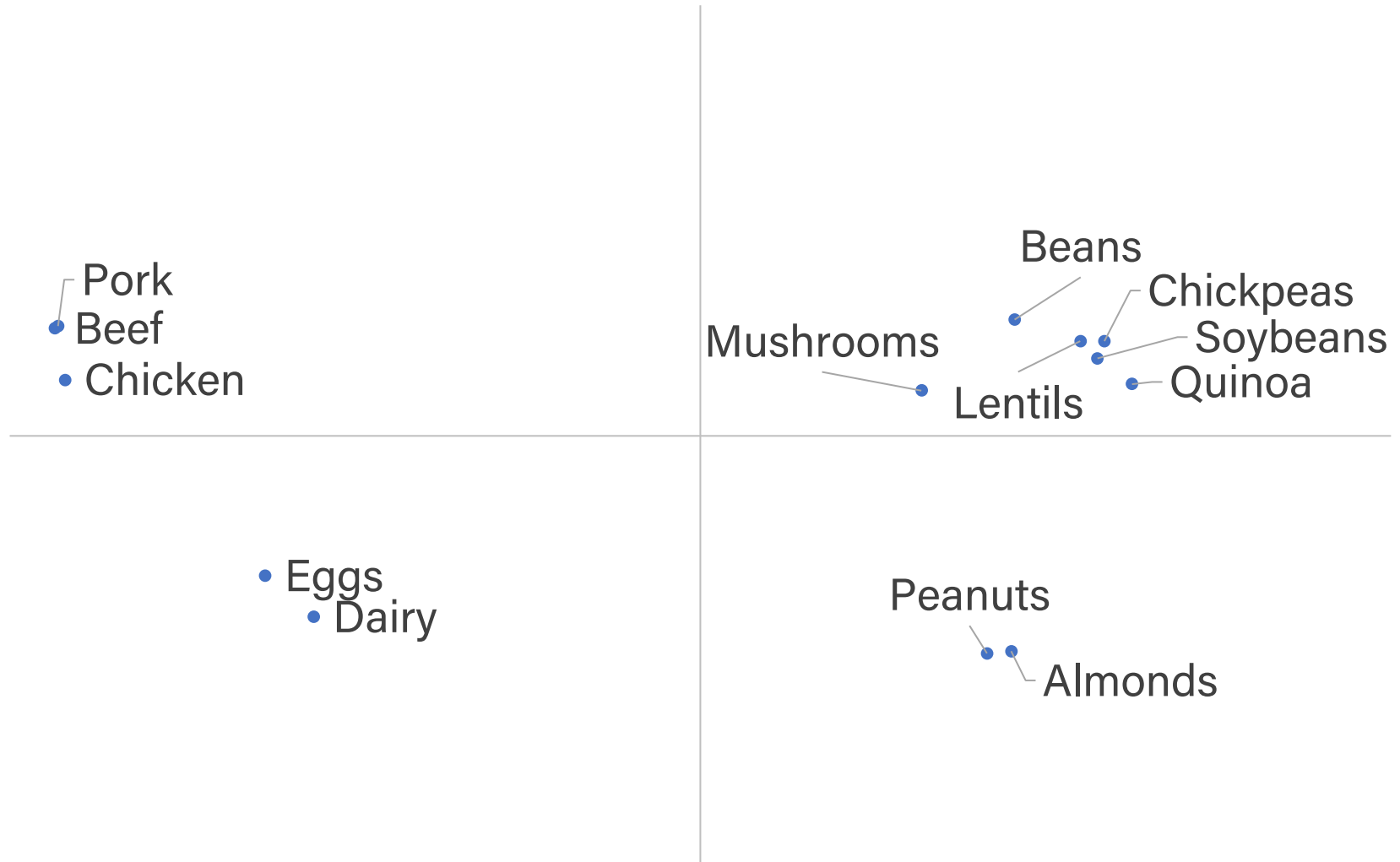
Product groupings

How would you group the following sources of protein for human consumption in term of their similarity to each other? (*click and drag each item into one of the group boxes on the right; put items you feel are similar to each other in the same box; use as many or as few boxes as you like*)

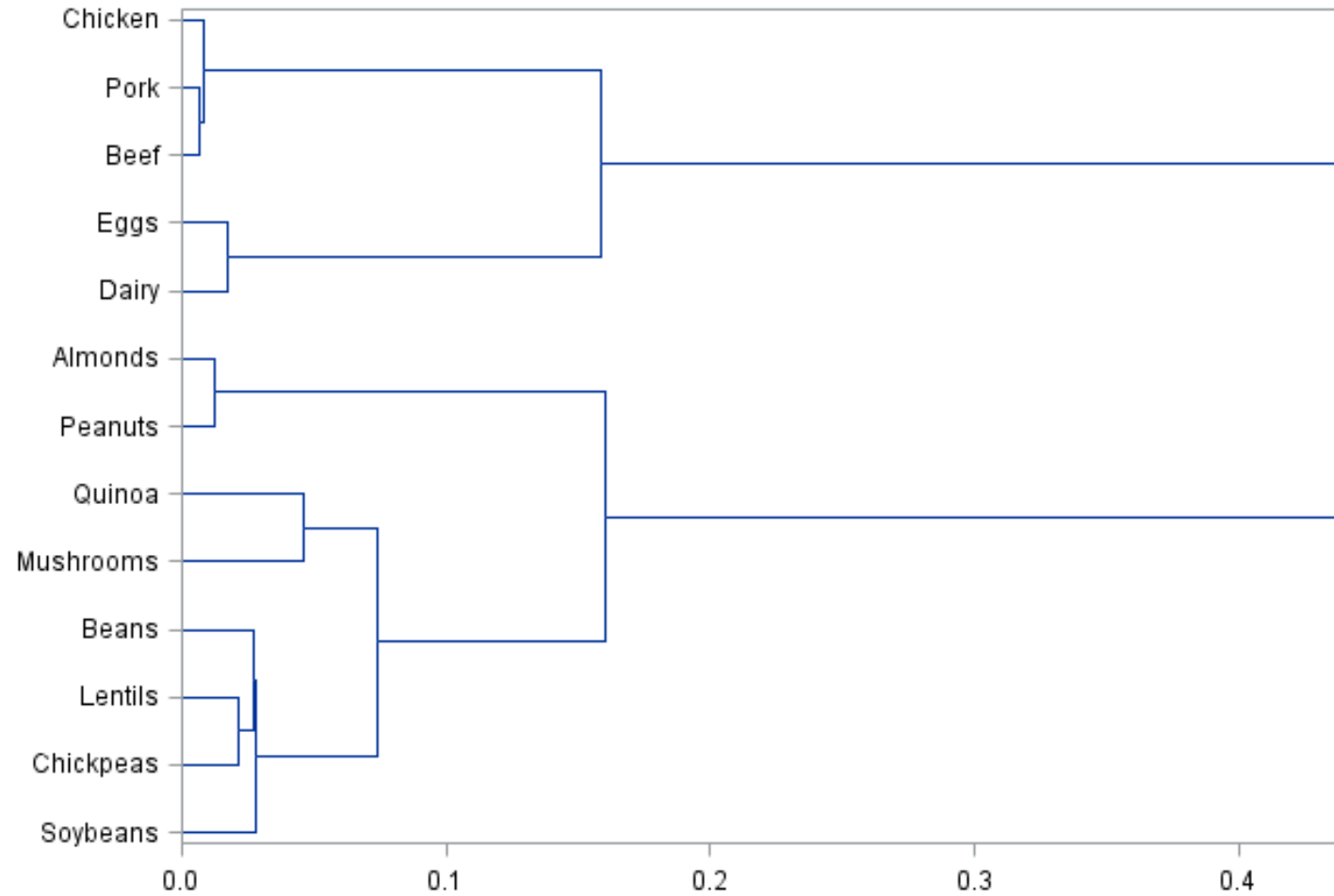
Items		
Soybeans		
Chickpeas		
Lentils		
Beans		
Mushrooms		
Quinoa		
Dairy		
Beef		
Pork		
Chicken		
Eggs		
Peanuts		
Almonds		

