ADVANCED MOLECULAR GASTRONOMY (TFCS9025)

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NOTE BY NOTE REPORT

09TH MAY, 2022

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1.0 Introduction

Molecular Gastronomy is a scientific discipline that explores the mechanism of culinary transformation which involves understanding the changes raw food ingredients go through till the final dish is consumed (This, 2005). Molecular gastronomy has gained attention in recent times and is developing into its field. It has been reported that most restaurants have embraced this discipline and are now incorporating it into their kitchen and menus. Most of these restaurants that have adopted this scientific approach are acclaimed as being part of the world's best restaurants (Barham et al., 2010)

Note by note cooking is a recent application of molecular cooking which evolved in the year 1994 (This, 2019). It involves the use of pure compounds to produce dishes as a result of combining the compounds or processing them and has been linked to the "production of synthetic music from sound waves of defined frequency" (This, 2019). This form of cooking has been said to be environmentally friendly as it is seen to minimize food spoilage, and conserve energy, water, and foodstuffs (Burke and Danaher, 2020). Note by note cooking was founded by Herve This, a French physicist who is also the co-founder of Molecular Gastronomy. According to a mathematical estimation by Herve This, this method of cooking can create new recipes in the area of 1000^{10} and this figure is without the factoring in different concentrations of compounds (Burke and Danaher, 2016). Usually, the chef designs the different part of the dishes which includes the shapes, tastes, colours, consistency, odours, textural perception, nutritional aspects, and temperature (This, 2014). The note by note cooking has been promoted internationally through the creation of the "The International Contest for Note by Note Cooking" which has seen a lot of participation over the years. Through this contest, thousands of recipes have been created some of which have been adopted by some restaurants across the globe. The application of science in the kitchen is fascinating and the marriage between science and food is unique.

In as much as this concept of cooking has gained publicity, there are however regulations that need to be adhered to as a result of the use of compounds which are considered as additives in the food industry. These compounds are authorized additives and they have limits as to how much should be included in the food (FSAI, 2015). Sodium alginate, xanthan gum, carrageenan, cellulose, methylcellulose etc, are pure compounds employed in the note by note cooking. These compounds are food additives with E numbers and therefore have regulations on their usage (FSAI, 2015).

The guidance on the use of these additives was taken into consideration during the development of the recipes according to the guidelines set by the Food Safety Authority of Ireland (FSAI).

The main concept that influenced the creation of fruit of the forest berries cheddar cheesecake was individual preference. Cheesecake was first created in Ancient Greece and has been widely consumed all over the world, especially in America. This motivated me to create a similar product using pure compounds.

Savoury food according to Cambridge English Dictionary is a dish that is spicy or salty and not sweet in taste. Savoury is usually associated with the "umami" taste which is exemplified by the amino acid glutamate mostly used in the food industry as monosodium glutamate (sodium salt) (Hall, 2013). The consumption of high fiber foods has been in the headlines due to the link between fibre consumption and their role in the microbiota (Myhrstad et al. 2020). Fibres also help with weight management and improving digestive health (Myhrstad et al. 2020).

2.0 Aim and Objectives

2.1 Aim

To produce fruit of the forest berries cheddar cheesecake using pure compounds

2.2 Objectives

- To make a biscuit base with pure compounds
- To make the note by note savoury cheese
- To make a note by note berries using direct spherification

3.0 Materials and methods (Ingredients, Equipment, and Method)

3.1 Materials

Ingredient	Brand
Cellulose	**Nutricology Innovative Nutrition**
Xanthan gum	**En Place**
Corn starch	**Gem Pack Foods**
Carrot extract	**SOSA**
Gluten	**Weizengluten BOS Food Duesseldorf Lebensmitted CroBhandel GMBH**
Psyllium Husk	**Lepricol Food Supplement**
Omega 3 fatty acid	**Musgrave Excellence**
Biscuit flavour	**SOSA**
Sodium Alginate	**Louis Francois**
Iota Carrageenan	**MSK**
Calcium chloride	**SOSA**
Cheese powder	**Extracte En Pols**
Berries Flavor	**SOSA**
Red Food Colour	
Whey Protein	

3.2 Equipment

Weighing scale

Electrolux Oven, Skyline Premium, Equipment asset tag: 44239, Broderick's

Cool Head Professional Refrigeration- KBR Food Service Equipment

Gas stove, SDXCQ114418, Equipment Asset Tag: 44238, Broderick's.

3.3 Method

3.3.1 Note by Note Biscuit Base

Figure 1: Ingredients used in making the biscuit base

- All ingredients were measured according to the respective percentages in Table 1. below
- A pinch of salt was added and the ingredients were mixed in a mixing bowl and spread on a parchment paper
- The mixture was then put in the Electrolux oven at a temperature of 160°C and fan speed of 3 and baked for 10 minutes.
- The baked biscuit was brought out of the oven and allowed to cool.

Table 1: Product formulations summary; the percentages and their gram equivalent of each ingredient

Ingredients	**093 (g)**
Cellulose	15
Carrot extract	5
Omega 3 fatty acid	35
Gluten	10
Biscuit flavour	2 drops
Psyllium husk	15

3.3.2 Note by Note Savoury Cheese

Figure 2: Ingredients used in making savoury cheese

- About 20g of whey protein was weighed into a weighing dish and 170g of water was weighed into a saucepan.
- 30g of corn starch, 20g of dietary cellulose, 1g of cheese powder and 3g of iota carrageenan were weighed into weighing dishes.
- 3g of calcium chloride was weighed into a weighing dish
- 2 drops of cheddar flavour were added to the water.
- All dry ingredients (whey protein, corn starch and calcium chloride) were mixed until uniformly mixed.
- The ingredients were added to the water and whisked. After which the iota carrageenan was added.
- The saucepan containing the mixture was placed on the gas and allowed to boil until the temperature reached 75°C.
- The mixture was taken off and transferred into a cube mould after which it was placed in the Electrolux refrigerator at 3.6°C for 20 minutes to set.

