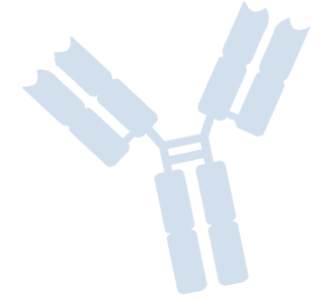
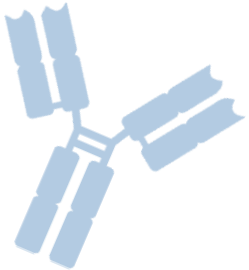




**Westmount Charter
Mid High School**



Gut Instinct – Do Supermarket Yogurts have more Live Cultures than Homemade?



Saindhavi Surendran (Gr. 6)

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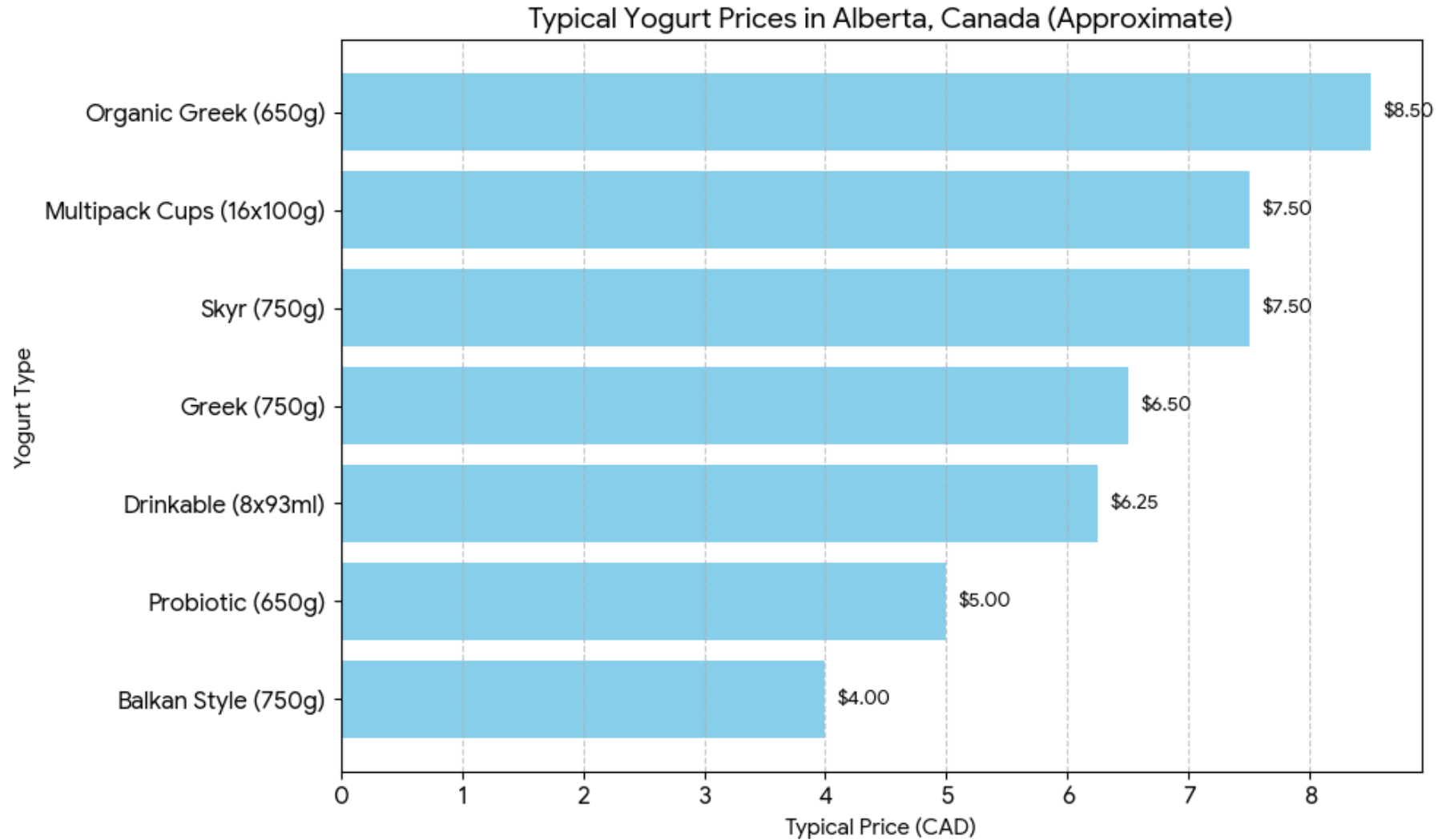


