



RECIPE DEVELOPMENT

Work Package 3 – May 2014 – April 2016

Final report – Project Deliverable 3.1

INTRODUCTION	4
1. General context.....	4
2. Work package context.....	4
A- STEP 0: DEVELOPMENT SPECIFICATIONS	6
1. Overview of institutional meals	6
2. Pre-survey for recipe development.....	9
All the results from Step 0, as consumers' preferences in the four countries, were compiled to describe the culinary development for the chef (Step 1)	10
B- STEP 1: RECIPES SELECTION	10
1. Recipe development: workshop with culinary students.....	10
1.1. Protocol	10
1.2. Creative recipes	11
1.3. Jury selection.....	11
2. Selection of Recipes: acceptability pre-test	13
2.1. Improvement of recipes based on expert jury remarks.....	13
2.2. Internal acceptability pre-test with general consumers	13
2.3. Adapted recipes.....	15
2.4. Results and recipes selection:	15
C- STEP 2: CONSOLIDATION OF RECIPES	15
1. A common base for each selected recipes.....	16
2. Recipe adjustments for target consumers:	17
2.1. Target Consumers.....	17
2.2. Consolidated recipes and dishes	17
3. Acceptability test with target consumers – Focus Group	18
4. Production issues: consumer appreciation and technical aspects.....	20
4.1. Objectives and context.....	20
4.2. Real consumption context: self service.....	20
4.3. Upscale production of recipes.....	23
4.4. Technical issues	23
4.5. Consumer appreciation and liking.....	23
D- STEP 3: FINAL ADJUSTEMENTS OF the 2 RECIPES	24

1. Culinary exploration	24
1.1. Final dish development	24
1.2. Prototypes	24
CONCLUSION.....	25
FINAL TECHNICAL SHEET: PEA PIE.....	28
FINAL TECHNICAL SHEET: STEAK mixture for vegetarian balls.....	29
Figures	30
Tables	30
REFERENCES.....	30

INTRODUCTION

1. General context

By promoting the shift towards healthy and sustainable diets through consumer exposure and innovation in the food industry, **VeggiEAT** addresses European and global societal public health challenges. The **Second Action Plan for Food and Nutrition Policy 2007–2012**, specifically recommended a daily intake of more than **400 g of fruits and vegetables**, based on the current evidence favouring these foods as key components for the prevention of chronic disease (Jeurnink et al, 2012; Murphy et al 2012; Cooper et al, 2012). However, **the majority of Europeans do not meet these WHO recommendations**.

Vegetables have proven to be among the **most difficult categories of food to introduce into a diet** (Morizet et al, 2011) especially within catering environments such as schools, workplaces and elder care. Nevertheless, packaged fruits and vegetables, namely, canned and frozen varieties, provide a convenient way to promote intake. These have a shelf life longer than their fresh counterparts and are ready to eat and easy to use in meal preparation (Miller & Knudson, 2012). Moreover, they provide valuable alternatives for busy and cost-conscious consumers. It is believed that the challenge of complying with individual intake recommendations and a desirable increase in vegetable consumption at population level may be achieved through **innovation in process, in the sensory characteristics of the vegetables, and in the way that they are presented (exposure, choice architecture, and dishes)** to the consumer.

2. Work package context

The objective of WP3 is to select the products and factors of the intervention study (WP4) through the development and acceptability assessment of recipes and dishes and through pilot testing of CA designs. This WP is led by the Institute Paul Bocuse (IPB) and includes 3 tasks as outlined (*Figure 1*):

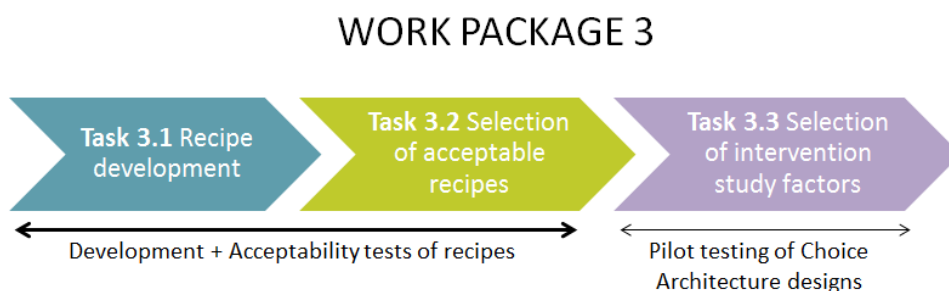


Figure 1 : WP3

The overall objective of WP3 is to investigate choice architecture factors that would allow to nudge consumers into choosing dishes that would not be spontaneously selected, but that are well-liked and consumed once chosen. The challenge of the recipe development step is therefore to design

recipes in order to produce dishes that taste nice for the target populations in the settings in which they normally eat.

The recipe development has been piloted by IPB in France from May 2014 to April 2016, using 6 recipe versions and engaging different expertise such as chefs and researchers. An overview of WP3 tasks and intermediary outcomes is presented in the table below (*table 1*).

Table 1 : WP3 description and main tasks

Task	Step	Objective	Methodology	Outcomes
3.1 Recipe development	3.1.A) Selection of the relevant study settings in the 4 countries	To identify, characterize and select the targeted settings for the project	Literature review	Typology of foodservice settings for the targeted populations in the four countries.
	3.1.B) Identification of typical recipes and dishes including the target vegetables in the four countries in the selected settings	To describe and select usual recipes that are realistic in the selected context	Literature review Field observation and pre-survey	Identification of the basic dishes on which the recipe development will be performed
	3.1.C) Development of recipes	To constitute the experimental plan(recipes, photos,)	Culinary development	A list of recipes that can be implemented within public sector foodservice incorporating processed vegetables
3. 2 selection of acceptable recipes	3.2.A) Methodological development: acceptability test	To develop a protocol for the assessment of acceptability and other indicators of perception such as expected and perceived freshness	Literature review	Definition of acceptability/feasibility Intermediary recipe evaluation
	3.2.B) Acceptability measures	To measure the acceptability of the recipes in different experimental contexts	Consumer groups evaluation Experimental tests at the experimental restaurant using The Observer XT (IPB)	Pilot tested recipes (D3.1)
3.3 selection of intervention study factors	3.3.A) Identification of possible CA factors	To list the possible CA factors for the presentation of the recipes and select a subset of factors for pilot testing	Literature review	List of factors to pilot test
	3.3.B) Pilot tests	To select relevant CA factors for WP4	Experimental tests of the recipes with different presentation options	Selection of experimental factors

This report will describe the four steps from development specifications to the two selected recipes (*figure 2*). It will report on the development procedure and the different versions of recipes (V1.0 to V 3.2)

Task 3.3 is described in a separate document.

