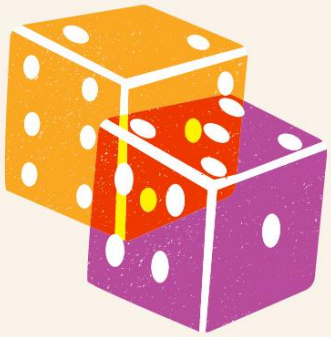
Advanced Molecular Gastronomy

TFCS9025: 2021-22

By: **Nimra Jamal**

Student ID: **D21127087**

Note by Note Cooking Assignment
Pasta Cube



Submitted to: **Roisin Burke & Pauline Danaher**

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Introduction

Molecular Gastronomy

Figure 1 Molecular Gastronomy

Molecular Gastronomy (MG) was founded by Hervé This and Nicholas Kurti in 1988. The idea behind this discipline was to make Molecular Gastronomy a particular discipline after realizing the fact that there is a huge gap present between food science and home cooking. According to the definition, food science is based on food production on an industrial scale as well as nutrition and food safety, whereas MG is based on a different concept. It mainly involves the science behind any conceivable food preparation technique that can be utilized in a restaurant environment or even in domestic cooking. MG includes producing great results from readily available ingredients. It also includes the discovery of new phenomena and new mechanisms (Burke et al., 2020).

Concept Behind Note by Note Cooking & Cuisine

The note by note cooking concept is different from standard cooking as it does not involve typical food ingredients, such as meat, fish, vegetables or fruits, but instead, the concept behind MG is to utilise pure compounds or mixtures to make a new product (Agroparistech, 2020). While designing a product in MG, different aspects are taken into account, including shape, consistency, nutritional properties, colour, odour, taste, trigeminal sensations, and temperature. The important examples of pure compounds are 1-Octen-3-ol which gives the aroma of wild mushrooms, limonene which gives the smell of citrus, and sotolon, whose fragrance at high concentrations resembles curry and at low concentrations, maple syrup or sugar, and tyrosine an odourless but flavourful amino acid present in cheese (This, H., 2014.).

Figure 2 Product developed with the help of MG techniques

With an increase in world population, it is expected that there will be increased challenges and threats related to food insecurity and shortage. The world population is expected to get 9-10 billion by 2050 and it will be really difficult to feed everyone on the planet. Some solutions have been proposed by

the researchers, including the use of Genetically Modified Organisms (GMO), fighting the food spoilage issue, and changing the physical and chemical properties of food to increase its shelf life.

Hence, the molecular cooking concept is used that involves the use of different equipment, such as siphons, rotary evaporators, water heating circulators, liquid nitrogen, etc. These techniques are further used to develop food with new ingredients e.g. pure compounds to give a new definition to the product. The compounds chosen for the development of a product could be a part of already existing traditional dishes (This, H., 2014).

Introduction of Pasta Cube

The concept of this year note by note cooking contest is to develop a dice or cube-like structure and it should include savoury pure compounds in it. The idea is to develop an innovative recipe by using different pure compounds and mixing them to give it a shape of an innovative, tasty, and nutritious product. Further, the theme of this year's note-by-note cooking is to include fibres in the recipe so that the product would be healthier for the human gut. Pasta is a type of food typically made from an unleavened dough of wheat flour mixed with water or eggs and formed into sheets or other shapes, then cooked by boiling or baking. It can include some spicy or tangy sauces in it for better taste development. The sauces that are used in pasta widely are tomato sauce which is sweet and spicy as well. The tomato sauce developed for pasta mainly includes tomato paste, garlic, onion, basil, coriander, etc. Hence, the concept is to develop a pasta dice and add cheese flavour in it along with other pasta sauce flavours and make it appealing to the consumers. In Pakistan, most of the pastas have spice flavours added to pasta. People in South Asia, especially in Pakistan, India, Bangladesh, and Afghanistan, love to eat spicy food and they are more used to adding salt and spices to their food on daily basis, hence the idea for this pasta dice is to develop it according to Pakistani consumers which should be innovative, spicy, and healthy.

Figure 3 Pasta

For the final recipe, the base part used for the savoury dice is gelatine and a tomato sauce seasoning has been developed that contains a mixture of pure compounds in it. The seasoning is used in the savoury dice to give the flavour of spicy tomato sauce flavour in it. Further, noodles are also prepared and it mainly contains the cheese flavour in them, so the consumer can feel the perfect combination of cheese with spicy tomato sauce on his palate. Further, fibres are also added to the savoury dice as per the theme of the contest.

Aim of the Assignment

The major aims of the note by note cooking assignment are as discussed below:

Figure 4 Aims of the task

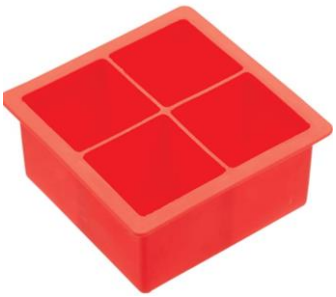
1. To utilize the technique of "synthetic cooking" efficiently, a culinary technique using pure compounds, to build food i.e. dishes and drinks
2. To contribute towards the fight against food spoilage, while sparing water, energy, foodstuff, and taking care of the environment.
3. To study the recipes that could be developed by using the pure compounds.
4. To study and decide on the shapes, consistencies, tastes, odours, trigeminal sensations (pungencies, freshness, etc.) temperatures, and colours.
5. To scrutinize and evaluate the formulation of all steps required to develop a new innovative product (dice) for the consumers.
6. To match the flavour profile or tonalities of the product with the benchmark.

Final Materials & Method

Following are the materials or ingredients required for the development of the pasta cube.

Equipment Required for Preparation

Bowls	Spoons	Stove
		

Gelatine Syringe Injectors 	Silicone Spoon Head 	Sauce Pan 
Plate 	Cube Trays 	Syringe tube 
Whisker 	Chef Knife 	Weighing scale 

Materials Required for the Sensory Evaluation

Napkin 	Water 	Trays 

Disposable glass	Spoon	Plates
		

Major Raw Materials Required for the Product

The below materials are the finalized ingredient used in the finished recipe. These ingredients are diligently selected keeping in mind the concept of note by note cooking.

Pasta Cube

Gelatine

Gelatine is mainly a partial product of collagen hydrolysis, which is water-soluble, thermo-reversible, and multi-functional hydrocolloid. Collagen consists of high molecular weight and it is a type of protein that is crucial for the livestock. According to the research, gelatine is one of the major hydrocolloid products that is obtained from the hydrolysis of collagen proteins and it is hydrophilic. Gelatine is a source of protein that is mainly derived from large amounts of collagen. The main characteristics of collagen proteins are that it consists of at least 33% amino acid glycine and 22% proline present.

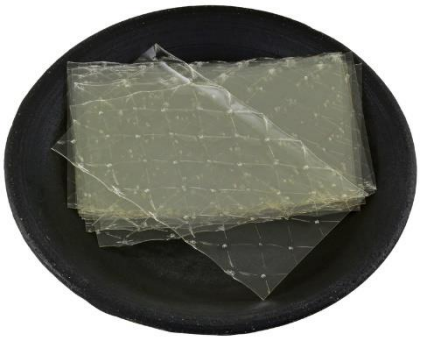


Figure 5 Gelatine sheets

Gelatine can play its role in cohesion and film forming cation and stabilising protectors. It is further known to play a crucial role in the gel-forming characteristics and texture, thickening, water-binding capacity. Furthermore, it provides great functional properties at a lower cost. The physical properties of gelatine are influenced by concentration, pH, the interaction of material components, temperature, and curing time. It is noted that viscosity, gel strength, and melting point are also the main parameters used to determine the physical properties of gelatine (Said, 2020).

It is mainly used in some popular foods, such as desserts, candies, stock, candies, etc. In its pure form, gelatine is pale yellow in colour and a tasteless substance. It is sold in powder form or as sheets and when added to water, it forms a mixture known as colloid forms. The mixture gets thickened as it cools and it eventually turns into a gel. It can be utilized in forming gel caps for medication and is also used in a variety of cosmetics, hair treatments, and crafts (Delishably, 2022).

Figure 6 Gelatine

Agar

Agar is also known as agar-agar. It is a gelatine-like product that is primarily obtained from the red algae known as *Gelidium* and *Gracilaria* (division Rhodophyta). It is mainly used as a solidifying component of bacteriological culture media. It can also be utilized in canning meat, fish and, poultry; in cosmetics, medicines, and dentistry; as it acts as a clarifying agent in brewing and wine making. Further, it can be also used as an agent in ice cream, pastries, desserts, and salad dressings; and as a wire-drawing lubricant. It is mainly isolated from algae as an amorphous and translucent product sold as powder, flakes, or bricks.