- I Research Background
- II Hypothesis & Objectives
- III Experiment & Results
- IV Conclusion & Next Steps

Why we need Yogurt?

- ❖ Yogurt is called “living snack” due to the presence of live culture such as *Lactobacillus bulgaricus* and *Streptococcus thermophilus*
 - ❖ Probiotics are key to maintain healthy gut microbiome known to support better immune system and brain function
- ❖ Natural yogurt is nutrient dense containing high amount of
 - ❖ Minerals such as Calcium, Phosphorous, Potassium, Magnesium, Zinc and Selenium
 - ❖ Vitamins such as A (Retinol), B12 (Cobalamin) and B2 (Riboflavin), B5 (Pantothenic acid)
- ❖ Good natural source of protein and fat and better digestible than milk
- ❖ Has creamy, thick and velvety texture which can be flavored with fruits and nuts for enjoyment

Yogurt price by type



Yogurt Match-off

	Super market	Homemade
Convenience	High - No preparation, variety of flavors and packaging	Low - Preparation, longer incubation required
Consistency	Neutral - Same texture and taste every time but has thickeners like pectin or gum	Neutral - Depends on the preparation method and ingredients, but can be customized
Culture Freshness	Neutral - Depends on the time from production and consumption	High - Consumed quickly and natural
Cost	High - Varies but can be between \$4 and \$8 per 750 gm depending on the type	Low - 1L of milk costs around \$1.7
Environmental	High - Plastics packaging, refrigeration, and transportation	Low - Re-usable jars, no plastics

Online Survey from Calgary



The Big Scoop: Tell me how you yogurt ?

Hi there! My name is **Saindhavi Surendran**, and I'm conducting a science fair project to analyze the probiotic benefits and nutritional value of store-bought yogurt, and challenges with making yogurt at home.

Your input will help me better understand the real-world choices consumers face and challenges with alternatives. Your feedback is incredibly valuable to my research— thank you for your support!

A photograph of a yogurt bowl topped with strawberries and granola, set on a blue cloth. Below the photo is a red horizontal line, followed by the survey title "The Big Scoop: Tell me how you yogurt ?". The text below the title reads: "Hi there! My name is **Saindhavi Surendran**, and I'm conducting a science fair project to analyze the probiotic benefits and nutritional value of store-bought yogurt, and challenges with making yogurt at home." and "Your input will help me better understand the real-world choices consumers face and challenges with alternatives. Your feedback is incredibly valuable to my research— thank you for your support!".

The online survey included 7 questions and received 99 responses so far.

Survey Questions

- ❖ How often do you consume yogurt?
- ❖ What type of yogurt, do you mostly consume? (Select all that apply)
- ❖ Select all ingredients that you have seen in supermarket yogurts?
- ❖ Please rank the following factors in terms of their importance, when buying yogurt?
- ❖ Do you see flavored yogurt as healthy as plain yogurt?
- ❖ Have you made yogurt at home?*
- ❖ What are the reasons you prefer store-bought yogurt over making it yourself at home? (Select all that apply)

Survey Results

- ❖ 30% eat yogurt daily
- ❖ Greek yogurt most popular (76.3%), followed by plain yogurt
- ❖ Probiotics was noted less important than taste, protein and nutrients
- ❖ Most common ingredients identified: Milk, Live Culture and Added Sugars
- ❖ 70% noticed added sugars/artificial sweeteners
- ❖ Taste = most important buying factor
- ❖ Most think flavored yogurt is less healthy (27% say it is healthy)
- ❖ 78% have never made yogurt at home
- ❖ Main reasons: convenience & not knowing the procedure

My Questions?