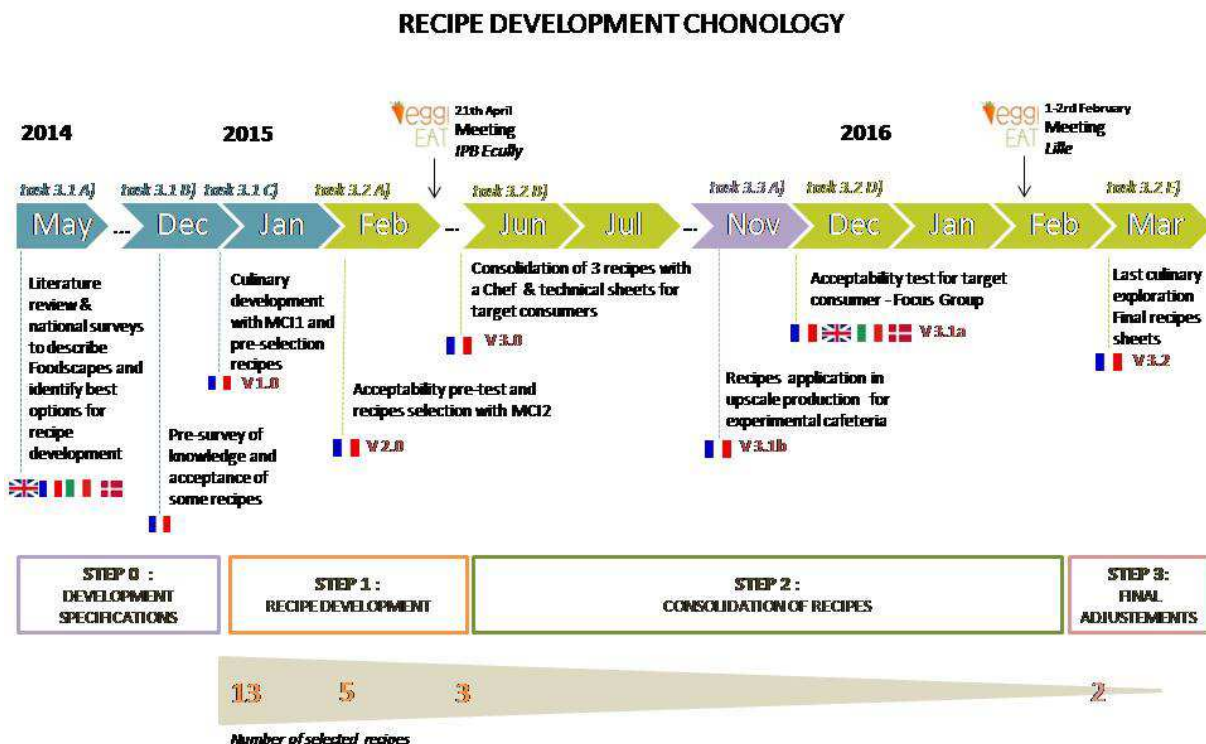


Figure 2 : Recipe development chronology

A- STEP 0: DEVELOPMENT SPECIFICATIONS

1. Overview of institutional meals

Theoretical Framework

In order to describe and understand the many aspects of the institutional meal, the term foodscapes is used. Foodscapes within school and elderly care facilities are highly heterogeneous across countries and can therefore be difficult to describe and analyse in a coherent form. To develop a common Framework to describe the foodscapes within school and elderly care facilities, we looked to the world of marketing for inspiration. We amended existing theories from E. Jerome McCarthy's a four P's classification (McCarthy, 1964) and Robert F. Lauterborn's four C's classification (Lauterborn, 1990), to Peter Bowman's Service 7 (Bowman, 2013). The framework of four P's will serve as a tool for analysing, understanding and comparing the 3 foodscapes in schools.

The four P's used are: product, price, physical environment and promotion.

- **Product** covers features and options, level of service, the basis of the product. All concerning the actual product which in this case is the meal served.
- **Price** is the payment terms of the meal, if there is a subsidy and the price level of a meal in the four countries.

- **Physical environment:** In the original four P model, *place* is used to describe the setting, whereas in this framework it is included in the *physical environment* as it is seen in the 7P model (Rafiq& Ahmed, 1995). It serves to describe the physical environment in which the meal is consumed being the facilities, number of people eating together and duration of a meal.
- **Promotion** is how the product is advertised to the customers. In which way the schools and elderly care or the provider communicates the product to the target consumer.

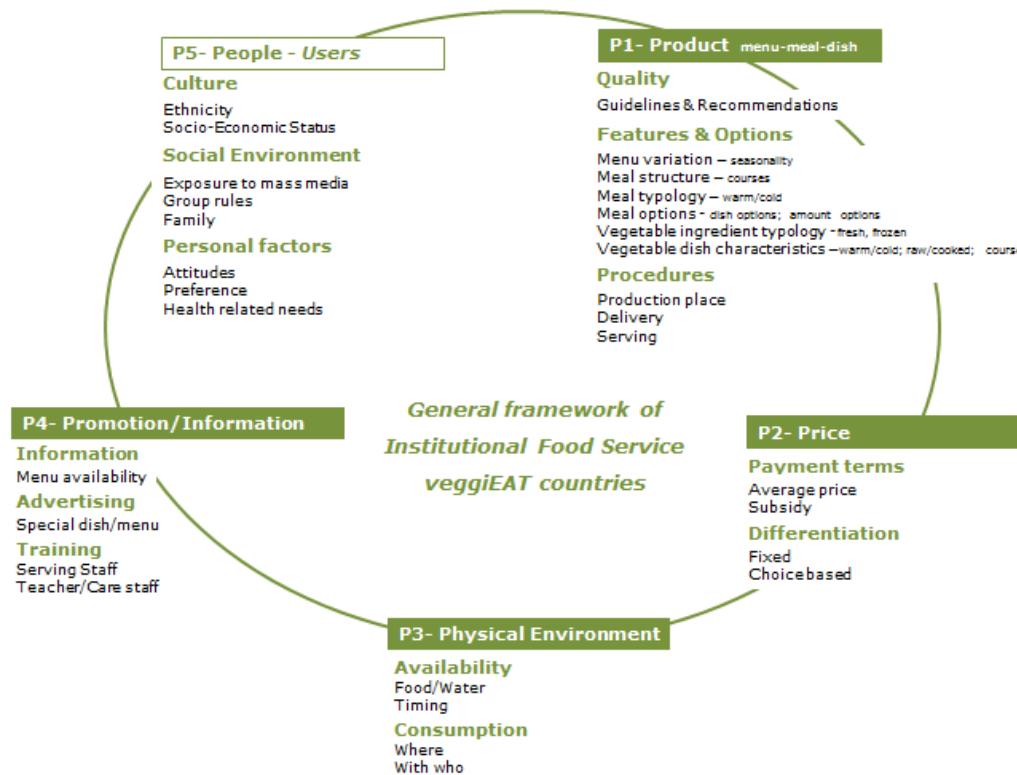


Figure 3 : General Framework

Methodology

A thorough literature search was conducted in the online databases PubMed, Medline, Web of Science and supplemented with searches in grey literature within each country; further information was gained through different government and health websites. Due to a lack of published journals within this field of research, experts within each country were contacted for further references and interviewed if necessary.

