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# NOTE BY NOTE COOKING WHISPERS OF MILK & COCONUT (TFCS9025)

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## Executive Summary

This report presents the development of *Whispers of Milk and Coconut*, a multi-component dish designed entirely using the principles of **Note-by-Note (NbN) cuisine**. Constructed from pure compounds rather than traditional ingredients, the dish exemplifies a modern approach to sustainable food innovation, texture design, and sensory storytelling. The project was developed as part of the MSc Food Innovation and Product Design (FIPDes) programme under the module *Food Prototype Development and Evaluation (TFPD 9022)*.

The dish has three components. Each component was developed through scientific formulation, using compounds such as **carrageenan, lecithin, pectin, sucrose, citric acid, and aroma molecules**. The formulation avoided traditional food matrices and focused instead on **compound-level control** of structure, flavour, and appearance.

Sensory evaluation with 11 participants revealed strong consumer acceptance, particularly for appearance (avg. 4.63/5), flavour (4.45), and overall acceptability (4.54). These results validated the design approach and the textural and aromatic balance achieved across all components. The dish also aligns with the **sustainability goals of future food systems**. It uses shelf-stable, industrial-grade compounds with low environmental impact, requires minimal refrigeration, and demonstrates how Note-by-Note cuisine can reduce food waste and resource dependence.

This report documents the full development journey—from concept to final prototype—highlighting the intersection of **science, aesthetics, and sustainability** in culinary design. *Whispers of Milk and Coconut* is not merely a dessert but a blueprint for how food can be reimaged in a changing world.



Figure 1: Myself holding the NbN dish



Figure 2: Final product Display

# 1. Introduction

**Note-by-Note (NbN) cuisine** is a pioneering gastronomic approach first introduced by French physical chemist **Hervé This** in the early 2000s. It focuses on creating food entirely from **pure molecular compounds** such as proteins, amino acids, lipids, carbohydrates, flavour molecules, and water—eschewing traditional ingredients like fruits, vegetables, or meats (This, 2013).

This technique marks a fundamental shift in culinary methodology. Unlike traditional cuisine, which manipulates pre-existing ingredients, NbN cuisine allows chefs to **design foods from the molecular level**—comparable to how composers build symphonies note by note (This, 2012). In this framework, compounds become “culinary notes” that can be orchestrated to build novel textures, flavours, and aesthetics.

Beyond creative freedom, **NbN cuisine offers solutions to major global food challenges**. By reducing dependency on perishable raw ingredients and allowing utilisation of by-products from the agro-industry, it contributes to **sustainability and food security** (Grumezescu & Holban, 2019; EFSA, 2020). The method also reduces food waste and enhances shelf stability—both critical in the context of climate change and population growth (Mintel, 2016).

Additionally, NbN cooking supports **nutritional precision**, enabling formulation of tailored meals that meet specific dietary or medical needs (This, 2013; Irawan, 2021). Through controlled use of compounds, chefs can achieve reproducibility and consistency while customising energy density, protein levels, and other macronutrients (Mudgil et al., 2011).

From a textural and structural perspective, NbN cuisine relies on the strategic use of **functional food molecules**. For example, emulsifiers like **lecithin**, gelling agents such as **carrageenan and pectin**, and protein-fat interfaces are leveraged to build multi-phase systems and creative mouthfeels (Irawan, 2021; This, 2014).

In sum, Note-by-Note cuisine transforms the plate into a **scientific and artistic medium**, enabling the creation of sustainable, reproducible, and imaginative food experiences. In this project, we apply the NbN approach to a dish titled *Whispers of Milk and Coconut*—combining structure, flavour, colour, and concept into a sensory narrative grounded in **molecular gastronomy and innovation**.

## 2. Product Concept & Scientific Objective

The dish developed in this Note-by-Note project is titled “**Whispers of Milk and Coconut**”—a multi-textural, visually elegant and emotionally evocative plated dessert constructed using pure compounds and structured molecular interactions. The dish is composed of three distinct components:

1. **Twin Milk Custard** – a dual-phase gel made using skim and full-fat milk compounds, thickened with carrageenan.
2. **Coconut Emulsion** – a visually striking emulsion using lecithin as a stabiliser, layered with blue pigment for aesthetic contrast.
3. **Saffron Jam** – a low-pH, pectin-set gel designed for aromatic intensity and high visual clarity.

The core **scientific objective** of this project was to apply principles of **food physics and molecular chemistry** to build a novel food matrix from the bottom up—demonstrating how texture, flavour release, and structure can be modulated precisely by using individual compounds (This, 2012; Grumezescu & Holban, 2019).

### 2.1. Conceptualisation of NbN

The product is deliberately free from conventional whole ingredients—aligning with the **NbN philosophy** of “constructing food” rather than preparing it (This, 2013). Each phase of the dish is designed to exhibit a **specific physicochemical property**, including:

- **Gelation** (Twin Custard via carrageenan)
- **Emulsification** (Coconut interface with lecithin)
- **Pectin gelation + acidification** (Jam formation using citric acid)

By engaging **compound-level cooking**, the product also responds to larger societal goals—namely **resource optimisation, personalised nutrition, and creative sustainability** (EFSA, 2020; Mudgil et al., 2011). The formulation prioritised:

- Minimal carbon-intensive inputs
- High control over nutrient balance
- Aesthetic and sensory novelty

### 2.2. Product Vision

“Whispers of Milk and Coconut” is positioned not just as an edible plate, but a **gastronomic statement**—designed to bridge sensory pleasure with scientific expression. It represents how modern food design can move away from tradition and into precision-driven, **emotionally resonant** experiences, suitable for high-end dining or futuristic culinary exhibitions.