Agar has an overall capacity to absorb water as much as 20 times its own weight. It is insoluble in cold water and dissolves readily in boiling water; a dilution solution is still liquid at 42°C (108°F) but solidifies at 37°C (99°F) into a firm gel. Agar naturally occurs as a complex cell-wall constituent containing the polysaccharide agarose with sulfate and calcium (Petruzzello).

Figure 7 Agar

It consists of a mixture of two polysaccharides known as agarose and agaropectin. Agarose consists of 70% of agar and it is a linear polymer made of repeating subunits of agarose. Disaccharide or double sugar consists of D-galactose and 3,6-anhanhydrousgalactopyranose. It is indigestible, but intestinal bacteria can help ferment the absorbable nutrients, especially short-chain fatty acids (Moolihai).

Fibres

Fibres are a type of carbohydrate that cannot be digested by the human body. Most of the carbohydrates can be broken down into sugar molecules, and instead, it passes through the body undigested. It helps in regulating the body's use of sugars and keeps hunger and blood sugar in check. It is estimated that adults need at least 20 to 30 grams of fibre per day for good health. A great source of fibres are fruits and vegetables, whole grains, and beans.

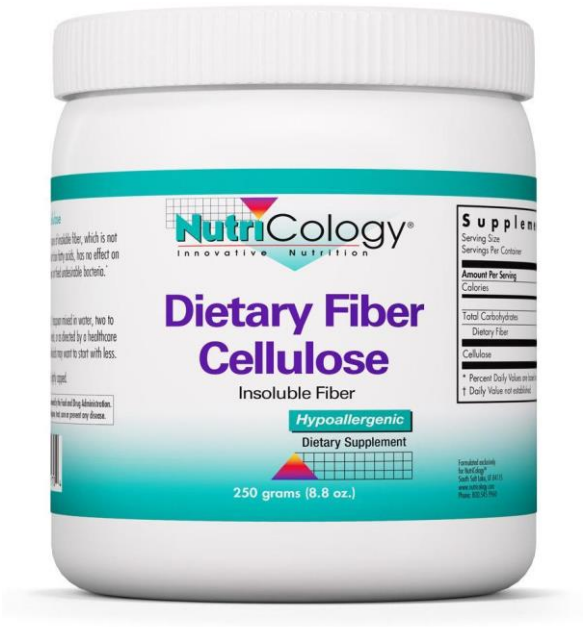


Figure 8 Dietary Fibre Cellulose

There are two main types of fibres i.e. which dissolve in water and insoluble fibres, which do not dissolve in water. The soluble fibres are useful in lowering blood cholesterol levels. The foods containing soluble fibres include oatmeal, nuts, beans, lentils, apples, and blueberries.

The insoluble fibres don't dissolve in water and they are useful in food moving through the digestive system. They aid in promoting regularity and prevent constipation. These fibres are present in wheat, whole wheat bread, whole grain couscous, brown rice, legumes, carrots, cucumbers, and tomatoes.

Flavouring Compounds

There are different flavouring compounds used to give a great profile to the end product. The pasta itself contains cheese flavour in it and the sauce of pasta contain the dominating flavour of tomato, chilli, ginger, garlic, onion, and coriander. There are different pure compounds involved in giving particular aroma of each ingredient present in the recipe.

Tomato flavours are primarily produced by a diverse set of chemicals including sugars, such as glucose and fructose, acids (citrate, malate, and glutamate), and multiple, less well-defined volatiles. Of the more than 400 volatiles that is detectable in fruits, only 16 were predicted to contribute to tomato flavour based on their concentrations in fruit and odour thresholds (odour units). According to the research, flavour intensity was associated with twelve different compounds, seven of which were independently significant after accounting for fructose: 2-butylacetate, cis-3-Hexen1-ol, citric acid, 3-methyl-1-butanol, 2-methylbutanal, 1-octen-3-one, and trans,trans-2,4-decadienal. The sweetness was associated with twelve compounds, eight of which overlapped with those important for flavour and three of which were independent predictors of sweetness after accounting for fructose: geranial, 2-methylbutanal, and 3-methyl-1-butanol (Tieman et al., 2012).

In the case of garlic, Diallyl disulphide (DADS; structure: two sulfur atoms with allyl groups) is a major organosulfur compound of garlic. Furthermore, it is found out that the pungent odour of fresh garlic is mainly due to thiosulfates and the products attained by their degradation. The heating process causes decomposition of thiosulfates and nitrogen-containing volatile compounds, including pyridines and pyrazines are generated. In black garlic, black aldehydes are the dominant aromatic compounds, while esters and phenols are key aroma compounds in aged garlic extract (Abe et al., 2020).

Ginger is widely used as either a food product or a herbal medicine around the globe. According to the study, β-Myrcene, β-phellandrene, eucalyptol, β-linalool, β-elemene, and geraniol were important characteristic aroma compounds of ginger oils (Vedashree et al., 2020). Onions are also used a lot in the South Asian dishes and it is mainly added in the base of the recipe. The compounds that are responsible for the aroma are propane thiol.

Ingredients & Method

Table 1 Ingredients required for the pasta dice

Sr No	Ingredients	Quantity
1	Gelatine Powder	10 g
2	Water	240 g
3	Red Colour	1 g
4	Tomato Sauce Seasoning	10 g
5	Nutricology Dietary Fibres	6 g

Table 2 Ingredients required for dorm like structure

Sr No	Ingredients	Quantity
1	Agar Powder	6 g
2	Water	150-200ml
3	Green Colour	1 ml
4	Sosa Coriander Flavour	0.5 ml
5	Tomàquet Tomato Powder	10 g
6	Sosa Chicken Flavour	1.5 ml

Table 3 Ingredients required for Agar noodle preparation

Sr No	Ingredients	Quantity
1	Agar Powder	6 g
2	Water	150 ml
3	Yellow Colour	2 g
4	Aroma de formatge tipus cheddar en pols (500g), Sosa	10-15 g

Table 4 Ingredients required for the development of tomato sauce seasoning

Sr No.	Ingredients	Quantity
1	White Salt	14 g
2	Sugar	30 g

3	Tomàquet Tomato Powder	20 g
4	Citric Acid	5 g
5	Maltodextrin	15 g
6	Sosa Tomato Flavour	1 ml
7	Red Colour	1 g
8	Sosa Ginger Flavour	1 ml
9	Sosa Garlic Flavour	1 ml
10	Sosa Onion Flavour	1 ml
11	Sosa Coriander Flavour	1 ml
12	Monosodium Glutamate	5 g
13	Sodium Diacetate	5 g

Methodology

For Pasta Dice

The following steps should be followed to make pasta cube.

1- Weigh all the ingredients with the help of a weighing scale.
2- Take a clean bowl and add 100 ml of cold water in it.
3- Add gelatine powder to it and whisk it in cold water with the help of a whisker.
4- After whisking for 10-15 min, a sticky structure will be formed.
5- Add this sticky mixture to saucepan and add the rest of the water in it and boil the mixture.
6- Add other ingredients to the mixture, such as tomato sauce seasoning, colour, etc.
7- Let the mixture gets boiled for 2-3 min and then take it off the stove.
8- Let it cool down for some time and add it in cube-shaped trays.
9- Put the trays in the refrigerator and let them cool down for 3-4 hours.
10- Take it out when the mixture gets solidified.

For Agar Noodles

The following steps should be followed to prepare agar noodles.

1- Weigh all the ingredients properly with the help of a weighing scale.
2- Add cold water 50 ml to the bowl
3- Add agar to the bowl and whisk with the help of a whisker.
4- A sticky mixture will be obtained due to constant whisking.

5- Add the sticky mixture to the saucepan and then heat it while constant stirring.
6- Add the rest of the water and ingredients one by one in the mixture and heat it until the mixture starts to boil.
7- Take the saucepan off the stove and let the mixture cool down for some time.
8- Add the mixture to gelatine syringe and attach the tube to the nozzle of the syringe.
9- Take another bowl and fill it with ice and cold water.
10- Immerse the syringe tube in the ice bowl and slowly inject the mixture into the tubes.
11- Let the tube stay in the ice bowl for 1 minute and then inject the agar mixture onto a plate.
12- You will observe that agar has caused the solidification of the mixture in the form of noodles.
13- Repeat the process over and over again and take out as much noodles as you want.
14- Display the noodles with the gelatine cube.

