Developing Fiber-Enriched Yogurt: A Product Development Case Study

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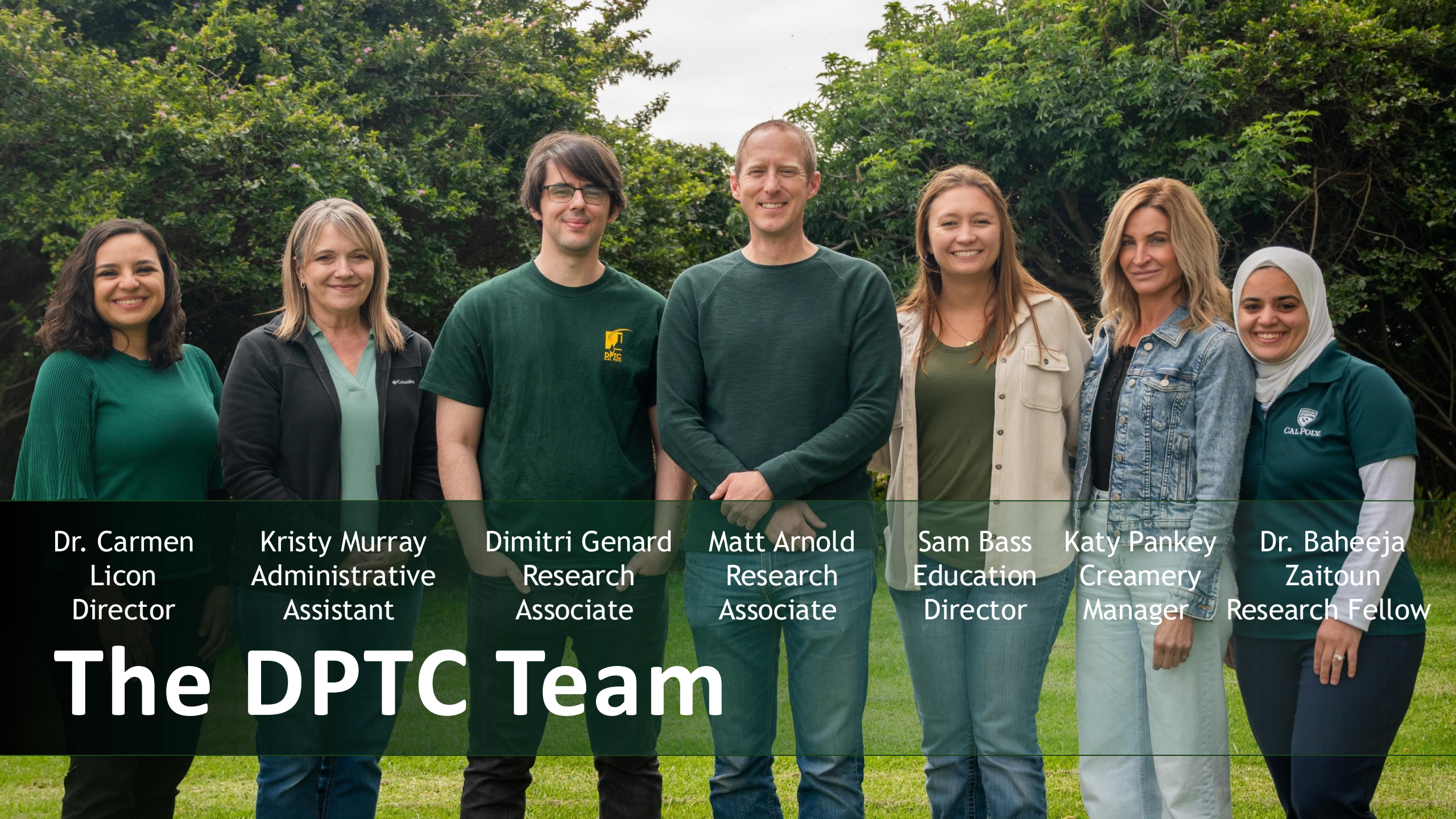
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The DPTC Team

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Technical Assistance

Developing new products and enhancing existing products. Expertise in cheese, ice cream, cultured milk products, and extended shelf-life beverages. We also offer a complete range of analytical product testing.