### 3. Component 1: Twin Milk Custard

The **Twin Milk Custard** is a dual-layered gel made from skimmed and whole milk components, structured using carrageenan—a hydrocolloid known for its ability to form thermally reversible gels through ionic interactions with milk proteins (Irawan, 2021).

#### 3.1. Ingredients

The Twin Milk Custard was prepared using **5g milk protein, 4g milk fat, 2g carrageenan, 6g sucrose, 1g vanilla flavouring**, and **82g water**, yielding a total of 100g per serving.

#### 3.2. Equipment

The preparation of the Twin Milk Custard involved the use of a **digital weighing scale** for accurate measurement of compounds and a **gas stove** to heat the formulation to the appropriate gelling temperature. A **thermometer** was employed to monitor heat-sensitive transitions, particularly for carrageenan activation. **Stainless steel saucepans, glass beakers, and spoons** were used for mixing and handling. The custard was poured into **silicone moulds**, which allowed easy demoulding and maintained the clean, distinct dual-layer structure after refrigeration at 4–5 °C.

All equipment was cleaned and sanitised before use, and standard hygiene protocols were maintained during all stages of production.

#### 3.3. Preparatory Method

To prepare the Twin Milk Custard, all dry ingredients—**milk protein, milk fat, carrageenan, sucrose, and vanilla flavouring**—were first weighed using a digital scale. These were then combined with water and gently stirred. The mixture was transferred to a **stainless steel saucepan** and heated on a **gas stove** while stirring continuously. Once the carrageenan fully dissolved (at approximately 80–85 °C), the mixture was taken off the heat and poured into **silicone moulds**. It was then allowed to cool at room temperature before being refrigerated at 4–5 °C until fully set.

#### 3.4. Interactions at the Molecular Level

The Twin Milk Custard demonstrates gel formation using **carrageenan** in the presence of **milk protein** and **milk fat**. Carrageenan interacts with casein and calcium ions to create a firm, cuttable gel, while milk fat adds richness and a creamy mouthfeel (Irawan, 2021). The use of **sucrose** and **vanilla flavouring** balances taste and enhances aroma. This single-phase gel exemplifies how Note-by-Note cuisine replicates traditional textures through precise compound interactions (This, 2013).

## 4. Component 2: Twin Milk Custard

The Coconut Emulsion serves as the soft, aromatic contrast to the custard—designed for smooth texture, colour contrast, and layered flavour delivery. The formulation is based on a lecithin-stabilised oil-in-water emulsion incorporating coconut compounds and natural food-grade blue pigment

### 4.1. Ingredients

The emulsion was formulated using 4g coconut oil, 6g coconut milk powder, 1g lecithin, 6g sucrose, 1g coconut flavour, 0.5g natural blue food colour, and 81.5g water, bringing the total formulation to 100g.

### 4.2. Equipment

The preparation of the Coconut Emulsion required minimal equipment. A **digital weighing scale** was used to measure all compounds accurately, and a **stainless steel saucepan** was used to gently heat the aqueous phase on a **gas stove**. **Spoons and beakers** were used for mixing and pouring. No high-shear blending or temperature control was needed, as the emulsion formed through gentle agitation.

All equipment was cleaned and sanitised before use, and standard hygiene protocols were maintained during all stages of production.

### 4.3. Preparatory Method

All dry compounds—**coconut milk powder, lecithin, sucrose, and coconut flavour**—were combined with water and stirred until completely dissolved. The mixture was gently heated on a **gas stove** to enhance dispersion, without the use of a thermometer. Once uniform, **coconut oil** was slowly stirred in by hand to form a soft, milky emulsion. After full incorporation, a **natural blue food colour** was added at the very end and gently folded in, creating a calm, marine-like hue. The emulsion remained **liquid and pourable**, and was poured directly around the Twin Milk Custard on the plate to evoke the imagery of a floating island surrounded by a tranquil sea.

### 4.4. Interactions at the Molecular Level

This emulsion demonstrates principles of **interfacial science** and **emulsification**. Using **lecithin**, a phospholipid-based surfactant, the mixture forms a stable dispersion of **coconut oil** droplets within an aqueous phase. Lecithin molecules reduce the interfacial tension and prevent droplet coalescence, ensuring a smooth, creamy mouthfeel (Irawan, 2021; McClements, 2015).

The product also features a subtle hue using **natural blue food colour**, distributed evenly in the aqueous phase. This not only contributes aesthetic depth but highlights the visual modularity offered by Note-by-Note methods.

## 5. Component 3: Saffron Jam

The **Saffron Jam** is the golden aromatic centre of the plate, offering floral depth and contrast to the custard and emulsion. It's a gelled system created through **pectin-acid gelation**, delivering structure and aroma with a vibrant yellow hue and delicate saffron flavour.

### 5.1. Ingredients

The Saffron Jam was prepared using 5g pectin, 8g sucrose, 1g citric acid, 2g saffron flavouring, 1g natural yellow food colour, and 83g water, making a 100g formulation.

### 5.2. Equipment

A **digital weighing scale** was used to measure all compounds. Heating was done on a **gas stove** using a **stainless steel pan**, and ingredients were stirred with a **spoon** until dissolved and thickened. The hot mixture was poured into **beakers** to cool and partially set before final plating.