For the Tomato Sauce Seasoning

1- Weigh all the ingredients with the help of a weighing scale.
2- Take a clean bowl and add maltodextrin to it after weighing.
3- Add flavour one by one into the maltodextrin powder and mix it well, so that there won't be any lumps left in the maltodextrin.
4- Add salt and sugar to the mix and with the help of a spoon, mix all the ingredients.
5- Add the rest of the ingredients in the powdered mixture one by one and mix them well.
6- Add colour at the end of mixing all the ingredients.

Results

The sensory analysis of the final dish is conducted by the consumers to check the overall acceptability in terms of taste, texture, flavour, and mouth-feel. The products that were developed before had very low acceptance and they were bitter. During the first two weeks, the cheese cube was developed that had high level of pea protein and cheese powder in it. The excess amount of these two ingredients caused undesirable bitterness in the product. The overall texture of the cube was dense and it was not too pleasing. Furthermore, the topping that was developed with the help of xanthan gum did not have any good prominent flavour of cheese in it. There were lots of improvements required in the initial recipes and many improvements have been done during each week.

Figure 9 Pasta Dice with Cheese Flavour in dice and gelatine topping containing tomato powder flavour

Week 1

The figure shown above is developed during the first week. The cube structure has the following ingredients added to it.

Table 5 Ingredients required for the preparation of pasta cube

Sr No	Ingredients	Quantity
1.	MyVegan Pea Protein Isolate	50 g
2.	Aroma de formatge tipus cheddar en pols, Sosa	20 g
3.	Gluten	30 g
4.	Tomàquet Tomato Powder	5 g
5.	Nutricology dietary fiber cellulose	5 g
6.	Cornflour	10 g

7.	Yellow Color	1 g

Table 6 Ingredients required for the preparation of topping

Sr No	Ingredients	Quantity
1.	Xanthan Gum	2 g
2.	Water	100 ml
3.	Sosa Cheese Flavour	3 ml
4.	Red Colour	1 g

The pasta cube had cracks in it and the shape was not perfect. The flavour was not like pasta and it was unpleasant and bitter. The cube was overall dense and the cooking was not done appropriately. The aftertaste was also too bitter and it had dominating pea protein flavour in it which was not too good. The results of the sensory evaluation conducted are given below:

The appearance of the product was not too attractive and consumers found it bit cracked and the symmetry of the dice was not that good. The average score got by the consumers is 2.2 for the overall appearance and further improvements are required.

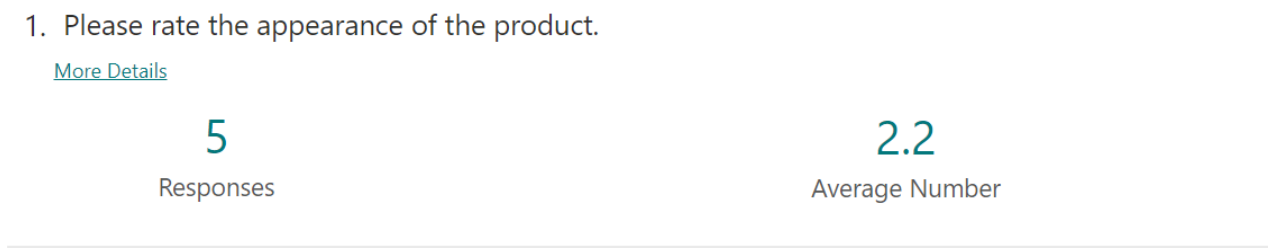


Figure 10 Sensory evaluation results regarding the appearance of the pasta dice

The flavour profile was not too pleasing and the average score is 2.2. Further suggestions are given by the consumers regarding the taste profile. Salt should be added into the dice in order to enhance the overall flavour. The cheese flavour is too high in the dice and the amount of it should be decreased. Further, the pea protein is giving an unpleasant affect to the overall flavour profile and it should be eliminated in further trials.

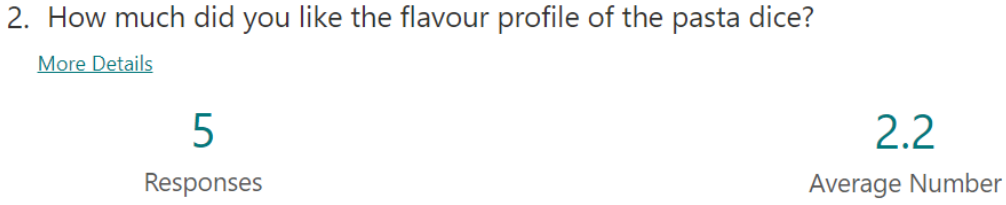


Figure 11 Sensory evaluation results regarding the flavour profile of the pasta dice

According to the consumers, the topping did not contain any prominent flavour present and more flavours or ingredients should be added to boost the flavour.

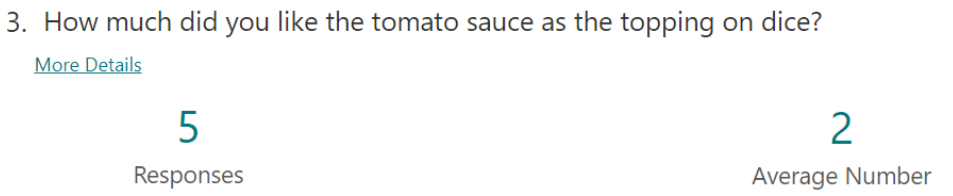


Figure 12 Sensory evaluation results regarding the acceptance of tomato sauce on dice

The results below show the sensory analysis of different attributes of the product. The mouth feel is slightly disliked by the consumers. The texture is just right for some consumers and it is disliked slightly by other consumers. Moreover, the aftertaste is disliked by the consumers and further work is needed to be done to get a better product.

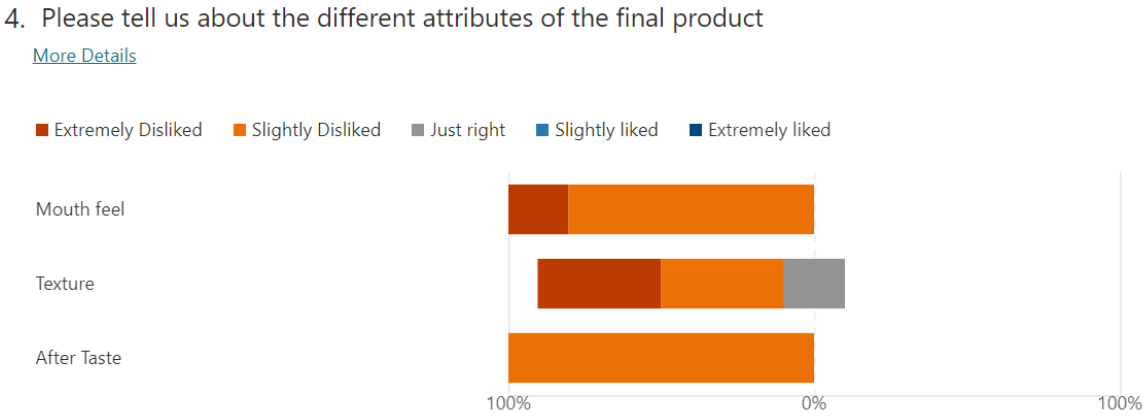


Figure 13 Sensory evaluation results regarding the overall acceptance of different attributes in the final product

The comments are mentioned in the figure and it clearly says that further improvements are required as the overall taste is bitter.