Primary researchers were identified to conduct the literature search and data collection within their respective countries. The primary researcher was native to the country in question to ensure high coverage range as well as limit general communication bias in the data collection; LRS for DK, MW for FR, CM & CD for IT and HH & IK for the UK. The main period of the literature search occurred during August and September 2014.

To ensure a high coherence in the literature search in the four countries a grid was developed in accordance with the theoretical framework. The grid was developed based on a case analysis from Denmark (REF LAU) and was reviewed by all the primary researchers to ensure the grid could be applied in all four countries. The grid consisted of a list of questions, which could be answered within

each P to clearly describe the foodscape in the schools and elderly care institutions. Grids are available in the appendix report (*Appendix 1*).

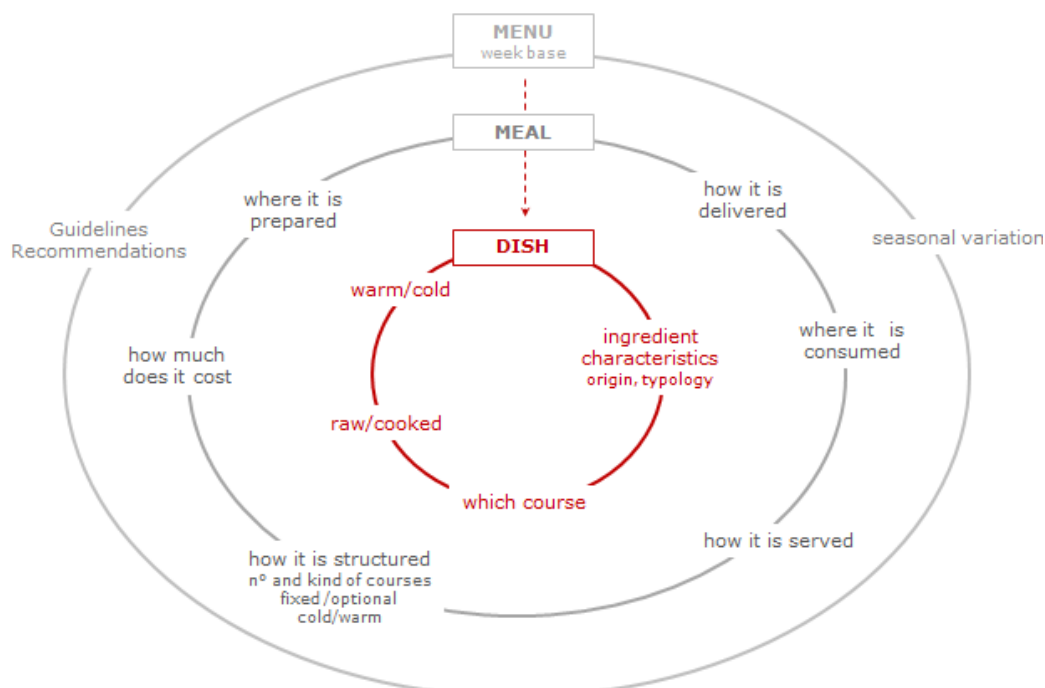


Figure 4 : Vegetable based recipe development to IFS general framework

Due to the heterogeneity in sources of information, results were analyzed narratively and presented through tabulation using the grid where a summary of the answers within each P is presented for each country.

Main Results

- There are major differences between countries and the challenge is to **find a way the dish will be accepted in all four countries**.
- Two very different target groups which influences development of **two different recipes**
- Information on the Physical Environment can be useful to develop the product.
- The developed recipe must be:
 - A Lunch meal
 - A hot dish
 - Fresh, canned or frozen vegetable ingredients
 - Ingredients should be in season as much as possible
 - Easy to portion in the right amount
 - Can be produced in a collective catering kitchen
 - Can be reheated
 - Can be included in a nutritionally balanced menu
 - Included in an affordable meal for the two targeted groups.

2. Pre-survey for recipe development

Objectives

In this quantitative and qualitative study, a group of students of the Master of sensory analysis of University Lyon I interviewed people in the street about several related topics: their eating habits and frequency of vegetable consumption, their most- and least-liked vegetables, and their usual places of consumption. Respondents were also shown pictures of four different vegetable preparations to know which one was visually preferred and to develop recipes according to people's expectations. They also asked them to indicate their most desirable vegetable for each preparation.

French Participants

A total of 183 participants (71 men, 112 women) participated in the study. Two categories were interviewed, 95 teenagers (39 boys, 55 girls) aged from 12 to 16 years old (mean $14,2 \pm 1,5$ s.d.), mostly in secondary school, and 87 elderly people (32 men, 55 women) older than 65 years old (mean $70 \pm 7,0$ s.d.), for the most part retired. These interviews were conducted in the streets of Lyon, in public places, and in retirement homes.

Procedure

Students carried out a quantitative and qualitative study based on a questionnaire about vegetable consumption habits, tastes, and out-of-home places of consumption and visual perceptions of four presented products. Thus, both quantitative (0 to 10 scales and single choice questions) and qualitative (open-response questions) questions were asked. The questionnaire is available as *Appendix 2*.

The four products were shown in a random order on pictures tagged with only a letter to not induce any order bias (*figure 5*)

The **product G** is a falafel specialty, that looks like vegetables dumplings

The **product N** looked like a pale vegetable steak

The **product R** looked like vegetable bites or “amuse-bouche”

The **product T** is another type of vegetable steak, smaller and greener



Figure 5 : Product G, N, R, T for the pre-survey

Main Results

This study describes the two recipe developments for teenagers and elderly people (*figure 6*)

	Adolescents	Older people
Preferred product	N+R	R
Least liked	T	T
Most familiar	N	N
Least familiar	T	T
Preferred form	Burger/galette	Cocktail bite

Figure 6: Target consumers' preferences in France (pre-survey)

All the results from Step 0, as consumers' preferences in the four countries, were compiled to describe the culinary development for the chef (Step 1)

B- STEP 1: RECIPES SELECTION

1. Recipe development: workshop with culinary students

1.1. Protocol

Objectives

This step of the recipe development was conducted in the context of an innovation and creativity Masters course, developed specifically for the VeggiEAT project. Within this course, students from the Innovation and Culinary Masters programme (MCI1) developed recipes, with the help of a Chef and a member of the research centre, based on the criteria defined in the previous phases of the WP3. The challenge was to innovate in the treatment of specified vegetables keeping in mind relevant costs and ease of replication through the processes used, in the sensory characteristics of the vegetables, and/or in the way that they are presented (exposure, choice architecture, and dishes) to the consumer in order to encourage specified individuals to comply with individual intake recommendations and to promote a desirable increase in vegetable consumption among specified populations.