Group 1	Group 2
Group 3	Group 4

Conceptual product groupings



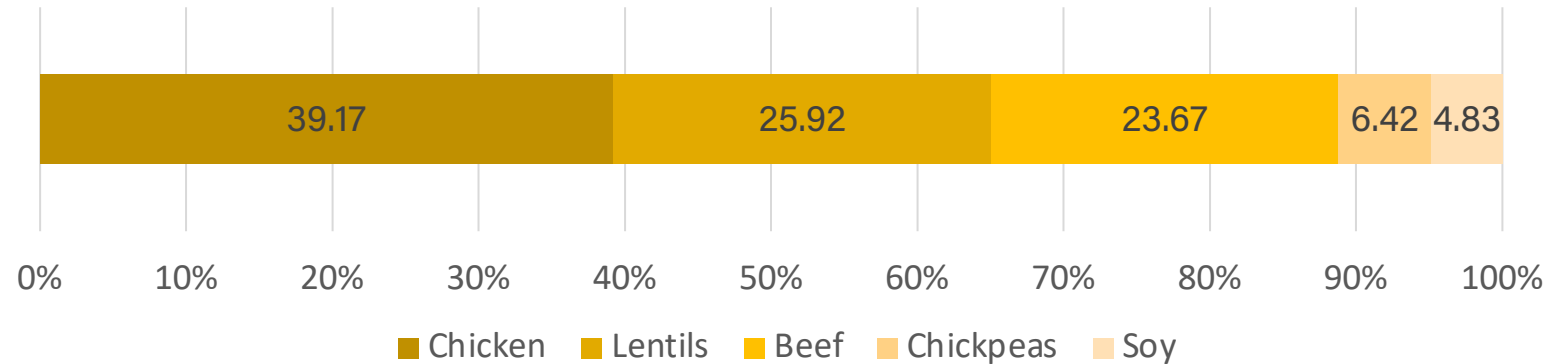
Conceptual product groupings



Which source of protein do you think tastes the best?

Protein	Proportion of the sample
Chicken	39.17 ^A
Lentils	25.92 ^B
Beef	23.67 ^B
Chickpeas	6.42 ^C
Soy	4.83 ^C

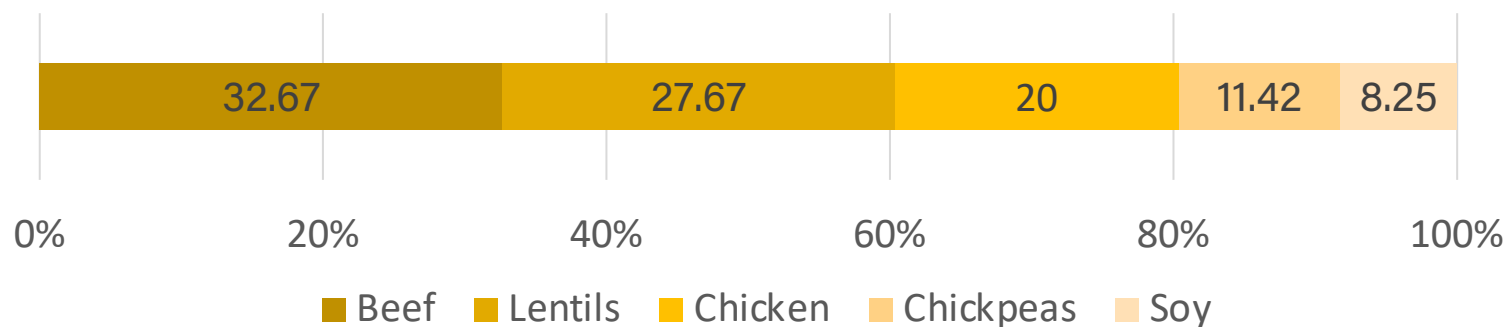
- Overall, Soy protein was not perceived to be the best-tasting as often as animal products and Lentils
- There was not a significant difference in taste perceptions between Soy and Chickpeas



Which source of protein do you think is highest in protein per serving?