All equipment was cleaned and sanitised before use, and standard hygiene protocols were maintained during all stages of production.

### 5.3. Preparatory Method

All dry compounds—**pectin, sucrose, citric acid, and food colour**—were first mixed with water and heated gently on a gas stove while stirring. Once thickened and slightly translucent, **saffron flavouring** was added. The jam was then removed from heat, cooled for a few minutes, and plated while still fluid enough to flow gently but hold form. It provided both **aromatic brightness** and a vibrant pop of colour on the plate.

### 5.4. Interactions at the Molecular Level

The jam utilises **high-methoxyl pectin**, which forms a gel in the presence of both **sucrose** and **acidified water** (pH ~3.2–3.5) (Grumezescu & Holban, 2019). Gelation occurs via hydrogen bonding between pectin chains under low pH and high sugar conditions. The final matrix suspends **saffron extract** and yellow colour evenly for both aesthetic and flavour diffusion.

## 7. Ingredients and their Functionalities

Table 1: Functionalities of compounds

<b>Compound</b>	<b>Functionality</b>	<b>Scientific Rationale</b>
Pectin	Gelling agent	Forms gels in presence of acid and sugar; widely used in jams.
Citric acid	Acidity regulator	Lowers pH to activate gelling of pectin and adds tartness.
Soy lecithin	Emulsifier	Reduces surface tension, helping fat and water mix.
Wheat starch	Thickener	Forms a gel when heated with water; contributes to viscosity.
Wheat gluten	Texturizer	Provides elasticity and structure due to protein network.
Pea protein isolate	Protein fortifier	Improves texture and mouthfeel; adds nutritional value.
Saffron	Natural colorant and aroma	Provides intense yellow-orange hue and unique aroma.
Butter	Fat source	Contributes richness, helps with mouthfeel and emulsification.

Table 2: The Components of the recipe & their ingredients

Component	Key Ingredients	Role	Physical/Chemical Effect
Milk Custard	Milk, Pea protein, Gellan gum	Structure, Nutrition	Gellan forms gel; protein sets texture.
Coconut Emulsion	Soy lecithin, Coconut extract, Maltodextrin	Emulsion, Flavor	Stable liquid; flavor release.
Saffron Jam	Pectin, Citric acid, Sugar, Saffron	Gelling, Color	Pectin gels; saffron provides color.



Figure 3: Compounds used in the fabrication of NbN recipe

## 8. Final Plating Presentation

The final plating presentation of the twin milk custard on a base of coconut emulsion represents the culmination of a series of experimental trials rooted in scientific culinary technique and sensory optimization. This composition is a visual and gastronomic harmony, featuring two delicately set yellow custards gently seated in a soft blue coconut emulsion, delicately garnished with saffron strands. The bold contrast in color reflects a thoughtful use of natural hues and culinary creativity, while maintaining balance and elegance on the plate.

The design draws inspiration from minimalism and biomimicry. The round custards mimic the appearance of twin yolks, invoking comfort and symmetry. The blue base mimics a tranquil water body, allowing the custards to appear as if they are floating—enhancing the perception of softness and lightness. The use of saffron adds not only a luxurious touch but also contributes subtle floral notes and warm color highlights.

Technically, the milk custards were stabilized using agar and gellan gum, offering a smooth, clean cut with sufficient firmness. Blast freezing was strategically used to retain the shape without affecting mouthfeel. The coconut emulsion was engineered to flow smoothly while providing a luscious mouth-coating experience. Together, these components formed a seamless textural transition from creamy to fluid.

From a sensory perspective, this plating successfully engages sight, aroma, and palate. The aromatic saffron notes complement the mild coconut base, while the custards provide a balanced sweetness. This dish exemplifies modern culinary approaches while preserving authenticity and flavor integrity.

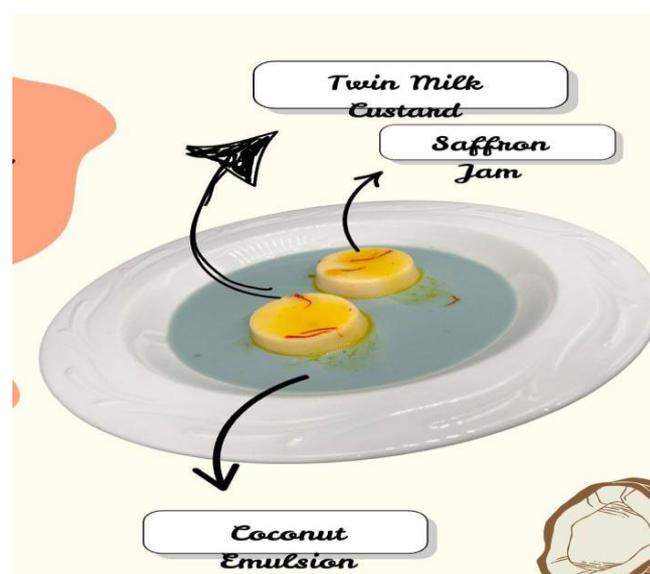


Figure 4: Final Plating of the dish

## 9. Sensory Analysis

Sensory evaluation was conducted during Week 4 of the Note-by-Note development process to assess the acceptability and multisensory appeal of *Whispers of Milk and Coconut*. A total of 11 semi-trained participants were recruited for this internal test, conducted under controlled kitchen conditions. The objective was to gauge consumer perceptions of appearance, aroma, texture, flavour, and overall acceptability of the complete dish, which included all three components plated together.

