

# BonAPI

**Making recipes suitable for**

her vegan diet

**his gluten allergy**

**her red meat allergy**

his pescetarian diet


their crustacean allergy

his celery allergy

her shellfish allergy

his vegetarian diet

August 2020



# Executive Summary

## You have 1,000,000 different types of user

With growing allergy and intolerance rates as well as shifts to more plant-based diets, people are now, more than ever, looking for alternatives to common ingredients. However, finding suitable substitutes that fit their specific eating profile can become a burden, especially when having to adhere to multiple constraints. This paper examines the reasons behind these trends, why they are here to stay and offers a novel solution removing hurdles to their cooking.

In attempts to cater to ever-diversifying dietary preferences, the digital recipe offering has become extremely nuanced. Despite this, due to the vast number of specific dietary needs that individuals may have, finding suitable recipes can still be time consuming, tiring and even impossible.

BonAPI offers an integrable solution to digital recipe providers, making direct ingredient alternative suggestions available to users to suit any dietary needs.

BonAPI's ingredient alternative suggestions are available in 7 languages. It leverages on ingredient composition data of macro- and micro- nutrients, flavour and structure profiles as well as curated and custom 'do-it- yourself' replacements to find the best alternatives. Dietary preference and allergy constraints can also be applied to refine the search. The suggestions look to supplement foregone nutrients lost through food avoidance as well as offer the same functional purpose of the unsuitable ingredient.

Direct integration is possible through the [Dynamic Ingredients RESTful API](#) and can be implemented in recipes' ingredient lists and instructions. It offers individual ingredient alternative suggestions, adaptation of ingredient lists to suit dietary preferences, and provides viable alternative suggestions for ingredients that don't suit allergy or intolerance requirements.

The BonAPI technology is also available through the iFrame based [Ingredient Alternatives Widget](#), and can be added to a specific page or element. This offers the ability to search for alternative suggestions to individual ingredients given diet and allergy constraints.

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# Introduction

Summary

Diet and allergy focussed blogs, websites and recipe publishers are slowly responding to the strong shifts in peoples' eating habits. Yet, current approaches such as the creation of recipe categories, are inherently limiting through their static, unscalable and scattered presence.

Introduction

BonAPI is an integrable solution, bringing direct ingredient alternative suggestions to existing digital recipe providers, offering them higher user retention and the ability to serve an unrestricted user base.

Requirements

This document discusses the changes in allergy and intolerance prevalence, as well as the transition towards more plant-based diets. It looks at how these trends are reflected in the accessibility of online recipes and the role they can play in catering to individuals' dietary needs.

Preferences

Through demonstrating the scale and growing diversification of peoples' specific eating requirements, the need for a shift in the approach to offering recipes becomes apparent. This paper highlights key elements that need to be addressed to allow end users to make informed decisions when looking for ingredient alternatives while following a recipe. BonAPI is the solution for recipe providers that not only adapts recipes to a user's eating profile, but looks to supplement any foregone nutrients and also offer alternatives that will replace any functional workings the ingredient may have had in the dish.

Implications

Through direct integration of ingredient alternatives suggestions, digital recipe providers can maintain their current user base while becoming welcoming to those who previously found many recipes unsuitable.

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# Why are People Changing What They Eat?

## DIETARY REQUIREMENTS

Adverse food reactions are often abnormal responses to the ingestion of certain types of foods. Broadly, these reactions are defined and classified in two categories: Allergies and Intolerances.

### Allergies

True food allergies result in an abnormal response to food protein by the immune system mediated either by immunoglobulin E antibodies (IgE-mediated) or immune cells (non-IgE mediated). The former (IgE-mediated) can cause immediate reactions: resulting in swelling, hives and most dangerously, anaphylaxis. The latter (non-IgE mediated) can trigger gastrointestinal responses including vomiting, diarrhoea or swallowing difficulties.<sup>49</sup>

### Intolerances

A food intolerance refers to a non-immune related adverse reaction to the ingestion of certain foods, unrelated to food protein. Rather, it can be the result of absent enzymes needed to break down elements of a food; for example, lactose intolerance is caused by not having the enzyme lactase that is required to break down the lactose sugars present in cow's milk.