Protein	Proportion of the sample
Beef	32.67 ^A
Lentils	27.67 ^A
Chicken	20.00 ^B
Chickpeas	11.42 ^C
Soy	8.25 ^C

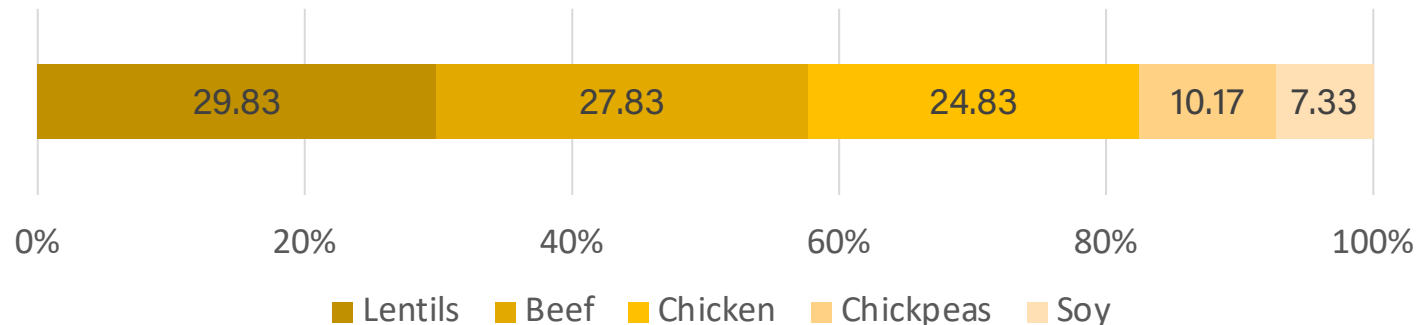
- There is a lack of public knowledge about the high protein content in Soy protein
- Lentils were selected more than Chicken
 - This may provide an opportunity for comparison in consumer communications



Which source of protein do you think is the healthiest?

Protein	Proportion of the sample
Lentils	29.83 ^A
Beef	27.83 ^A
Chicken	24.83 ^A
Chickpeas	10.17 ^B
Soy	7.33 ^B

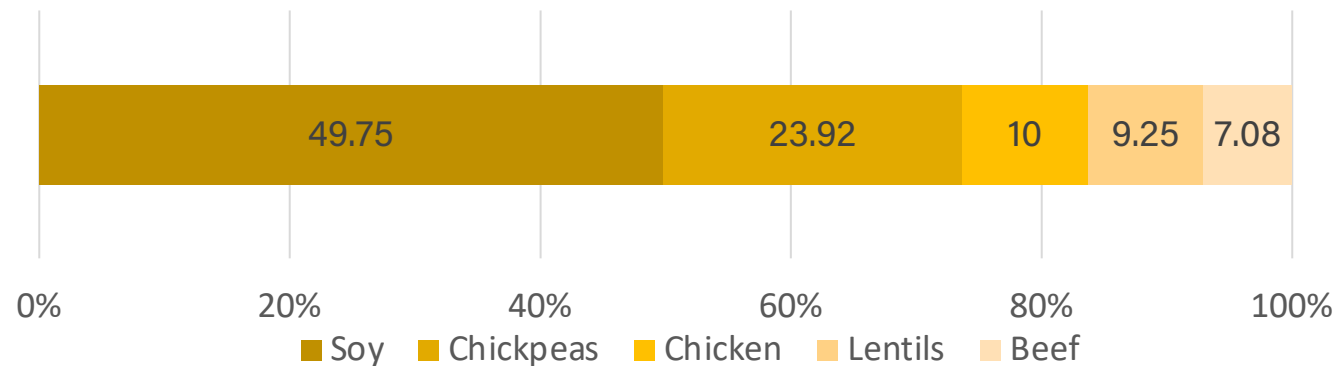
- The USDA MyPlate recommends consuming a variety of foods in the protein group, including soy products
- There is an opportunity to communicate the healthfulness of soy products as a source of protein



Which source of protein do you think is the most environmentally friendly?

Protein	Proportion of the sample
Soy	49.75 ^A
Chickpeas	23.92 ^B
Chicken	10.00 ^C
Lentils	9.25 ^C
Beef	7.08 ^C

- Soy was overwhelmingly selected as the most environmentally friendly source of protein
- There is an opportunity to highlight sustainability further while providing consumer education about the protein content and healthfulness of soy products



Which of the following options do you think is the MOST important for soybeans grown in the USA?

<u>Most Important</u>	<u>Proportion of the sample</u>
Providing alternative options for protein for human consumption	30.58 ^A
Providing protein for raising dairy, eggs, beef, pork, and chickens	23.50 ^B
Providing improved nutrition to staple foods	15.42 ^C
Providing nutrition to low-income countries	14.25 ^C
Providing alternative options for plastic use	8.17 ^D
Providing alternative options for biofuel use	8.08 ^D

- Soy as a source of protein was most important for consumers
 - Combined, “Providing alternative options for protein for human consumption” and “Providing protein for raising dairy, eggs, beef, pork and chickens” were selected by 54% of consumers
- Nutrition, broadly, was more important than providing plastic and fuel alternatives

Which of the following options do you think is the LEAST important for soybeans grown in the USA?

<u>Least Important</u>	<u>Proportion of the sample</u>
Providing alternative options for plastic use	28.58 ^A
Providing alternative options for biofuel use	19.67 ^B
Providing protein for raising dairy, eggs, beef, pork, and chickens	14.67 ^C
Providing nutrition to low-income countries	12.58 ^C
Providing improved nutrition to staple foods	12.33 ^C
Providing alternative options for protein for human consumption	12.17 ^C

- Soy as a source of bioplastic or biofuel was least important for consumers
 - Combined, “Providing alternative options for plastic use” and “Providing alternative options for biofuel use” were selected by 48% of consumers