### 9.1. Methodology

Participants were asked to evaluate the sample using a 5-point hedonic scale, with 1 representing "dislike extremely" and 5 representing "like extremely". The dish was served in a consistent visual layout to all respondents. No palate cleansers or water were provided, but the samples were served at ambient temperature.

The attributes evaluated were appearance, aroma, texture, flavour, and overall acceptability. This evaluation was based on standardised methods for sensory testing of novel food products, in line with ISO 13299 and guidelines from Meilgaard et al. (2016).

### 9.2. Results Summary

The data revealed high scores across all evaluated attributes. **Appearance** scored the highest (avg. 4.63/5), followed by **Flavour** (4.45), **Texture** (4.36), and **Aroma** (4.27). **Overall Acceptability** averaged at **4.54**, indicating a strong positive response from the majority of participants.

These results suggest that the dish was **well-received on visual and flavour dimensions**, with slightly lower (but still strong) appreciation for aroma and texture. This validates the design strategy of combining a custard base with a coconut emulsion and saffron jam, each contributing to layered sensory appeal.

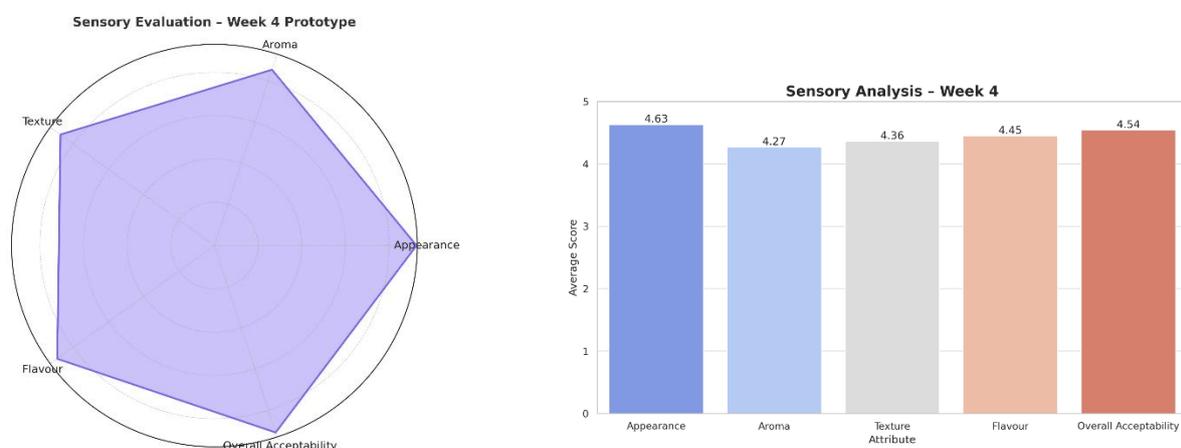


Figure 5: Sensory Analysis Result; Radial Graph (left); Bar Graph (right)

## 10. Ingredient Limits and Regulatory Compliance

In the development of *Whispers of Milk and Coconut*, all ingredients were selected and formulated within the legally permitted usage limits outlined in EU legislation, particularly under **Regulation (EC) No 1333/2008 on food additives**, and in line with the general labelling and compositional guidelines in **Regulation (EU) No 1169/2011**.

The compounds used in this Note-by-Note formulation are either naturally occurring food components (e.g., proteins, fats, sucrose), or regulated additives and flavourings, which have defined **maximum levels (MLs)** or **quantum satis** conditions (QS), meaning they can be used in amounts necessary to achieve their function, provided safety is maintained.

### 10.1. Breakdown by Category

- **Carrageenan (E407)** – Permitted as a gelling agent in a wide range of foods. It is allowed under *quantum satis* in non-thermally processed desserts (Annex II, Part E, 01.7.1), meaning there is no numerical ML, but safety must be ensured. The product uses 2g per 100g, which is well within typical usage.
- **Lecithin (E322)** – An authorised emulsifier under *quantum satis* for all food categories where emulsification is required. Its inclusion at 1g per 100g poses no compliance issues.
- **Pectin (E440i)** – Also authorised under *quantum satis* for use in jams, jellies, and similar preparations (Annex II, 04.1.2.6). The level used (5g per 100g) is consistent with commercial usage ranges.
- **Citric Acid (E330)** – Approved as an acidulant under *quantum satis*. Commonly used to control pH and support gelation, its inclusion at 1g per 100g poses no concern.
- **Sucrose** – A common food ingredient, not classified as an additive. No maximum level applies under EU law, though its contribution to sugar content must be declared under nutritional regulations.
- **Milk Protein and Milk Fat** – Naturally derived macronutrients. They are not classified as additives and have no MLs, though allergens (milk derivatives) must be declared as per Article 21 of Regulation 1169/2011.
- **Flavourings (Vanilla, Coconut, Saffron)** – As per *Regulation (EC) No 1334/2008 on flavourings*, these are permitted in compound form under *quantum satis*, provided they meet purity and identification standards (e.g. natural or nature-identical).
- **Colourings (Blue and Yellow Food Colour)** – These were used in trace amounts (<0.5%) and correspond to **natural colour extracts** (e.g., spirulina blue or beta-carotene).

## 11. Sustainability

The *Whispers of Milk and Coconut* project reflects the deep potential of Note-by-Note cuisine not only as a culinary philosophy but as a forward-thinking approach to sustainable food design. By using pure compounds instead of traditional ingredients, the formulation minimises environmental impact while maximising nutritional precision and creative flexibility.