- ❖ Do supermarket yogurts contain healthy probiotics?
 - ❖ Are there differences between brands and yogurt types?
 - ❖ Can flavored yogurt is as healthy as natural yogurt?
 - ❖ How does it compare to homemade yogurt?
- ❖ Do supermarket yogurts serve as a good starter?
 - ❖ Do all starters produce similar yogurt in similar way?
 - ❖ What are the important factors in a starter?
- ❖ How to make a good yogurt with less effort in cold climates?
 - ❖ Are there difference in yogurt formed using different incubation methods?
 - ❖ Does humidity play a key role in yogurt formation and quality

Variables

Ingredients

- ❖ Milk type, with higher fat milk (3.25%) resulting in thick and creamy yogurt
- ❖ Quality of culture starter (store bought vs homemade)

Milk preparation

- ❖ High heat (85-95 °C) helps sterilize the milk and breaks down whey protein
- ❖ Clean utensils free of bad bacteria and yeast

Temperature & Humidity

- ❖ Has the biggest impact on the bacterial growth with sustained temperature between 38-42 °C being ideal
- ❖ Humidity can help with retaining moisture and heat retention

Time

- ❖ Shorter time (4-8 Hrs) results in mild and sweet but soft yogurt
- ❖ Longer time (12-24 Hrs) results in acidic and tart but firm yogurt

Test Summary

	Ingredients	Test - Best Use by	Incubation Methods
Astro Plain (3%)	Skim milk, Cream Skim milk powder, Active bacterial cultures	~ 18 days	Oven, Multi-cooker, Insulated Box
Activia Plain (3.2%)	Skim milk, Ultrafiltered skim milk and/or Milk protein concentrate, Cream Skim milk powder, Active probiotic culture (Bifidobacterium lactis CNCM 1-2494) and active bacterial cultures	~ 14 days	Oven, Multi-cooker, Insulated Box
Liberte Greek Plain (5%)	Skim milk, Cream, Milk protein, Bacterial cultures	~ 17 days	Oven, Multi-cooker, Insulated Box
Activia Vanilla (2.2%)	Skim milk, Ultrafiltered milk and/or Milk protein concentrate, Sugars, Cream Water, Modified corn starch, Gelatin, Active probiotic culture (Bifidobacterium lactis CNCM I-2494) and active bacterial cultures, Natural flavour, Vitamin D3	~ 25 days	Instant Pot
Homemade	3.25% and yogurt starter (live cultures)	N/A	Oven, Multi-cooker, Insulated Bix

Procedure

Step 1: Milk Preparation

- ❖ Heat homogenized milk (3.25%) to boil (around 95 °C)
- ❖ Cool milk to around 38-41 °C, filtering it to measuring container

Step 2: Culture Preparation and Mixing

- ❖ Thoroughly wash, dry and sterilize the glass jars. Use new spoon and stirrer for each test jar
- ❖ Add half-teaspoon (2.5 ml) of yogurt as a starter at the bottom of jar
- ❖ Add 75 ml of filtered milk to each jar and stir the starter with the milk
- ❖ Close the jar opening with paper towel firmly using rubber band

Step 3: Incubation & Monitoring

- ❖ Place the test jars in selected appliance and rotate them occasionally
- ❖ Monitor the yogurt formation every 30 minutes, following the initial set time
- ❖ Check for yogurt formation through tilt test and smell

Experimental Results

	Insulated Box	Oven with Light On			Multi-Cooker		
	Day 1	Day 1	Day 2	Day 3	Day 1	Day 2	Day 3
Astro Plain (3%)	Not Formed	10:00 Hrs	9:00 Hrs	Not Formed	9:00 Hrs	9:00 Hrs	9:00 Hrs
Activia Plain (3.2%)	Not Formed	8:30 Hrs	8:00 Hrs	Not Formed	7:00 Hrs	8:00 Hrs	8:45 Hrs
Liberte Greek Plain (5%)	Not Formed	8:30 Hrs	8:00 Hrs	Not Formed	7:00 Hrs	8:00 Hrs	8:00 Hrs
Activia Vanilla	Not tested				~ 12:00 Hrs (Day 1)		
Homemade	~ 24 Hrs	6:00 Hrs	7:00 Hrs	8:30 Hrs	6:30 Hrs	4:00 Hrs	4:00 Hrs