Conclusions from Consumer Perceptions

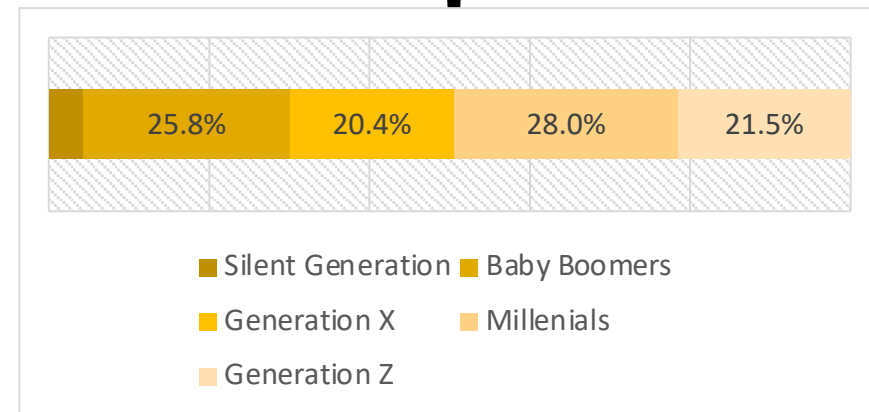
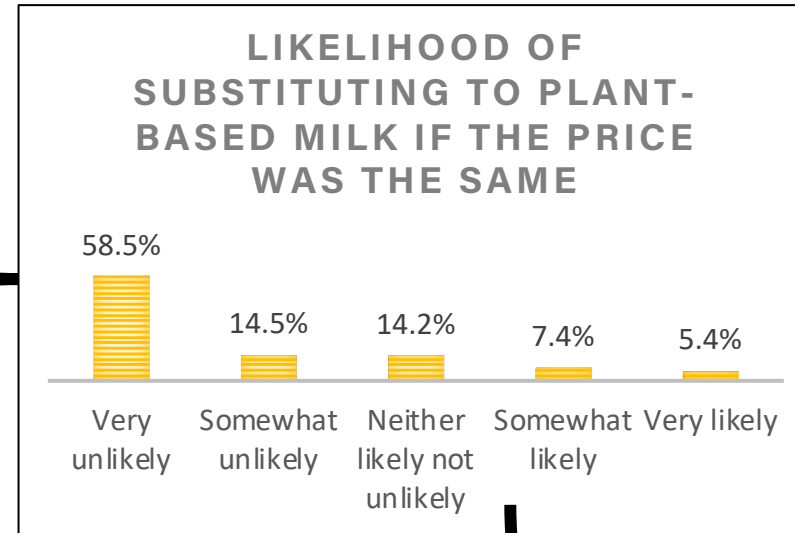
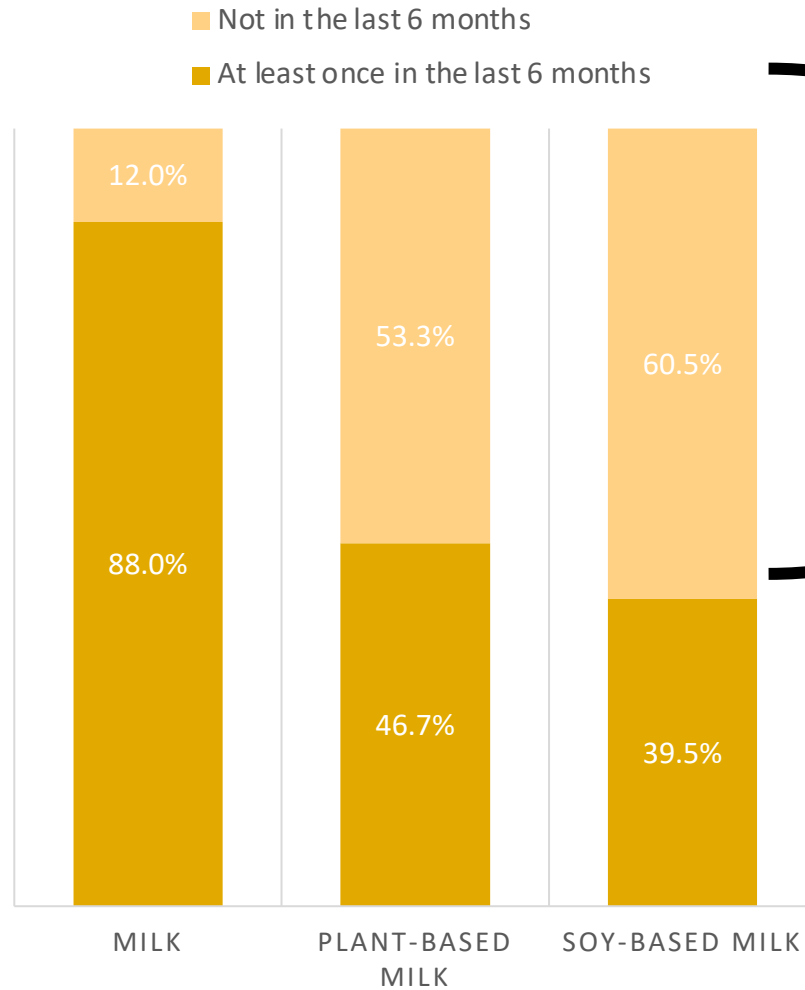
Consumers associate soybeans more with chickpeas, beans, lentils, quinoa and mushrooms than they do animal-based proteins.

Though soy is not typically considered the healthiest or the tastiest protein source nor is it considered to be the highest in protein, it is considered the most environmentally friendly.