5. Please tell us what you disliked the most about the product?

More Details

5

Responses

Latest Responses

"The off flavour of cheese"

"The dense mouth feel"

"The taste needs to be improved. It is too bitter"

Figure 15 Comments of consumers regarding the product

Week 2

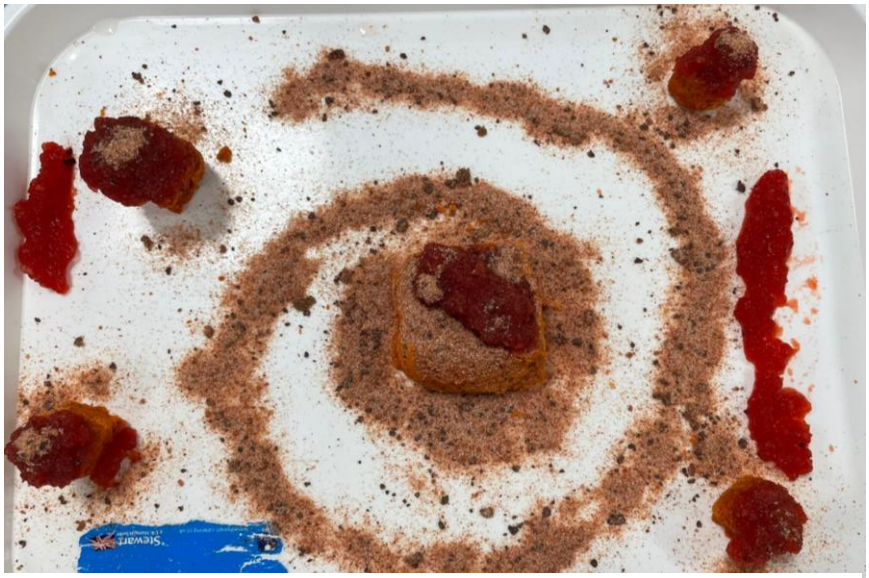


Figure 14 Pasta dice containing cheese flavour in it and the tomato sauce seasoning on top of it

During week 2, the cheese dice were developed and a tomato sauce seasoning was prepared. The ingredients of each product is mentioned below:

Table 7 Ingredients required for the preparation of the pasta cube

Sr No	Ingredients	Quantity
1.	MyVegan Pea Protein Isolate	20 g
2.	Aroma de formatge tipus cheddar en pols (500g), Sosa	30 g
3.	Gluten	25 g
4.	Fajita Seasoning	5 g
5.	Nutricology Dietary Fibre	6 g
6.	Corn starch	10 g
7.	Salt	10 g

8.	Yellow Colour	1 g

Table 8 Ingredients required for the preparation of tomato sauce seasoning

Sr No	Ingredients	Quantity
1.	White Salt	20 g
2.	Sugar	30 g
3.	Tomàquet Tomato Powder	25 g
4.	Citric Acid	2 g
5.	Maltodextrin	10 g
6.	Sosa Tomato Flavour	0.5 ml
7.	Red Colour	1 g
8.	Sosa Ginger Flavour	2 ml
9.	Sosa Garlic Flavour	0.5 ml
10.	Iqemusu Onion Flavour	1 ml
11.	Sosa Coriander Flavour	0.5 ml

According to the consumers, the product was too salty and it still had bitterness in it, even though the level of pea protein and cheese powder has been taken out. The aroma was also not too pleasing and the dice was not cooked properly. The dice was still dense and the presence of salt in the seasoning caused an increase in the saltiness of the product and it was difficult to consume it.

The results of sensory analysis by the consumers are given below:

The flavour of pasta dice is still not acceptable by the consumers and according to them, there is too much salt in the pasta dice. The mixture of pea protein and cheese flavour has given an unpleasant taste to the product.

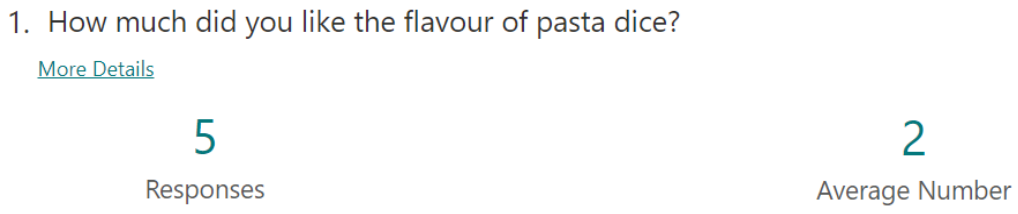


Figure 16 Sensory evaluation result regarding the flavour of the pasta dice

2. How much do you like the tomato sauce seasoning on the top of dice?

More Details

5
Responses

3.2
Average Number

Figure 18 Sensory evaluation result regarding the acceptance of tomato sauce seasoning

3. How much do you like the overall appearance of the product?

More Details

5
Responses

2.2
Average Number

Figure 17 Sensory evaluation results regarding the overall appearance of the pasta dice

4. Please rate the overall attributes of the pasta dice and the tomato sauce seasoning.

More Details

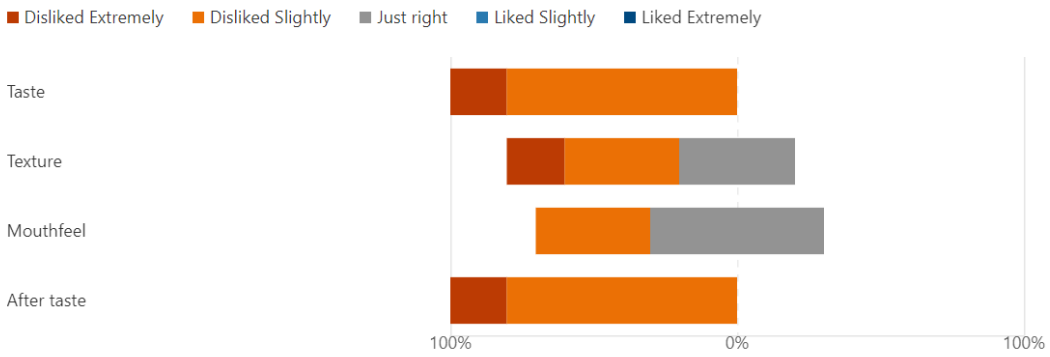


Figure 19 Sensory evaluation results regarding the attributes of the pasta dice

5. Any comments in order to improve the product?

More Details

5
Responses

Latest Responses

"The salt level is too high"

"Make product more attractive and change the recipe for pasta dice"

"The seasoning is good but further work needs to be done in case of p..."

Figure 20 Comments regarding the final product developed

Week 3

Figure 21 Pasta dice with tomato sauce seasoning flavour in dice and the agar noodles with cheese flavour in it

For week 3, a savoury dice was prepared and it included tomato sauce seasoning in it. The noodles had cheese powder added to it. The recipes of the product are as given below:

Table 9 Ingredients required for the preparation of pasta dice

Sr No	Ingredients	Quantity
1.	Gelatine	10 g
2.	Water	240 g
3.	Red Color	2 g
4.	Tomato Sauce Seasoning	20 g
5.	Nutricology Dietary Fiber	6 g

Table 10 Ingredients required for the preparation of Agar noodles

Sr No	Ingredients	Quantity
1.	Agar	6 g
2.	Water	150 ml
3.	Aroma de formatge tipus cheddar en pols (500g), Sosa	5 g

Sensory analysis of the product is conducted by the consumers. According to the consumers, the flavour of the seasoning in the product is great, but the level of spiciness in the savoury dice should reduce. The pasta noodles have off flavour in them and there is a need to increase the level of cheese flavour in the pasta. The consumers overall have shown great interest in the savoury dice as it has a burst of tomato sauce flavour in it and it is tangy and hot overall.

Week 4

Figure 22 Pasta dice with tomato sauce seasoning in the cube, agar noodles containing cheese powder, and green dorms containing coriander, chicken, and tomato powder flavour

For week 4, only minor changes were implemented in the recipe and the main focus was made on the visual appearance of the end product. During this last class, agar noodles were prepared having cheese flavour in it and the savoury dice had tomato sauce flavour added to them with the help of seasoning. The dorms present above the dice had the prominent flavour of coriander, chicken, and tomato added to it.

Sensory analysis of the product is conducted to check the overall acceptance of the flavour texture, appearance and mouthfeel. The consumers liked the overall appearance of the product. The texture of the product was also nice and the only drawback in the product was that it still had the spicy flavour present. The result of sensory the analysis done by the consumers is given below:

1. How much did you like the taste profile of the pasta cube?

More Details

6	2.67
Responses	Average Number

Figure 23 Sensory evaluation results regarding the taste profile of the pasta dice

2. Please tell us about the overall appearance of the product?

More Details

6 Responses

4.17 Average Number

Figure 24 Sensory evaluation result regarding the overall appearance of the product

3. How much did you like the texture of the end product?

More Details

6 Responses

3.33 Average Number

Figure 25 Sensory evaluation results regarding the texture of the end product

4. How much do you like the aroma of the pasta cube?

More Details

6 Responses

2.33 Average Number

Figure 27 Sensory evaluation results regarding the aroma of the pasta cube

5. How much do you like the overall pasta cube?

More Details

6 Responses

3.33 Average Number

Figure 26 Likeness for the pasta dice

Hence, the result shows that consumers liked the overall appearance of the product and it is really attractive overall. The flavour profile got the least marks as the dice was spicy and tangy and the noodles had mild cheese flavour present in it. The dorms present above the dice have prominent aroma of coriander and chicken flavour in it. Overall, the results show that consumers gave an average score of 3.33 to overall likeness for the product which is good.