3.3.3 Note by Note Berries

- For the berries solution, 100mL of water was measured into a bowl
- 1g of sodium alginate was weighed and added to the water
- 5g of glucose and 2 drops of berries flavour were added as well
- 1 drop of red food colour was added and the mixture was left to hydrate for 10 minutes.

- For the bath, 250mL of water was weighed into a bowl and 2.5g of calcium chloride was added and dissolved.

- A pipette was used to pipette the berries solution and dropped into the calcium bath, a sieve was used to collect the berries and placed them on a plate until ready to be used.

4.0 Results

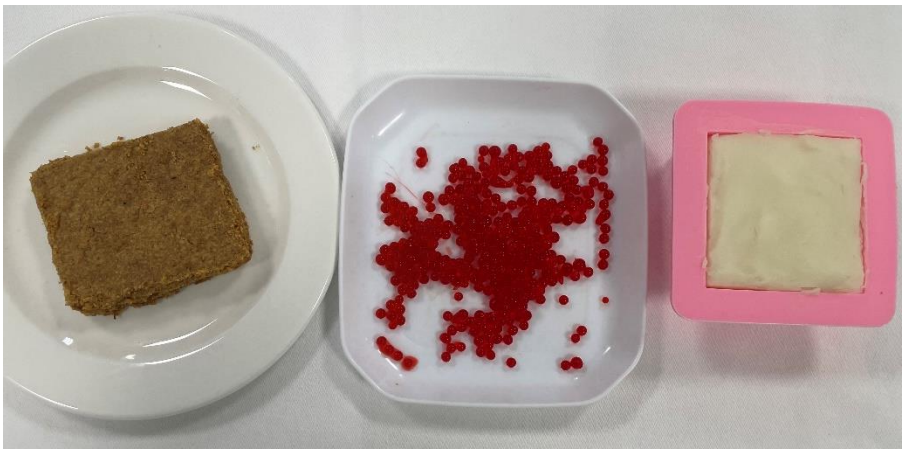

Figure 3: The three individual components of the fruit of the forest berries cheddar cheesecake

Figure 4: Fruit of the forest berries and cheddar cheesecake top view

Figure 5: Fruit of the forest berries and cheddar cheesecake side view

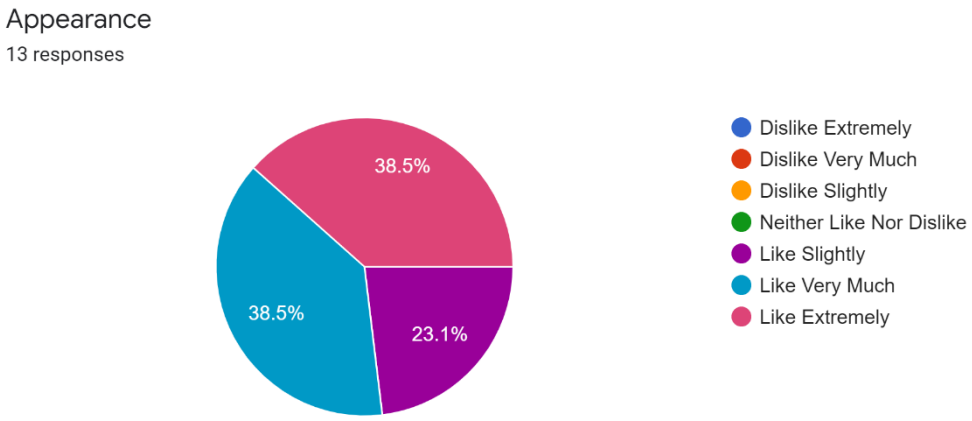

Figure 6: A pie chart showing the sensory ratings of the appearance of the product