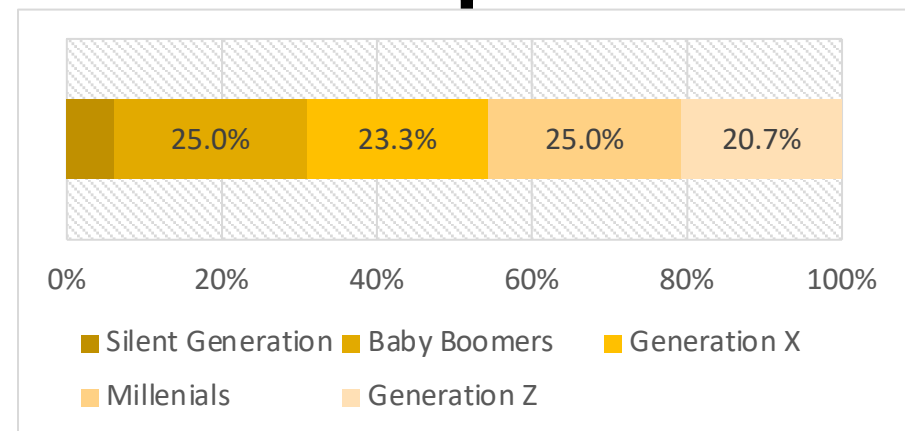
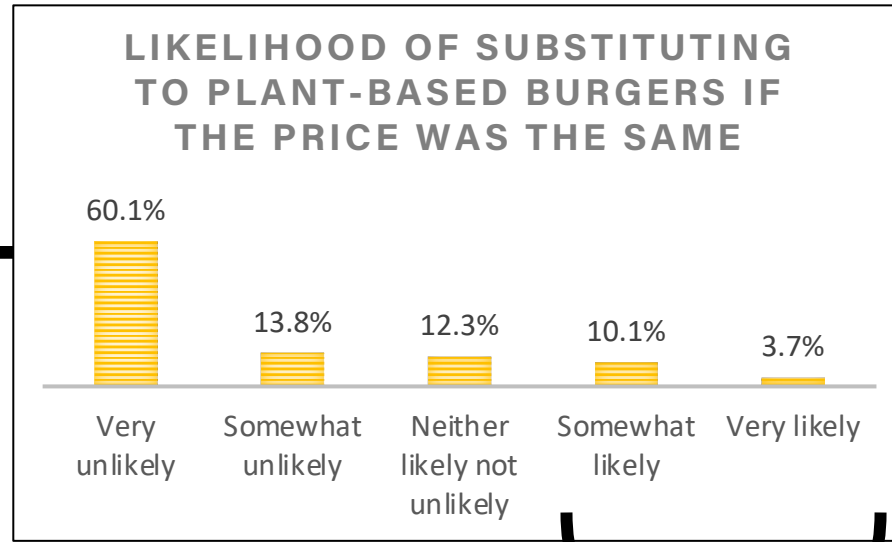
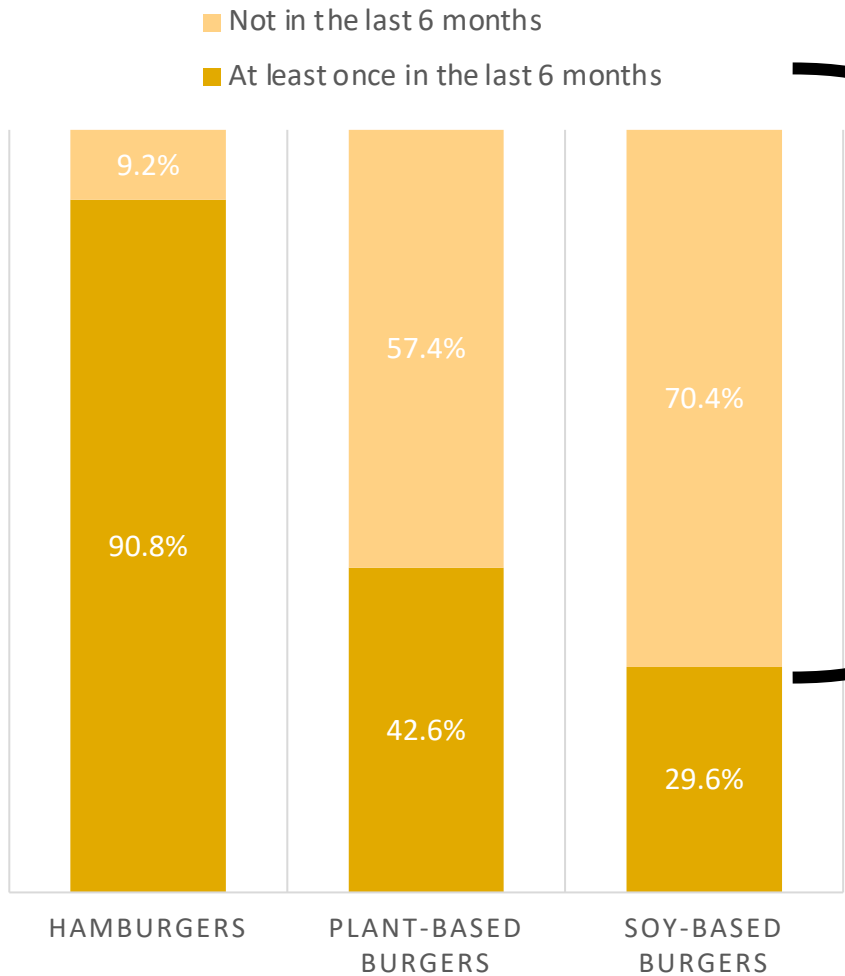
Providing alternative options for protein for human consumption is considered most important for U.S. soybeans, while providing alternative options for plastic use is considered least important.

Market Exploration

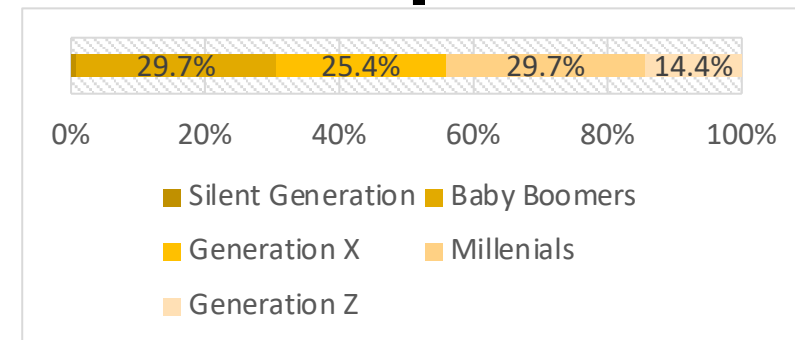
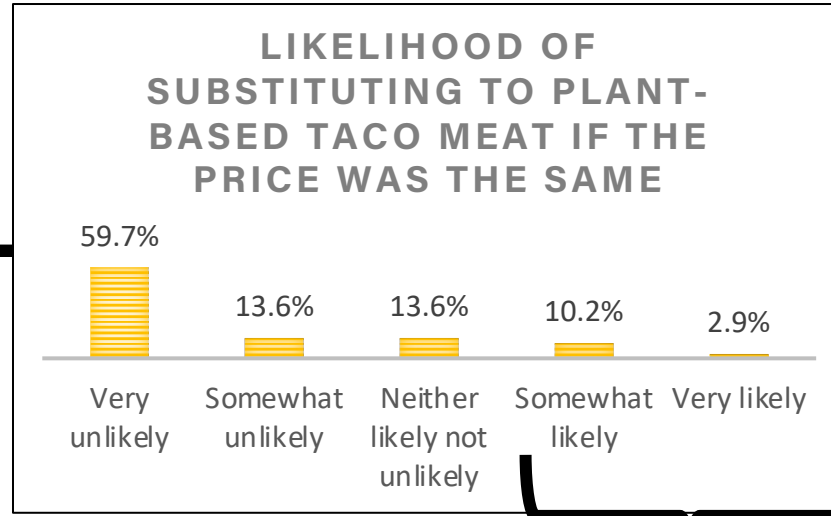
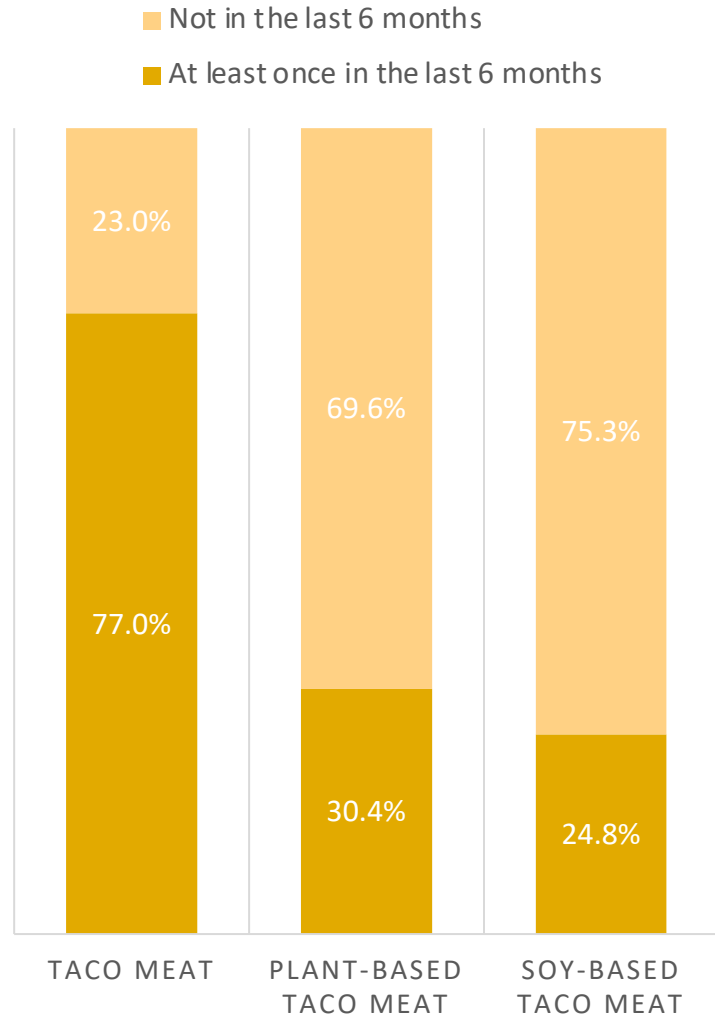
Who might switch to plant-based milk?



