CASE STUDY

Topic: ***SymbioBurst*: A Case Study in the Development of Functional Dairy and Plant-Based Yogurts**

Team №: **3: Dairy 1**

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I. Executive Summary (150 words)

The present case study presents the development of *SymbioBurst*, a line of innovative functional yogurts designed to meet the growing demand for health-enhancing, clean-label food products. The project includes two distinct formats: a dairy-based yogurt and a vegan, allergen-free plant-based alternative made with rice or hemp. Both variants are enriched with symbiotic cultures, multi-strain probiotics, prebiotics, chaga mushroom flour, and fruit juice spheres, with the plant-based version featuring also encapsulated avocado essential oil.

The objective was to develop scientifically grounded, consumer-oriented products that support digestive and immune health while delivering a unique sensory experience. Key outcomes include successful formulation, pilot-scale production, and early consumer feedback from 84 respondents. Market analysis confirms strong potential in the premium functional yogurt segment. Financial projections indicate promising margins, especially at scale. Strategic recommendations focus on targeted marketing, clear labeling, and phased distribution. *SymbioBurst* is positioned as a forward-looking brand in the evolving functional food landscape.

II. Introduction (300 words)

In recent years, the growing convergence of personalized nutrition, microbiome science, and ethical consumption has significantly advanced the functional food sector, particularly in the domain of fermented products. Consumers are increasingly seeking food products that offer tangible health benefits beyond basic nutrition. Yogurt, as a widely consumed fermented matrix, offers a unique platform for the incorporation and bioavailability of functional compounds. It provides an ideal environment for probiotics and bioactive peptides, while its sensory properties and familiarity make it well suited for introducing novel health-promoting ingredients.

The inspiration for this project stems from the convergence of three key trends: the growing demand for functional foods; the increasing popularity of vegan and allergen-free alternatives; and the consumer appeal of innovative textures and natural ingredients. Our goal was to develop two distinct but related products that reflect these trends. The first is a premium dairy-based yogurt, and the second a plant-based yogurt made from either rice or hemp milk. Both formulations are fortified with symbiotic probiotics, prebiotics, and Chaga mushroom flour for its adaptogenic properties, while fruit juice spheres add a novel sensory experience. The plant-based version also includes encapsulated avocado essential oil to improve nutritional profile and mouthfeel, addressing some of the common textural and nutritional limitations of non-dairy yogurts.

This case study outlines the development journey of the two yogurt variants, SymbioBurst Classic (dairy-based yogurt) and SymbioBurst Pure (plant-based yogurt, with rice or hemp base), from concept to commercialization. A core objective and challenge was to integrate not only the scientific and technical foundations of the formulation strategy but also a consumer-centered design approach encompassing market research, product engineering, and strategic positioning.

Ultimately, this project represents a fusion of evidence-based nutrition, biotechnological innovation, consumer-driven design and sustainable formulation strategies in creating differentiated products aligned with modern dietary preferences and health priorities.

III. Market Analysis (300 words)

The European yogurt market was valued at USD 20.8 billion in 2024 and is projected to grow steadily at a rate of 5.0% annually until 2031, supported by consumer interest in probiotic-rich and gut-friendly products. Within this category, plant-based yogurt is seeing even more dynamic growth. In 2024, it generated revenues of approximately USD 1.28 billion, with a forecasted CAGR of 13.5% through 2030. More broadly, the plant-based dairy market in Europe has grown from €6.8 billion in 2019 to €10.7 billion in 2023, underlining the continent's accelerating shift toward sustainable and allergen-free alternatives.

Several consumer trends are shaping this landscape. Firstly, the target group of health-conscious individuals increasingly favor functional foods with added benefits such as probiotics, prebiotics, and adaptogens. Secondly, sustainability is a major decision driver, particularly among younger consumers in Western Europe. Thirdly, "premiumization" is evident: consumers are willing to pay more for products with clinically supported health claims and clean-label ingredients.

Market research suggests that single-serve, convenient formats (such as the 200 ml containers proposed for SymbioBurst) are especially attractive to consumers seeking portability and portion control. Flavors play a major role in consumer selection, with exotic fruits (e.g., lychee, passion fruit, berries) and sensory experiences (such as juice spheres) enhancing trial appeal.

As for the competition, the market is dominated by Danone, Nestlé, Alpro, and Arla. However, few combine advanced functionality with sensory innovation. This is where SymbioBurst stands out with dual dairy and plant-based lines enriched with elements like encapsulated avocado oil, Chaga mushroom flour, and fruit juice spheres.

Current market trends—such as the rise of personalized nutrition, interest in adaptogens (e.g., chaga), and premium plant-based alternatives—support a strong market entry strategy. With consumers actively seeking multifunctional foods, SymbioBurst is well-positioned to meet demand for next-generation yogurts that merge scientific credibility with enjoyable, health-forward experiences.

IV. Research and Development (500 words)

1. Research and Development Process for the New Food Product

The R&D strategy followed a convergent model integrating food technology, nutritional science, and consumer-driven design. The goal was to develop two functionally equivalent yet matrix-specific yogurts — one dairy-based and one plant-based — targeted at both conventional and specialized dietary markets.

Initial phases involved identifying consumer needs and current trends, with emphasis on demand for allergen-free, probiotic-rich, and plant-based functional foods. A comprehensive literature review

supported the inclusion of proven bioactive compounds such as probiotics, prebiotics, Chaga mushroom, and encapsulated avocado oil.

Based on these insights, the two yogurt products developed were:

1. **Dairy-based yogurt**: Containing symbiotic yogurt starters, multi-strain probiotics, prebiotics, fruit juice spheres (berries, lychee, passion fruit), and Chaga mushroom flour.
2. **Plant-based yogurt** (rice or hemp-based): Allergen-free and vegan, incorporating symbiotic yogurt starters, multi-strain probiotics, prebiotics, fruit juice spheres, Chaga mushroom flour, and encapsulated avocado essential oil.

2. Primary Consumer Research: Survey-Based Evaluation of Product Acceptance

An online consumer survey was conducted to explore interest in functional yogurts enriched with probiotics, prebiotics, superfoods (like Chaga mushroom), plant bases, and other innovative ingredients (https://docs.google.com/forms/d/e/1FAIpQLSeiBjo1vjVs9Lk8jkmOB_yaPCMP6873VpUoi45YuMejj3Wtxw/viewform) (**Appendix 1**). 84 participants responded. A screenshot of response numbers (taken on 7.07.2025 at 18:45 Bulgarian time) is shown in Figure 1. Some figures with some preliminary results for some of the questions are given in **Appendix 2**. The whole resulting feedback will be processed and reported at the full case study presentation, scheduled in two weeks, offering insight into consumer perceptions, market alignment, and potential refinements. This consumer-oriented approach reinforces SymbioBurst's foundation in nutritional science, ingredient innovation, and sensory satisfaction across both dairy and plant-based platforms.

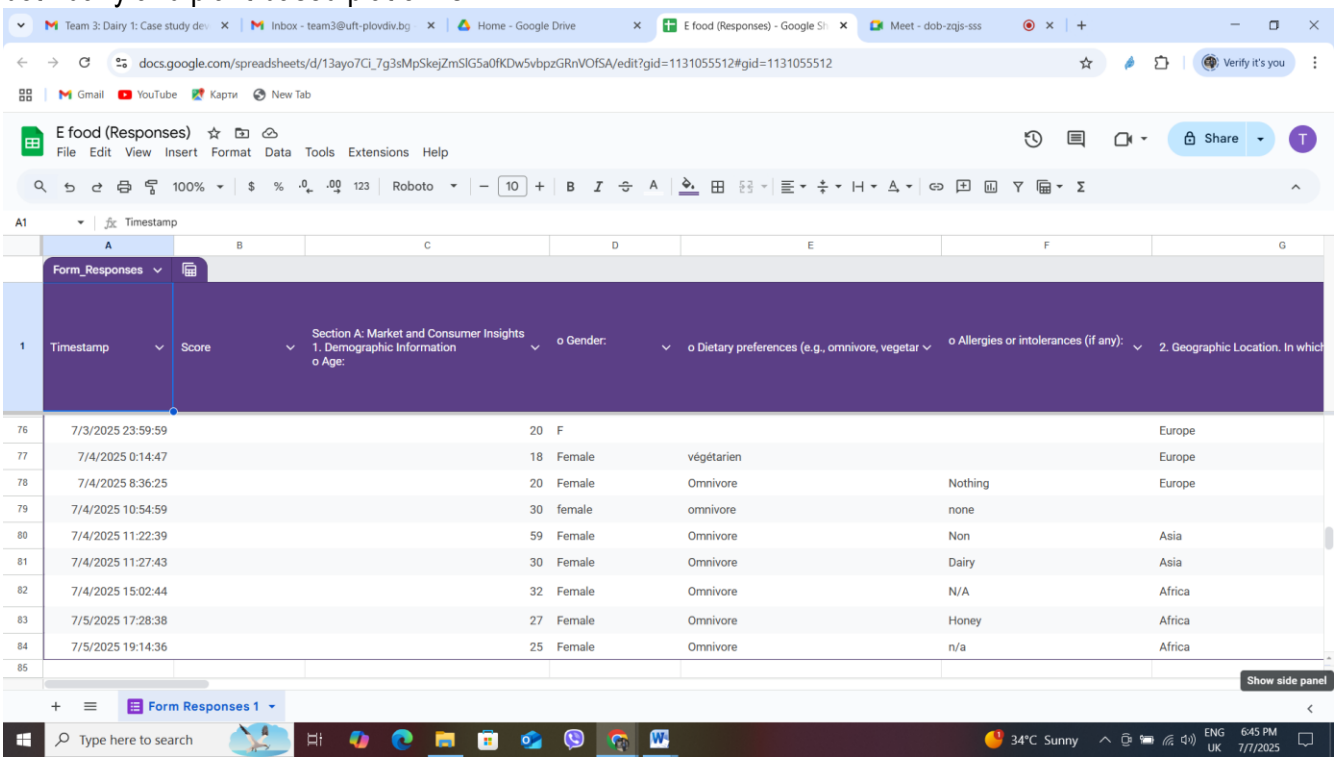


Fig. 1. A screenshot of the current number of responses to the online questionnaire for the yogurt case study development

3. Formulation, Recipe Development, and Production

Formulation began with benchmarking and literature review of probiotic yogurts to select ingredients with substantiated health benefits that also contribute to product stability.