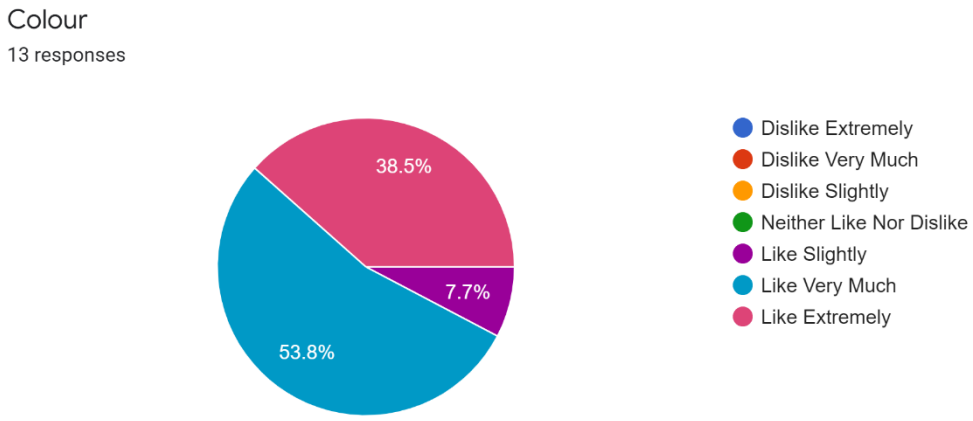

Figure 7: A pie chart showing the sensory ratings of the colour of the product

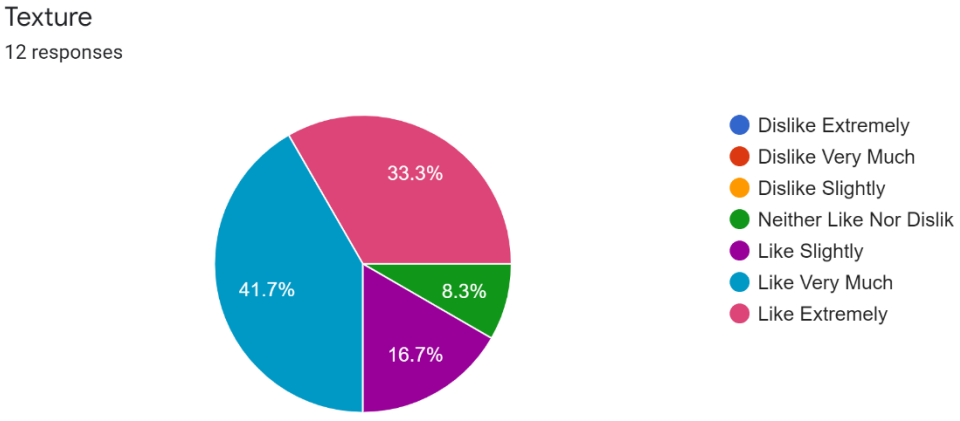

Figure 8: A pie chart showing the sensory ratings of the texture of the product

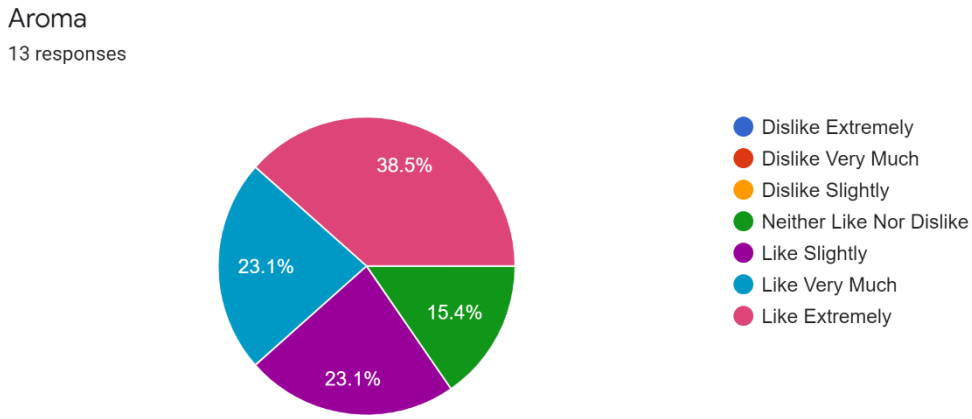

Figure 9: A pie chart showing the sensory ratings of the aroma of the product

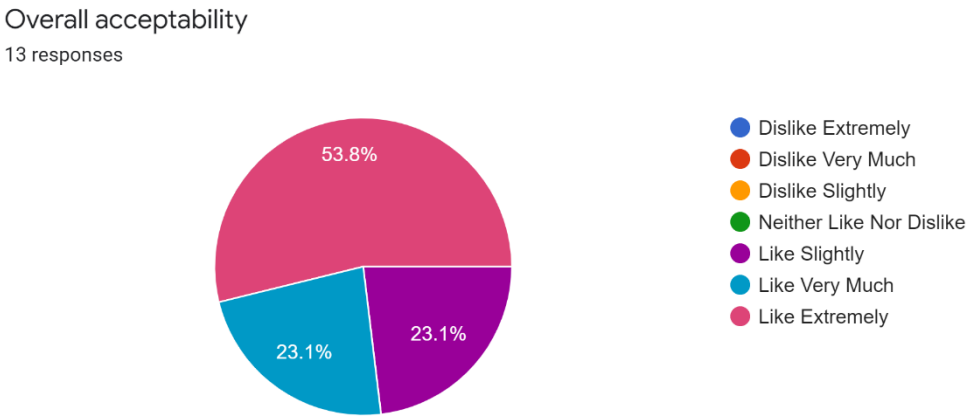

Figure 10: A pie chart showing the sensory ratings of the overall acceptability of the product

5.0 Discussion

The objective of this project was to create a savory dish using pure compounds. The note by note fruit of the forest cheesecake has three individual components which include a high fiber biscuit base, a savory cheese, and berries toppings. These individual components were all made using pure compounds which have been specified in the part 3 above. The spherification technique was used in making the berries for the toppings. Spherification is the act of encapsulating liquid solutions in a thin polysaccharide layer and when placed in the mouth it pops out to release a burst of flavor in the liquid solution (Halford, 2014). Usually, the polysaccharides used are obtained from algae a common example is an alginate (Fu et al., 2014). A sodium alginate solution that contained red food color and berries flavor was dropped into a calcium carbonate solution using a pipette. It is believed that divalent cations such as calcium are able to reinforce interactions between alginate chains and facilitate their ability to encase (Halford, 2014). The solution was dropped in the calcium bath and the berries were collected onto a plate to prevent them from hardening any further as the more time it spends in the calcium bath, the stronger the interactions and the firmer the spheres.

To get the desired shape of the cheese, a cube mold was employed to achieve this shape and the biscuit base was cut out with a knife to match the size of the cheese. The cheese was made by placing the ingredients listed in Figure 2 above on a heating medium until a temperature of 75°C. The addition of iota carrageenan to the recipe was to facilitate gel formation. Iota carrageenan is known to hydrate at a temperature of 70- 75°C and later facilitate gel formation (Geonzon et al., 2019). Some carrageenan has been seen to be activated only when the heat has been introduced an example is the iota carrageenan. The addition of calcium chloride to the cheese recipe was due to the fact that calcium has been seen to be a promoter for gelling of iota carrageenan (Janaswamy and Chandrasekaran, 2002). Iota carrageenan has a melting temperature between 5-10°C unless mixed with starch (Qin, 2018). The addition of corn starch to the recipe was to take care of the melting effect and prevent it from melting.

The creation of the biscuit base concept was from the competition theme. The addition of fiber was to meet the demands set out in the theme. The choice of cellulose and psyllium husk was a result of their availability. The choice of gluten as part of the ingredient was because gluten is the main component of wheat which has been used over the years to produce digestive biscuits. Usually, the biscuit base of cheesecakes is made from crumbling digestive biscuits. Adding carrot

extract was to enhance the colour as well act as a source of antioxidants (carotenoids) (Stahl and Sies, 2003).

A sensory evaluation was conducted using 13 panelists. The panelists were asked to rate the product in terms of appearance, colour, texture, aroma, and overall acceptability using a 7-point hedonic scale. Score "7" was assigned to "Like extremely", "4" to "Neither like nor dislike", and "1" to "Dislike extremely". The sensory attributes and qualities of food have been likened to a circular plate with its perimeters divided into three parts: the first part has to do with the appearance which is perceived with the eyes, the second is flavor (aroma and taste) sensed by the olfactory epithelium (nose) and papillae (tongue) and finally the texture which is perceived using the muscles endings (Kramer and Szczesniak, 1973).