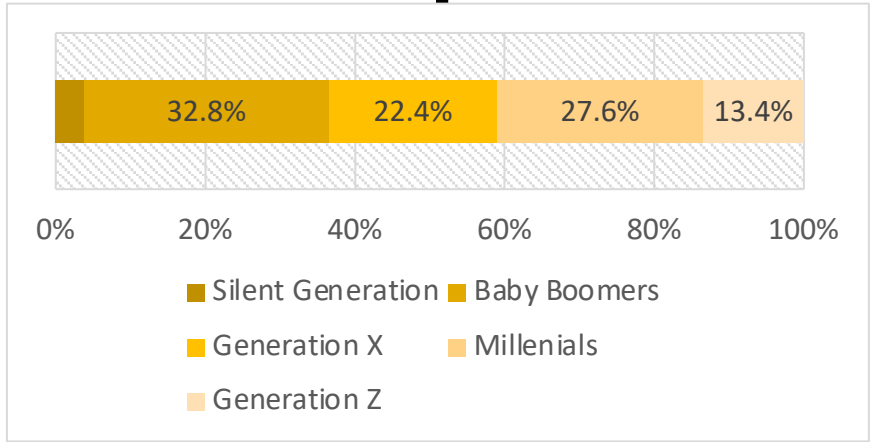
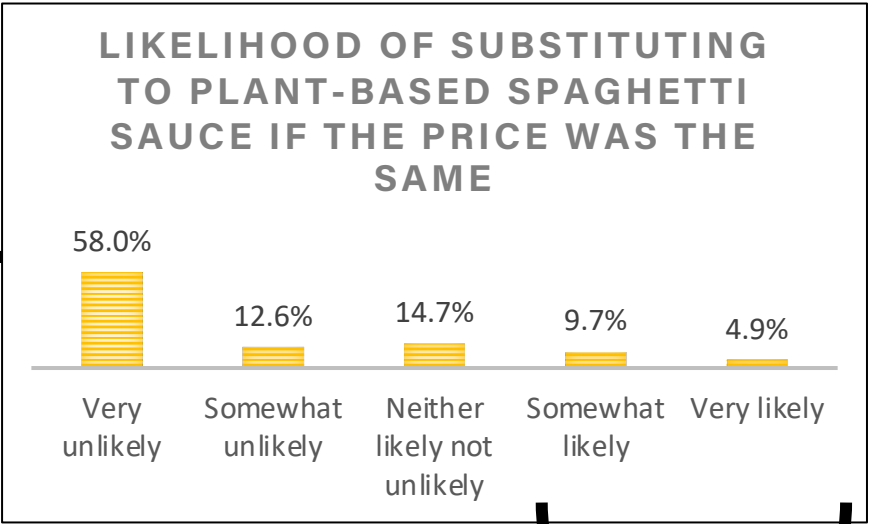
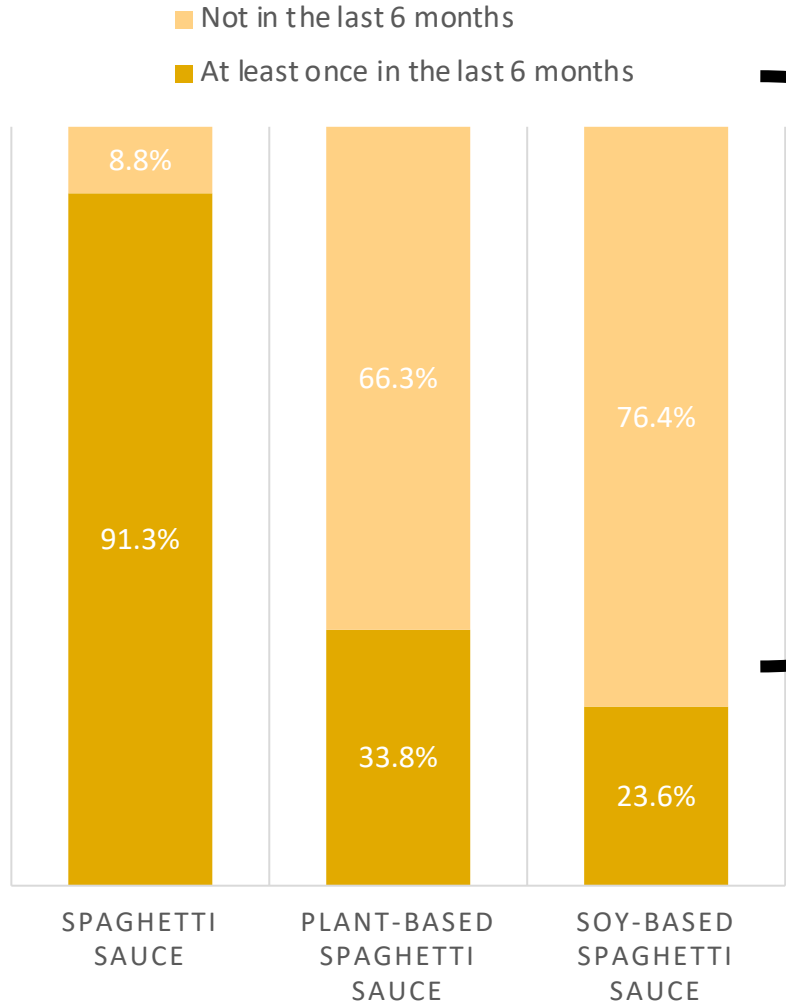
Who might switch to plant-based hamburgers?