Key ingredients and rationale:

- **Symbiotic probiotics**: A multi-strain blend including *Lacticaseibacillus rhamnosus, Lactiplantibacillus plantarum, Lactobacillus acidophilus, Lactobacillus helveticus, Lactobacillus gasseri, Lactobacillus johnsonii*, and *Bifidobacterium* sp. complex. It promotes gut microbial balance and diversity.
- **Prebiotics**: Fructooligosaccharides (FOS) support the growth of bifidobacteria and lacic acid bacteria while reducing coliforms.
- **Chaga mushroom flour**: Rich in beta-glucans, polyphenols, and melanin; offers antioxidant, anti-inflammatory, and adaptogenic benefits.
- **Fruit juice spheres**: Created via reverse spherification with pectin gels, they add nutrients, antioxidants, and sensory appeal.
- **Encapsulated avocado essential oil** *(plant-based yogurt only)*: High in omega fatty acids and vitamin E, with anti-inflammatory effects; encapsulation preserves bioactivity.

The dairy-based yogurt used traditional fermentation, adapted to include probiotics, prebiotics, Chaga mushroom, and juice spheres without affecting product quality. The plant-based version was optimized for creaminess, mild sweetness, and fermentability while remaining vegan and allergen-free.

To ensure scalability, production methods included controlled fermentation, precise ingredient incorporation, and encapsulation protocols. Flowcharts in Figures 2 and 3 illustrate the full production processes.

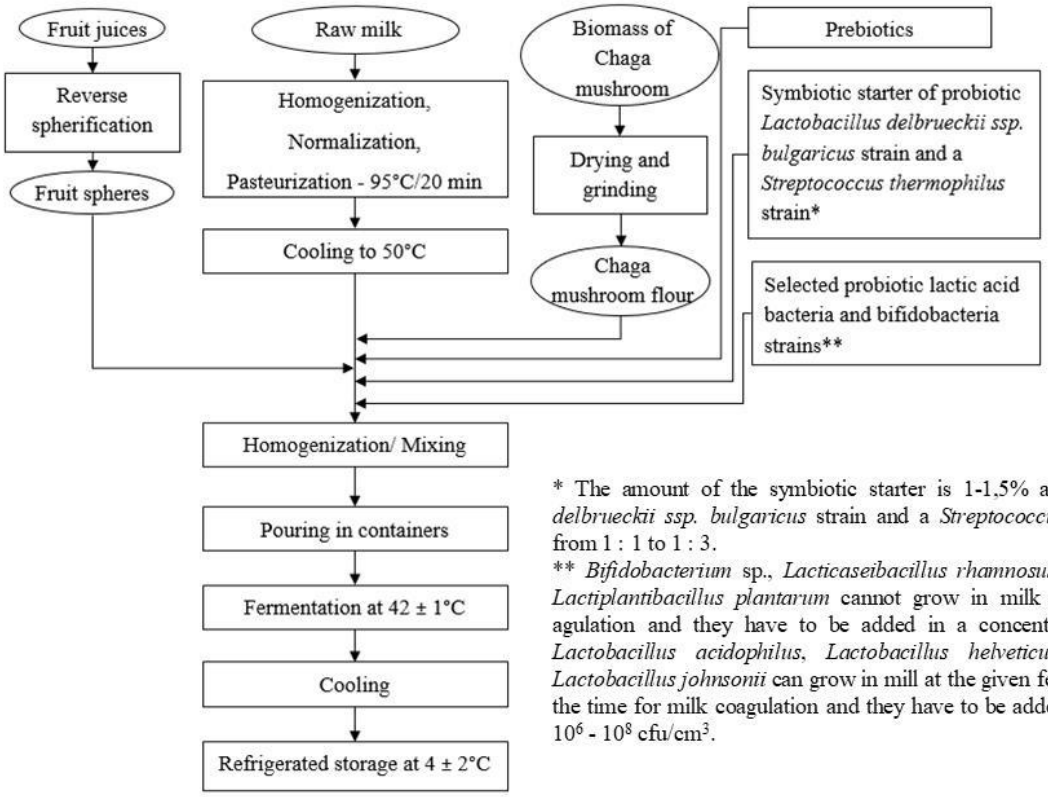


Fig. 2. Production process of functional dairy-based yogurt

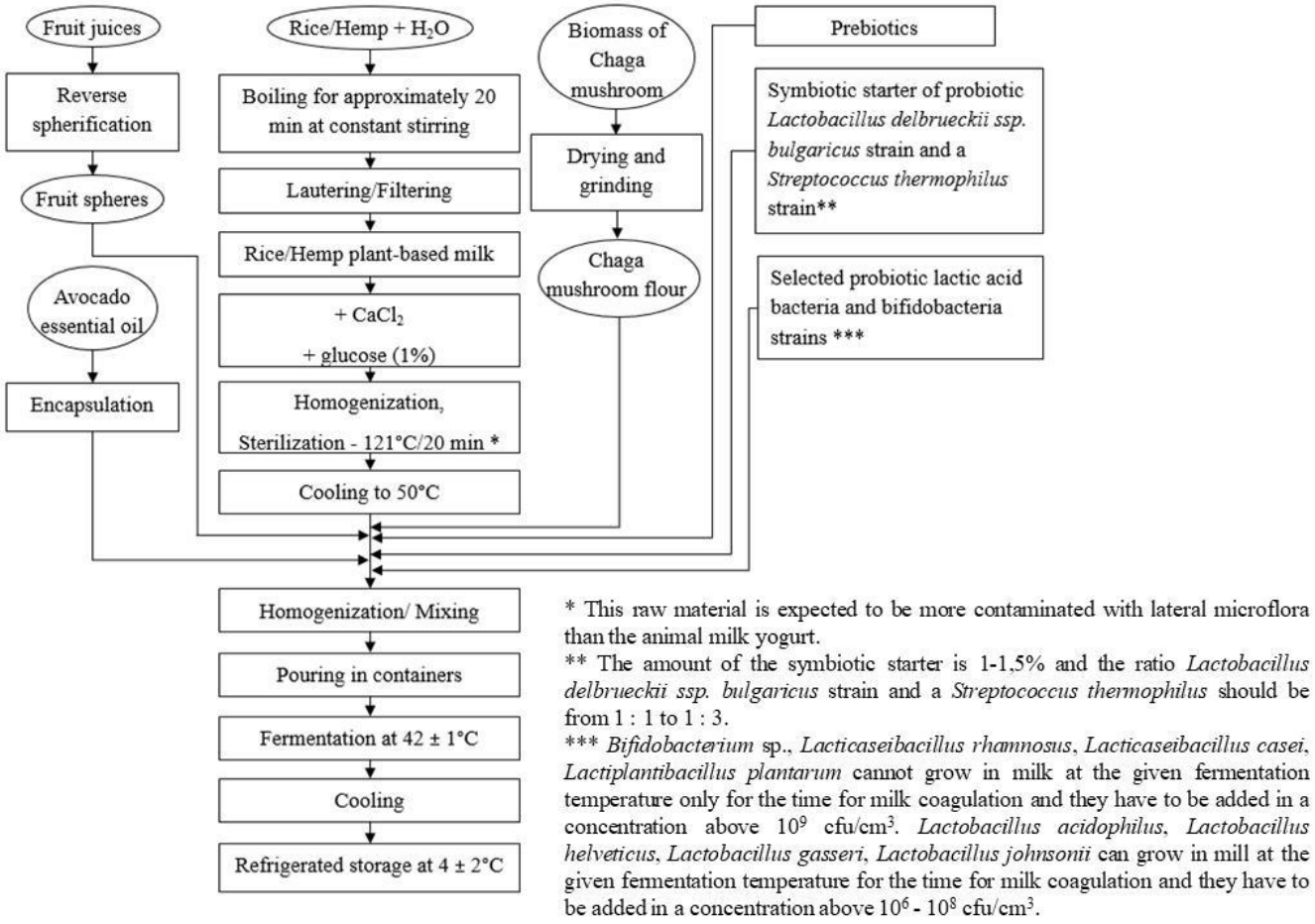


Fig. 3. Production process of functional plant-based yogurt

This integrated approach enabled the creation of two functional yogurts aligned with health trends and diverse dietary needs.