Discussion

Pasta is a food made from flour, water, and sometimes egg, that is cooked and usually served with a sauce. It is made in various shapes that have different names: Spaghetti, lasagne, ravioli, and cannelloni are all types of pasta. These days, pasta has gained so much popularity as it contributes towards different health issues, including weight gain, diabetes, and cardiovascular diseases. Pasta has a long history as one of the major components of the Mediterranean diet, which has been proven through years of research to be a healthy dietary pattern. It is noted that pasta available in the US is enriched with iron, riboflavin, thiamine, and folic acid. It is overall considered as a low cost, convenient, versatile, and nutritious food with a good taste profile that is widely liked by everyone (Webb et al., 2019).

The major concept behind the Molecular Gastronomy class is to develop new dishes by utilizing new techniques and using pure compounds instead of actual ingredients. The product chosen for the development is “Pasta” which is developed according to a South Asian recipe. During this class, weekly analysis results and progression of the product development at each stage is mentioned in logbook attached to Appendices. All step-by-step changes along with quantities and results are mentioned briefly.

The tasks assigned during the class are as given below:

Table 11 Task assigned and accomplished

Sr No	Task Assigned	Task Completed
1	Brainstorming and conception	3/3/2022
2	Bibliographic Research	5/3/2022
3	Submission for the list of ingredients	7/3/2022
4	Final Concept Submission	7/0/2022
5	First note-by-note cooking class	28/3/2022
6	Second note-by-note cooking class	1/4/2022

7	Third note-by-note cooking class	6/4/2022
8	Easter Break	Till 24/4/2022
9	Last note-by-note class	25/4/2022
10	Sensory Evaluation Final	25/4/2022
11	Final Report	9/5/2022

For each week, goals and objectives were adjusted according to the trials, and a logbook was prepared to keep a track record of all the activities conducted during each week. Raw materials and the ratio of each ingredient added to the pasta dice was adjusted according to each week. Furthermore, sensory evaluation by the class fellows is conducted to check the overall response or acceptability for the product. This approach of keeping a record of weekly activity in the kitchen facilitated the generation of new ideas the or proceeding weeks.

The major aims of this class were to develop a product by using pure compounds. In normal cooking, we use the original ingredients and raw materials for making the final product, but the concept of this class is to make a final product and give it the taste of original food product by using pure compounds only. Further, class aim was to develop a savoury dice-shaped product that should have fibres added to it while making sure that the product has flavour profile or tonalities related to the benchmark food product.

To achieve the aims or goals set in this class, every week a different strategy has been implemented to develop a product that is related to the benchmark sample. The product I chose was pasta and the final product has been prepared by conducting different kitchen trials and adjusting the recipes accordingly.

Week 1 was mainly about getting to know about the raw ingredients that has be used for the recipe and to checking different flavours present in the kitchen. During first class, the product recipe was designed and it was the hardest class as it involved getting familiar with all the pure compounds and raw ingredients. The objectives set for the first week were to check if the recipe works and how all the flavours or ingredients are playing its role in the end product. Further, the baking temperature was also adjusted and checked if how much time does the dice take to get cooked properly. The product developed at the end was not good enough as it had bitter taste due to excessive amount of cheese powder and pea protein in it. The topping that was prepared with the gelatine had a prominent flavour it. The tomato powder flavour was too

distinct in it and it was not giving the pasta sauce flavour. Further, the sensory analysis results showed that the product does not show the pasta attributes and further improvement is required.

Week 2 involved the change in the ratio of first week's class recipe. The objective was to decrease the bitterness in the end product. For this purpose, the amount of pea protein and cheese powder was reduced and more baking time was given to the dice. Too much cooking caused the dice to get stuck to the baking tray and cracks appeared in the product. The cheese and pea protein flavour were still too high in the end product. The level of salt was also high and it needs to be reduced. A tomato sauce seasoning was prepared along with the dice. The taste was liked by the consumers, but it was too spicy if applied in large quantity on the cube.

For **week 3**, major changes were implemented in the recipe. The recipe that was prepared in last two week were not good enough and consumers did not find it attractive and enticing. Hence, major ingredients for the dice were changed and gelatine was added in the dice and tomato sauce seasoning was added to give a boosting flavour to the dice. For making product more attractive, agar noodles were prepared and cheese powder is added to it. The consumers liked the product developed at the end. According to them, the dice has high level of spice in the cube and the level of seasoning in the dice should be lowered. Further, the agar has mild flavour of cheese in it and it should be increased.

For **week 4**, all the ingredients and procedures used for the development of product were same. Some minor changes have been implemented to make the product perfect for the showcase. The level of seasoning in the dice was reduced and dorms were prepared for the decoration of cubes. The dorms had a dominating flavour of coriander, chicken, and tomato powder in it. The final product was really liked by the consumers as visually it looked great and the dice had good shape. The colour of dorms and dice was a perfect combination and the noodles present in the plate gave the clear concept about the product.

The sensory analysis results showed a significant difference between consumer overall preference. The pasta dice developed during the first two weeks had cracks in them and they were not cooked properly. The product later developed with gelatine and agar had better acceptance overall, as it had good visual appearance and flavour profile was much better.

Conclusion

The process of coming up with an idea and developing an innovative product in Molecular Gastronomy which can leave the consumers with wonderment and amazement was the main

object of this class, while using the pure compounds. Moreover, to learn and go through all the procedures; becoming familiar with all aspects related to product development was the main challenge of this whole period. Working for four weeks on a product and realizing and visualizing its progress was the target which is now achieved after successful production of the desired product. This target was achieved with deep study of conception, four weeks of kitchen trials and presenting the data in this form of report which kept on allowing the writer to collect all the required information necessary for the production of the product and report. The development of the product and report enhanced the knowledge and experience of the writer R&D.

Research and extensive study was done while choosing the product (Pasta) for development. Pasta is the product that is mainly liked by everyone and it is common all around the world. The concept was to use pure compounds and develop a product which exactly tastes like it. Different flavours were tested and analysed and the best suitable ingredients and flavours were chosen for the final product. This class overall helped me a lot in getting to know more about the pure compounds and how can they be added in the product.

There are few experiments which would have been conducted with more extension, but unfortunately due to lack of time, it couldn't be done. However, at this stage of product development in Molecular Gastronomy, the objectives are met providing a sense of satisfaction to visualize the product which was conceptualized few weeks back. Nevertheless, for further improvement in the product, further recommendations are made in the recommendation section.

Texture, taste, mouthfeel and overall acceptance was asked in the sensory evaluation form to get an overall idea of consumer's preferences for the final Pasta Cube. Hedonic scale (1 to 5) helps to identity the intensity of response. Overall results candidly depicted that the product was admired by the participants and got the positive response in regard to appearance, texture, and mouthfeel. The results are applicably seen in these results section where respondents overall marked their acceptability for the product on the majority basis of taste. For this product, these results are satisfactory and got clear direction for improvement in terms of sensory.

Recommendations

For the Product Development

- To get better acceptance on all 4 attributes of Pasta dice, more research should be conducted to improve the flavour of pasta cube. Trials with different flavours and ingredients should be made. Specially trials with good quality flavour profiles or seasonings should be done.
- Keeping the concept, new flavours should also be tried and cube with different ingredients (except for gelatine or agar) should be made and checked for their texture.
- More versions of toppings for trials are recommended.

For Sensory Evaluation

- Target more participants falling in the potential consumer list to identity their preferences for the product.
- Diversify the sensory panel to get maximum responses in terms of all the 4 attributes of the product. This could facilitate the process of collecting more fair results in terms of sensory analysis.
- Maximize the availability of pasta lover participants to know their opinions and views for this product that whether they like it or not.

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Appendices

Log Book

MODULE CODE: TFCS9025

MODULE TITLE: Advanced Molecular Gastronomy

STUDENT NAME: Nimra Jamal

FOOD PRODUCT: Pasta Cube

WEEK NO.: 1 **DATE: 28 March 2022**

Weekly Aims and Objectives

To develop a savoury dice while giving it the flavour of pasta and tomato sauce for the consumers. The aim is to design a perfect recipe for the pasta cube and make adjustments to ingredients to get the desired taste in the final product.

The weekly objectives will be achieved by following all the steps required for the development of the product and then conducting the sensory analysis to check if consumers can perceive the end product as a pasta cube. Hence, the major steps are to find the perfect raw ingredients and flavour notes for the product and then analyse in which quantities they should be added to the product for the final sensory attributes.