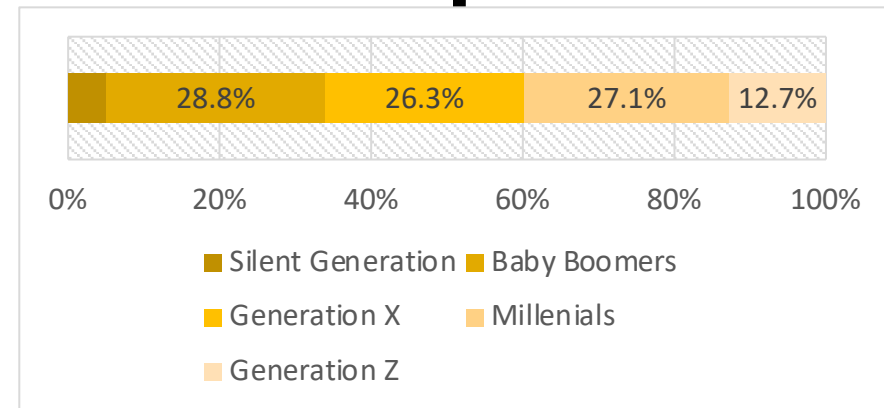
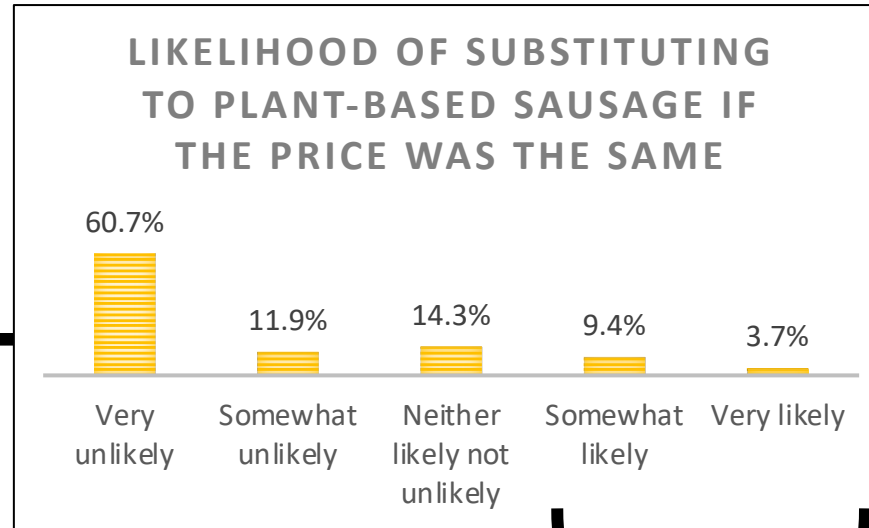
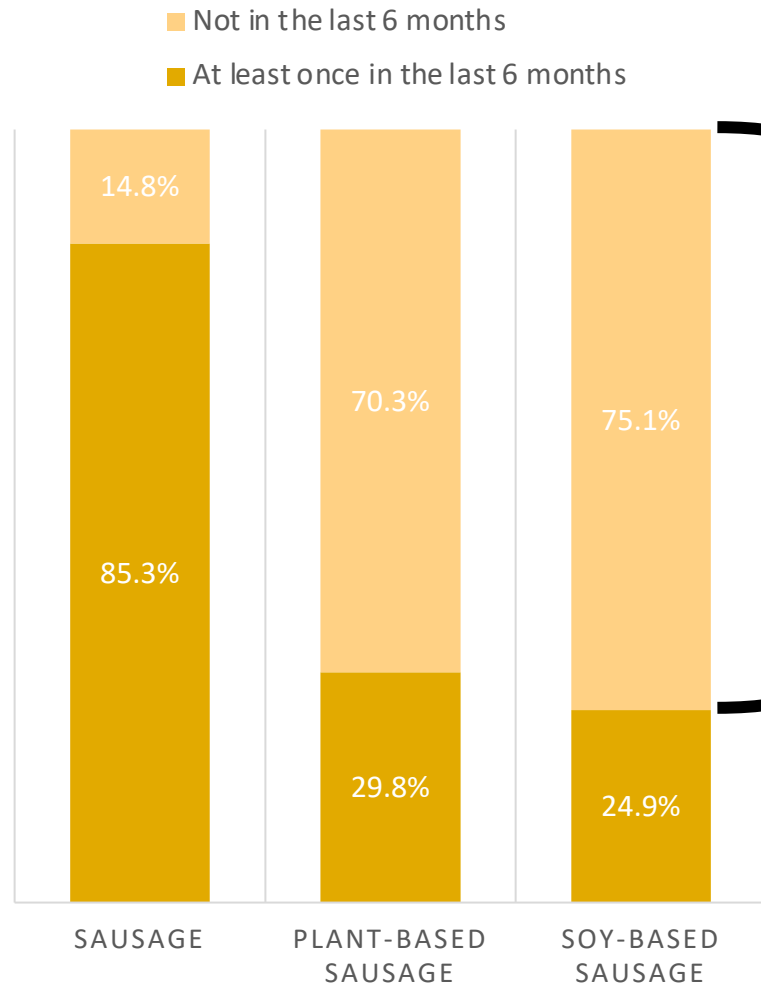
Who might switch to plant-based taco meat?