V. Product Description (500 words)

The innovative dairy-based yogurt *SymbioBurst Classic* combines conventional yogurt with cutting-edge functional ingredients. The base is high-quality milk and it is fermented with symbiotic yogurt starter, blending probiotic strains and prebiotics to support gut health and microbial balance. It contains:

- A symbiotic mix of probiotic strains: *Bifidobacterium* complex (*B. bifidum, B. infantis, B. longum, B. breve*), *Lacticaseibacillus rhamnosus, L. casei, Lactiplantibacillus plantarum, Lactobacillus acidophilus, Lactobacillus helveticus, Lactobacillus gasseri, Lactobacillus johnsonii*;
- Prebiotics (fructooligosaccharides);
- Microencapsulated fruit juice spheres (forest fruits, lychee, passion fruit):
- Chaga mushroom flour.

The product offers a balanced macronutrient profile with protein from dairy, natural sugars from fruit, and fiber from prebiotics—resulting in a next-generation yogurt that promotes digestive and overall well-being.

The vegan, allergen-free yogurt alternative *SymbioBurst Pure* provides inclusive nutrition without compromising functionality or flavor. Made from rice or hemp milk, it is free from dairy, soy, gluten, nuts, and other common allergens, ideal for consumers with dietary restrictions.

Fermented with plant-compatible symbiotic yogurt starter, it includes:

- The same multi-strain probiotics as the dairy-based version;
- Prebiotics (fructooligosaccharides);
- Microencapsulated fruit juice spheres;
- Chaga mushroom flour;
- Encapsulated avocado essential oil.

This version is low in saturated fat, contains no added sugars, and offers moderate fiber and healthy fats. The plant base provides mild protein, while the encapsulated oil enhances the lipid profile, yielding a clean-label, functional food aligned with modern dietary trends.

The **nutritional information** for the two new yogurt products is given in Table 1.

Table 1. Nutritional Information Comparison of *SymbioBurst Classic* and *SymbioBurst Pure* (per 100g)

Nutrient / Feature	*SymbioBurst Classic* (Dairy-based yogurt)	*SymbioBurst Pure* (Plant-based yogurt)
Energy	~80–93 kcal	~87–100 kcal
Protein	4–5.3 g	2–3.3 g
Total Fat	2–2.7 g	4–5.3 g
Saturated Fat	~1.7 g	~0.7–1.3 g
Unsaturated Fat	Minimal	~2.7–4 g (from oil)
Carbohydrates	8–9.3 g	6.7–8.7 g
Sugars (natural + fruit)	~5.3–6.7 g	~4–5.3 g
Dietary Fiber	~1.3–2 g	~2–2.7 g
Probiotics	≥6.7×10^{10} CFU/g	≥6.7×10^{10} CFU/g
Sodium	~40–53 mg	~27–40 mg
Calcium	~13–17% RDI	~7–10% RDI (fortified)
Functional Ingredients	Chaga mushroom, fruit spheres	Encapsulated avocado oil, Chaga mushroom, fruit spheres
Free From	—	Dairy
Vegan	No	Yes

Unique Selling Proposition (USP): Both yogurts deliver:

- Probiotic + prebiotic synergy

- Immunity and gut health benefits
- Novel texture from fruit spheres
- Adaptogenic effects from chaga mushroom flour

What differentiates the dairy-based yogurt product is the integration of chaga mushroom flour with an advanced symbiotic fermentation system**.** The inclusion of fruit juice spheres offers a multisensory experience—both visual and textural—setting it apart from conventional flavored yogurts. It appeals to health-conscious consumers seeking scientifically backed, bio-enhanced dairy options with added immunity and digestive benefits.

The plant-based yogurt stands out as a fully vegan, allergen-safe functional product that bridges the gap between plant-based eating and targeted nutrition. Its use of encapsulated avocado oil adds value for consumers seeking healthy fats in a stable, enjoyable format. Combined with the visual and flavor appeal of fruit juice spheres and the inclusion of chaga mushroom flour, this yogurt addresses multiple wellness trends: gut health, immunity, adaptogens, and clean-label plant-based nutrition.

VI. Marketing and Promotion (300 words)

The marketing strategy for launching *SymbioBurst* focuses on positioning the brand as a premium, science-driven, and wellness-focused yogurt line that delivers both functional benefits and sensory innovation. The dual-format product range — dairy-based and plant-based — caters to diverse dietary needs, enhancing market reach and inclusivity.

The brand identity of *SymbioBurst* conveys a fusion of cutting-edge nutritional science and enjoyable taste experiences. The branding emphasizes clean, modern design and scientific credibility, highlighting key features such as *multi-strain probiotics*, *prebiotics*, *bioactive ingredients* like *chaga mushroom flour*, and *encapsulated fruit spheres*. The plant-based variant will additionally highlight its *vegan*, *allergen-free*, and *dairy-free* credentials.

We have developed the label and packaging design (Fig. 4, Fig. 5, Fig. 6 and Fig. 7). The 200 ml format for *SymbioBurst* is designed to be visually appealing and functional. It prioritizes sustainability, using recyclable PET cups or biodegradable bioplastics, aligning with the brand's eco-friendly values. The labels are informative and detailed and they have QR codes that offer consumers the chance to learn more about the microbiome health benefits of the Symbioburst yogurts and track their consumption, providing real-time feedback on how the product is supporting their well-being.

Fig. 4. Packaging container for *SymbioBurst Classic* (the dairy-based yogurt)

Fig. 5. Label for *SymbioBurst Classic* (the dairy-based yogurt)

Fig. 6. Packaging container for *SymbioBurst Pure* (the plant-based yogurt)

Fig. 7. Label for *SymbioBurst Pure* (the plant-based yogurt)

SymbioBurst will be priced at €3.99–€4.49 per unit, reflecting its high-quality ingredients, functional positioning, and value-added benefits. This pricing strategy positions *SymbioBurst* as a competitive yet accessible option in the functional yogurt category, offering a unique value proposition for health-conscious consumers.

Distribution will focus on supermarkets, health food stores, pharmacies, and online platforms, with a subscription model available for regular customers. Promotional activities will include social media campaigns, influencer collaborations, educational social media content and in-store sampling events. Educational content (e.g., gut health benefits, behind-the-scenes R&D stories) will be shared via Instagram, TikTok, and YouTube to build brand authenticity. Influencers in the health and wellness space will also promote *SymbioBurst* on the same platforms leveraging their credibility to engage a broad audience. Key messaging will emphasize *SymbioBurst's* clean, healthy, and next-generation positioning, with a focus on its functional benefits and environmental commitment. Launch activities will focus on building consumer trust and encouraging trial, with sampling campaigns and collaborations at wellness expos, nutrition events, and online health communities.

VII. Financial Analysis (300 words)

Cost analysis. Initial product development costs — including R&D, certifications (organic/vegan), branding, website setup, and staff — are projected at €76,000 in Year 1. These are fixed and non-recurring (Table 2).

Manufacturing variable costs are estimated at €1.65/unit (dairy-based yogurt) and €1.60/unit (plant-based yogurt), covering ingredients (e.g., peptides, chaga mushroom flour, encapsulated oil), recyclable packaging, and production.

Sales and revenue estimation. Market research suggests growing demand for functional, plant-based, and clean-label yogurts in Europe. Competitor pricing for premium functional yogurts ranges from €3.49 to €4.49. *SymbioBurst* targets a retail price of €3.99 (VAT incl.), translating to ~€3.50 (excl. VAT). For a pilot run of 20,000 units per line, projected gross revenue per line is €79,800.

Table 2. Financial analysis for the *SymbioBurst* yogurts

Metric	*SymbioBurst* Classic (Dairy-based yogurt)	*SymbioBurst* Pure (Plant-based yogurt)
Production volume (units)	20,000	20,000
Unit price incl. VAT (€)	3.99	3.99
Unit price excl. VAT (€)	3.50	3.50
Variable cost total (€)	33,000	32,000
Variable cost per unit (€)	1.65	1.60
Fixed costs allocation (€)	38,000	38,000
Fixed cost per unit (€)	1.90	1.90
Total cost per unit (€)	3.55	3.50
Unit margin (€)	-0.05	0.00
Total costs (€)	71,000	70,000
Total revenue (€)	70,000	70,000
Estimated net profit (€)	-1,000	±0
Break-even volume (units)	165,000	132,000
ROI (approx.)	21%	23%

Profitability and ROI. Estimated net profit from the initial batch is €13,800 (dairy-based yogurt) and €14,800 (plant-based yogurt). The calculated break-even volumes are 165,000 units (dairy) and 132,000

units (plant-based yogurt). Return on investment (ROI) is strong for a pilot stage: 21% (dairy-based yogurt) and 23% (plant-based yogurt). Profitability is expected to increase through economies of scale, better sourcing, and rising brand awareness.

SymbioBurst's strong margins, differentiated formulations, and alignment with health-driven market trends position it as a highly scalable and profitable opportunity in the functional food sector.

With scaling, ingredient and packaging costs per unit are expected to decrease, improving margins. Continued consumer interest in functional, allergen-free, and probiotic-rich foods suggests strong growth potential, particularly for the plant-based variant. If well-received, the project shows favorable profitability and supports long-term brand expansion in the premium health food sector.

VIII. Challenges and Risks (200 words)

Developing a new synbiotic dairy-based yoghurt with fruit juice spherifications that offers a plant-based alternative presents several challenges. First, ensuring sensory appeal (taste, texture, and appearance) may be difficult due to the use of alternative milk bases and spherifications, which may not match consumer expectations of traditional dairy yoghurt. Second, achieving product stability and shelf-life can be complex, especially in maintaining the integrity and texture qualities of the fruit-juice spheres and the viability of probiotics. Third, sourcing high-quality, consistent rice/hemp ingredients and aligning with regulatory requirements for synbiotic labeling can add to production hurdles. Lastly, consumer acceptance of both the plant-based and the dairy-based functional yogurts remains a potential risk. (Gomez-Quintero et al., 2022; Sharma et al., 2024).