Materials and Method (Ingredients, Equipment, and Method)

The materials required for the preparation of pasta cube are:

Table 12 Ingredients required for the preparation of pasta dice

Sr No	Ingredients	Quantity
1.	MyVegan Pea Protein Isolate	50 g
2.	Aroma de formatge tipus cheddar en pols (500g), Sosa	20 g
3.	Gluten	30 g
4.	Tomato Powder	5 g
5.	Nutricology Dietary Fiber	5 g
6.	Cornflour	10 g
7.	Yellow Color	1 g

For the paste on top of the pasta cube:

Table 13 Ingredients required for the preparation of topping

Sr No	Ingredients	Quantity

1.	Xanthan Gum	2 g
2.	Water	100 ml
3.	Sosa Cheese Flavour	3-5 drops
4.	Red Color	1 g

Equipment Required:

1- Whisker
2- Mixing Bowls
3- Spoon
4- Baking trays (cube-shaped)
5- Oven set at 160°C
6- Spatula

Method:

The following steps should be followed while preparing the pasta cube:

1- Take a bowl and add pea protein powder to it. Add cheese powder and mix water in these two ingredients to make a fine dough.
2- addAdd gluten to the mix and do kneading of the dough to give a smooth texture.
3- Add all the other ingredients, such as tomato powder, CMC, cornflour, and yellow colour one by one and knead the dough further for 5-10minutes.
4- Set the oven to 160°C and add the dough into baking trays (cube-shaped) for further baking.
5- Place the baking trays into the oven and set the timer to 25 minutes.
6- Check after 25 minutes if the dice have cooked properly otherwise place the baking tray back again for 5 minutes.
7- Take the baking tray out and place the dice out on the trays for further decoration

For the paste on top of the Dice

1- Take 100ml cold water and add it to the bowl.
2- Weigh Xanthan gum and add it to the water bowl for further mixing.
3- With the help of a whisker, whisk the Xanthan gum and water mixture to get the gel-like structure.
4- Add cheese flavour to it and after that add a red colour.

5- Whisk until all the ingredients get mixed homogenously.
6- Place the gel paste on top of the cube for decoration.

Results and discussion

The flavor and sensory attributes of the cube were analysed by the consumers. The cheese flavor was too dominating in the pasta cube and it was giving a bitter note due to the presence of too much cheese powder in the cube. The tomato flavour got suppressed because it was present in a lesser amount as compared to cheese powder. The cube was not giving the flavour note of pasta and it was giving an unpleasant mouthfeel. The pea protein was another cause of the unpleasant flavor in the product.

The gel paste that was used on the top did not have any dominating flavour of cheese in it. Although the color was great and it was looking good on the top of dice according to the consumers.

Conclusion

The conclusion drawn from this week's work is that I have to look for other raw materials in order to build a strong pasta flavour profile in my cube. The cube had bitterness in it due to the presence of too much cheese powder and pea protein in it. I want to give my dice a good cheese flavor along with tomato sauce flavour, so that it would taste like spicy pasta with cheese and tomato flavor mixed in it.

For the next trials, cheese powder quantity will be adjusted and new raw material will be considered for the recipes. The flavour profile is quite weak and the baked dice do not have a good texture overall. Further improvements will be introduced in the coming weeks.

Recommendations for following week.

The recommendation for the next week is to add basil to the pasta cube and enhance the tomato powder level in the recipe. Salt should be added to the product as it acts as a good flavour enhancer in the product.

Ingredients required for the following 2 weeks.

None.

MODULE CODE: TFCS9025

MODULE TITLE: Advanced Molecular Gastronomy

STUDENT NAME: Nimra Jamal

FOOD PRODUCT: Pasta Dice

WEEK NO.: 2 **DATE: 1st April 2022**

Weekly Aims and Objectives

To develop a savoury dice while giving it the flavour of pasta and tomato sauce for the consumers while making changes to the previous recipe. The aim is to design a good recipe for the pasta cube and make adjustments to ingredients to get the desired taste in the final product.

The weekly objectives will be achieved by following all the steps required for the development of the product and then conducting the sensory analysis to check if consumers can perceive the end product as a pasta cube. Hence, the major steps are finding and adding the perfect raw ingredients and flavour notes for the product and then analysing in which quantities they should be added for the final sensory attributes. To attain the objectives, further changes in the recipe will be implemented to check if the sensory attributes or flavour profile of the product is going in right direction.

Materials and Method (Ingredients, Equipment and Method)

The materials required for the preparation of pasta cube are:

Table 14 Ingredients required for the preparation of pasta dice

Sr No	Ingredients	Quantity
1.	MyVegan Pea Protein Isolate	20 g
2.	Aroma de formatge tipus cheddar en pols (500g), Sosa	30 g
3.	Gluten	25 g
4.	Fajita Seasoning	5 g
5.	Nutricology Dietary Fibre	6 g
6.	Corn starch	10 g
7.	Salt	10 g
8.	Yellow colour	1 g

A seasoning has been developed for the topping of savoury cube. The ingredients included in the seasoning are:

Table 15 Ingredients required for the preparation of the tomato sauce seasoning

Sr No	Ingredients	Quantity
1.	White Salt	20 g
2.	Sugar	30 g
3.	Tomàquet Tomato Powder	25 g
4.	Citric Acid	2 g
5.	Maltodextrin	10 g
6.	Sosa Tomato Flavour	0.5 ml
7.	Red Colour	1 g
8.	Sosa Ginger Flavour	2 ml
9.	Sosa Garlic Flavour	0.5 ml
10.	Sosa Onion Flavour	1 ml
11.	Sosa Coriander Flavour	0.5 ml

Equipment Required:

1- Whisker
2- Mixing Bowls
3- Spoon
4- Baking trays (cube-shaped)
5- Oven set at 160°C
6- Spatula

Method

For pasta cube:

The following steps are being followed while making the savoury dice with pasta flavours in them.

1- Take a clean bowl and weigh all the ingredients separately required for the pasta cube.
2- Add pea protein to the bowl and add cheese powder to it. Mix gluten in the mix as well.
3- Add water to the bowl slowly to make a smooth dough. Knead the mixture and give it the shape of the dough.
4- Add all the other ingredients one by one to the bowl after measuring with the help of a weighing balance.
5- After preparing the dough, put the mixture in the baking tray and make sure the surface is homogenous.
6- Set the temperature of oven to 160°C and place the baking trays in the oven.
7- Set the timer to 25-30 minutes.

8- Check if the baking has been done. Take out the tray and place the savoury dice on the plate for further decoration purpose.

The following steps should be followed while preparing the seasoning:

1- Take a bowl and add Maltodextrin to it after measuring with the help of a weighing scale.
2- Add flavours one by one into the maltodextrin and with the help of a spoon, mix the flavours in the maltodextrin so that all flavours get mixed homogenously.
3- Add sugar and salt into the mixture and mix it properly with the other powders.
4- Add citric acid into the mix which act as flavour enhancer.
5- At the end, add the colour and mix it properly to get a red colour.
1- Take 100ml cold water and add it to the bowl.

Results and discussion

The flavour and sensory attributes of the pasta dice were analyzed by the consumers. The dice still have the unpleasant flavour of cheese and pea protein in it. The presence of salt has caused too much bitterness in the product and it is difficult to consume it. The pasta cube is too dense and the mouthfeel is too heavy when it comes to tasting the cube.

The seasoning taste is overall good and it got good feedback from the consumers. Although, the salt level in the seasoning is quite high and if it is added on the top of the pasta cube, it increases the overall effect of bitterness in the mouth. The seasoning has the perfect combination of tomato and spice mix flavours in it and it is really liked by the consumers. It is giving the spicy tangy note of pasta and only salt level in the seasoning is needed to be adjusted for next trials.

Conclusion

The conclusion drawn from this week's work is that further improvement is required in the case of pasta dice. The pasta dice still have a bitter flavour in it and it is due to the pea protein powder in it and the high level of salt present. The flavour profile of the pasta cube should be adjusted and maybe for next week, it is better to take the pea protein out of the recipe. Maybe, for next week it is better to work with gelatine and make a pasta cube with the help of gluten.

Further, the seasoning is good and is liked by consumers. But it is important to lower the level of salt in the seasoning as Europeans don't like too much salt in the product. Overall, flavour

profile of seasoning is quite prominent and it is giving the note of the spicy ketchup flavour that pasta usually have in them. Hence, further trials are required for the pasta cube next week and maybe it is better to take out all the ingredients and just use the gelatine in the base of the product.