Symptoms of food intolerances include bloating, stomach discomfort and diarrhoea. They are generally not life threatening.<sup>50</sup>

“There is no cure for food allergy or intolerance so the only way to manage the condition is to observe a **strict avoidance diet**. This puts a strain on the food allergic person, their family and friends.” - Foods Standards Agency

## Prevalence of Food Allergies and Intolerances

In the U.S.A., more than 170 foods have been identified to cause adverse reactions<sup>1</sup> with the most common allergies and intolerances being peanuts, milk, shellfish and tree nuts<sup>2,3</sup>. It is estimated that 240-550 million people are suffering from food allergies<sup>5</sup> worldwide, of which 11-26 million are in Europe<sup>5</sup> and 32 million are in the U.S.A.<sup>2,3,4</sup>.

Estimates from the German Risk Institute put local food allergy rates at 4% among in infants and 2-3% among adults<sup>47</sup>. In the UK, where 1-2% of adults and 5-8% of children<sup>5</sup> have food allergies, almost 20% of people have experienced

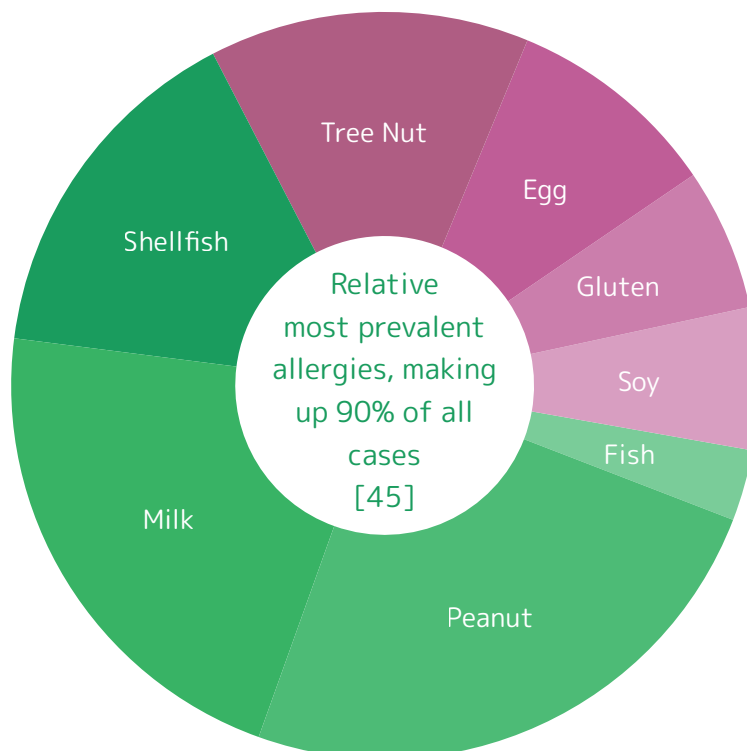
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some form of adverse reaction to certain foods, showing a strong presence of food hypersensitivity<sup>39</sup>.

Food allergies are most prevalent among children, with 3-6% in the developed world affected<sup>38</sup> and as many as 2.5% developing a peanut allergy and 5% developing an egg allergy<sup>6</sup>. Among children with food allergies, 38%<sup>7</sup> to 40%<sup>3</sup> suffer from severe reactions—including anaphylaxis—while 30%<sup>7</sup> to 40%<sup>3</sup> have allergies to multiple foods. The Centers for Disease Control & Prevention reported that over the course of 10 years, from 1999 to 2009, food allergies among children increased by 50%. While allergies to certain foods have previously been thought to leave after childhood, more recent findings suggest that they are lasting longer, with peanut, tree-nut and shellfish allergies typically staying for life<sup>1</sup>.