To address these issues, iterative product testing with target consumers is key to refining flavor, mouthfeel, and appearance. Microencapsulation techniques can enhance probiotic stability and improve shelf-life. Close collaboration with ingredient suppliers can ensure quality and consistency, while early consultation with food regulatory experts will support compliance. Effective marketing and education on the benefits of synbiotic and plant-based diets can help overcome consumer hesitation.

Together, these mitigation strategies support the development of an innovative, appealing, and functional food product.

XI. Internationalization Strategy (300 words)

SymbioBurst's internationalization strategy is founded on adaptive innovation, cultural inclusivity, regulatory compliance, and sustainability to ensure smooth global expansion and long-term brand credibility. The approach combines product adaptation, phased market rollout, and collaborative partnerships that reflect both scientific precision and cultural awareness.

Phased Global Rollout and Product Adaptation

Expansion will begin in the European Union (France, Germany, Spain), where regulatory frameworks align with EFSA standards, followed by health-oriented markets such as Canada and Japan. A third phase will target emerging, diverse regions including Brazil, India, and Middle Eastern countries (UAE, Saudi Arabia, Qatar). SymbioBurst's two variants — Classic (dairy-based) and Pure (plant-based) — enable flexibility across cultures. The Classic line will pursue Halal and Kosher certifications (Fig. 8), while

the Pure variant will target vegan (Fig. 9), Hindu, and Buddhist consumers. A “Cultural Flavor Mapping” tool will guide flavor localization (e.g., Matcha–Yuzu for Japan, Mango–Turmeric for India, Açaí – Passionfruit for Brazil) and limited-edition fusions such as *Ramadan Relief*, *Diwali Delight*, and *Hanami Harmony* (Fig. 10).

Fig. 8. Exemplary Halal certification for the Symbioburst products

Partnerships, Compliance, and Innovation

Co-branding with local companies (e.g., *SymbioBurst x Almarai* or *x Danone France*) will enhance authenticity, while collaborations with universities (Wageningen, Bologna, Guelph) will validate health claims. Regulatory compliance will align with FDA, EFSA, ISO 22000, Organic, and B Corp certifications (Fig. 11). Further information on the International Food Safety and Quality Standards that shows how SymbioBurst will integrate globally recognized certification systems (IFS, BRC, HACCP, GS1) and quality standards to guarantee food safety, quality, and traceability, including Regulatory Overview on FDA vs. EFSA Labelling and Claims for SymbioBurst is given in Appendix 3.

Fig. 9. Label design for Symbioburst Pure, specifying that it is vegan.

Fig. 10. Limited editions of the Symbioburst yogurt line

Fig. 11. Lid labels design for Symbioburst Classic and Symbioburst Pure

Sustainability and Consumer Engagement

A Global Sustainability Charter will unify eco-friendly packaging, carbon transparency, and renewable energy adoption. QR-enabled, multilingual packaging will educate consumers on microbiome health and sustainability. Digital marketing will adapt regionally — scientific wellness content in Europe, family-centered storytelling in Latin America, and gamified interaction in Asia. Product textures and branding will

match local preferences, while shelf-stable technologies and optimized cold-chain logistics will reduce environmental impact.

Through this glocal (wordgame – a made-up word to combine *global* and *local*) approach — Science Meets Nature Everywhere — SymbioBurst aims to deliver inclusive, functional, and sustainable yogurt experiences across global markets.

XII. Sustainability impact (max. 300 words)

SymbioBurst integrates sustainability across its entire product lifecycle — from ingredient sourcing and production to packaging and distribution — reflecting a deep commitment to environmental responsibility and transparency. The dual product lines, SymbioBurst Classic (dairy-based) and SymbioBurst Pure (plant-based), enable flexibility in reducing environmental impact while addressing diverse consumer needs.

The Pure variant, formulated with rice and hemp, offers a lower carbon and water footprint compared to conventional dairy. Hemp cultivation, in particular, enhances biodiversity, improves soil structure, and requires minimal pesticides (Craig et al., 2023; Marlyse Meffo Kemda et al., 2024). Both product lines incorporate naturally functional ingredients such as Chaga mushroom flour and fruit juice spheres, with potential to include upcycled fruits to reduce food waste. Partnerships with local farmers practicing regenerative agriculture will further support soil regeneration and biodiversity while strengthening regional economies.

SymbioBurst aims to achieve carbon neutrality by 2050 through renewable energy integration, efficient logistics, and verified carbon offset initiatives such as reforestation and renewable energy investments. Implementing simplified Life Cycle Assessments (LCA) for both product lines will quantify and communicate key environmental metrics — including CO_2 emissions, water use, and waste generation— to ensure transparency and continuous improvement.

Packaging strategies include recyclable PET and biodegradable or plant-based alternatives, supported by digital Eco-Score labeling and QR codes that replace printed materials while educating consumers about sustainability practices. Localized production and optimized cold-chain logistics will reduce transportation emissions and resource use. Water efficiency will be closely monitored through standardized indicators (e.g., liters of water per kilogram of product), with closed-loop systems introduced where feasible.

Together, these initiatives form a holistic approach — uniting carbon reduction, circular resource use, regenerative sourcing, and transparent communication — positioning SymbioBurst as a model for sustainable innovation in the functional food sector.

XIII. Digital and Technological Integration *(Max. 250 words)*

Digital technology and education form the foundation of SymbioBurst's innovative strategy, transforming it into a truly interactive learning ecosystem. The **multilingual website** bubbleyogurt.carrd.co (Fig. 12) connects every yogurt cup to a dynamic digital platform through GS1 Digital Link QR codes (Fig. 13a, Fig. 13b, Fig. 13c, Fig. 13d, Fig. 13e, Fig. 13f) printed on the packaging. By scanning them, consumers

access transparent, localized information that bridges food science, sustainability, and everyday experience (Fig. 14; Fig. 15).

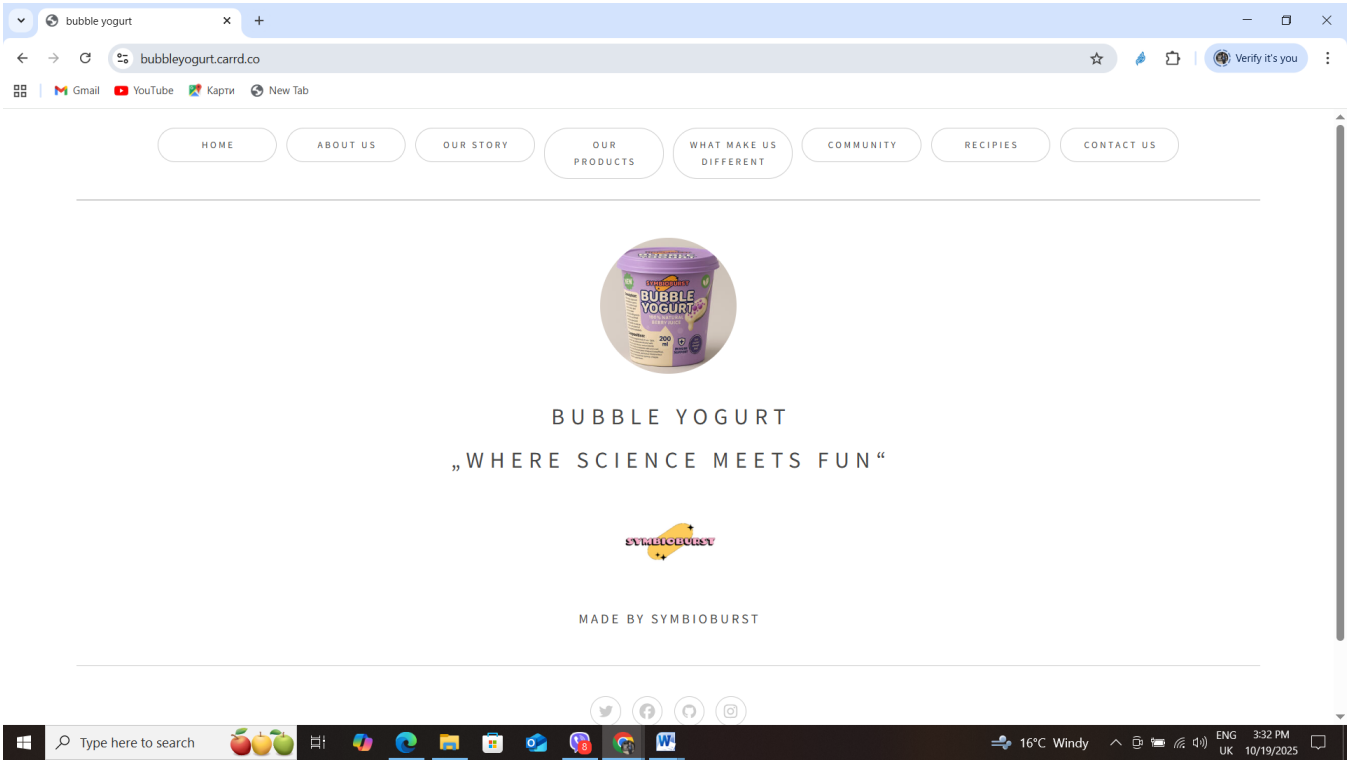


Fig. 12. The homepage *SymbioBurst* website (in English)

a) In English

b) In French

c) In Spanish

d) In Romanian

e) In Hungarian

f) In Bulgarian

Fig. 13. QR codes for the version of the multilingual website in the different languages

The website includes eight interactive sections that guide users through SymbioBurst's story and science:

- **Home** – introduces the *SymbioBurst Classic* and *SymbioBurst Pure* yogurts, emphasizing taste, balance, and innovation.
- **About Us** – presents the team of students and mentors working within the *E-Food Project*, demonstrating collaboration in education and research.
- **Our Story** – narrates the brand's journey from concept to sustainable, functional product innovation.
- **Our Products** – explains the science behind the formulations, detailing probiotics, prebiotics, and Chaga mushroom flour in clear, accessible language.
- **What Makes Us Different** – features technological processes such as reverse spherification **and** encapsulation, supported by a YouTube demonstration video.
- **Community** – highlights outreach, educational initiatives, and partnerships that promote healthy eating and sustainability awareness. It also features the team's creative use of a **"Burst me up" Instagram selfie filter**, with photos of the members using it to promote brand identity and digital interaction.
- **Recipes** – inspires creativity and learning through simple, nutritious uses of SymbioBurst products.
- **Contact Us** – provides communication channels and includes an interactive **questionnaire** that collects consumer opinions on taste, sustainability, and innovation. The feedback will be used to guide **future product adjustments and educational content updates**.