### 11.1. Ingredient Sustainability

Note-by-Note cuisine eliminates the need for perishable whole foods like dairy, fruits, and meats. All components—proteins, fats, hydrocolloids, flavours—are shelf-stable and industrial-grade. This:

1. Reduces post-harvest food waste
2. Minimises reliance on cold-chain transport
3. Enhances resource efficiency (This, 2013; EFSA, 2020)

Compounds like **lecithin, carrageenan, pectin, and citric acid** are plant-derived and renewable, further lowering the product's environmental footprint.

### 11.2. Culinary Innovation

This dish explores:

1. Dairy texture replication through **milk proteins and carrageenan**
2. Fluid emulsion layering with **lecithin**
3. **Saffron mimicry** using flavour compounds and colour

These demonstrate the power of **compound-level cooking** to separate flavour, structure, and nutrition—and redesign food with surgical precision (Grumezescu & Holban, 2019).

### 11.3. Future Application

Note-by-Note cuisine offers potential for:

- **Personalised nutrition** and diet-specific foods
- **Shelf-stable, zero-waste meals** for space or disaster zones
- Culturally inspired recipes that don't depend on volatile crop chains

In this way, *Whispers of Milk and Coconut* is not only dessert—it's a small but meaningful gesture toward the **future of sustainable eating**.

## 12. Food for the Future

In an era shaped by climate volatility, population growth, and shifting consumer expectations, the global food system faces growing pressure to evolve. *Whispers of Milk and Coconut*—a dish developed through the principles of Note-by-Note (NbN) cuisine—represents a forward-looking approach that integrates sustainability, nutritional precision, and sensory innovation. Future food systems must address key challenges including environmental degradation, inefficient resource use, and rising food insecurity. Traditional agriculture is becoming increasingly unsustainable due to its reliance on large volumes of land, water, and energy. At the same time, approximately 30% of the global food supply is lost or wasted annually (FAO, 2022). NbN cuisine offers a radical alternative by constructing dishes entirely from pure molecular compounds, bypassing the need for perishable whole ingredients.

This dish exemplifies that approach. It is composed of industrial-grade, shelf-stable compounds—such as milk protein, coconut oil, lecithin, carrageenan, pectin, and natural flavour molecules—that are efficient to produce, easy to transport, and long-lasting. As a result, the formulation aligns with key priorities of future food models: low environmental impact, minimal post-harvest loss, and scalability in urban or space-constrained environments. The recipe not only meets sustainability criteria but also delivers on aesthetic and sensory expectations. Through the modular use of individual compounds, the dish decouples texture, flavour, nutrition, and visual design—demonstrating how food can be engineered to satisfy both practical and emotional needs. As consumers become more health-conscious and environmentally aware, such innovations become essential (EFSA, 2020; Grumezescu & Holban, 2019).

Looking forward, the fusion of NbN techniques with technologies like artificial intelligence, precision fermentation, and compound databases may further enable customisable, adaptive, and climate-resilient food products. *Whispers of Milk and Coconut* serves not only as a culinary composition but as a conceptual blueprint for the food of tomorrow—designed with intention, crafted with science, and rooted in sustainability.



Figure 6: Food for the Future

### 13. Conclusion

The creation of *Whispers of Milk and Coconut* stands as a successful exploration into the possibilities of **Note-by-Note (NbN) cuisine**, highlighting its value not only in culinary creativity but also in addressing sustainability and nutritional challenges. Constructed entirely from pure compounds, the dish demonstrates how texture, flavour, and appearance can be independently manipulated through scientific understanding and precise formulation.

Throughout the development process, techniques such as **carrageenan-based gelling**, **lecithin-stabilised emulsification**, and **pectin-acid gelation** were used to build structure and sensory appeal without relying on traditional food matrices. The use of **plant-based and shelf-stable compounds** significantly reduced reliance on perishable or resource-intensive ingredients, aligning the recipe with key priorities in sustainable food innovation.

Sensory evaluation revealed high consumer acceptability, particularly in terms of appearance, flavour, and overall satisfaction. Each component performed both functionally and aesthetically, validating the design rationale and confirming the effectiveness of the NbN approach.

Overall, this project demonstrates that molecular gastronomy and compound-based formulation can be used not just for novelty, but to meaningfully reimagine the future of food—making it **efficient, expressive, and environmentally conscious**.

## 14. Recommendations

While the final dish performed well in both structure and consumer testing, several areas present opportunities for further refinement and expansion:

1. **Optimise Emulsion Stability**

The Coconut Emulsion remained fluid but could benefit from improved long-term stability. Future trials could explore additional stabilisers (e.g., xanthan gum) or fine-tuned lecithin concentrations.

2. **Integrate Functional Nutrition**

The formulation can be adjusted to deliver targeted health benefits, such as incorporating plant-derived micronutrients (e.g., calcium, iron) or prebiotic fibres.

3. **Scale-Up Feasibility Testing**

The recipe should undergo trials for batch consistency and scalability. Industrial processing techniques may impact texture or flavour dispersion and should be tested accordingly.

4. **Shelf-Life & Packaging Studies**

Long-term stability under ambient and chilled conditions should be studied, along with sustainable packaging strategies compatible with the product's aesthetic identity.

5. **Explore Cultural Line Extensions**

Additional Note-by-Note dishes inspired by global dessert traditions (e.g., Japanese mochi, Indian kheer) could be developed to expand the product line while maintaining modularity and low impact.