In terms of appearance, 38.5% of the assessors liked the appearance extremely, whilst 38.5% liked it very much and 23.1% liked it slightly. These scores show that the product has a very good appearance. "The first impression a food gives are visual and a major part of our readiness to accept a food is based on its appearance" (Hutchins, 1997). The appearance of a product can influence the categorization of the product by its consumers, influence consumer decisions, and can draw attention to the said product (Creusen and Schoormans, 2004). It plays an important role as it can communicate the functional properties of the food, has symbolic values for its consumers, and give an impression that the product is of good quality (Creusen and Schoormans, 2004). A product's appearance can either sell or not sell a product. This is why most restaurants and food manufacturers carefully present their foods in a way that appeals to the consumer. The appearance of the product having good sensory scores and being liked by assessors gives the product one step toward being largely accepted by consumers. The science of food colour has attracted constant attention over the last decade (Hutchins, 1997). Colour is seen as a component of appearance, it also includes shape, size, visual appearance, and eye appeal (MacDougall, 2003). The colour of the product was liked by the assessors.

Aroma plays an essential role in our perception of food. It is believed that most people judge their food by smelling it. This is why food scientists, chefs, and other food handlers have employed the use of plant extracts, chemical aromatics, and other essential oils in enhancing the flavor of foods and drinks to increase their acceptability. Results from the sensory evaluation show that the product has an acceptable aroma and this is good for its acceptability. No one disliked the aroma

of the product, only about a small percentage of the assessors (15.4%) neither liked nor disliked the aroma of the product. 38.5% of the assessors extremely liked the aroma of the product, whilst 23.1% liked the aroma very much and the remaining 23.1% liked the aroma slightly.

Texture can have a strong influence on food nutrition and intake, it plays an important role in determining the quality of food when consumed (Kilcast and Lewis, 1990). The texture of a food can have an effect on the taste of the food and in the long run affect how much one eats, for instance, a solid food melted into liquid will have a stronger taste in the liquid form than in the solid form (Heavner, 2019). It is said that not only does the texture of the food play a role in its acceptability but it also forms a crucial part of identifying a particular food (Fleming, 2013). According to the results of the sensory evaluation, 33.3% of the assessors extremely liked the texture of the product, 41.7% liked it very much, 16.7% liked the texture slightly whilst only 8.3% neither liked nor disliked the texture. It can be concluded that a greater number of assessors liked the texture of the product and this plays a role in the product's acceptability. Overall, the product had good sensory ratings, 53.8% of the assessors liked extremely the overall product acceptability, 23.1% liked it slightly and 23.1% liked it very much. These sensory scores show the potential of the product to do well when introduced on a menu.

6.0 Conclusion

The note by note fruit of the forest berries cheddar cheesecake was produced using pure compounds. The berries were produced following the spherification technique and the biscuit was produced using pure compounds and ingredients close to pure compounds. The cheese was produced in the form of a cube. The fruit of the forest berries cheddar cheesecake was formed by putting together these three individual components. From the sensory evaluation, 38.5% of the assessors liked the appearance extremely, 38.5% of the assessors extremely liked the aroma of the product, 33.3% of the assessors extremely liked the texture of the product and 53.8% of the assessors liked extremely the overall product acceptability. Results from the sensory evaluation show that the product has higher acceptability and has the potential of doing great.

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APPENDIX (Logbook)

MODULE CODE: TFCS9025

MODULE TITLE: ADVANCED MOLECULAR GASTRONOMY

STUDENT NAME: WHITNEY VALE-HAGAN

FOOD PRODUCT: NOTE BY NOTE SAVOURY CHEESECAKE

WEEK NO.: ONE (1) **DATE:** 28TH MARCH, 2022

1.0 Aim

To produce a note by note savoury cheesecake

1.1 Objectives

- To compare the effect of varying xanthan gum percentages on two different recipes.
- Try different formulations using different starch sources (corn, potato)
- To conduct a sensory analysis on the acceptability of the crust.

1.2 Materials and Method (Ingredients, Equipment and Method)

1.2.1 Materials

Ingredient	Brand
Cellulose	**Nutricology Innovative Nutrition**
Xanthan gum	**En Place**
Corn starch	**Gem Pack Foods**
Carrot extract	**SOSA**
Gluten	**Weizengluten BOS Food Duesseldorf Lebensmitted CroBhandel GMBH**
Psyllium Husk	**Lepricol Food Supplement**
Omega 3 fatty acid	**Musgrave Excellence**
Biscuit flavour	**SOSA**
Tapioca	**Gem Pack Foods**

1.2.2 Equipment

Weighing scale

Electrolux Oven, Skyline Premium, Equipment asset tag: 44239, Broderick's

Cool Head Professional Refrigeration- KBR Food Service Equipment Broderick's

Gas stove, SDXCQ114418, Equipment Asset Tag: 44238, Broderick's.

1.2.3 Method

Table 1: Product formulations summary; the percentages and their gram equivalent of each ingredient

Ingredients	**435**	**792**	**093**	**634**
	%	**%**	**%**	**%**
Cellulose	30	30	30	25
Xanthan gum	5	5	1	5
Corn starch	30	--	--	--
Carrot extract	5	5	5	5
Omega 3 fatty acid	10	10	10	15
Potato	--	30	5	--
Gluten	--	--	30	30
Tapioca	--	--	--	--
Biscuit flavor	2 drops	2 drops	2 drops	2 drops
Psyllium husk	20	20	20	20

- All ingredients were measured according to the respective percentages in Table 1. Above

- The ingredients were mixed together in a mixing bowl and spread on a parchment paper
- The mixture was then put in the Electrolux oven at a temperature of 160C and fan speed of 4 and baked for 10 minutes.
- The baked biscuit was brought out of the oven and allowed to cool.
- After which assessors were asked to choose which one they most prefer.