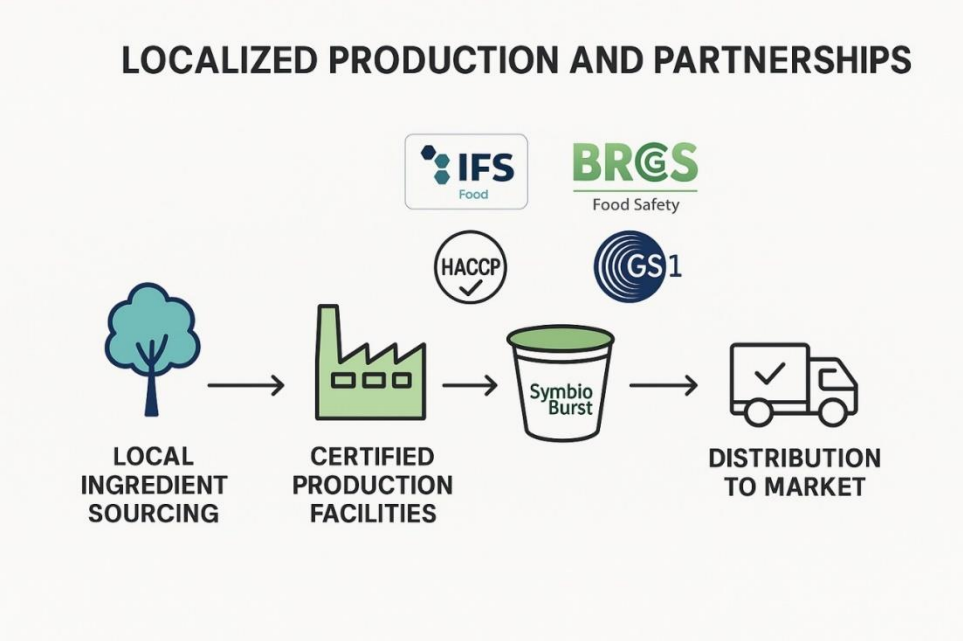


Fig. 14. Localized production and partnerships in the production and distribution of Symbioburst

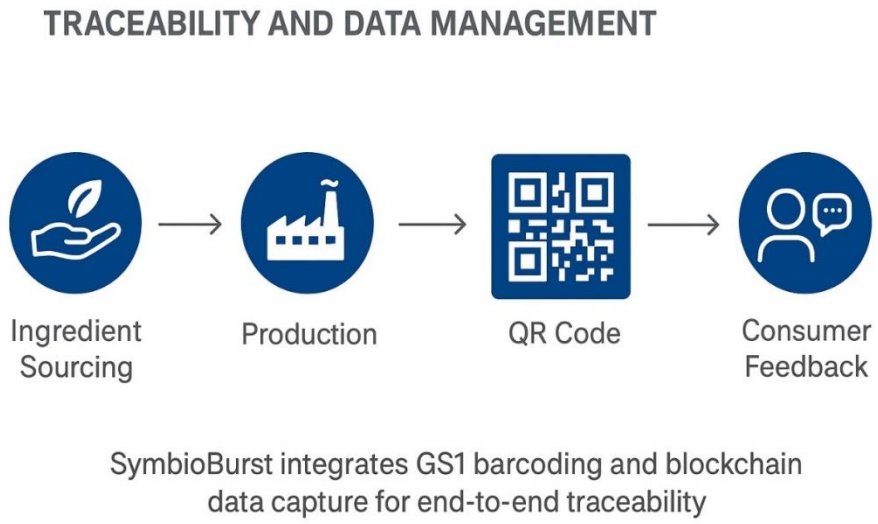


Fig. 15. Traceability and data management

Additionally, the site will feature **digital comics, infographics, and interactive learning materials** created to make food technology engaging and understandable for all ages. Future expansions will include **AI-driven personalization**, **AR storytelling**, and **blockchain traceability**, reinforcing SymbioBurst's mission to connect digital education with sustainable food innovation.

XIV. Consumer Communication Plan *(Max. 250 words)*

The SymbioBurst Consumer Communication Plan integrates education, transparency, and engagement to build a strong and trusting relationship with consumers. Guided by the slogan **"Science Meets Nature,"** the strategy combines clear scientific storytelling with visually appealing and interactive communication tools that educate as much as they promote.

On-Pack Communication: Each SymbioBurst package features an **already developed QR code** linking directly to the **multilingual website** bubbleyogurt.carrd.co. This connection transforms packaging into a digital learning interface. Consumers can instantly explore sections such as *Our Products*, *What Makes Us Different*, and *Sustainability*, where they discover the science behind probiotics, prebiotics, and Chaga mushroom flour, as well as the brand's sustainability efforts. Simple infographics and videos make this information engaging and easy to understand for all age groups.

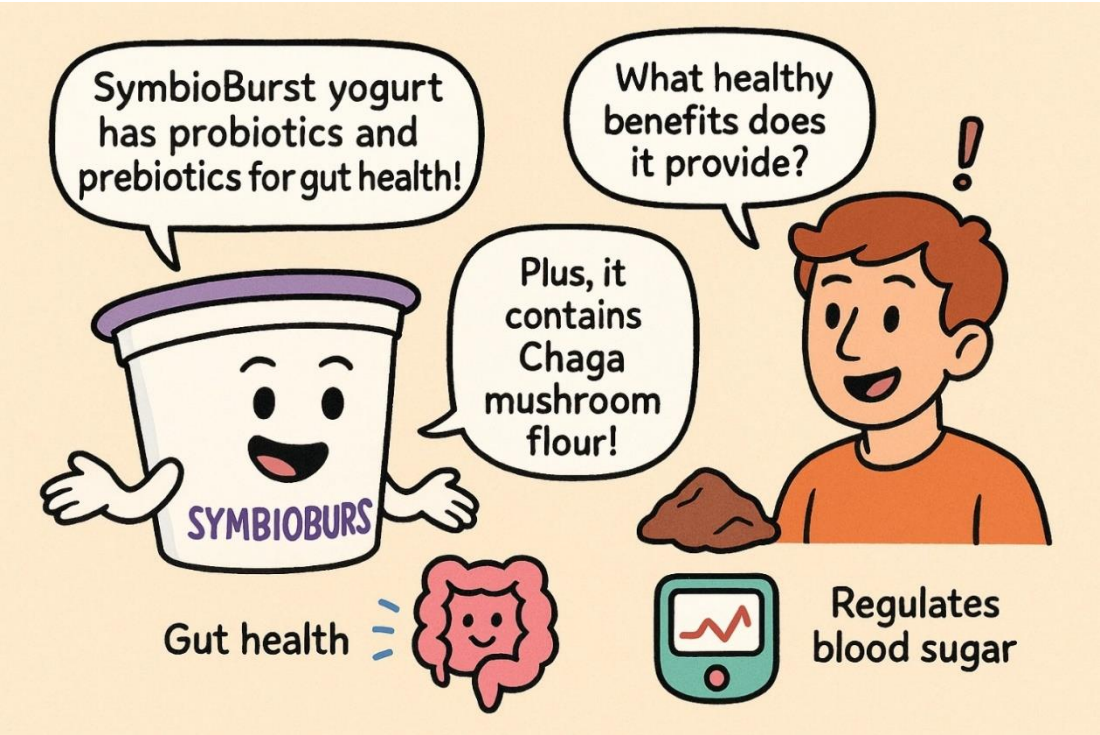
Educational and Interactive Engagement: SymbioBurst goes beyond marketing by acting as an **educational bridge** between food technology and consumers. The website's Community, Recipies, and **Educational Materials** (including comics (Fig. 16a,b), videos, and infographics) encourage active

learning about nutrition, fermentation, and sustainability. These tools are tailored for diverse audiences—from children discovering healthy eating in an educational way to students exploring food science.

Feedback and Co-Creation: Through the interactive **Questionnaire** on the ***Contact Us*** page button, consumers share opinions on product taste, packaging, and sustainability awareness. This feedback loop will directly inform future product improvements, recipe development, and educational updates—making consumers co-creators in the ongoing evolution of SymbioBurst.