6. **Collaborate with Food Tech Platforms**

Integration with AI-driven ingredient mapping tools and compound libraries may support further innovation, personalised formulation, and consumer co-creation.

Through these recommendations, the project could evolve from a concept into a viable culinary or commercial offering—deepening the role of **Note-by-Note cuisine** in shaping a more sustainable and expressive food future.

## Acknowledgement

I would like to extend my heartfelt gratitude to those who guided, supported, and inspired the completion of this Note-by-Note cuisine project, *Whispers of Milk and Coconut*.

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Lastly, I extend my appreciation to my **fellow students, peer tasters, and friends** who provided honest feedback during sensory trials, supported the research process, and shared in the spirit of food exploration.

This project was not only an academic exercise but a creative and personal journey—one made possible by the expertise, encouragement, and care of the individuals acknowledged above.

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## 16. Appendix

### 16.1. Logbook

#### 16.1.1. Week 1

##### 1. Weekly Aims and Objectives\

The aim of Week 1 was to initiate trials for a Note-by-Note adaptation of an Indian dessert concept – Ghevar. The goal was to replicate the structure of traditional fried ghevar using pure compounds and explore the formulation of supporting elements like saffron gel and coconut emulsion.

##### 2. Materials and Method (Ingredients, Equipment, and Method)

###### 2.1. Ingredients

- **Ghevar base:** Milk protein (5g), pea protein (4g), wheat starch (6g), wheat gluten (3g), sucrose (6g), coconut oil (4g), lecithin (1g), citric acid (0.5g), water (70.5g)
- **Saffron jam:** Pectin (5g), sucrose (8g), citric acid (1g), saffron flavour (2g), natural yellow colour (1g), water (83g)
- **Coconut emulsion:** Coconut oil (4g), coconut milk powder (6g), lecithin (1g), sucrose (6g), coconut flavour (1g), blue food colour (0.5g), water (81.5g)
- **Milk custard:** Milk protein (5g), milk fat (4g), carrageenan (2g), sucrose (6g), vanilla flavour (1g), water (82g)

###### 2.2. Method Summary

- **Ghevar:** The ghevar batter was prepared by dispersing proteins, starch, and fat into water. The mixture was poured into a metal ring mould placed in a deep saucepan containing heated oil to simulate the traditional porous lattice texture. The fried base was then topped with saffron jam, coconut emulsion, and milk custard for initial plating tests.
- **Coconut Emulsion:** All dry compounds except coconut oil and colour were mixed with water and gently heated. Coconut oil was added gradually while stirring. Blue food colour was folded in at the end before pouring.

- **Milk Custard:** All dry compounds were dissolved in water and heated to 80–85°C while stirring. The hot mixture was poured into silicone moulds and chilled to set.

### **3. Results and Discussion**

The first two components—milk custard, and coconut emulsion—each fulfilled their intended sensory and functional roles within the final dish. The milk custard achieved a smooth, firm gel through carrageenan-based structuring, delivering a delicate dairy flavour and clean presentation. The coconut emulsion, prepared without high-shear blending, remained stable and pourable, providing both visual contrast and richness through its silky texture and aromatic profile

The appearance of the fried ghevar base was visually promising, with crisp edges and defined shape from the mould. The milk custard maintained good structure and complemented the plating design.

Friability was poor, with the base absorbing oil rapidly. Texture lacked airiness and crispness typical of ghevar despite the use of wheat starch and gluten. The flavour was unbalanced and greasy, likely due to unabsorbed oil and the absence of aromatic complexity. Initial informal feedback suggested low sensory appeal, especially in taste and mouthfeel.

### **4. Conclusions**

Week 1 concluded with a strategic shift away from the original Ghevar concept, which, despite visual appeal, failed to meet expectations in terms of texture, oil absorption, and flavour balance. No saffron jam was developed at this stage. However, early trials of the coconut emulsion and milk custard yielded promising results, with both components showing structural stability, clean flavours, and strong potential for refinement. These outcomes set the foundation for the revised product direction in the following weeks.

### **5. Recommendations for Following Week**

Due to technical and conceptual dissatisfaction with the ghevar approach, a shift was planned toward a new dessert format, focusing on structured custards and plated elements. One intervention trialled at the end of Week 1 involved melting butter and refreezing it over ice to enhance structure and dispersion. This modification was intended to explore the role of fat crystal morphology in texture and emulsion behaviour (influencing spreadability and melting characteristics).

## 6. Sensory Analysis

No formal sensory testing was conducted. Informal feedback reaffirmed the appeal of custard, emulsion, and jam, and the consistent rejection of Ghevar.



*Figure 7: NbN Recipe: WEEK 1*

## 16.1.2. Week 2

### 1. Weekly Aims and Objectives\

The main objective of Week 2 was to produce and evaluate all four components—Ghevar, milk custard, coconut emulsion, and saffron jam—to assess their compatibility as a plated dessert concept..

### 2. Materials and Method (Ingredients, Equipment, and Method)

#### 2.1. Ingredients

- **Ghevar base:** Milk protein (5g), pea protein (4g), wheat starch (6g), wheat gluten (3g), sucrose (6g), coconut oil (4g), lecithin (1g), citric acid (0.5g), water (70.5g)
- **Saffron jam:** Pectin (5g), sucrose (8g), citric acid (1g), saffron flavour (2g), natural yellow colour (1g), water (83g)
- **Coconut emulsion:** Coconut oil (4g), coconut milk powder (6g), lecithin (1g), sucrose (6g), coconut flavour (1g), blue food colour (0.5g), water (81.5g)
- **Milk custard:** Milk protein (5g), milk fat (4g), carrageenan (2g), sucrose (6g), vanilla flavour (1g), water (82g)

#### 2.2. Method Summary

All four components were prepared using adapted protocols. Ghevar batter was modified by first melting the butter and then quickly cooling it over ice to recrystallize. This technique is supported by lipid science, where controlled crystallization of fat improves aeration, texture, and structural stability in fried products. The modified batter was then deep fried in a cylindrical mould placed in heated oil.