Results Summary

	Overall Rating	Did it Work?	Consistency & Texture	Smell & Taste
Astro Plain (3%)	(4)	Mostly - Longer than other plain yogurts	Thick, rough and bit grainy	Mild and slightly tangy
Activia Plain (3.2%)	(3)	Mostly - Came second most of the times	Less thick, smooth	Bit sour
Liberte Greek Plain (5%)	(2)	Mostly - Came second most of the times	Thick, silky, and bit runny	Mild and sweet
Activia Vanilla	(5)	Occasionally - Took more than 12 Hrs	Watery and thin	Strong and tart
Homemade	(1)	Always - was the first to set	Thick and rough	Tangy

Temperature Measurement after Yogurt Formation

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Activia	37.3 °C	37.3 °C	Not Measured	Not Measured	37.7 °C	37.1 °C
Liberte Greek	36.4 °C	37.2 °C			37.3 °C	38.9 °C
Astro	38.1 °C	37.2 °C			38.4 °C	38.6 °C
Homemade	37.3 °C	38.0 °C			39.9 °C	39.1 °C

Whey Water Collected across trials

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Activia Plain	1 ml	1.5 ml	2 ml	0.25 ml	0.25 ml	0.52 ml
Liberte Greel	0.75 ml	< 0.25 ml	1.25 ml	1 ml	1 ml	1 ml
Astro	N/A	N/A	2 ml	1.5 ml	2 ml	2 ml
Homemade	0.75 ml	1.5 ml	1.5 ml	0.25ml	1 ml	0.5 ml

Yogurt Quality

	Activia	Liberte	Astro	Homemade
Did it work	Yes	Yes	Yes	Yes
Consistency/ Texture	Thick Silky runny	Somewhat thick and silky and a bit runny	Thick silky	Thick Silky runny
Smell	tangy	sweet	Tangy	tangy
Taste	neutral	neutral	Slightly tangy	neutral

Observations

Starter Culture

- ❖ Homemade starter resulted in consistent formation even in insulated box
- ❖ Store-bought yogurt did not work after few days which was not observed in homemade starter
- ❖ Flavored yogurt cannot be used as a starter

Incubation Method

- ❖ Multi-cooker made yogurt was thick & grainy, and was tangy & tart
- ❖ Oven made yogurt was smooth & silky, and was mild sweet & tangy
- ❖ Maintaining set temperature was key in yogurt formation
- ❖ Humidity did not influence yogurt formation or its quality

Temperature & Time

- ❖ Constant temperature and 4-6 Hrs produced the best tasting yogurt that was thick, silky and smooth

Conclusions

- 1) Supermarket yogurts does contain live cultures but not as effective as homemade, especially flavored types
- 2) Live cultures within store-bought yogurt depleted in few days once opened
- 3) Supermarket yogurts can be used as a starter but results may vary depending on the yogurt type, brand and the shelf life
- 4) Yogurt can be made within 4-6 Hrs using appliances like multi-cooker or crock pot even in colder climate

Next Steps

- 1) Identify the type of cultures and calculate the culture forming units (CFU) in tested yogurt cultures
- 2) Do some bacterial cultures are better than others
- 3) Do reduced fat milk or ultra filtered milk can be used instead of whole milk
- 4) Do organic milk makes a better yogurt
- 5) Does frozen cultures work as effective as live ones

Citations (URL)

- 1) <https://ca.brodandtaylor.com/blogs/recipes/the-science-of-great-yogurt>
- 2) <https://www.activia.ca/en/products/regular/plain/plain/>
- 3) <https://astro.ca/products/astro-original-balkan/astro-original-balkan-plain-3-750-g/>
- 4) <https://liberte.ca/en/greek/plain-2>
- 5) [Probiotic viability in yoghurt: A review of influential factors \(https://www.sciencedirect.com/science/article/abs/pii/S0958694620301631\)](https://www.sciencedirect.com/science/article/abs/pii/S0958694620301631)

Sources of Error

1. Temperature Fluctuations

Yogurt bacteria grow best around 40–45°C. In a colder climate, the temperature may have dropped below the ideal range, slowing fermentation or affecting thickness.