Recommendations for following week.

The recommendation for the next week is to further work on the pasta cube and adjust the flavour profile in the end product. Some of the raw materials are affecting the flavor profile of the product and hence the product is deviating away from the idea of pasta. Hence, for next week it is important to take out raw materials and use gelatine mainly and maybe add seasoning into the dice to check the flavour profile.

Ingredients required for the following 2 weeks.

None.

MODULE CODE: TFCS9025

MODULE TITLE: Advanced Molecular Gastronomy

STUDENT NAME: Nimra Jamal

FOOD PRODUCT: Pasta Cube

WEEK NO.: 3 **DATE: 6th April 2022**

Weekly Aims and Objectives

To create a savoury dice while giving it the flavour of cheese and tomato sauce for the consumers while making changes to the previous recipe. The aim is to design a good recipe for the pasta cube and make adjustments to ingredients to get the desired taste in the final product. The idea is to analyse the previous recipes and make adjustments into this week's trials by giving desirable taste and aroma to the product.

The weekly objectives will be achieved by following all the steps required for the development of the product and then conducting the sensory analysis to check if consumers can perceive the end product as a pasta cube. Hence, the major steps are finding and adding the perfect raw ingredients and flavour notes for the product and then analysing in which quantities they should be added for the final sensory attributes. To attain the objectives, further changes in the recipe will be implemented to check if the sensory attributes or flavour profile of the product is going in right direction.

Materials and Method (Ingredients, Equipment and Method)

The materials required for the preparation of pasta cube are:

Table 16 Ingredients required for the preparation of the pasta dice

Sr No	Ingredients	Quantity
1.	Gelatine	10 g
2.	Water	240 g
3.	Red Color	2 g
4.	Tomato Sauce Seasoning	20 g
5.	Nutricology Dietary Fibre	6 g

For Pasta Noodles

Table 17 Ingredients required for the preparation of the agar noodles

Sr No	Ingredients	Quantity
1.	Agar	6 g
2.	Water	150 ml

3.	Aroma de formatge tipus cheddar en pols (500g), Sosa	5 g

A seasoning has been developed for the topping of savoury cube. The ingredients included in the seasoning are:

Table 18 Ingredients required for the preparation of the tomato sauce seasoning

Sr No	Ingredients	Quantity
1.	White Salt	20 g
2.	Sugar	30 g
3.	Tomàquet Tomato Powder	25 g
4.	Citric Acid	2 g
5.	Maltodextrin	10 g
6.	Sosa Tomato Flavour	0.5 ml
7.	Red Color	1 g
8.	Sosa Ginger Flavour	2 ml
9.	Sosa Garlic Flavour	0.5 ml
10.	Sosa Onion Flavour	1 ml
11.	Sosa Coriander Flavour	0.5 ml

Equipment Required:

1. Whisker
2. Mixing Bowls
3. Spoon
4. Baking trays (cube-shaped)
5. Oven set at 160°C
6. Spatula

Method

For pasta dice:

The following steps are being followed while making the savoury dice with pasta flavours in them.

1. Weigh all the necessary ingredients with the help of a weighing scale.
2. Take a clean bowl and add gelatine powder to it.
3. Then add 40g cold water into it and whisk it until the gelatine powder gets mixed properly and makes a sticky structure.
4. Add 200ml water into it further and heat the solution with the help of a cooking stove.
5. The heat level of the cooking stove should be normal. Cook the gelatine mix by constant stirring.
6. Add red colour into the solution to give a nice colour to the cube.

7. Add 20g of tomato sauce seasoning into the solution and stir the solution properly.
8. Also, add CMC fibre into the solution and cook the gelatine solution mix until it starts to boil.
9. Take gelatine solution off the stove and let it cool down for a couple of minutes.
10. Add the final mix into cube-shaped trays and put them into the refrigerator.
11. Check after 2-3 hours if the cube has got solidified and it has got compact in shape.

The following steps should be followed while preparing the noodles:

1. Take a bowl and add agar to it.
2. Add 50ml of cold water into the bowl and whisk the solution with the help of a whisker.
3. Whisk until a sticky homogenous solution is formed.
4. Add yellow colour and cheese powder into the mixture.
5. Add 100ml water into the mixture and shift the mixture into a pan.
6. Then heat the pan by placing it on the cooking stove.
7. Stir the mixture properly and wait until the mixture start to boil.
8. When the mixture gets boil, take the pan off the stove and let is cool down for 2-3 minutes.
9. Take a bowl and add ice into it and cold water.
10. With the help of noodle maker, inject the solution in the noodle maker and attach the pipe with the nozzle of the injection.
11. Inject the solution carefully into the cold ice bowl and let the solution stay in the pipe for a couple of minutes.
12. Then inject the solution out of the pipe and you will realize it will be in the form of noodles.

Results and discussion

The flavour and sensory attributes of the pasta dice were analysed by the consumers. The dice still have the unpleasant flavour of cheese and pea protein in it. The presence of salt has caused too much bitterness in the product and it is difficult to consume it. The pasta cube is too dense and the mouthfeel is too heavy when it comes to tasting the cube.

The seasoning taste is overall good and it got good feedback from the consumers. Although, the salt level in the seasoning is quite high and if it is added on the top of the pasta cube, it increases the overall effect of bitterness in the mouth. The seasoning has the perfect combination of tomato and spice mix flavours in it and it is really liked by the consumers. It is

giving the spicy tangy note of pasta and only the salt level in the seasoning is needed to be adjusted the for next trials.

Conclusion

The conclusion drawn from this week is that gelatine dices are good in flavour, yet the spice level is too high in the dice. Hence, the spice level needs to be low and it is better if the tomato sauce seasoning should be added in lesser quantities. Instead of adding 20g of tomato sauce seasoning into the product, it would be better if we reduce the amount to 10g only.

The noodles had great texture and mouthfeel, but it does not have a prominent flavour of cheese in it. There is a need of adding more cheese flavour in it by adding more cheese powder. For next trials, 10-15 g cheese powder would be added in the product to give nice cheese flavour to thee noodles.

Recommendations for following week.

The recipe for the next week is in the right direction. Only recommendation for the coming week is to lower the amount of tomato sauce powder into the gelatine cube and add more cheese powder in the noodles.

Ingredients required for the following 2 weeks.

None.

MODULE CODE: TFCS9025

MODULE TITLE: Advanced Molecular Gastronomy

STUDENT NAME: Nimra Jamal

FOOD PRODUCT: Pasta Cube

WEEK NO.: 4 **DATE: 25th April 2022**

Weekly Aims and Objectives

To implement changes in the previous recipe for pasta cube and make it more acceptable for the consumers. The idea is to prepare a dish that has the effect of tomato sauce and cheese flavour in it. The cube should taste like pasta and the recipe is based on the recipe based in Pakistan. People in Pakistan love to add spice in pasta and this dish is inspired by the typical dish prepared in Pakistan.

The weekly objectives will be achieved by following all the steps required for the development of the product and then conducting the sensory analysis to check if consumers can perceive the end product as a pasta cube. Hence, the major steps are finding and adding the perfect raw ingredients and flavour notes for the product and then analysing in which quantities they should be added for the final sensory attributes. To attain the objectives, further changes in the recipe will be implemented to check if the sensory attributes or flavour profile of the product is going in right direction.

Materials and Method (Ingredients, Equipment and Method)

The materials required for the preparation of pasta cube are:

Table 19 Ingredients required for the preparation of the pasta dice

Sr No	Ingredients	Quantity
1.	Gelatine	10 g
2.	Water	240 g
3.	Red Color	2 g
4.	Tomato Sauce Seasoning	10 g
5.	CMC Fibre	6 g

Table 20 Ingredients required for the preparation of the agar noodles

Sr No	Ingredients	Quantity
1.	Agar	6 g
2.	Water	150 ml

3.	Aroma de formatge tipus cheddar en pols (500g), Sosa	15 g
4.	Nutricology Dietary Fibre	2 g

Table 21 Ingredients required for the preparation of the dorm like structure

Sr No	Ingredients	Quantity
1	Agar	6 g
2	Water	150 ml
3	Sosa Coriander Flavour	0.5 ml
4	Sosa Chicken Flavour	1 ml
5	Tomàquet Tomato Powder	10 g

A seasoning has been developed for the topping of savoury cube. The ingredients included in the seasoning are:

Table 22 Ingredients required for the preparation of the tomato sauce seasoning

Sr No	Ingredients	Quantity
1.	White Salt	20 g
2.	Sugar	30 g
3.	Tomàquet Tomato Powder	25 g
4.	Citric Acid	2 g
5.	Maltodextrin	10 g
6.	Sosa Tomato Flavour	0.5 ml
7.	Red Color	1 g
8.	Sosa Ginger Flavour	2 ml
9.	Sosa Garlic Flavour	0.5 ml
10.	Sosa Onion Flavour	1 ml
11.	Sosa Coriander Flavour	0.5 ml

Equipment Required:

1- Whisker
2- Mixing Bowls
3- Spoon
4- Baking trays (cube-shaped)
5- Oven set at 160°C
6- Spatula

Method

For pasta dice:

The following steps are being followed while making the savoury dice with pasta flavours in them.