From 2004 to 2006 almost 10,000 children suffering from food allergy related issues in the U.S.A. had to receive hospital care each year<sup>8</sup>. Since then, rates of allergies and intolerances have only been increasing, with the number of anaphylaxis treatments rising by almost 380% from 2007 to 2016<sup>37</sup>. Similarly, in the UK, admissions for anaphylaxis increased by over 600% in the 20 years leading up to 2012<sup>11</sup>.

Among children, peanut allergies—a potential trigger for anaphylaxis—have tripled over 20 years and have become the leading cause of child mortality from allergy related issues in the U.S.A.<sup>12</sup>. A 2013 paper in the Journal of the American Medical Association showed that families incur food allergy related medical costs of up to \$25 billion per year<sup>10</sup> with a food allergy sufferer visiting the emergency room every 3 minutes<sup>9</sup>.



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## DIETARY PREFERENCES

Western societies have seen a strong shift towards more plant-based diets recently, with multiple factors driving people away from animal-based foods and products. The largest dietary groups that limit or avoid animal-based foods can be split up into: vegan, vegetarian, pescetarian and, most recently, flexitarian dietary choices.

A **FLEXITARIAN DIET** will not specifically restrict foods, but will follow a predominantly vegan diet while limiting animal-based products, fish and meat consumption.

A **PESCETARIAN DIET** includes animal-based products such as dairy, as well as fish and other seafoods, but avoids land animal meats.

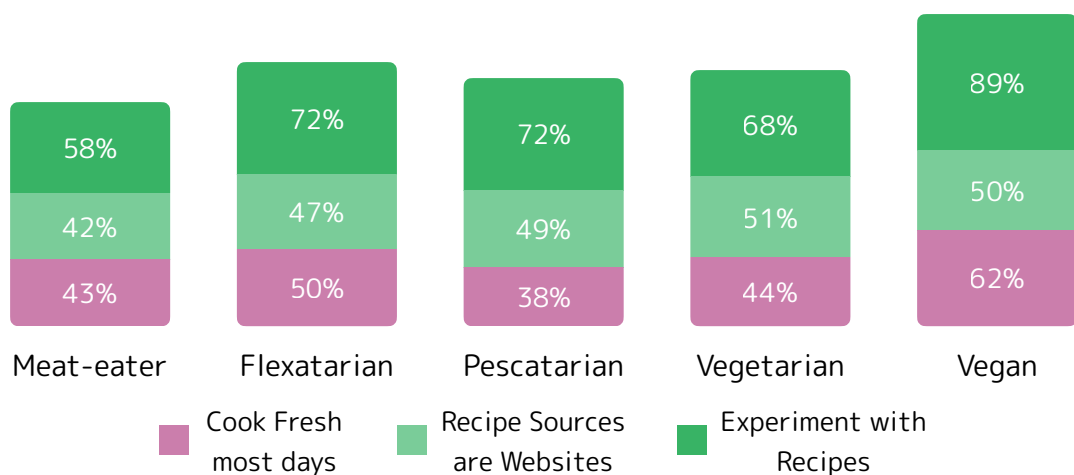
A **VEGETARIAN DIET** will include animal-based foods such as dairy and eggs, but does not include meats or fish.

A **VEGAN DIET** will include no products or foods which require the involvement of animals in their production. This includes dairy, honey, and meats.

The most constrictive of these diets, veganism, has seen a strong increase in popularity over the past years. The share of US consumers identifying as vegan grew from 1% to 6% from 2014 to 2017<sup>13</sup>. Moreover, Google Trends suggests that interest in 'veganism' has grown 7 times over from 2014-2019 while vegetarians and vegans are forecast to represent 25% of UK consumers by 2025, with almost 50% expected to identify as flexitarian<sup>14</sup>.

When it comes to food preparation, over 50% of flexitarians, vegetarians and vegans will typically prepare food on a daily basis. Meanwhile, just under 50% of these groups use websites a key source for recipes and on average over 75% of them will experiment with recipes. This shows a clear need and openness to adopting alternative ingredients when preparing meals.