Procedure

The students spent two days to research and try on recipes, and wrote technical sheets. Another two days were then spent in the kitchen to further enhance and try out the recipes. A tasting of the recipes was organized during the last day of the course for the jury to determine the best recipe.

Criteria for culinary development

Recipe development had to follow the requirement specifications:

- Develop delicious and nutritious vegetable recipes using cans or frozen sweet corn and/or peas
- Create recipes that will encourage the intake in alternatives dishes.
- Recipes have to be produced in a central kitchen

- Finger food, easy to eat
- Different textures for children and older people
- Meet low cost

1.2. Creative recipes

The students produced thirteen recipes (*figure 7*) including the usage of canned or frozen peas and sweet corn, and matching against the imposed criteria.



**Choux Pastry
with Peas**



**Hush
Puppies**



**Curry Peas
Gyoza**



**Pea Cheese
sticks**



**Corn
Nuggets**



**Vegetable
burger**



Corn soup



**Pea velouté
soup**



**Pesto and
Peas Pie**



**Vegetable
Spring Rolls**



**Mille-Feuille Peas
& Carrots Cake**

Figure 7 : Recipes V 1.0

1.3. Jury selection

The jury of experts elected five out of thirteen best recipes of the culinary workshop (**v1.0**):

- Pesto and Pas Pie



- Hush Puppies



- Vegetable Spring Rolls

- Vegetable burger

Jury perception of the recipe selection



Hush Puppies are easily edible with the hands, and the shapes and tastes of them attract children's attention. The bites are satisfying, rich, and tasteful. The downside of this recipe is that it is greasy. According to the Chef, it is greasy because it is not completely fried, and the Hush Puppies are fried too well in advance before service.

Price: 0,99 €/serving

The idea with this recipe is to simulate a hamburger with polenta fries, but just with vegetables, and therefore healthier. The **Lentil Steak** is dried and hard in the final tasting. The Chef suggests that by adding some tofu to the recipe it would soften the texture of the lentil steaks. The polenta fries are too greasy; adding an egg white to the recipe would lighten up the texture of the fries.



Price steak: 1.1 € /serving



The jury reports that the **corn soup** is too salty and too strong in chicken powder flavour. The Chef said that the recipe should be repeated, changing the quantities of the salt and chicken powder. Globally it was good, and original.

Price: 0,67 €/serving

The **pesto pie** is very nicely presented. The jury reports that the pie is well presented visually. However, the crust is too dry, too thin and not crunchy enough. More butter should be used to enrich the pie dough. There is a small discrepancy between the expectation and the actual taste, but the pea pesto is an interesting idea and the flavours are well balanced.



Price: 0,86 € /serving



In the recipe of **Vegetable Spring Rolls**, neither the peas nor the sweet corn flavours could be found in the roll. The colour of the spring rolls is not pleasant due to the strong purple hue that the red cabbage released. Also, too much vermicelli was used in the recipe. Students originally thought that the colour purple would be fun for the children to eat because it is not a usual colour presented in food. For example, new varieties of orange, purple and yellow cauliflowers have been created in the past few years to attract children to try

Price: 1,28 €/serving

more vegetables.

General feedback

The jury reported that the recipes are not healthy enough and under seasoned. They suggested increasing the usage of salt and pepper in all recipes. Moreover, too many recipes contained cheese, and too many recipes were fried. The culinary students felt they needed to compensate the restrictions by adding cheese for taste and nutritional purposes. Cheese is a good source of protein, which could be beneficial for health development and maintenance in children or seniors. Moreover, cheese adds an extra dimension to the taste of the recipes. The cheese is also an ideal binding agent. The deep-frying method also helps to hold the ingredients together. Some recipes might be difficult to make without the use of cheese or a deep-frying method.

Conclusion and perspectives

In conclusion, MCI1 students have developed thirteen recipes including the use of canned or frozen peas and sweet corn matching against the imposed criteria. Most of the recipes need adjustment in order to promote healthy eating and increase vegetable intake; however the jury accepts most of the recipes.

Different preparation procedures can be employed in order to increase the health benefits of the recipes. For example, the cream from the corn soup can be removed, so the fat content in the soup would drastically decrease. There will be less oil used in the recipe with the steaming method. The recipes need to be reevaluated and tested again for further development.

2. Selection of Recipes: acceptability pre-test

2.1. Improvement of recipes based on expert jury remarks

Students improved the five recipes based on all remarks:

Criteria of the development:

- Considering canteen and old care feasibility
- Samples /small portions adapted to the pre-test
- Adapted to the kitchen technical constraints: restricted space kitchen

2.2. Internal acceptability pre-test with general consumers

Objectives

Using those five prototypes, the Research Centre of IPB and students from the Masters programme in Culinary and Innovation 2 (MCI2) organized an internal consumer pre-test to select the three most appreciated recipes. They evaluated rate of acceptability and liking to compare the preference for the recipes in order to increase the vegetable intake among teenagers and older people.

Procedure (method & material)