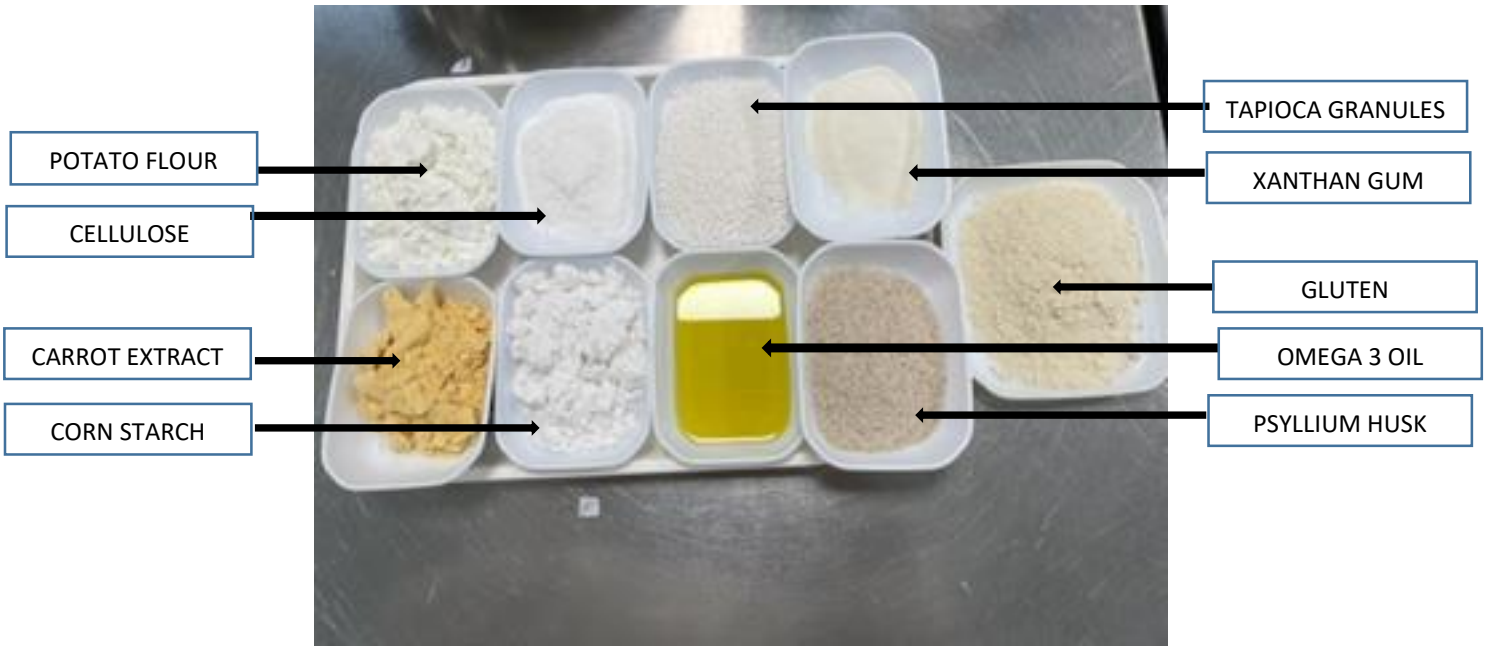

Figure 11: Image of all ingredients used for biscuit base

1.3 Results and discussion

Figure 12: Sample 425 with corn starch as base ingredient

Figure 13: Sample 792 with potato starch as a base ingredient

Figure 14: Sample 793 with gluten as a base ingredient and less omega 3 fatty acids

Figure 15: Sample 634 with gluten as a base ingredient and a higher percentage of omega 3 fatty acids

The products with non-gluten flour had pale appearances. The gluten gave a product with better appearance and taste as compared to the non-gluten flour formulations.

Product 634 had relatively better appearance and taste as compared to product 093 although they had the same gluten percentage. This was due to the fact that product 634 had relatively higher fat content as compared to 093 and this might have reduced the dryness on the product a bit.

The non-gluten flours were very dry and did not hold well. The reason is that non-gluten flours lack the binding effect that gluten has.

Tapioca granules were very hard and difficult to chew.

1.4 Conclusions

The fat contents were low and therefore the products were very dry. The product made with gluten had the best sensorial properties and qualities.

The tapioca granules used were too hard and they were not serving any special purpose hence it is best to take them out.

1.5 Recommendations for following week.

Increase oil content

Increase the amount of xanthan gum used

Make a new formulation without the tapioca

1.6 Ingredients required for the following 2 weeks.

Whey protein

WEEK NO.: TWO (2) **DATE:** 1ST APRIL, 2022

2.0 Aim

To produce a note by note savoury cheese and biscuit base

2.1 Objectives

- To make a biscuit base with an increased fat content using gluten.
- To make the note by note savoury cheese

2.2 Materials and Method (Ingredients, Equipment and Method)

2.2.1 Materials

Ingredient	Brand
Cellulose	**Nutricology Innovative Nutrition**
Xanthan gum	**En Place**
Corn starch	**Gem Pack Foods**
Carrot extract	**SOSA**
Gluten	**Weizengluten BOS Food Duesseldorf Lebensmitted CroBhandel GMBH**
Psyllium Husk	**Lepricol Food Supplement**
Omega 3 fatty acid	**Musgrave Excellence**
Biscuit flavour	**SOSA**
Sodium Alginate	**Louis Francois**
Iota Carrageenan	**MSK**
Calcium chloride	**SOSA**
Cheese powder	**Extracte En Pols**
Berries Flavour	**SOSA**
Red Food Colour	
Whey Protein	

2.2.2 Equipment

Weighing scale

Electrolux Oven, Skyline Premium, Equipment asset tag: 44239, Broderick's

Cool Head Professional Refrigeration- KBR Food Service Equipment

Gas stove, SDXCQ114418, Equipment Asset Tag: 44238, Brodericks.

2.2.3 Method

2.2.3.1 Note by Note Biscuit Base

- All ingredients were measured according to the respective percentages in Table 2. below
- The ingredients were mixed together in a mixing bowl and spread on a parchment paper
- The mixture was then put in the Electrolux oven at a temperature of 160C and fan speed of 4 and baked for 10 minutes.
- The baked biscuit was brought out of the oven and allowed to cool.