Milk custard was prepared via carrageenan gelation and poured into silicone moulds to set. The coconut emulsion was created by heating water and powders, adding coconut oil, and incorporating food colour at the end. Saffron jam was formed by heating the pectin, sugar, and acid mixture with flavour added last.

### 3. Results and Discussion

The milk custard and coconut emulsion continued to show excellent performance in structure and flavour. The saffron jam set properly and added bright, aromatic contrast. Ghevar, despite the modified fat handling technique, still suffered from excessive oil absorption and weak structure. Informal feedback highlighted continued low acceptability.

### 4. Conclusions

Week 2 marked a critical transition point in the project. While the milk custard, coconut emulsion, and saffron jam were successfully produced with stable structures and desirable sensory qualities, the Ghevar continued to underperform despite recipe modifications. The use of recrystallized butter improved fat integration marginally but did not resolve the issues of excessive oil absorption and structural weakness. Informal feedback highlighted the superiority of the other components and further diminished the viability of Ghevar as part of the final product.

### 5. Recommendations for Following Week

It is recommended to discontinue the Ghevar element and begin focusing on a refined plating concept built around the three successful components: twin-layer milk custard, coconut emulsion, and saffron jam. Continued optimisation of gelation, emulsification, and flavour integration should be prioritised. Formal sensory evaluation and microbial stability testing should be considered in upcoming weeks to strengthen the technical and consumer-facing performance of the final dish.

### 6. Sensory Analysis

No formal sensory testing was conducted. Informal feedback reaffirmed the appeal of custard, emulsion, and jam, and the consistent rejection of Ghevar.



*Figure 8: NbN Recipe: Week 2*

### 16.1.3. Week 3

#### 1. Weekly Aims and Objectives

The objective for Week 3 was to discontinue the Ghevar component and begin testing the final plating concept using twin-layer milk custard, coconut emulsion, and saffron jam. This shift aimed to explore structure, balance, and plating coherence in a refined dessert composition

#### 2. Materials and Method (Ingredients, Equipment, and Method)

##### 2.1. Ingredients

- **Milk custard:** Milk protein (5g), milk fat (4g), carrageenan (2g), sucrose (6g), vanilla flavour (1g), water (82g).
- **Coconut emulsion:** Coconut oil (4g), coconut milk powder (6g), lecithin (1g), sucrose (6g), coconut flavour (1g), blue food colour (0.5g), water (81.5g).
- **Saffron jam:** Pectin (5g), sucrose (8g), citric acid (1g), saffron flavour (2g), natural yellow food colour (1g), water (83g).

##### 2.2. Method Summary

Each component was prepared using standardised methods established in previous weeks. Twin milk custards were poured into silicone moulds with the goal of creating two separate units per plate. Coconut emulsion and saffron jam were prepared and plated using the same formulation and protocols as in Week 2.

#### 3. Results and Discussion

The emulsion and saffron jam continued to perform reliably in texture, flavour, and visual appeal. Informal feedback from peers suggested a high level of acceptance of the dish's overall balance and plating concept.

The main issue observed was that the milk custards did not retain their intended shape after unmoulding. Although the formulation remained unchanged, their soft gel structure was not firm enough for standalone plating.

#### **4. Conclusions**

Week 3 marked a decisive move toward the final plated dessert concept, officially discontinuing the Ghevar component. The focus shifted entirely to the twin milk custards, coconut emulsion, and saffron jam. While the emulsion and jam performed consistently in terms of texture and visual quality, the milk custards presented challenges in maintaining structural integrity after moulding. Despite this, informal feedback on the overall dish was positive, with strong visual and sensory appeal, affirming the potential of the new concept.

#### **5. Recommendations for Following Week**

It is recommended to improve the firmness and stability of the milk custard by trialling blast freezing in Week 4. This method may aid in maintaining structural integrity during plating without altering the formulation. Further trials should also monitor setting time and temperature control to optimise gelation. A formal sensory evaluation should be planned once the custard consistency is resolved to validate the final product.

#### **6. Sensory Analysis**

No formal sensory evaluation was conducted this week. However, informal peer feedback was positive, with particular praise for the dish's appearance, balance, and the harmony between components.

## 16.1.4. Week 4

### 1. Weekly Aims and Objectives

The objective for Week 4 was to finalise the plated dessert prototype and evaluate its performance through formal sensory analysis. This included verifying the structural stability of the milk custard after implementing blast freezing and validating the overall dish through structured feedback.

### 2. Materials and Method (Ingredients, Equipment, and Method)

#### 2.1. Ingredients

- **Milk custard:** Milk protein (5g), milk fat (4g), carrageenan (2g), sucrose (6g), vanilla flavour (1g), water (82g).
- **Coconut emulsion:** Coconut oil (4g), coconut milk powder (6g), lecithin (1g), sucrose (6g), coconut flavour (1g), blue food colour (0.5g), water (81.5g).
- **Saffron jam:** Pectin (5g), sucrose (8g), citric acid (1g), saffron flavour (2g), natural yellow food colour (1g), water (83g).