2. Inconsistent Thermometer Readings

If the thermometer was inaccurate or not placed properly in the milk, the recorded temperature may not reflect the true fermentation temperature.

3. Quality of Store-Bought Yogurt Starter

The supermarket yogurt may have contained fewer live bacteria than expected, especially if it was old or improperly stored.

4. Contamination

If utensils, containers, or hands were not fully clean, other bacteria could have affected the fermentation process.

5. Uneven Heating of Milk

If the milk was not heated evenly or not cooled to the correct temperature before adding the starter, the bacteria could have been damaged.

6. Measurement Errors

Incorrect ratios of milk to starter yogurt could change the fermentation results.

7. Incubation Time Differences

If the yogurt was left to ferment for too short or too long, it may not have reached the expected consistency.

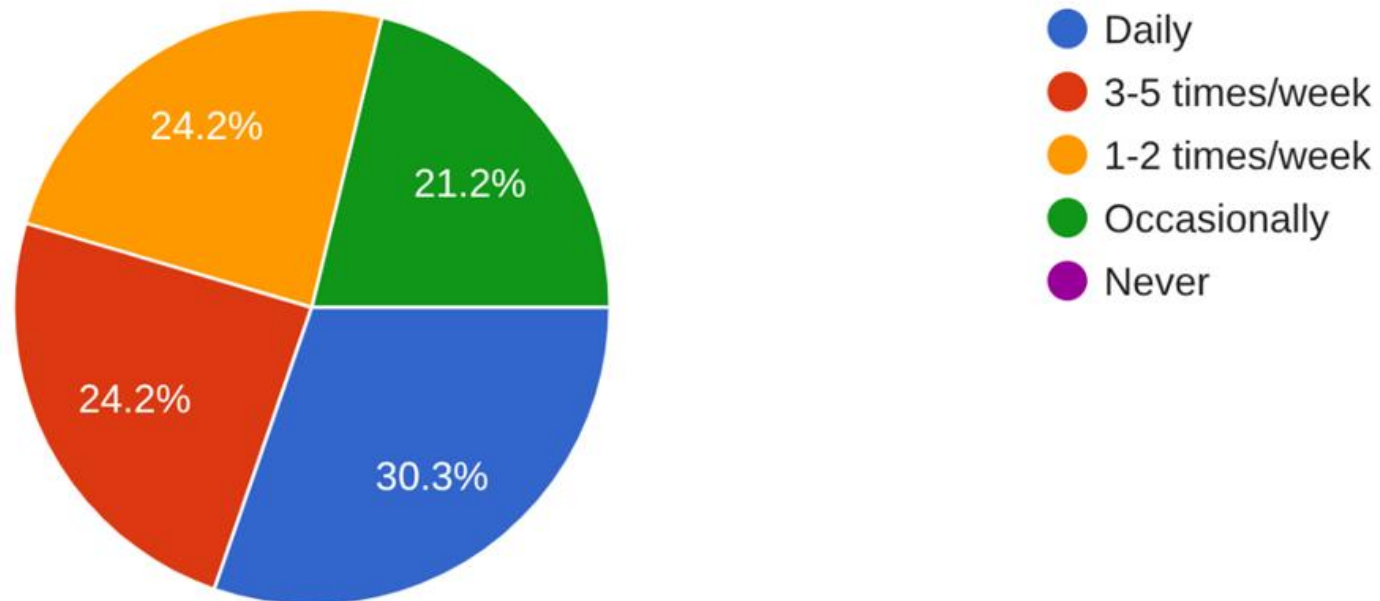
Yogurt Survey

The Big Scoop – Tell me how you yogurt?

How often do you consume yogurt?

How often do you consume yogurt?