Research

Industry-sponsored projects, collaborative projects with other universities, federally funded, or proprietary research and development projects.

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Short courses

Educational training programs for the dairy workforce. We can customize short courses based on needs.

Who do we serve?

Industry and Entrepreneurs

Faculty

Students

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What We Offer

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1. FEE-FOR-SERVICE PILOT PLANT USAGE
2. PRODUCT DEVELOPMENT & PROTOTYPING
3. REFINING PRODUCT PROCESSING
4. COMPOSITIONAL ANALYSIS & PRODUCT TESTING
5. REPORT & CONSULTING

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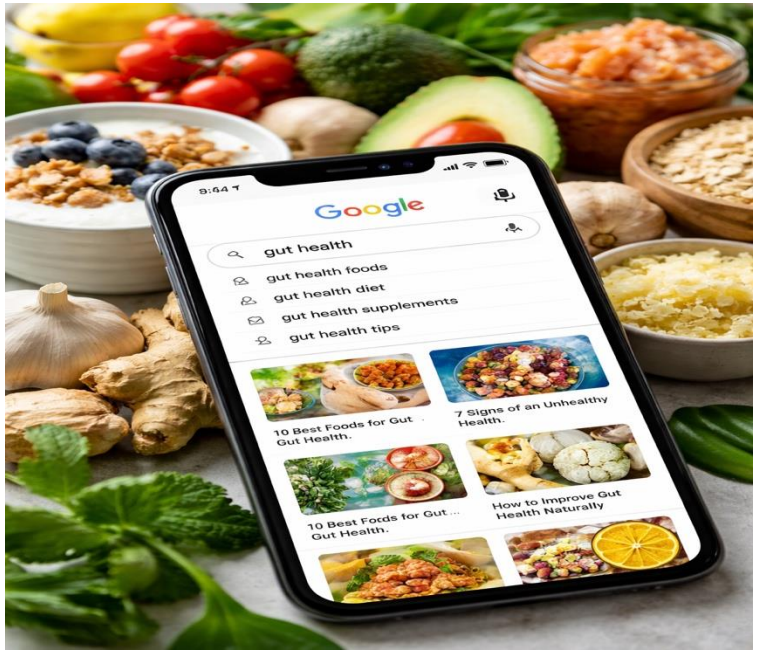
Industry Impact

Why Fiber in Yogurt?

- 84% of people in the US have become more interested in foods or products that support gut health in the past several years
- Google searches for ‘gut health’ have more than doubled in the last three years
- Fiber intake remains below recommendations
  - 25 g for adult women and 38 g for adult men
- Yogurt is an attractive delivery system



Why Fiber in Yogurt?

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- Four lines of fiber-fortified cultured dairy products on the US market:
  - Ratio - cultured dairy dessert (not meeting yogurt standard of identity), 20 g protein, **10 g fiber (soluble corn fiber + chicory root)** per 150 g serving
  - Activia Proactive - 10 g protein, **3 g fiber (chicory root fiber)** per 150 g serving
  - Lala Gold drinkable yogurt - 25 g protein, **6 g fiber (chicory root fiber)** per ~300 mL serving
  - Chobani Complete drinkable yogurt - 20 g protein, **3 g fiber (chicory root fiber)** per ~300 mL serving

Objective

Assess the performance of various fibers in stirred yogurt and identify reasonable lower and upper limits for fiber fortification