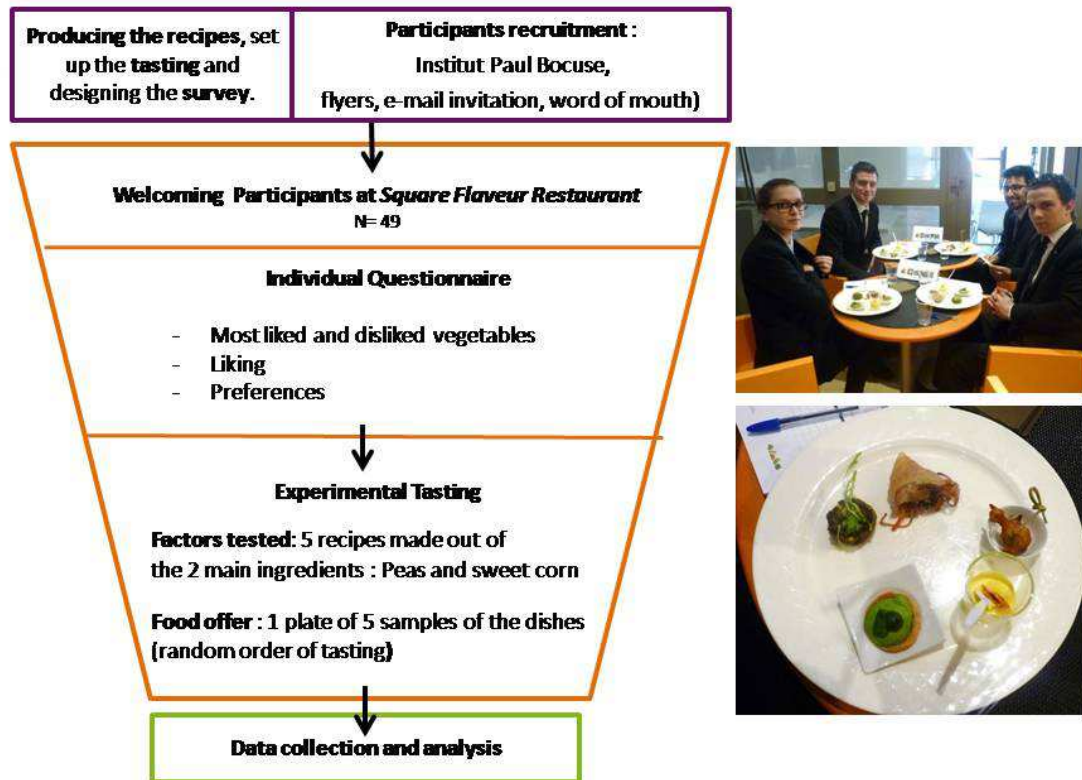


Figure 8 : Pre-test procedure

2.3. Adapted recipes



Figure 9 : From V 1.0 to V 2.0

2.4. Results and recipes selection:

Even with improvements(*figure 9*), Hush Puppies and Vegetable Spring Rolls are still rather high in fat and inappropriate related to health requirements for Veggieat.

Following results of the questionnaires and the debrief about nutritional issues, feasibility in a school canteen or older care, taste and attractively, three recipes stand out (**v2.0**):

- Pie with peas & pesto: good scores for liking, visual, smell
- Sweet Corn soup: good scores for liking, visual, smell
- Vegetable steak: good score for liking and smell, bad for visual (-> can be improved)

C- STEP 2: CONSOLIDATION OF RECIPES

1. A common base for each selected recipes

Objectives

Two IPB Chefs were in charge of recipe refinement, to review the technical sheets and to send the data to partner countries to conduct a consumer test for acceptability.

Criteria for further recipe development:

- Products for the study, recommended by Bonduelle (corn and peas)
- Technical constraints :
 - Need to fit production method conditions in the four countries
 - Need to be easy to reheat/assemble (sous vide, frozen...)
 - Adapted to cost constraints
- Nutritional issues
 - Fit nutritional thresholds for a single dish
 - Not too rich in fat
 - Adjust to comments from the jury and of consumers from the MCI workshops

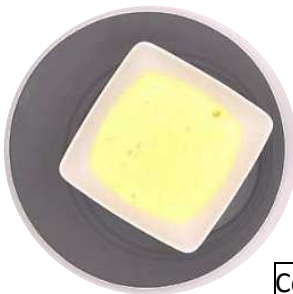


Corn without added sugar



Steamed extra-thin

Consolidated recipes(v3.0)



Sweet Corn soup (designed as a 'starter')

It is thicker than the initial soup to provide a smooth texture. Chefs specifically worked on the sweet corn taste, adding whole sweet corn grains and increasing the umami taste from vegetable stock. Therefore, there is only four ingredients: sweet corn, cream, semi-skimmed milk (to substitute for part of the cream) and vegetable bouillon.

Contains cream and milk: must be frozen or sous-vide.

Pea pie (designed as a main dish)

The custard pea mixture is simplified according to technical constraints. Chefs finely mixed canned peas with eggs, cream and milk to obtain a smooth mixture. The final pie is assembled from industrial dough and whole peas are put at the bottom to surprise consumers and enhance the pea taste.

Contains cream and milk: must be frozen or sous-vide



Veggie steak (designed as a main dish)

To obtain the consistency of a steak and improve this aspect, Chefs coarsely chopped different kinds of canned vegetables such as peas, sweet corn, chickpeas, red beans and added herbs (chives and parsley) to develop taste. For texture cohesion, they added egg and some breadcrumbs. The steak was then assembled in a burger.

Contains eggs: must be frozen.

2. Recipe adjustments for target consumers:

2.1. Target Consumers

The Veggieat Project is intended for two target consumers:

Young people –secondary school students, normally eating at their school







Older people–aged 65+

2.2. Consolidated recipes and dishes

The Chefs considered research from WP2 to fit the target consumers' preferences and to develop two alternative (versions) of each recipe(*table 2*)

Table 2 : Characteristics of the 6 developed recipes V 3.1a



	Adolescents	Older People
Corn Veloute		
	Popcorn	Cream - Paprika Chervil
Pea pie <i>served with salad</i>		
	Cherry tomatoes Lettuce	Pepper in custard Cumin on top Lettuce & arugula
Veggie Burger <i>served with salad</i>		
	Burger bread - Ketchup - Processed cheese - Onion - Tomato slices - Chopped pickles Lettuce	Tomato slices Lettuce & arugula

These six recipes (**v3.1a**) were sent to the four countries (UK, DN, IT, FR) for acceptability testing, within focus groups, in order to measure qualitative appreciation of each dish and to propose improvements as well as find an appropriate name for the dish per target consumers.

3. Acceptability test with target consumers – Focus Group

Main objectives

- Verify that the recipes are not rejected.
- Ideas of improvement
- Test names in the four languages for the recipes

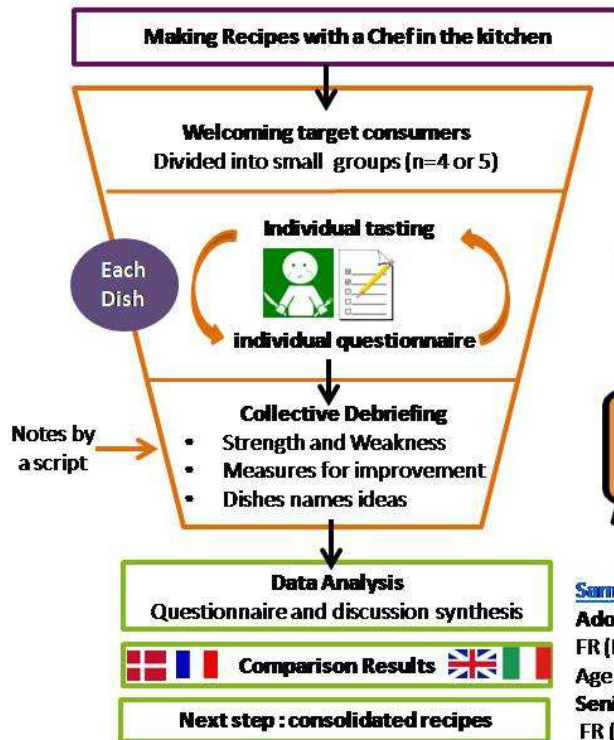
Procedure

In each country, focus groups were recruited and followed a common protocol designed by the VeggiEAT team. A participant questionnaire was also administered (Appendix 3)