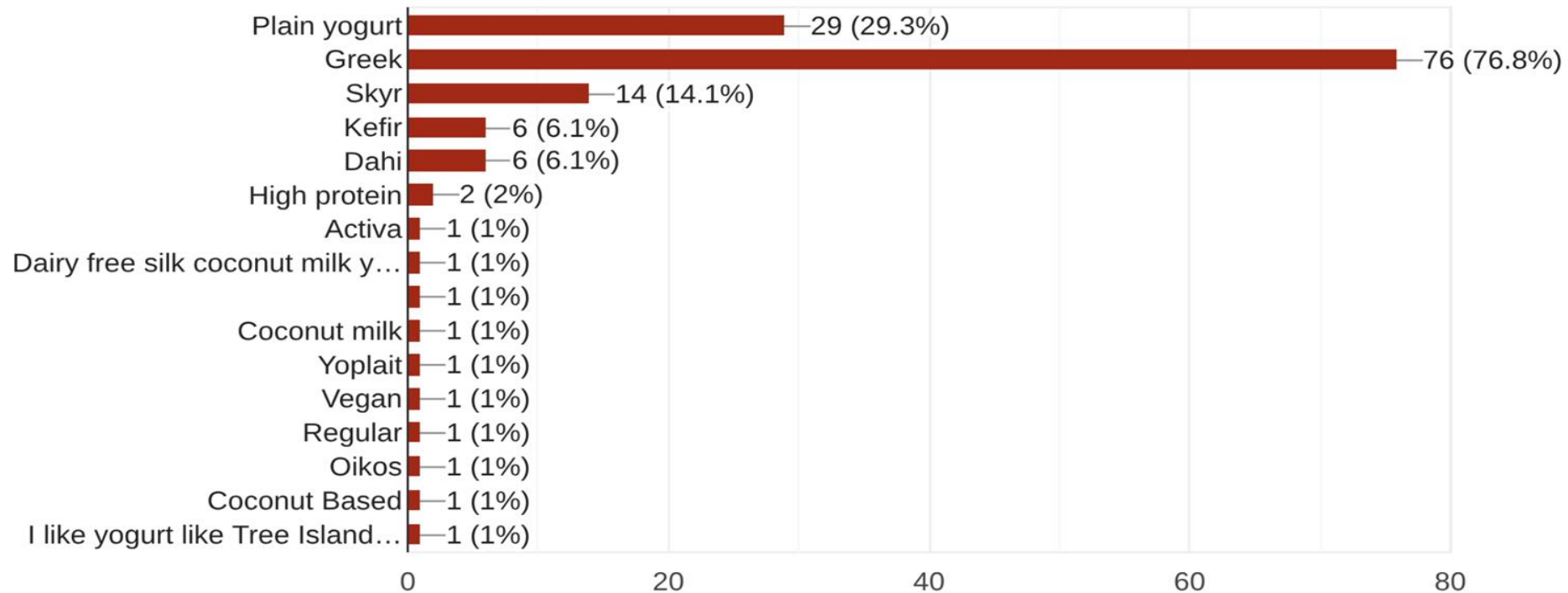
99 responses



What type of yogurt, do you mostly consume?

What type of yogurt, do you mostly consume? (Select all that apply)