Experimental Design

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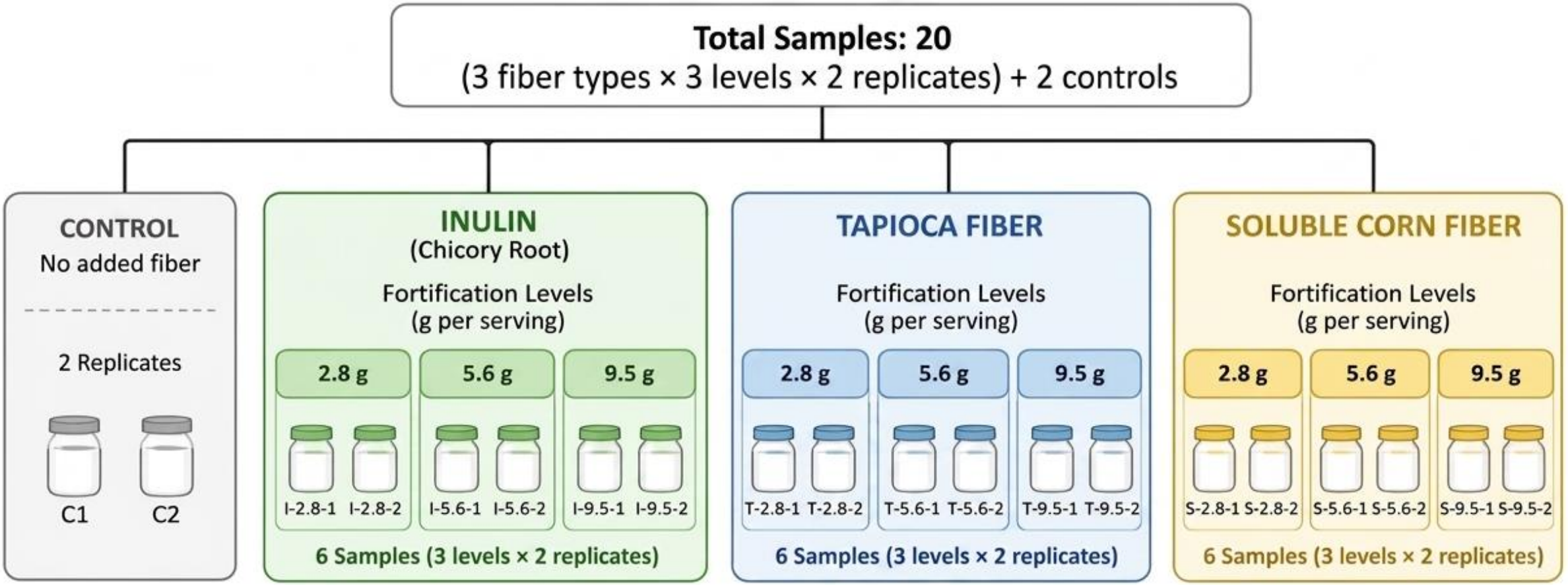
- 2% milk, no thickeners added
- Yomix® 151 LYO 375 DCU (Danisco) yogurt starter culture, which contains *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus*



Experimental Design

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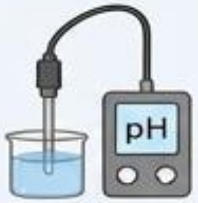
All 20 Samples Evaluated

Testing Timeline

Week 0 — **Week 2** — **Week 4**

Analyses Performed at Each Time Point (Week 0, 2, and 4)

pH



Measure pH

Color

Measure color (L*, a*, b* values)

Textural Analysis

Measure texture (hardness, cohesiveness, springiness, etc.)

Syneresis
(measured on metal mesh)

Place sample on metal mesh; collect and measure expelled liquid (% expelled liquid)

Qualitative Sensory Assessment

Sensory evaluation (Appearance, texture, flavor, overall acceptability, etc.)