Table 2: Product formulations summary; the percentages and their gram equivalent of each ingredient

Ingredients	**093**
	%
Cellulose	15
Xanthan gum	5
Carrot extract	5
Omega 3 fatty acid	35
Gluten	25
Biscuit flavour	2 drops
Psyllium husk	15

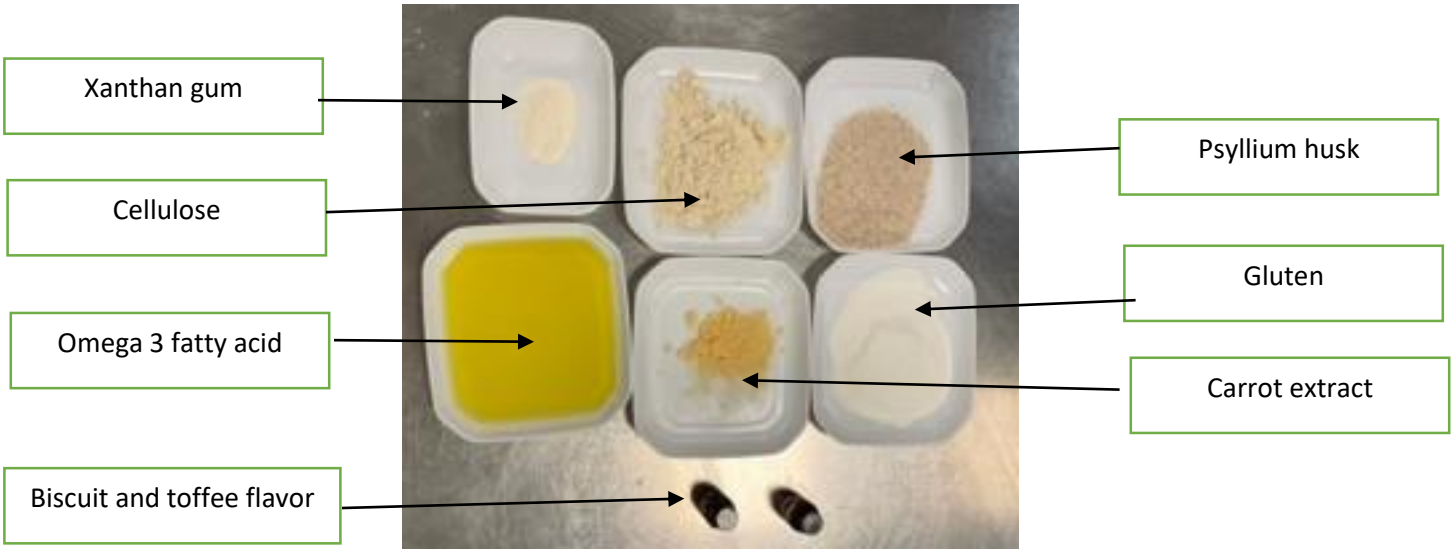

Figure 16: Image of all ingredients used for biscuit base

2.2.3.2 Note by Note Savoury Cheese

- About 20g of whey protein was weighed into a weighing dish and 170g of water was weighed into a saucepan.
- 30g of corn starch, 20g of dietary cellulose, 5g of cheese flavour and 3g of ioata carrageenan were weighed into weighing dishes.
- 3g of calcium chloride was weighed into a weighing dish
- 2 drops of cheddar flavour and 2 drops of citron was added to the water.
- All dry ingredients (whey protein, corn starch and calcium chloride) were mixed together until uniformly mixed.
- The ingredients were added to the water and whisked. After which the ioata carrageenan was added.
- The saucepan containing the mixture was placed on the gas and allowed to boil until the temperature reached 75°C.
- The mixture was taken off and transferred into a cube mould after which it was placed in the Electrolux refrigerator at 3.6°C for 20 minutes to set.

Figure 17: Image of all ingredients used for note by note cheese

2.3 Results and discussion

Figure 18: Note by note savoury cheese cake

The note by note cheese was made. According to assessors, the cheese flavour was a bit too strong and this made the cheese have a bitter aftertaste. It was advised that, the cheese flavour should be reduced a bit to increase upon the products sensorial attributes. The addition of the lemon flavour to the cheese was not accepted by the assessors. The astringent taste of the lemon left a lasting taste in the mouth after swallowing. Assessors asked for the lemon to be omitted from the recipe.

For the biscuit base, increasing the oil content per last week's recommendation reduced the crumbliness of the base a bit. The biscuit had no salt in it and so the taste was blunt. Most assessors recommended the addition of salt in order to improve upon the taste of the base.

2.4 Conclusions

Increasing the fat content reduced the crumbliness of the dough. Reducing the cheese flavour also helped with the taste of the product.

2.5 Recommendations for following week.

Make the berries for the toppings

Omit lemon flavour

Reduce the cheese flavour

Add salt to biscuit base

2.6 Ingredients required for the following 2 weeks.

Berries flavour

Champagne

Sodium alginate

WEEK NO.: THREE (3) **DATE:** 04th APRIL, 2022

3.0 Aim

To produce a note by note savoury cheese and biscuit base with berries made from spherification

3.1 Objectives

- To make a biscuit base without xanthan gum
- To make the note by note savoury cheese with less lemon flavour
- To make note by note berries using direct spherification

3.2 Materials and Method (Ingredients, Equipment and Method)

3.2.1 Materials

Ingredient	Brand
Cellulose	**Nutricology Innovative Nutrition**
Xanthan gum	**En Place**
Corn starch	**Gem Pack Foods**
Carrot extract	**SOSA**
Gluten	**Weizengluten BOS Food Duesseldorf Lebensmitted CroBhandel GMBH**
Psyllium Husk	**Lepricol Food Supplement**
Omega 3 fatty acid	**Musgrave Excellence**
Biscuit flavour	**SOSA**
Sodium Alginate	**Louis Francois**
Iota Carrageenan	**MSK**
Calcium chloride	**SOSA**
Cheese powder	**Extracte En Pols**
Berries Flavour	**SOSA**
Red Food Colour	
Whey Protein	

3.2.2 Equipment

Weighing scale

Electrolux Oven, Skyline Premium, Equipment asset tag: 44239, Broderick's

Cool Head Professional Refrigeration- KBR Food Service Equipment

Gas stove, SDXCQ114418, Equipment Asset Tag: 44238, Broderick's.