Methodology

Table 3 : Focus group progress

Methodology



Sample sizes
Adolescents :
 FR (N=10, 3 F, Age 12-17) UK (N=63; age 18) IT (N=9; 4 F; Age 17)
Seniors :
 FR (N=11; 4F, Age>65) UK (N=12); IT (N=8, 4F; Age 66-77)

General feedback

Adolescents

- Sweet Corn Soup: Globally appreciated for the smell, aroma but mainly disliked because of the whole grain corn, popcorn in the soup and texture too thin.
- Pea Pie: Appreciated for the contrasting texture and taste, but need to work on the unattractive flat colour.
- Veggie Steak: Interesting and original, but disliked for the faded colour, "not well blended" mix of puréed and whole beans and the too sweet taste (mainly ketchup)

Older people

- Sweet Corn Soup: Appreciated for the colour and richness in flavours, but not unanimously liked regarding the whole piece of sweet corn in the soup. The texture was too thin.
- Pie Pea: There was some feedback on the nice combination between the dough and pea cream, but generally it was thought unattractive and tasteless.
- Veggie Steak: Well appreciated for the concept of a healthy alternative steak with a mixture of vegetables even if it needs to be less dry and tastier.

Conclusion for the recipes

In general, all the recipes lack taste and colour, and need to be readjusted to find the perfect texture (not too dry – not too sticky) and become attractive (*Appendix 4*)

Decisions about the recipes to take forward were made at a management meeting based on consumer and expert feedback.

Adolescents

On evaluation by foodservice staff and adolescents, it was agreed that the dishes were visually attractive where the adolescents felt the vegetarian steak/burger was the best as they liked the taste and favoured a 'grab and go' dish approach. The least visually attractive across all countries was the pea tart even though following results from the sensory stage this was served in sweetened pastry and contained the favoured vegetable of peas. Notwithstanding, the dish is innovative and fits the recipe development objective. For the next stage of research, a case study approach will be taken and choice architecture in the form of a default - ie dish of the day will be tested as a 'nudge' tool. It was decided therefore in testing this concept to take the least attractive dish, that is the pea tart, to the main field study and to be evaluated in school canteens across the four countries; UK, France, Denmark and Italy.

Older people

Following feedback from older people, the Sweet Corn Soup was definitely favoured as soup is a popular dish amongst the target age group. The vegetable steak/burger was not so well accepted, but taste was liked, and therefore respecting the principle of testing the 'nudge' concept, it was decided to take this dish through to the field test in the setting of older people eating together. Although, it was felt more appropriate for the dish to take the form of 'meat balls' to accommodate those with poor dentition.

4. Production issues: consumer appreciation and technical aspects

4.1. Objectives and context

Recipes from **v3.0** were adapted to be tested in a real context of consumption: self-service restaurant. This is the experimental part of WP3 studying choice architecture factors with a general population (task 3.2.C). For recipe development, the objective was to adjust production for upscale settings.

4.2. Real consumption context: self service

- **Place:** Experimental Restaurant at the Research Centre of the Institut Paul Bocuse.
- **Type of restaurant:** Self service



- **Cost:** 10€ (except beverages)
- **Time of consumption:** Lunch, from Monday to Friday for 10 days.
- **Participants:** 293 participants, without exclusion criteria.

Food production chronology

The upscale production was spread across three steps:









Figure 10 : Food process for upscale production

Protocol proposal

- Subjects : general population, locally recruited, 10 lunches (25-30 per lunch)
- Self-service: each subject chooses starter + dessert on the self-service line. Then the main dish is ordered at the counter and consumers get a ticket for their choice. They eat their starter, then come back to get their hot dish in exchange for their ticket.
- Price is fixed and constant.
- Offer is as follows (table 4)

Table 4: Experimental protocol for the self-service survey

	Offer		Variables measured	Methods of measurement
	Recipe	Presentation		
Starter	<p>Sweet Corn soup</p> 	<p>+ 1 fixed portion of toppings, to be chosen from a set of 4.</p> 	<ul style="list-style-type: none"> -Choice of toppings -Liking and associated measures -Quantity consumed 	<ul style="list-style-type: none"> -Video observation (using Observer XT)) -Choice of toppings -Questionnaire -Bowl weighing -Photos of bowls (with APIC studio)
Main dish	<p>Veggie Steak/Burger</p>  <p>Pea Pie</p>  <p>(Non-Vegetarian Dish)</p> 	<ul style="list-style-type: none"> • Choice of 1 dish • Following choices architecture protocol (part 2) 	<ul style="list-style-type: none"> -Choice of main dish -Quantity consumed -Liking and associated measures 	<ul style="list-style-type: none"> -Video observation -Plate weighing -Photos of plates (with APIC studio) -Questionnaire
Dessert	<p>Mille-feuille</p>	<p>To be chosen from a set of 4 flavours</p> 		

4.3 Upscale production of recipes



Figure 11 : Technical process

For two days, MCI1 students produced the whole quantities for the 10 days of self-service test supervising by Chefs. Regarding hygiene, production containing perishable ingredients (e.g. eggs, milk and cream) had to be vacuum-packed then frozen. The packaging was adapted to the quantities requested per day.

4.4. Technical issues

The self-service test was a good way to experiment upscale production and pertinent points have been retained:

- Quantities for upscale production had to be adapted from **v.3.0 of the recipes** by grinding liquid proportions, and adjusting the seasoning.
- The freezing cell had to be large enough to assure freezing rotation
- Vacuum-packing and freezing guaranteed hygiene safety and ensured limited wastage

4.5. Consumer appreciation and liking

A questionnaire was administered to measure different factors of liking.

After analysis, researchers from IPB concluded that:

→ In general, the 3 dishes offered are appreciated by the participants.

- No dish is more appreciated than the other following the 'nudge' treatment
- The vegetarian steak/burger achieved the same liking for the 5 treatments.