Inulin
(Chicory Root)

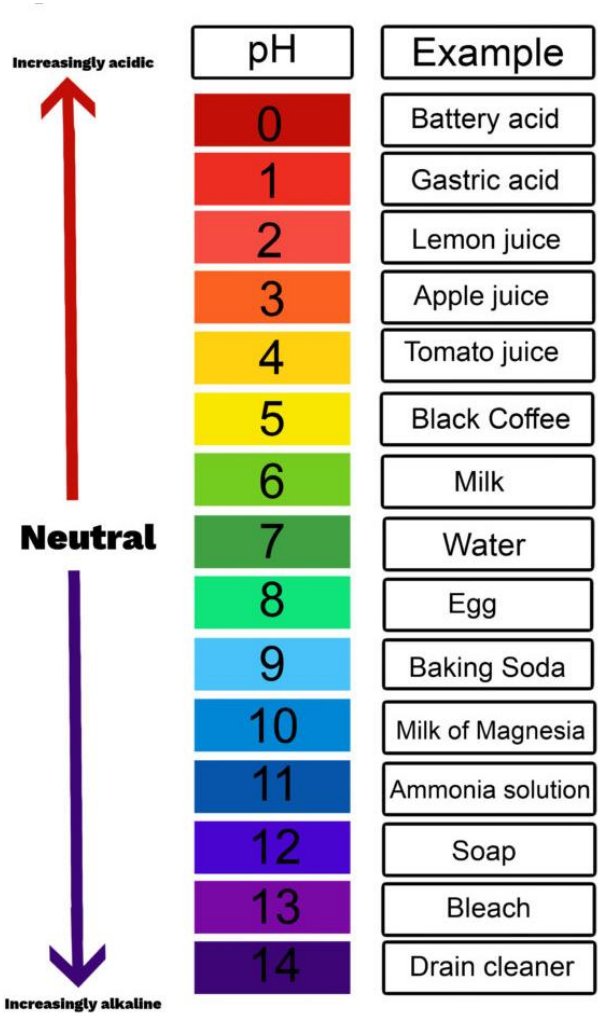
Tapioca
Fiber

Soluble
Corn Fiber

Results and Discussion

Results and discussion

- Fiber type and concentration did not significantly affect yogurt pH ($p = 0.094$)
  - indicating that the incorporation of the dietary fiber inulin, tapioca, or corn fiber **did not** interfere with the lactic acid production during fermentation.
- However, the storage time did have a significant effect ($p<0.05$) on yogurt pH, with all treatments showing a gradual decline through the storage process
- Mean pH values declined from around 4.3 at week 0 to about 4.1 by week 4



Results and discussion

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Fiber type	Usage Level (%)	Week	Hardness
Control	0	4	106.45 ± 5.30
Inulin	2.8	4	132.15 ±7.14
	5.6	4	121.60 ±0.28
	9.5	4	130.85 ±7.85
Corn	2.8	4	116.20 ± 1.56
	5.6	4	113.60 ± 1.84
	9.5	4	78.85 ± 4.88
Tapioca	2.8	4	91.80 ± 6.08
	5.6	4	80.45± 10.11
	9.5	4	94.00 ± 18.81