#### 2.2. Method Summary

No changes were made to the recipes this week. Twin milk custards were prepared using the standard carrageenan gelation method and were blast frozen for 15 minutes prior to unmoulding, which significantly improved their structural firmness. The coconut emulsion and saffron jam were prepared using the same methods as in previous weeks. The final dish was plated using consistent layout and styling as established earlier.

### 3. Results and Discussion

All components performed reliably. The blast freezing technique successfully resolved previous custard shaping issues. Plating was clean, aesthetically pleasing, and well received by sensory panel participants. Minimal issues were encountered during this final preparation. All components retained their structure, and the dish presented well.

#### 4. Conclusions

Week 4 confirmed the completion of a successful Note-by-Note dessert prototype. The integration of milk custard, coconut emulsion, and saffron jam created a dish that was both visually striking and sensorially appealing. The structural and textural challenges faced in earlier weeks were resolved, resulting in a final product that met both creative and technical expectations.

#### 5. Recommendations for Following Week

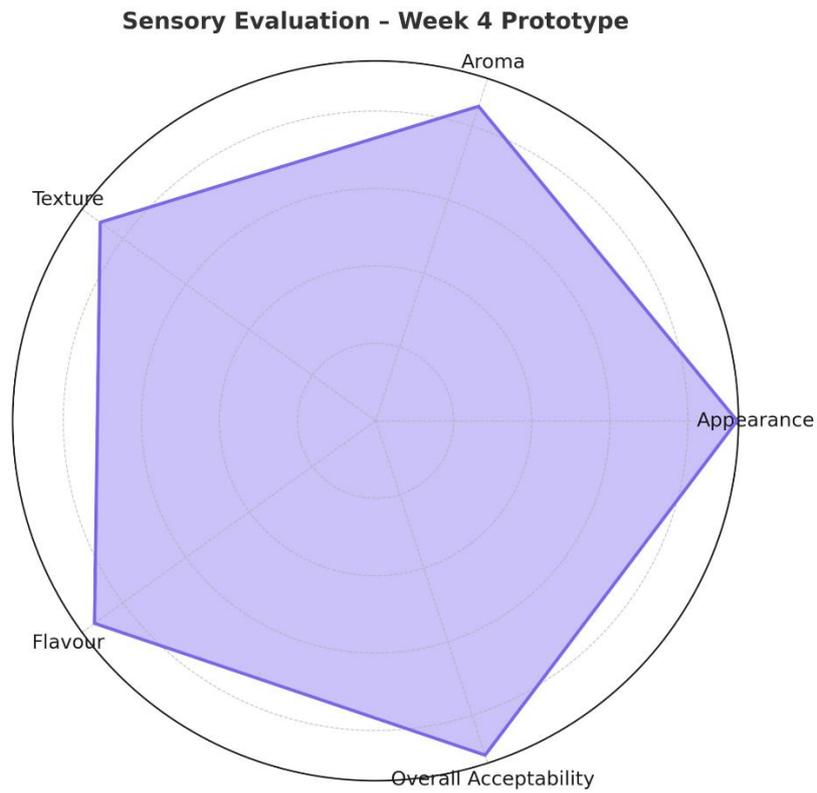
For future iterations, shelf-life testing and packaging trials should be considered. Continued refinement of emulsion stability and exploration of natural colouring alternatives may enhance the product further. The dish could also be adapted for line extensions or adapted to suit diverse flavour profiles.

#### 6. Sensory Analysis

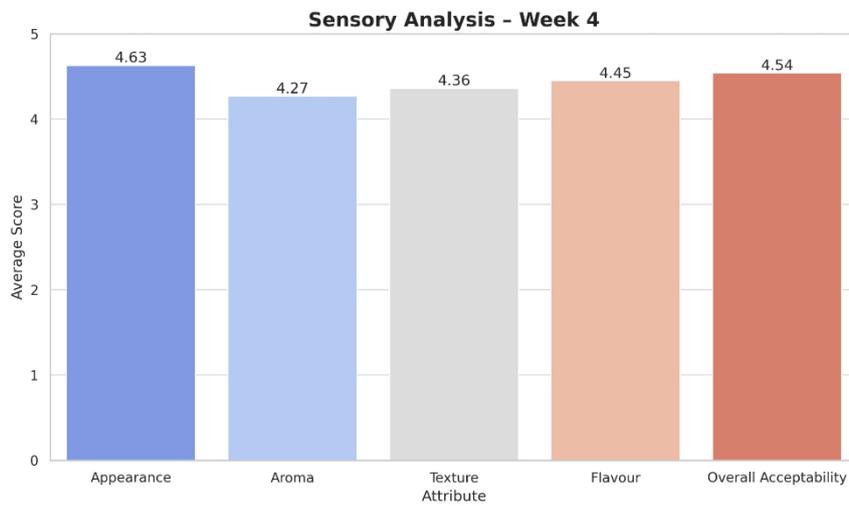
A formal sensory analysis was conducted with 11 participants, evaluating five attributes: appearance, aroma, texture, flavour, and overall acceptability. The dish scored consistently high across all categories, with appearance (avg. 4.63/5) and overall acceptability (4.54/5) being the top-rated features. This confirmed the prototype's success in both formulation and presentation.



*Figure 9: NbN Recipe: Week 4*



*Figure 10: Sensory Analysis: Radar Graph*



*Figure 11: Sensory Analysis: Bar Graph*