3.2.3 Method

3.2.3.1 Note by Note Biscuit Base

- All ingredients were measured according to the respective percentages in Table 3. below
- A pinch of salt was added and the ingredients were mixed together in a mixing bowl and spread on a parchment paper
- The mixture was then put in the Electrolux oven at a temperature of 160C and fan speed of 4 and baked for 10 minutes.
- The baked biscuit was brought out of the oven and allowed to cool.

Table 3: Product formulations summary; the percentages and their gram equivalent of each ingredient

Ingredients	**093** **%**
Cellulose	20
Xanthan gum	5
Carrot extract	5
Omega 3 fatty acid	20
Gluten	30
Biscuit flavour	2 drops
Psyllium husk	20

3.2.3.2 Note by Note Savoury Cheese

- About 20g of whey protein was weighed into a weighing dish and 170g of water was weighed into a saucepan.
- 30g of corn starch, 20g of dietary cellulose, and 3g of iota carrageenan were weighed into weighing dishes.
- 3g of calcium chloride was weighed into a weighing dish
- 2 drops of cheddar flavour was added to the water.
- All dry ingredients (whey protein, corn starch and calcium chloride) were mixed together until uniformly mixed.
- The ingredients were added to the water and whisked. After which the iota carrageenan was added.
- The saucepan containing the mixture was placed on the gas and allowed to boil until the temperature reached 75°C.
- The mixture was taken off and transferred into a cube mould after which it was placed in the Electrolux refrigerator at 3.6°C for 20 minutes to set.

3.2.3.3 Note by Note Berries

- For the berries solution, 100mL of water was measured into a bowl
- 1g of sodium alginate was weighed and added to the water
- 5g of glucose and 2 drops of berries flavour was added as well
- 1 drop of red food colour was added and the mixture was left to hydrate for 10 minutes.

- For the bath, 250m of water was weighed into a bowl and 2.5g of calcium chloride was added and dissolved.

- A pipette was used to pipette the berries solution and dropped into the calcium bath, a sieve was used to collect the berries and placed in a plate until ready to be used.

3.3 Results and discussion

Figure 19: Note by note berries

The spherification technique was used to produce note by note berries that serves as a topping for the note by note cheese cake. The balls were collected immediately the berries solution was dropped into the calcium bath to prevent it from becoming very hard. According to most of the assessors, the berries had an acceptable taste.

Figure 20: Note by note cheese cake with berries toppings

Increasing the oil content may have reduced the crumbliness of the biscuit base a bit but not entirely. In an attempt to help reduce the crumbliness, water was added and the presence of xanthan gum made the biscuit base form a dough which affected the texture of the biscuit base. The base had an elastic effect and didn't serve the purpose of a cheese cake base as cheese cake bases are not stretchy doughs.

For the note by note cheese, a new recipe was being tried to omit the corn starch. However, the mixture without the corn starch made a cheese solution which was not solidifying. In an attempt to make the solution solidify, the corn starch was added after the mixture was taken off the fire and this gave a cheese with a coarse texture and a poor mouthfeel. The figure x above shows how coarse the cheese texture is.

3.4 Conclusions

The addition of corn starch after taking the cheese mixture off the heating medium caused the cheese to have a coarse feel. The note by note berries turned out well.

3.5 Recommendations for following week.

Add the corn starch to the mixture before boiling. Make biscuit base without xanthan gum.

Add more omega 3 fatty acid to reduce the crumbliness.

3.6 Ingredients required for the following 2 weeks.

Berries flavour

WEEK NO.: FOUR (4) **DATE:** 25th APRIL, 2022

4.0 Aim

To produce the final note by note savoury cheese and biscuit base with berries made from spherification

4.1 Objectives

- To make a biscuit base without xanthan gum
- To make the note by note savoury cheese with less lemon flavour
- To make a note by note berries using direct spherification

4.2 Materials and Method (Ingredients, Equipment and Method)

4.2.1 Materials

Ingredient	Brand
Cellulose	**Nutricology Innovative Nutrition**
Xanthan gum	**En Place**
Corn starch	**Gem Pack Foods**
Carrot extract	**SOSA**
Gluten	**Weizengluten BOS Food Duesseldorf Lebensmitted CroBhandel GMBH**
Psyllium Husk	**Lepricol Food Supplement**
Omega 3 fatty acid	**Musgrave Excellence**
Biscuit flavour	**SOSA**
Sodium Alginate	**Louis Francois**
Iota Carrageenan	**MSK**
Calcium chloride	**SOSA**
Cheese powder	**Extracte En Pols**
Berries Flavor	**SOSA**
Red Food Colour	

4.2.2 Equipment

Weighing scale

Electrolux Oven, Skyline Premium, Equipment asset tag: 44239, Broderick's

Cool Head Professional Refrigeration- KBR Food Service Equipment

Gas stove, SDXCQ114418, Equipment Asset Tag: 44238, Broderick's.

4.2.3 Method

4.2.3.1 Note by Note Biscuit Base

Figure 21: Image of all ingredients used for note by note biscuit

- All ingredients were measured according to the respective percentages in Table 4. below
- A pinch of salt was added and the ingredients were mixed together in a mixing bowl and spread on a parchment paper
- The mixture was then put in the Electrolux oven at a temperature of 160°C and fan speed of 3 and baked for 10 minutes.
- The baked biscuit was brought out of the oven and allowed to cool.

Table 4: Product formulations summary; the percentages and their gram equivalent of each ingredient

Ingredients	**093** **(g)**
Cellulose	15
Carrot extract	5
Omega 3 fatty acid	35
Gluten	10
Biscuit flavour	2 drops
Psyllium husk	15

4.2.3.2 Note by Note Savoury Cheese

Figure 22: : Image of all ingredients used for note by note cheese

- About 20g of whey protein was weighed into a weighing dish and 170g of water was weighed into a saucepan.
- 30g of corn starch, 20g of dietary cellulose, 1g of cheese powder and 3g of iota carrageenan were weighed into weighing dishes.
- 3g of calcium chloride was weighed into a weighing dish
- 2 drops of cheddar flavour were added to the water.
- All dry ingredients (whey protein, corn starch and calcium chloride) were mixed together until uniformly mixed.
- The ingredients were added to the water and whisked. After which the iota carrageenan was added.
- The saucepan containing the mixture was placed on the gas and allowed to boil until the temperature reached 75°C.
- The mixture was taken off and transferred into a cube mould after which it was placed in the Electrolux refrigerator at 3.6°C for 20 minutes to set.