Social and Media Communication: SymbioBurst's digital presence extends to social media with storytelling campaigns, expert endorsements, and user-generated challenges under hashtags such as **#BurstYourBalance** and **#SymbioSpoon**, creating an active and informed community (Table 3) around health, sustainability, and scientific curiosity.

a)



b)

Fig. 16. Exemplary comics as part of the educational materials targeting different age groups.

Table 3. Age-specific strategy for education and advertising Symbioburst

Age Group	Approach	Channels
Children & Students	Focus on fun, visually engaging content – animations, infographics, educational games about healthy eating.	School programs, social media (TikTok, YouTube Kids)
Young Adults (18–35)	Practical tips for energy and focus, quick snack recipes, emphasis on fitness and wellness.	Instagram, TikTok, podcasts, blogs
Adults (35–55)	Scientifically grounded information on stress prevention, fatigue reduction, and chronic disease prevention; family-oriented focus.	LinkedIn, Facebook, webinars
Seniors (55+)	Clear and accessible explanations on maintaining immunity and overall vitality.	TV, radio, print media, lectures at community centers

IX. Conclusion (150 words)

The SymbioBurst case study demonstrates how scientific innovation, sustainability, and digital education can merge into a forward-thinking functional food brand. Combining two product lines—*SymbioBurst Classic* (dairy-based) and *SymbioBurst Pure* (plant-based)—the project addresses diverse nutritional and cultural needs through adaptive innovation and global market readiness. Guided by a glocal strategy (wordplay, a new word combining “global” and “local”), SymbioBurst integrates sustainable sourcing, regenerative agriculture, and carbon-neutral ambitions while aligning with international certifications and eco-friendly packaging.

Digitalization lies at the heart of the brand’s transparency and engagement strategy. Through QR-enabled multilingual packaging, consumers access the SymbioBurst website, interactive educational materials, and a questionnaire that informs future product improvements. The addition of comics, infographics, and even an Instagram filter strengthens outreach across age groups, blending science with creativity.

Ultimately, SymbioBurst exemplifies how digital learning, sustainability, and consumer co-creation can redefine the future of functional foods — making “Science Meets Nature” not just a slogan, but a living reality.

Appendix 1:

Yogurt Case Study Development Questionnaire

Welcome!

Thank you for taking the time to participate in our survey. We're exploring new ideas for functional yogurt products, and your input is incredibly valuable.

This short questionnaire will ask about your preferences, habits, and opinions related to yogurt — including ingredients, health benefits, and product trends. Your answers will help us better understand what consumers want and guide the development of future products.

The current survey focuses on the following two yogurts being developed:

1. ***Dairy-based yogurt:*** it contains symbiotic yogurt starter and milk peptides; it is enriched with fruit juice spheres (berries; lychee, passion fruit); different strains of probiotic microorganisms, prebiotics, Chaga mushroom.
2. ***Plant-based yogurt (Rice or hemp-based) yogurt:*** it is allergen-free and suitable for vegans; it it contains symbiotic yogurt starter and milk peptides; it is enriched with fruit juice spheres (berries; lychee, passion fruit); different strains of probiotic microorganisms, prebiotics, Chaga mushroom, encapsulated avocado essential oil.

All responses are confidential and will only be used for research purposes. There are no right or wrong answers — just your honest thoughts!

Let's get started!

Section A: Market and Consumer Insights

1. **Demographic Information**
   - Age:
   - Gender:
   - Dietary preferences (e.g., omnivore, vegetarian, vegan, dairy-free):
   - Allergies or intolerances (if any):
2. **Geographic Location.** In which region or country do you currently live?

   ☐ North America
   ☐ South America
   ☐ Europe
   ☐ Asia

☐ Africa
☐ Oceania
☐ Other (please specify): _____

3. **Do cultural or traditional food practices in your household influence your yogurt preferences (e.g., type, flavor, ingredients, preparation)?**

☐ Yes – cultural traditions play a major role
☐ Somewhat – a mix of cultural and modern influences
☐ No – my choices are based mostly on personal preference or health trends

4. **Health Priorities**
   - o Which of the following health benefits are most important to you? (Select all that apply)

☐ Gut health
☐ Immunity
☐ Mental wellness
☐ Energy
☐ Skin health
☐ Weight management
☐ Other (please specify): _____

5. **Consumption Behavior**
   - o How frequently do you consume yogurt or yogurt alternatives?

☐ Daily ☐ 3–5 times/week ☐ 1–2 times/week ☐ Rarely

- o When would you most likely consume the two yogurts being developed?

☐ Breakfast ☐ Snack ☐ Post-workout ☐ As a dessert ☐ Other: _____

- o Which of the following you consider the most important for making your choice of yogurt products?

☐ Taste
☐ Health benefits
☐ Texture and mouthfeel
☐ Price
☐ Ethical/sustainability credentials

- o How important are the following in your food choices?

☐ Carbon footprint ☐ Animal welfare ☐ Plastic-free packaging ☐ Local sourcing

6. **Trust in Health Claims**

- How important is scientific validation of functional ingredients to you when choosing food products?

☐ Extremely important
☐ Somewhat important
☐ Neutral
☐ Not important

7. **Which type of scientific evidence do you trust most when evaluating health claims on food products (e.g., "supports digestion" or "boosts immunity")?**

☐Clinical studies in humans
☐Endorsement by health professionals (e.g., doctors, dietitians)
☐Publications in scientific journals
☐Government or regulatory approval (e.g., EFSA, FDA)
☐University or research institution studies
☐Brand reputation or transparency
☐Other (please specify): _____

Section B: Product Concept Testing

8. **Product Awareness and Interest**
   - Would you be interested in trying a yogurt that includes scientifically backed probiotics, prebiotics, milk peptides, and adaptogens?

☐ Yes
☐ Maybe
☐ No

9. **Perception of the Dairy-Based Yogurt**
   - How appealing is a yogurt enriched with native milk bioactives (e.g., peptides, probiotics, immune-support compounds)?

☐ Very appealing
☐ Somewhat appealing
☐ Neutral
☐ Not appealing

- Concerns (if any) about dairy-based functional yogurts: _____

10. **Perception of Plant-Based Yogurt**

- How appealing is a rice/hemp-based yogurt with encapsulated avocado oil, fruit spheres, and Chaga mushroom flour?

☐ Very appealing
☐ Somewhat appealing
☐ Neutral
☐ Not appealing

- Concerns (if any) about plant-based functional yogurts: _____

11. **Ingredient Familiarity**
    - Please indicate your familiarity with the following ingredients (Unknown – Familiar – Use Regularly):

Ingredient	Unknown	Familiar	Use Regularly
Probiotics			
Milk peptides			
Encapsulated avocado oil			
Prebiotics			
Chaga mushroom flour			
Fruit juice spheres			

Section C: Sensory and Packaging Feedback

12. **Sensory Expectations**
    - What sensory attributes do you expect or desire in a functional yogurt?

☐ Creamy texture
☐ Mild sweetness
☐ Fruity bursts
☐ Natural flavors
☐ No aftertaste
☐ Other: _____

13. **Packaging Preferences**

· What elements influence your trust in a yogurt product? (Select all that apply)

☐ Transparent labeling
☐ Scientific claims

☐ Sustainability messaging
☐ Packaging design
☐ Recyclability or compostability
☐ Minimalistic design / easy to carry

14. **Help Us Name Our New Yogurts!** We're developing two innovative yogurt products and would love your creative input.

☐ SymbioBurst
☐ Symbiotica
☐ ProBioPulse
☐ ChagaBerry Bliss
☐ SymbiWell

15. **Which of the following slogans do you find most appealing and fitting for the two yogurt products being developed?** *(Please select your top 1 or 2 favorites)*

☐ "Nature's Science for Your Wellness"
☐ "Where Innovation Meets Nature"
☐ "Nourish Your Body, Delight Your Senses"
☐ "Functional Yogurt, Inspired by Nature"
☐ "Symbiotic Goodness, Naturally Delivered"
☐ "Wellness You Can Taste"
☐ "Crafted for Health, Loved for Flavor"

Section D: Commercial Viability & Purchase Intent

16 Willingness to Pay

· How much more would you be willing to pay for a yogurt product offering functional health benefits (e.g., probiotics, adaptogens, etc.) compared to standard yogurt?

☐ No more
☐ Up to 10% more
☐ Up to 25% more
☐ Over 25% more

17. Product Positioning

· Where would you expect to find the two yogurts being developed?