1. Weigh all the necessary ingredients with the help of a weighing scale.
2. Take a clean bowl and add gelatine powder to it.
3. Then add 40g cold water into it and whisk it until the gelatine powder gets mixed properly and makes a sticky structure.
4. Add 200ml water into it further and heat the solution with the help of a cooking stove.
5. The heat level of the cooking stove should be normal. Cook the gelatine mix by constant stirring.
6. Add red colour into the solution to give a nice colour to the cube.
7. Add 10g of tomato sauce seasoning into the solution and stir the solution properly.
8. Also, add CMC fibre into the solution and cook the gelatine solution mix until it starts to boil.
9. Take gelatine solution off the stove and let it cool down for a couple of minutes.
10. Add the final mix into cube-shaped trays and put them into the refrigerator.
11. Check after 2-3 hours if the cube has got solidified and it has got compact in shape.

The following steps should be followed while preparing the noodles:

1. Take a bowl and add agar to it.
2. Add 50ml of cold water into the bowl and whisk the solution with the help of a whisker.
3. Whisk until a sticky homogenous solution is formed.

1- Add yellow color and cheese powder into the mixture.
2- Add 100ml water into the mixture and shift the mixture into a pan.
3- Then heat the pan by placing it on the cooking stove.
4- Stir the mixture properly and wait until the mixture start to boil.
5- When the mixture gets boil, take the pan off the stove and let is cool down for 2-3 minutes.
6- Take a bowl and add ice into it and cold water.
7- With the help of noodle, inject the solution in the noodle maker and attach the pipe with the nozzle of the injection.
8- Inject the solution carefully into the cold ice bowl and let the solution stay in the pipe for a couple of minutes.
9- Then inject the solution out of the pipe and you will realize it will be in the form of noodles.

For dorm above the pasta dice:

The following steps should be followed for the dorm structure present above the pasta dice.

1- Weigh all the ingredients with the help of a weighing scale.
2- Add agar to the clean bowl and then add cold water into it.
3- Whisk the mixture with the help of a whisker until the agar gets dissolved and make a gel-like mixture.
4- Take a saucepan and add the mixture to it. Put the saucepan on the heating stove and let the mixture gets boiled for 1-2 minutes.
5- Add flavour and other ingredients into the mixture, such as tomato powder, color etc.
6- Take the saucepan off the heating stove and let the mixture cool down.
7- Use the round-shaped trays and add the mixture into them to give the dorm-like shape.
8- Let the mixture get solidify and then take it out of the tray.

Results and discussion

Figure 28 Final Product (Pasta dice, agar noodles, and agar dorm)

Since last week's trials, lots of things have been improved in the product. The overall appearance of the pasta cube has gotten much better since last week's trials. The flavour profile is also good, although it is still a little bit spicy for European people. The dorms present above the dice give a mixture of coriander, tomato, and chicken flavour.

Overall, the end product is really liked by the people and it is giving a good flavour of tomato sauce in it. The cheese flavour in the pasta is mild, but it is overall balancing the tanginess of the cube.

The results of sensory evaluation are discussed below:

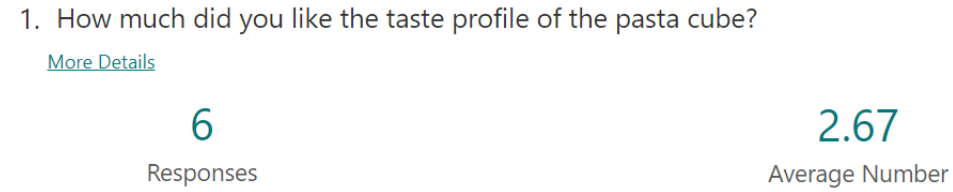

Figure 29 Sensory Evaluation results of the pasta dice

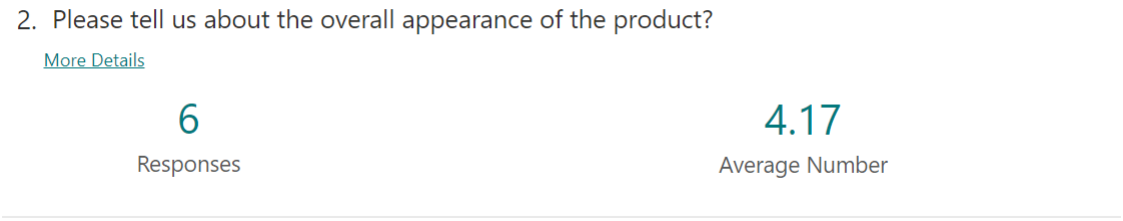

Figure 31 Sensory evaluation results of the overall appearance of the product

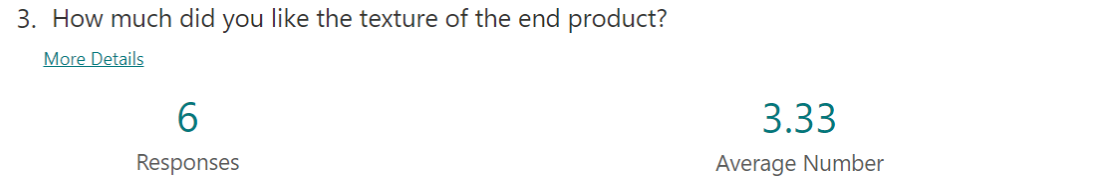

Figure 30 Sensory evaluation results of the texture of the pasta dice

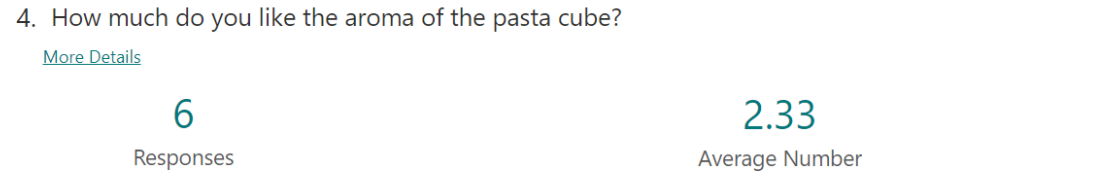

Figure 32 Sensory evaluation result of the aroma of pasta dice

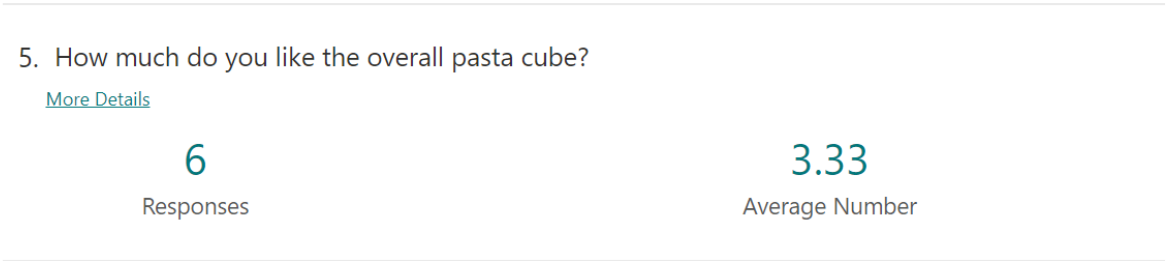

Figure 33 Overall Likeness for the pasta cube

Conclusion

The conclusion drawn from this week is that gelatine dices are good in flavour and the tanginess/spice level is a little bit high. It can be balanced by reducing the amount of seasoning in the dice. Further improvements could have implemented in extra week, but as this is the last class, so this is the final dish. The noodles have mild flavour according to the consumers, but it goes well with the savoury dice. The dorms have a dominating flavour of coriander in it and it can be reduced. Otherwise, overall the product is good for the final presentation.

Recommendations for the following week.

None.

Ingredients are required for the following 2 weeks.

None.