Results and discussion

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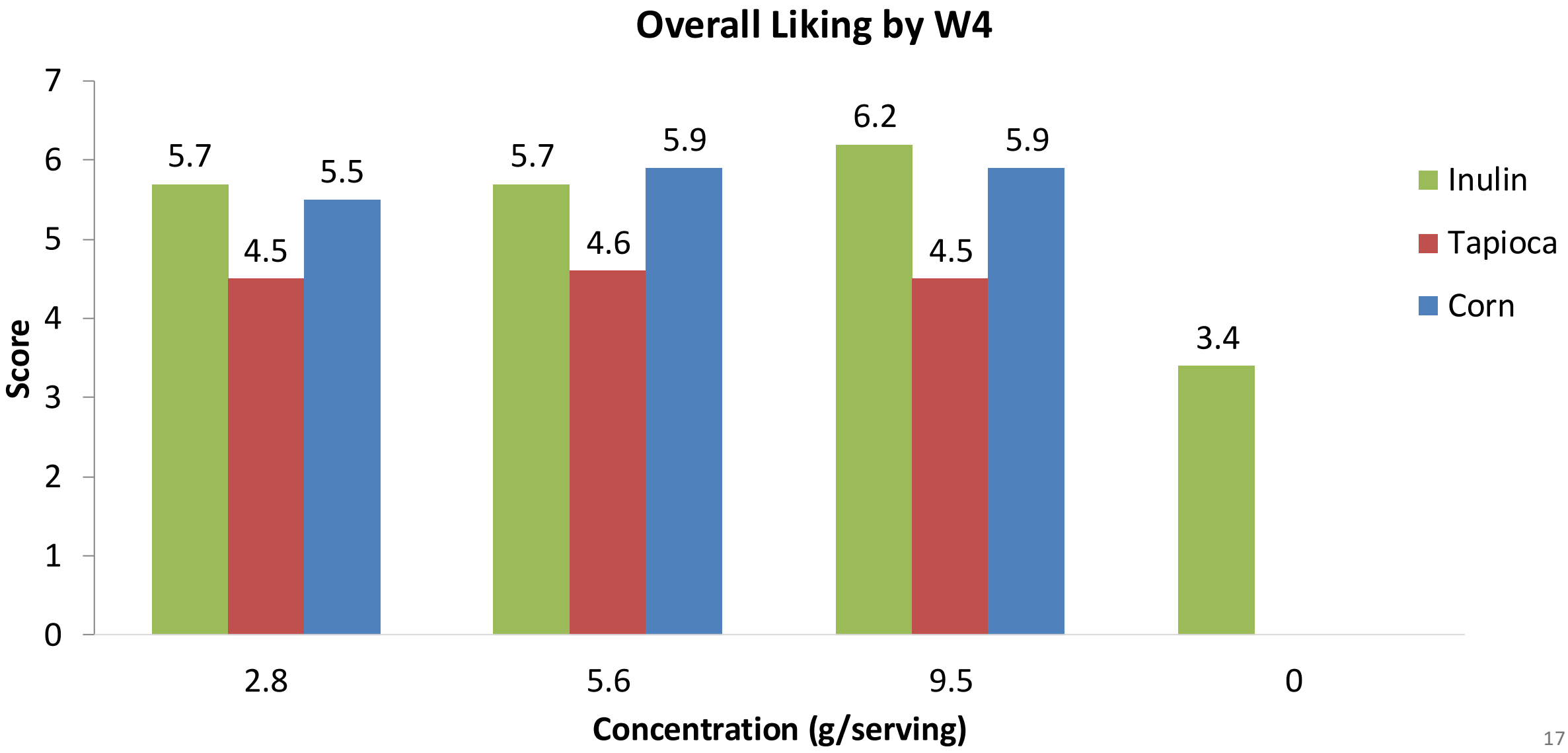
- Syneresis decreased with storage, *Inulin showed the lowest syneresis*

Fiber Type	Usage Level (%)	Week 0	Week 4
Inulin	2.8	35.13 ± 0.09	31.93 ± 0.88
	5.6	33.95 ± 0.13	32.70 ± 2.09
	9.5	34.07 ± 0.31	31.15 ± 1.72
Tapioca	2.8	43.59 ± 2.70	35.65 ± 0.91
	5.6	42.79 ± 3.27	35.46 ± 0.38
	9.5	40.45 ± 2.73	33.98 ± 0.97
Corn Fiber	2.8	32.87 ± 1.65	33.28 ± 0.18
	5.6	37.68 ± 5.56	30.76 ± 2.05
	9.5	38.22 ± 3.55	38.53 ± 1.24
Control	0	36.60 ± 0.58	34.41 ± 0.35

Results and discussion



Conclusion

- The type and concentration significantly affected the hardness and cohesiveness
- The type and concentration significantly affected the syneresis
- Cohesiveness significantly improved through the storage
- All fiber-enriched yogurts were liked more by the panel

Questions?

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