☐ Supermarkets
☐ Health food stores
☐ Online retailers

☐ Pharmacies/nutritional outlets
☐ Other: _____

18. Brand Trust

· Which of the following would most influence your trust in the two yogurts being developed?
☐ Clinical studies backing ingredients
☐ Transparent supply chain
☐ Third-party certifications (e.g., vegan, allergen-free, organic)
☐ Customer reviews
☐ Media/social proof

Section E: Open-Ended Feedback

19. What would make you choose any of the two yogurts being developed?
20. Do you have suggestions for improving either product concept?
21. **We'd love your input!** What features, ingredients, or health benefits would you like to see in future yogurt products? Feel free to share any thoughts or suggestions — for example:

- New flavors (e.g., tropical fruit, herbs, spices)
- Functional benefits (e.g., stress relief, immune support, gut health)
- Ingredients (e.g., plant-based proteins, superfoods, probiotics, adaptogens)
- Dietary needs (e.g., low sugar, allergen-free, high-protein, vegan)
- Packaging or format (e.g., drinkable yogurt, reusable containers, snack packs)
-

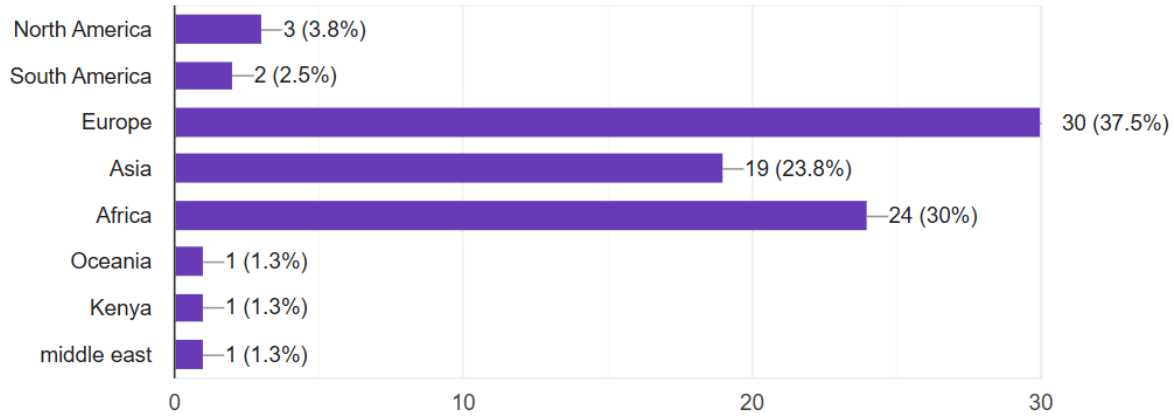
Your ideas: _____

Thank you for your kind participation! Your time, thoughts and opinions are really important for the development of the new yogurt products! We truly appreciate your input — your feedback will help shape the next generation of functional yogurt products!

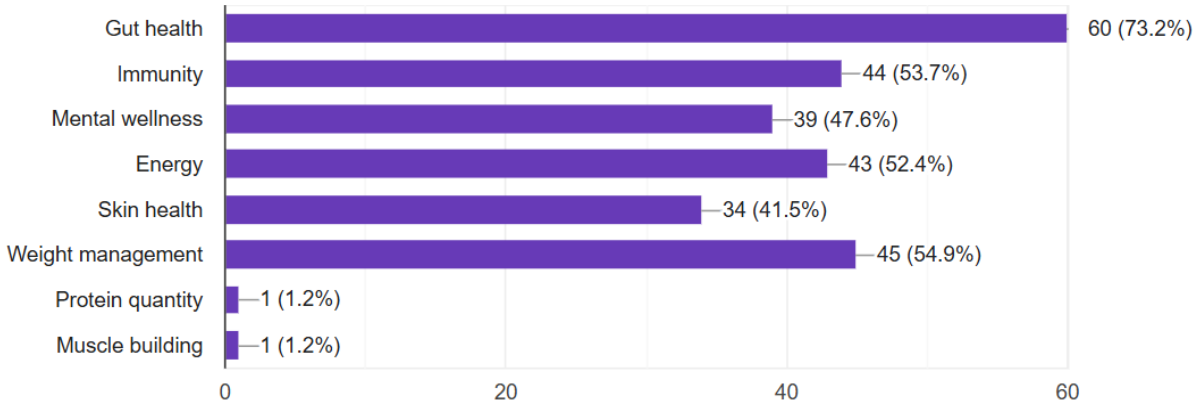
Have a great day!

Appendix 2:

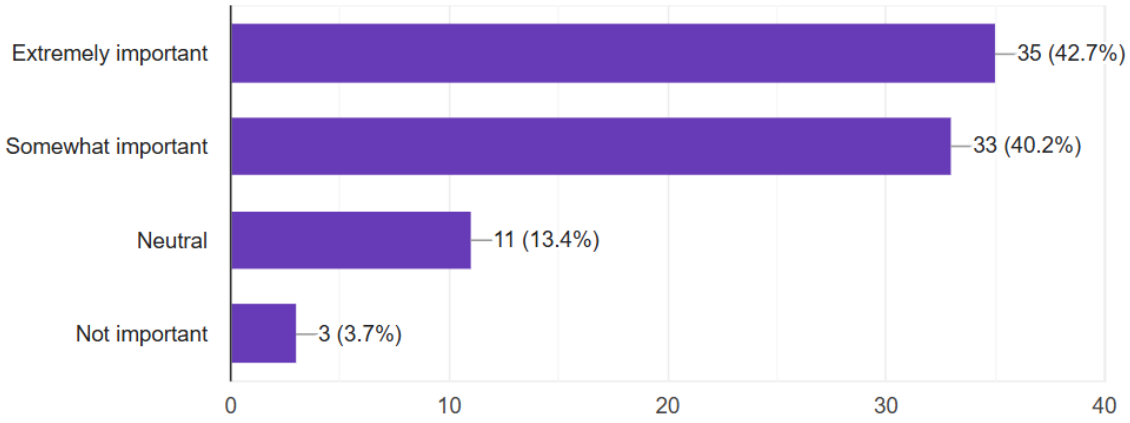
Figures with preliminary results for some of the questions from the Yogurt Case Study Development Questionnaire.



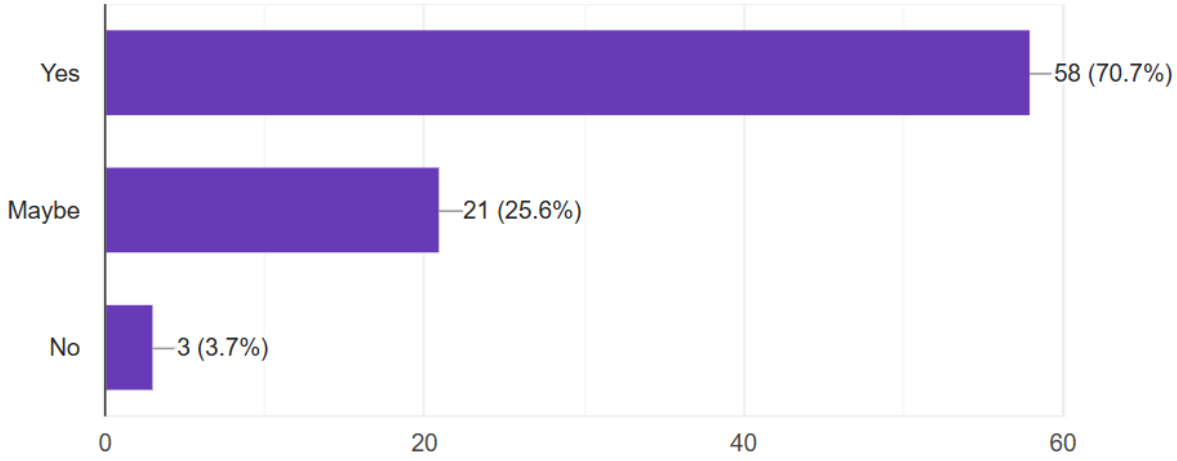
Appendix 2. Fig. 1. Preliminary results for Question 2. Geographic Location. In which region or country do you currently live?



Appendix 2. Fig. 2. Preliminary results for Question 4. Which of the following health benefits are most important to you? (Select all that apply)



Appendix 2. Fig. 3. Preliminary results for Question 6. How important is scientific validation of functional ingredients to you when choosing food products?



Appendix 2. Fig. 4. Preliminary results for Question 8. Would you be interested in trying a yogurt that includes scientifically backed probiotics, prebiotics, milk peptides, and adaptogens?

Appendix 2. List 1. Preliminary results for Question 19. What would make you choose any of the two yogurts being developed?

Health benefits

Taste
Curiosity for the new product, transparently written that the ingredients are organic, local etc
Improved on what is already in the market
There are new and I like trying new things
Price
Taste and price
If it offer more health benefits compared to regular yogurt (Greek yogurt may be a strong opponent because of its popularity)
The taste
The price - the benefits
Maybe something like a documentary or a short-video on how it works, how you made it and how it betters my health
At first it would be curiosity about new flavours so long as they are at resonable prices. Following that, I would purchase them so long as I like the taste more in comparison to other yogurts.
Health claims and good organoleptic qualities
Curiousity
Good customer reviews
Taste and functional health benefits
Taste Health benefits
Dairy based yogurt is what I prefer. I've neutral opinion about plant based yogurt.
Taste, cost
I don't know
Tast
The innovation of the flavour or the texture of product being innovative and creamy
First one
Curiosity
that it combines various biologically active substances that promote health
Taste and texture
Taste, and health benefits and texture
Reviews
Explore on new brand
Flavor and health benefits
I would like to have a taste of something new, tasty and energetic
High protein content
The transparency
I value more health than any other thing
Prebiotic in it
Being curious about the taste of plant based yogurts
If It cost less than normal. Probably would be in quite a small quantity but I might still buy it.
Try something new.

The health benefits of the milk based yoghurt. The other - I wouldn't buy.
Proven health-benefits
Curiosity
Nutritional value
Taste and ingredients
probiotic
none
Price compared to normal yogurt

Appendix 2. List 2. Preliminary results for Question 20. Do you have suggestions for improving either product concept?