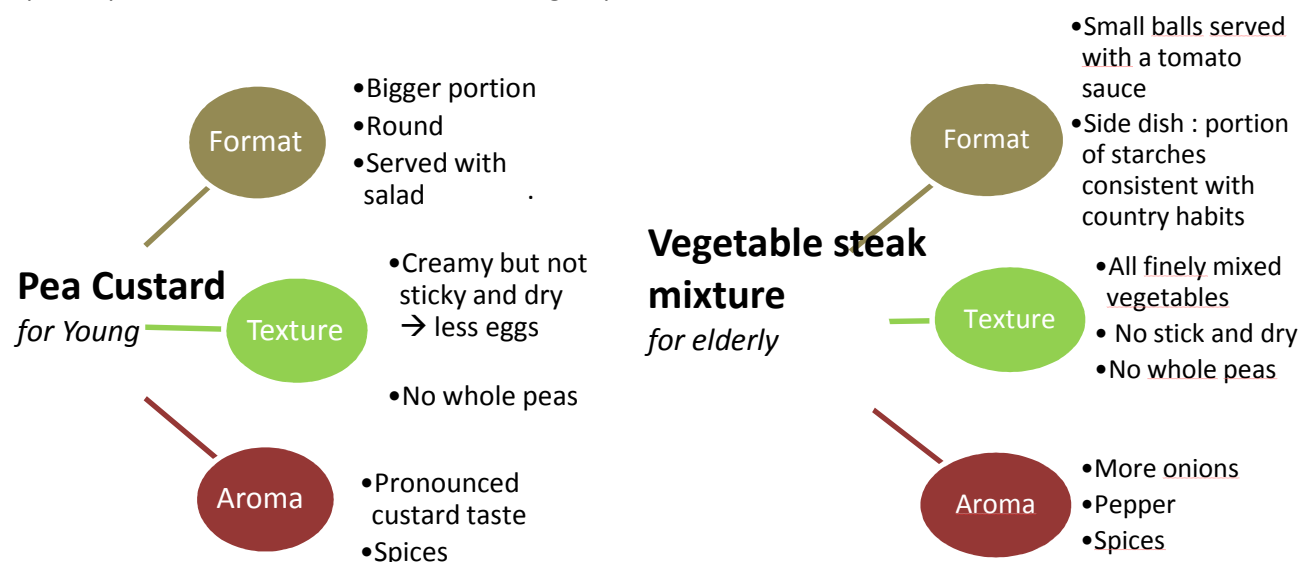
The analysis from open questions about liking gives qualitative feedback about appreciation of the dishes. There are the same factors of improvement reported from the focus group analysis.

D- STEP 3: FINAL ADJUSTEMENTS OF the 2 RECIPES

1. Culinary exploration

1.1. Final dish development

The development finalization mainly concerns the pea pie custard and the steak mixture. Adjustments such as accompanying side dishes will depend on the country and cultural food habits. Development strategy is based on taking all improvements from previous sessions: processing for upscale production and feedback from focus groups.



The Chef gives advice for implementation

1.2. Prototypes

Pea pie

The Chef proposes a tastier version with a little bit of mustard. The custard should be blended a bit longer to obtain a creamy texture. The steam cooking preserving the green colour will be intensified by the mustard. The concept is an easy assembly of frozen custard and crust at the place of consumption.

The Chef prescribes tomato slices and salad to go with the pea pie.



Target: young people

Feedback

- Tasty and well balanced eaten hot
- Better colour
- Creamier texture hot
- Tastes too salty cold
- Looks industrial and assembled

Improvements

- ➔ Try with a circular flat crust
- ➔ Bake the crust and the custard together
- ➔ Reduce salt

Steak mixture

The chef developed a tastier version with a bit of spices (Ras el hanout was proposed) to enhance the global taste. The mixture is a mix of thinner blended vegetables compare to previous versions, and whole vegetables so that the global texture is clearer and more pronounced. The cooking process takes place in the oven rather than pan directly from frozen.

The Chef prescribes tomato sauce, pasta and salad with the veggie steak, served in the form of meat balls.



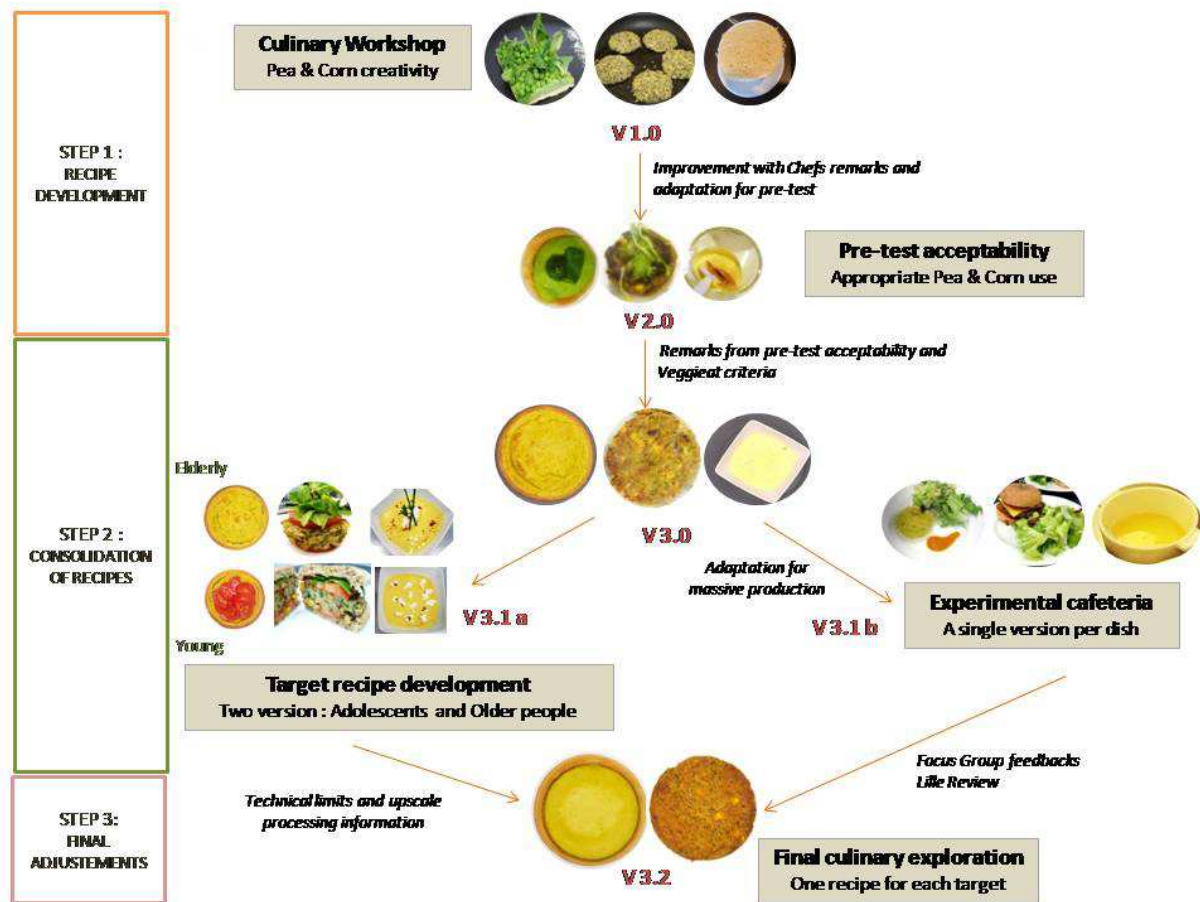
Target: older people

Feedback

- Tasty and well balanced eaten hot
- Nice texture contrast

CONCLUSION

In conclusion of the recipe development, collaborative work with chefs from the Institut Paul Bocuse and partner's research centres conclude with one final recipe for each target consumer. The bases of recipes are pea custard, to be incorporated into a pie, for young people and veggie steak mixture, to be served as a main element itself in the form of balls. The four countries will adapt presentation of the dishes and side dishes to fit with food habits, according to Step 0. The succession of recipe development is summarized hereafter:



Development of a consistent dish across countries and cultures is challenging hence a baseline ingredient framework will be utilised which will be refined according to custom.