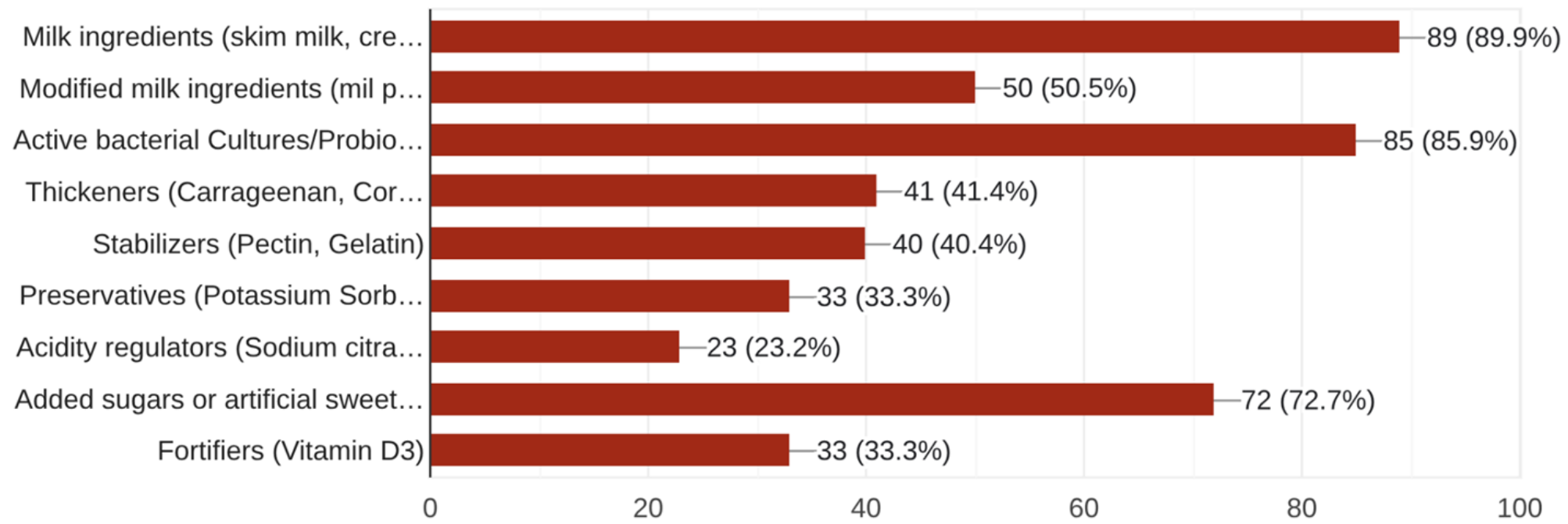
99 responses



Select all ingredients that you have seen in the supermarket yogurts.

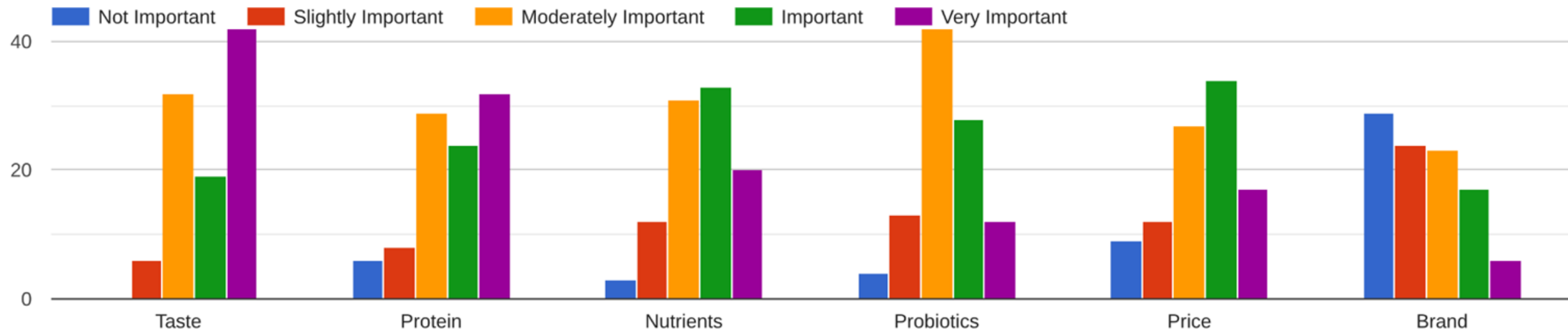
Select all ingredients that you have seen in supermarket yogurts?

99 responses



Please rank the following factors in terms of their importance, when buying yogurt.