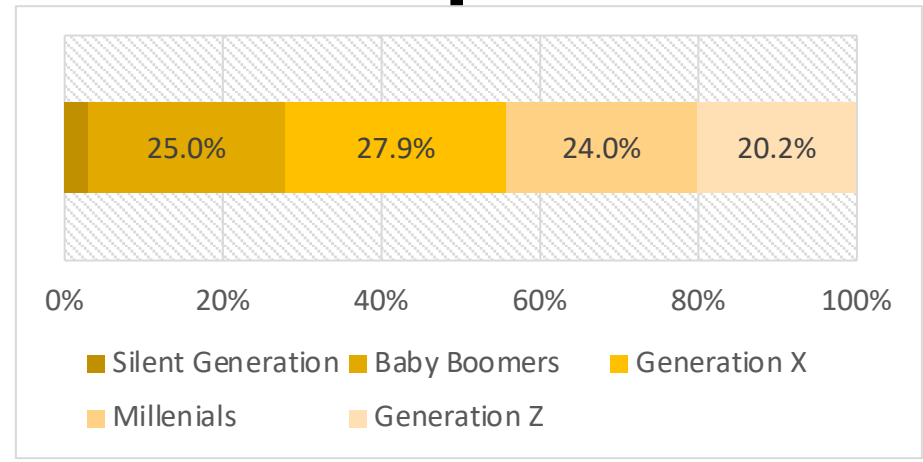
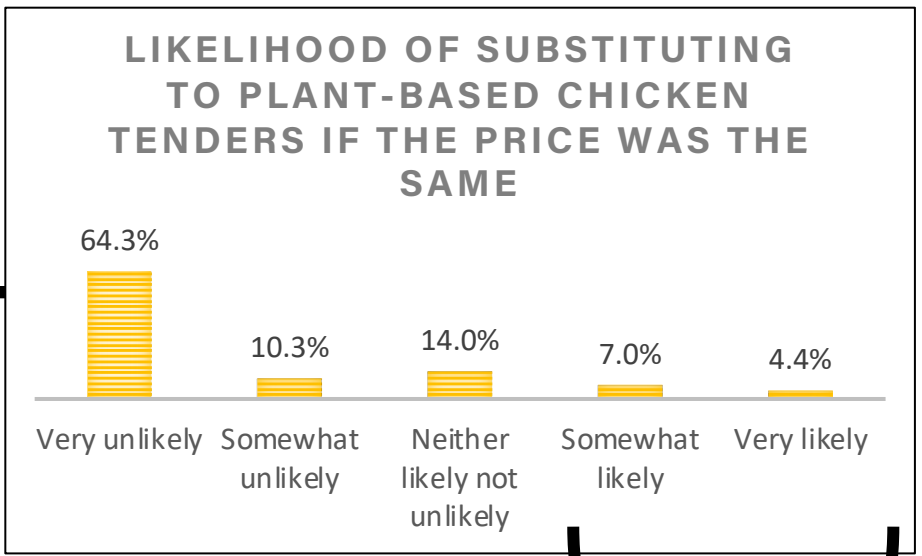
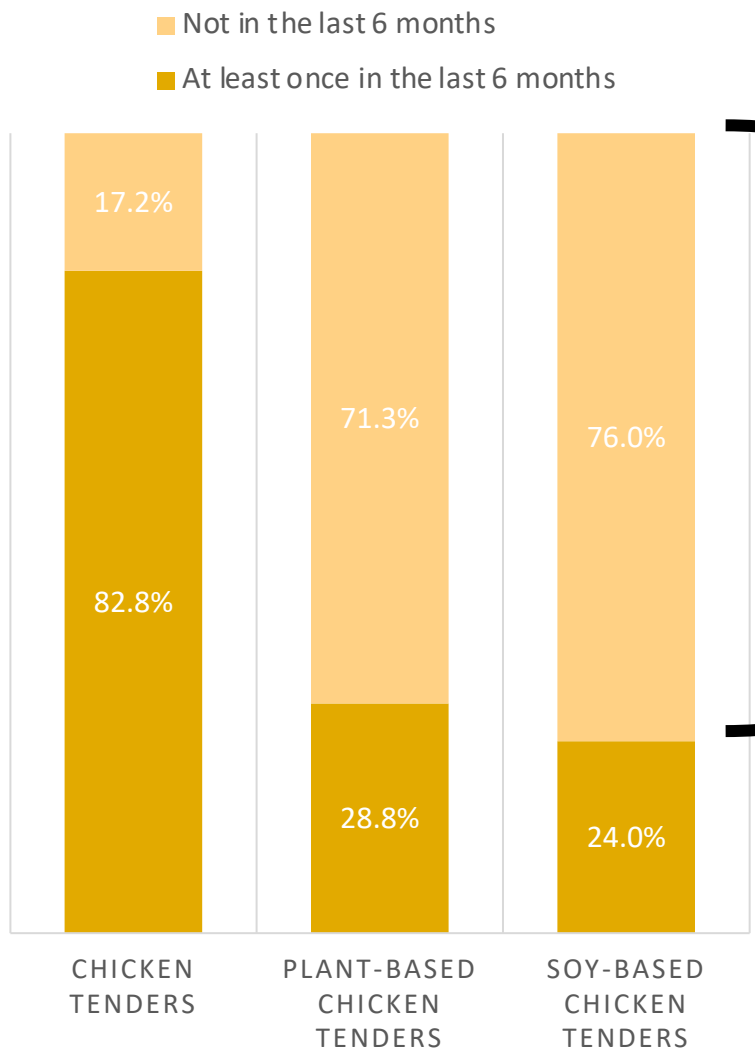
Who might switch to plant-based spaghetti sauce?



Who might switch to plant-based sausage?



Who might switch to plant-based chicken tenders?



Conclusions from Market Exploration

Of the consumers who have not purchased soy protein in the past 6 months, 12-15% would be at least somewhat likely to substitute to the plant-based alternative if the price was the same.

Relative to current consumption patterns, baby boomers indicate an interest in substituting toward soy protein products.

Interest in substitution is relatively consistent across plant-based product categories.

U.S. CONSUMER SURVEY

Perceptions and Preferences of Soy Products

Economic Impact of Competing
Soy Investment Alternatives