It was necessary to implement acceptability tests in context in every partner country to adjust the common base of recipes. However, the IPB, Chefs have succeeded in finding consensus recipes accepted by target consumers in each country.

At the Institut Paul Bocuse level, this large-scale project has been a unique experience that has involved multiple partners and programmes of students through a unique innovation process.

FINAL TECHNICAL SHEET: PEA PIE



Date of testing: 03/25/ 15

Objective of the session

- ➔ More attractive colour
- ➔ Taste enhancing
- ➔ Smooth texture
- ➔ Easy to process in a canteen by non-professional cooks
- ➔ Common ingredients



Ingredients

Ingredients	Technology	Quantities	Remarks
Salted pie crust (diameter : 12cm)	frozen	7 pieces	Raw but can be already pre-baked
Extra-fine peas	canned	400 gr	Bonduelle, drained
Eggs	fresh	120 gr	
Eggs yolk	liquid	40 gr	
Semi-skimmed milk	liquid	100 gr	
Salt	Dry	6 gr	
Mustard	Paste	15 gr	Dijon mustard

Details

Portions: 7 (120g of custard)

Type of dish: Main dish

Allergens: egg, milk, cream, mustard

Target: Young people eating in the canteen

Pictures



Scale: 10cm x 1cm (d x H)

Process

Crust:

- Defrost at room temperature 10mn
- Whole crust side and bottom
- Cook in oven at 150°C for 25mn

Pie custard:

- Mix peas, cream, milk, yolk, eggs, salt and mustard together in a blender for 1 min to obtain thin consistency
- Pour **120g** into mold and cover with plastic wrap
- Bake in steam oven at 85°C for 15mn
- Put in freezer for 30mn, unmold and take off cellophane
- Then, freeze for another 30mn

Pea pie

- Bake pre-baked crust and frozen custard together in oven at 150°C for 11mn.



Material – Utensils

- Oven
- Steam oven
- Freezer (-20°C)
- Round mold 10cm diameter (better silicon)
- Blender Vitamix
- Balance

Serving suggestion

Each country must adapt side dishes and presentation to its own food habits

Global recommendation:

Served with a portion of salad and tomato slices

FINAL TECHNICAL SHEET: STEAK mixture for vegetarian balls

TECHNICAL SHEET: STEAK mixture for vegetarian balls



Date of testing:
03/25/ 15

Objective of the session

- ➔ Taste enhancing
- ➔ Thin and less thick texture
- ➔ Easy to process in canteen by non-professional cooks
- ➔ Common ingredients



Ingredients

Ingredients	Technology	Quantities	Remarks
Extra-fine peas	canned	100gr	Bonduelle, drained
Red beans	canned	200gr	Bonduelle, drained
Corn without added sugar	canned	100gr	Bonduelle, drained
Chick peas	canned	200gr	Bonduelle, drained
Chives	fresh	10gr	
Parsley	fresh	10gr	
Eggs	fresh	120gr	
Salt	dry	5gr	
Raz el Hanout	dry	5 gr	
Neutral oil	liquid		

Details

Portions: 5 (120g per plate = 4*30g -balls)

Type of dish: Main dish

Allergens: egg, raz el hanout spices

Target: Older people eating together

Pictures



Scale: 11cm x 1cm (d x H)

Material – Utensils

- Oven
- Freezer (-20°C)
- Round inox mold 11cm diameter

Process

Steak Mixture

- Mix peas, red beans, corn and chick peas together
- Blend 350g of the whole vegetable mix with eggs for 35sec (power 1) then 20 sec (max power)
- Mix the whole vegetables, the mixture, herbs, salt and raz el hanout with a spatula
- Form Balls (30 g each)
- Put in freezer for 30mn, unmold and take off cellophane
- Then, freeze for another 30mn
- Bake in oven at 180°C for 15mn on oiled baking sheet.



Serving suggestion

Each country must adapt side dishes and presentation to its own food custom

Global recommendation:

Served with a portion of starch or salad

French Recommendation:

Served with salad, rice and tomato sauce

Figures

Figure 1 : WP3	4
Figure 2 : Recipe development chronology.....	6
Figure 3 : General Framework.....	7
Figure 4 : Vegetable based recipe development to IFS general framework.....	8
Figure 5 : Product G, N, R, T for the pre-survey	9
Figure 6: Target consumers' preferences in France (pre-survey)	10
Figure 7 : Recipes V 1.0	11
Figure 8 : Pre-test procedure	14
Figure 9 : From V 1.0 to V 2.0.....	15
Figure 10 : Food process for upscale production.....	21
Figure 11 : Technical process	23
Figure 12 : Different versions of recipes	25

Tables

Table 1 : WP3 description and main tasks	5
Table 2 : Characteristics of the 6 developed recipes V 3.1a.....	17
Table 3 : Focus group progress.....	18
Table 4: Experimental protocol for the self-service survey	22

REFERENCES

- Bowman, P (2012) Service 7 - Seven principles to help your professional service business deliver experiences clients will love *A&A book publishing*
- Cooper, AJ., Sharp, SJ., Lentjes, MAH et al. A Prospective Study of the Association Between Quantity and Variety of Fruit and Vegetable Intake and Incident Type 2 Diabetes. *Diabetes Care* 2012;35(6):1293-1300
- Jeurnink, SM., Buchner, FL., Bueno-de-Mesquita, HB et al. Variety in vegetable and fruit consumption and the risk of gastric and esophageal cancer in the European prospective investigation into cancer and nutrition. *Int J Cancer* 2012;131(6):E963-E973
- McCarthy, Jerome E. (1964) *Basic Marketing.A Managerial Approach*. Homewood, IL: Irwin.
- Miller, S. & Knudson B. (2012) Nutrition & costs comparisons of selected canned, frozen and fresh fruits and vegetables. Michigan State University.
- Morizet, D., Depezay L., Masse P., Combris P., Giboreau A. Perceptual and lexical knowledge of vegetables in preadolescent children. *Appetite* 2011;57:142-147
- Murphy, N., Norat, T., Ferrari, P. et al. Dietary Fibre Intake and Risks of Cancers of the Colon and Rectum in the European Prospective Investigation into Cancer and Nutrition (EPIC). *PLOS ONE* 2012;7(6):e39361
10.1371/journal.pone.0039361
- Lauterborn, B. (1990) New Marketing Litany: Four Ps Passé: C-Words Take Over. *Advertising Age*, 61(41), 26.
- Rafiq, M and Ahmed P, K. (1995) Using the 7Ps as a generic marketing mix: an exploratory survey of UK and European marketing academics. *Marketing Intelligence & Planning*, 13(9), 4-15.