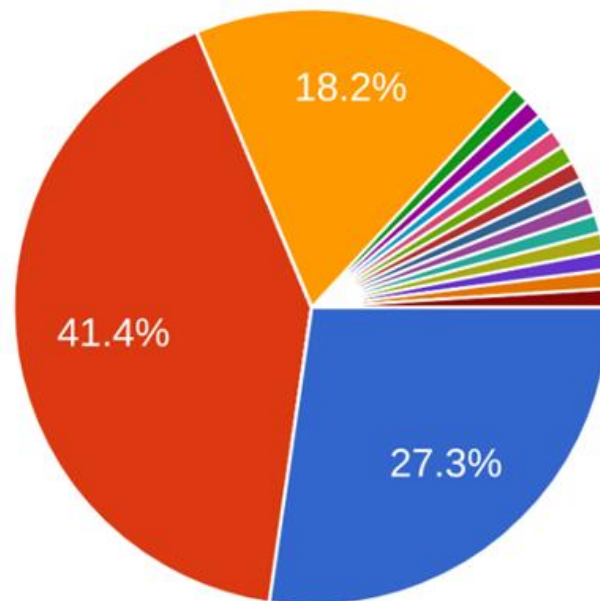
Please rank the following factors in terms of their importance, when buying yogurt?



Do you see flavored yogurt as healthy as plain yogurt?

Do you see flavored yogurt as healthy as plain yogurt?

99 responses

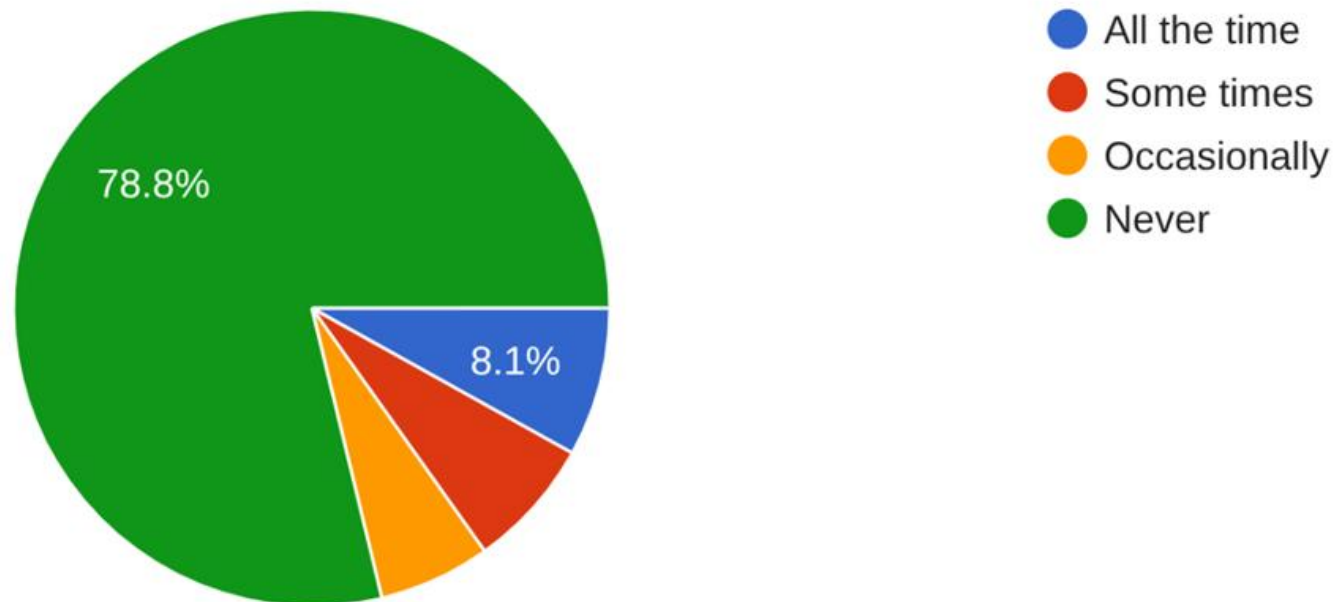


- Yes, flavored yogurt is both nutritional...
- No, flavored yogurt is not nutritional n...
- Do not know or not sure
- I think it depends on the ingredients
- It's probably not as good for me, but it...
- Having sugary yogurt is healthier than...
- Flavoured yogurt can be nutritious but...
- No, flavoured yogurt isn't as healthy a...

Have you made yogurt at home?

Have you made yogurt at home?

99 responses



What are the reasons you prefer store-bought yogurt over making it yourself at home?

What are the reasons you prefer store-bought yogurt over making it yourself at home? (Select all that apply)

99 responses