No
None
For now no
Just be honest and transparent.
Maybe to be eye catching and in adequate price
None
The simpler the better. To be honest I didn't understand the meaning of symbiotic, so in order to appeal to general common public I suggest using simple terms so anyone can get the message
An appealing design
In my opinion the project is pretty complete
No
Not at the moment
Shorten the slogan to 3 words, have the name better reflect the product without sound like medicine (other options don't really sound like food)
More education about benefits of the yoghurt
Nones
I don't know much about yoghurt apart from the health benefits
No the product concept is good
Not at the moment
Get better slogans. And the only name that's marketable is the one that doesn't sound like I'm eating chemicals, so maybe brainstorm a little there.
As berries are not mentioned I would suggest to change the fruit spheres based on the local production, i.e. include exotic berries from local producers as lychee and passion fruit are not typical for our climate in Bulgaria. If the product will be manufactured in Bulgaria, then it is better to change the other exotic fruits with local ones.Yo
QR code to list benefits and nutritional values
One of the products it's better to be a plant based yogurt
no

Appendix 2. List 3. Preliminary results for Question 21. We'd love your input! What features, ingredients, or health benefits would you like to see in future yogurt products?

Feel free to share any thoughts or suggestions — for example:
* New flavors (e.g., tropical fruit, herbs, spices)
* Functional benefits (e.g., stress relief, immune support, gut health)
* Ingredients (e.g., plant-based proteins, superfoods, probiotics, adaptogens)
* Dietary needs (e.g., low sugar, allergen-free, high-protein, vegan)
* Packaging or format (e.g., drinkable yogurt, reusable containers, snack packs)

Your ideas:

Dietary needs
Dietary needs
Fruits pieces inside
Ingredients and flavour should match
Packaging, especially recyclable or reusable packaging
Tropical fruits, low sugar
Dietary needs..low sugar
Fruits like strawberry, dragon fruit, mango, drinkable yogurt be very nice and usefull
Functional benefits but label it as stress relief or simple terms so it reaches general public.
For the packaging I don't thing a "scientific" design should be used but a nice design - colorful
New flavors,ingredients and packaging
A high protein feature to help boost muscle growth
Functional benefits
Some flavour that can be used as a drinks for summers
Yougurt is good for health
N/a
Nature
High protein
New flavors and functional benefits
Functional benefits (e.g., stress relief, immune support, gut health) * Ingredients (e.g., plant-based proteins, superfoods, probiotics, adaptogens) * Dietary needs (e.g., low sugar, allergen-free, high-protein, vegan)
Newer flavors, ingredients
I like high protein youghurts. The current ones taste really bad and their fruit flavors also taste artificial.
New flavours and functional benefit
Different ingredients. There are so many foods from different food groups yet to be explored
Dietary importance
* New flavors (e.g., tropical fruit, herbs, spices) * Functional benefits (e.g., stress relief, immune support, gut health)
Use Fruit flavor, Immune support, low sugar and drinkable yoghurt will be vital

New flavours
No added sweeteners
Dietary needs to meet for everyone
Nutrition benefits i.e lowers blood sugar levels,may be improves teeth, gum and jaw formation or to be strong. Can this be inform of supplement to i.e powdered foam so that people can add in food stuffs.
Plant based proteins ingredients added to the Yogurt
Ingredients. Moving away from animal sources aligns with many goals and functions that are good for the animals and the environment
Just make something that pops out visually. Product Marketing is the first step to a new product.
New flavors
New functional benefits
Vegan yogurts, unique/local milk, verified probiotic content
I dont have any
Dietary needs such as low sugar
Stress relief, high protein
new flavors
New flavors (cherries, kiwi, ect.)
Challenge for you: If possible develop a Yogurt powder, which can be reconstituted with minimal clean water / fruit juice. In low resource areas, with no electricity yogurt as a perishable can be difficult to transport and store because yogurt has to be refrigerated. With Minimum clean water and yogurt powder, a child can get some freshly mixed yogurt to improve gut health, immunity and dietary diversity. Yogurt powder can be sprinkled to other foods such as soups, vegetables, fruit, porridges the list is endless.

Appendix 3.

International Food Safety and Quality Standards

Beyond legislative compliance, SymbioBurst will integrate globally recognized certification systems and quality standards to guarantee **food safety, quality, and traceability**:

- **IFS Food Standard (International Featured Standards):** Ensures supplier audits, hazard analysis, and management system validation, especially relevant for co-manufacturing partners in Bulgaria, the EU, and the Middle East.
- **BRC Global Standard for Food Safety:** Provides a framework for risk-based quality management, allergen control, packaging integrity, and product authenticity. This certification strengthens trust in export markets and retail partnerships i.e. supermarkets.
- **HACCP (Hazard Analysis and Critical Control Points):** Implemented across all production site(s) to identify, monitor, and control microbiological, chemical, and physical hazards from raw materials to finished product.
- **GS1 Standards:** Applied for product identification (GTIN barcodes), digital traceability, and integration with supply chain management systems. QR codes embedded on packaging will align with **GS1 Digital Link standards**, enabling localized consumer engagement, origin traceability, and transparency.

Sustainability and Carbon Footprint Reduction: By emphasizing local ingredient sourcing and near-market production, SymbioBurst reduces transport emissions and supports local economies. The use of **renewable energy in partner facilities**, **recyclable or biodegradable packaging**, and **low-impact logistics (optimized cold-chain routes)** further minimizes environmental impact. Additionally, the **integration of GS1 tracking** enables **carbon accounting** at each production stage, offering verifiable sustainability metrics.

Regulatory Overview: FDA vs. EFSA Labelling and Claims for SymbioBurst

SymbioBurst's product labelling and health claims must comply with both FDA (U.S.) and EFSA/EU regulations, which emphasize consumer transparency, ingredient accuracy, and non-misleading communication. This is further described in the table below [Product labelling and claims].

Product labelling and Claims – FDA and EFSA

Criterion	FDA (USA)	EU / EFSA (Europe)
Legal Name of Food	Must use a name consistent with standards of identity (21 CFR 131.200 for yogurt). If product deviates (e.g., plant-based "yogurt"), must use a descriptive term like "cultured rice product" and avoid misleading consumers. Cannot call non-dairy "milk" if misleading.	Must use legal or customary name (Reg. 1169/2011). "Yogurt" allowed only for dairy. Plant-based versions must use "fermented rice drink," "fermented hemp dessert," or "yogurt-style" with clear qualifiers.
Ingredient List	Mandatory, in descending order of weight. Sub-ingredients of spheres/encapsulation must be declared. Allergens must be clearly listed.	Same — full list required. Emphasised ingredients must also include percentage (QUID).
QUID / Quantitative Declaration	Not required unless linked to a nutrient claim ("contains 10% fruit juice" must be truthful).	Mandatory if ingredient is highlighted in name or marketing (e.g., "with 10% avocado").
Allergen Labelling	Milk, soy, nuts, etc. must be declared using plain language. Allergen statement must be either in the list or as "Contains: milk." Cross-contact advisory is voluntary.	14 major allergens must be highlighted in ingredient list (bold/contrast). Precautionary statements ("may contain") should follow risk-based assessment.
Nutrition Facts / Panel	Mandatory Nutrition Facts panel (energy, fat, sat fat, trans fat, cholesterol, sodium, carbs, sugars, added sugars, protein). Must follow FDA format.	Mandatory Nutrition Declaration (energy, fat, saturates, carbs, sugars, protein, salt). Must follow EU format and reference 100 g/ml.
Net Quantity	Must be declared in both metric and US customary units (e.g., "NET WT 150 g (5.3 oz)").	Must be in metric (grams/ml).
Name & Address of Business	Manufacturer, packer, or distributor name + address required.	Food business operator name + address mandatory.
Date Marking & Storage	Use-by or Best-by date recommended (mandatory for infant formula). Storage instructions required if necessary for safety/quality.	Mandatory "best before" or "use by" date + storage conditions.

Country of Origin	Required only for certain foods (meat, fish, produce). Not mandatory for yogurt unless claiming origin.	Mandatory for some categories; if absence could mislead, must declare origin.
Probiotic Labelling	May declare "contains live and active cultures" if verified. Any claim about health benefit must be a lawful structure/function claim and truthful. Cannot claim to "treat/prevent disease."	May declare "contains live cultures" but no general "probiotic" health claims are approved. Any health claim must be authorised in the EU Register with exact wording.
Chaga Biomass / Novel Ingredients	Ingredient must be GRAS (self-affirmed or FDA-notified) or food additive approved. No drug claims allowed.	If considered a novel food, must be authorised under Reg. 2015/2283 with conditions of use and specific labelling requirements.
Hemp / Rice / Encapsulated Ingredients	Hemp seed ingredients are GRAS; CBD/THC not allowed in conventional foods. Encapsulation materials must be approved as food-grade.	Hemp seed products permitted if traditional or authorised. CBD/cannabinoids are novel foods and must have authorisation. Encapsulation materials must be on the EU approved additives list.
Health Claims	Nutrient content claims must meet FDA definitions ("low fat," "good source of protein"). Structure/function claims allowed if substantiated and accompanied by truthful wording. Cannot say "FDA approved" for a conventional food.	Only authorised nutrition and health claims allowed (Reg. 1924/2006). Must use exact approved wording from EU Register. Cannot say "EFSA approved" on label.
Certifications (Halal, Organic, etc.)	May display only with valid certification. USDA Organic seal if certified under NOP.	May display EU Organic logo if certified. Halal, Kosher logos allowed if backed by valid certification.
Lot / Batch Identification	Lot code required for traceability.	Lot or batch code required for traceability.
Marketing & Imagery Restrictions	Cannot mislead about nutrient content, serving size, or health benefits. No disease claims unless FDA-approved health claim exists.	Same principle: cannot mislead consumers. Images of fruits must correspond to actual ingredient content (QUID must support).

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