4.2.3.3 Note by Note Berries

- For the berries solution, 100mL of water was measured into a bowl
- 1g of sodium alginate was weighed and added to the water
- 5g of glucose and 2 drops of berries flavour was added as well
- 1 drop of red food colour was added and the mixture was left to hydrate for 10 minutes.

- For the bath, 250mL of water was weighed into a bowl and 2.5g of calcium chloride was added and dissolved.

- A pipette was used to pipette the berries solution and dropped into the calcium bath, a sieve was used to collect the berries and placed in a plate until ready to be used.

4.3 Results and discussion

Figure 23: Note by note cheese after setting

The note by note cheese was allowed to be set in the refrigerator at a temperature of 3°C for 20 minutes after which it was taken out and served. Keeping the product in the fridge facilitated the cooling process which allowed the cheese to set faster. After adding all the ingredients before placing it on the fire, the cheese turned out to have a smooth texture, unlike last week when it was grainier. Also, this time around the cheese did not have the bitter aftertaste after the concentration of cheese flavour added was reduced. The cheese turned out to have better taste, texture and consistency as compared to last week's cheese.

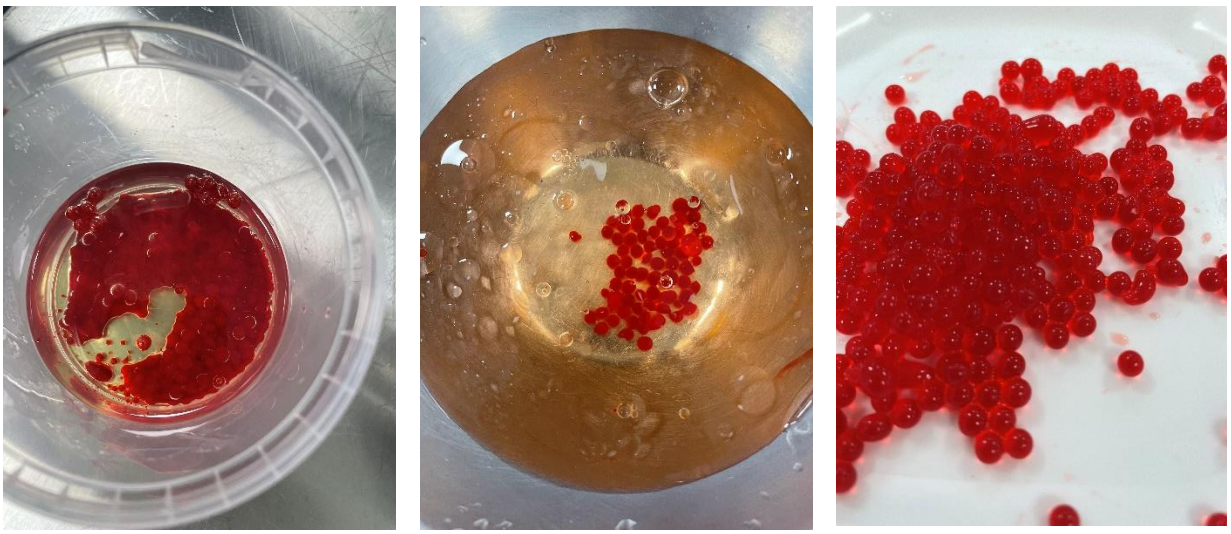

Figure 14: The process of obtaining the berries after being kept in oil for two weeks

Figure 14 above is an illustration of how the note by note berries was obtained. The berries were prepared the previous week and stored in cold oil and kept at refrigeration temperature until ready to use. When needed, the berries were taken out of the oil and rinsed in cold water as shown in the figure above. Storing products of spherification in oil at a cold temperature is known to protect the spheres for a very long time.

Figure 15: Note by note biscuit base

Following up on previous weeks, the biscuit base produced turned to be very crumbly and barely held together. After increasing the oil content, the biscuit base was less crumbly. The addition of salt also enhanced the taste of the biscuit base.

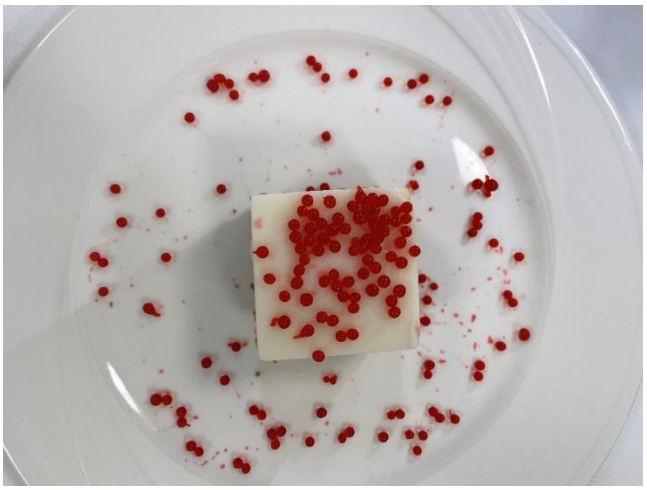

Figure 16: the fruit of the forest berries cheddar cheesecake

Figure 17: the fruit of the forest berries cheddar cheesecake

The three parts were put together, the cheese was placed on top of the biscuit base and the berries were spread on top of the cheese and on the plates. The figure above shows how the fruit of the forest berries cheddar cheesecake should be plated.

4.4 Conclusions

Note by note cheesecake with berries toppings was made using pure compounds and ingredients close to pure compounds as possible

4.5 Recommendations for the following week.

None

4.6 Ingredients required for the following 2 weeks.

None