Dynamic Recipe appropriateness by Diet [26]



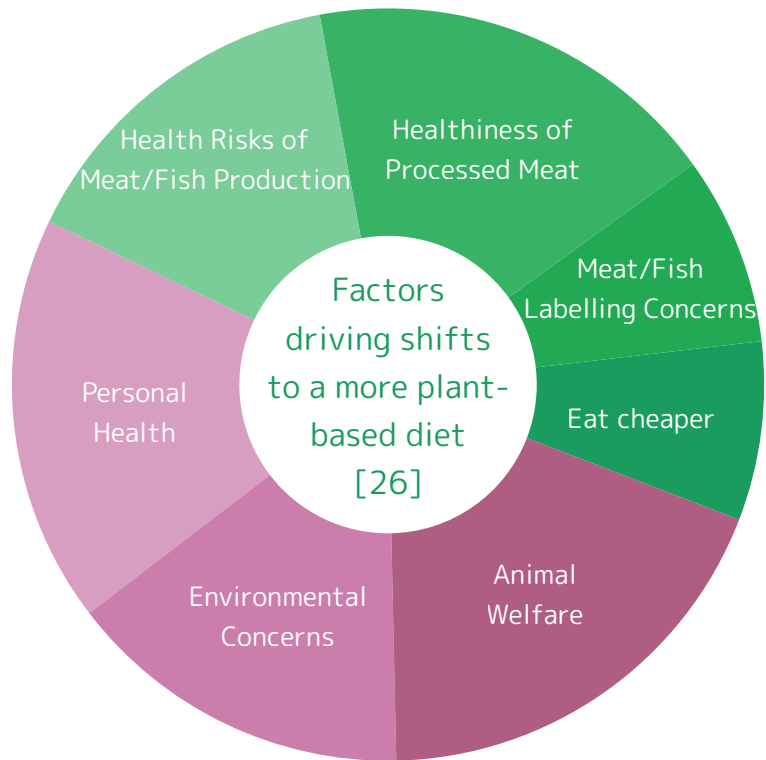


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With such a growth in interest and demand for more plant-based products, US sales in these areas—including alternatives to meats, cheeses, milk and eggs—grew by 17% in 2017 while in contrast the food market only grew by 2%<sup>40</sup>.

The reasons behind this move away from animal-based foods can be attributed largely to concerns over animal welfare, the environmental impact of animal-based foods and implications to personal health.



### Animal Welfare

Among increases in calls for better animal conditions, 44% of people looking to reduce or end their animal product or meat consumption cite animal welfare as a driver<sup>15</sup>.

Through the industrialised production of dairy, cows are now producing up to 10 times their natural quantity of milk and living only around a quarter of their natural lifespan<sup>16</sup>. An investigation in 2013 found that 13% of bull calves born in the U.K. dairy industry were shot on-farm as disposal was the cheapest option<sup>17</sup>. This practice is also allowed in organic farming and it is through the efforts of the buyers, such as supermarkets<sup>41</sup>, that it is being reduced.

Pigs are the most farmed mammal for meat, with nearly 1 billion slaughtered every year<sup>42</sup>. While their natural lifespan is up to 20 years, pigs are slaughtered at the age of 6 months<sup>18</sup> with the majority—over 97%—not spending their life outdoors. In the UK alone, just under 1 billion poultry birds are slaughtered every year for consumption, with 90% of chickens living in enclosed shelters. Here, 51% of egg production takes place in battery cages<sup>19</sup>, with 40 million male chicks killed every year in both the UK<sup>19</sup> and Germany<sup>48</sup> as byproduct regardless of farming practice, including organic and free-range.

Despite efforts towards more sustainable fishing, around 75% of fisheries are exploited or already depleted<sup>20</sup>. Meanwhile, estimates put world-wide by-catch



discards at 7 million tonnes<sup>43</sup> in 2012 with an estimated 23% of European fishery catches disposed of as by-catch. The highest disposal rates worldwide are between 70%-90% and observed in some trawling fisheries<sup>43</sup>—beam trawlers have been found to be the worst<sup>44</sup>.

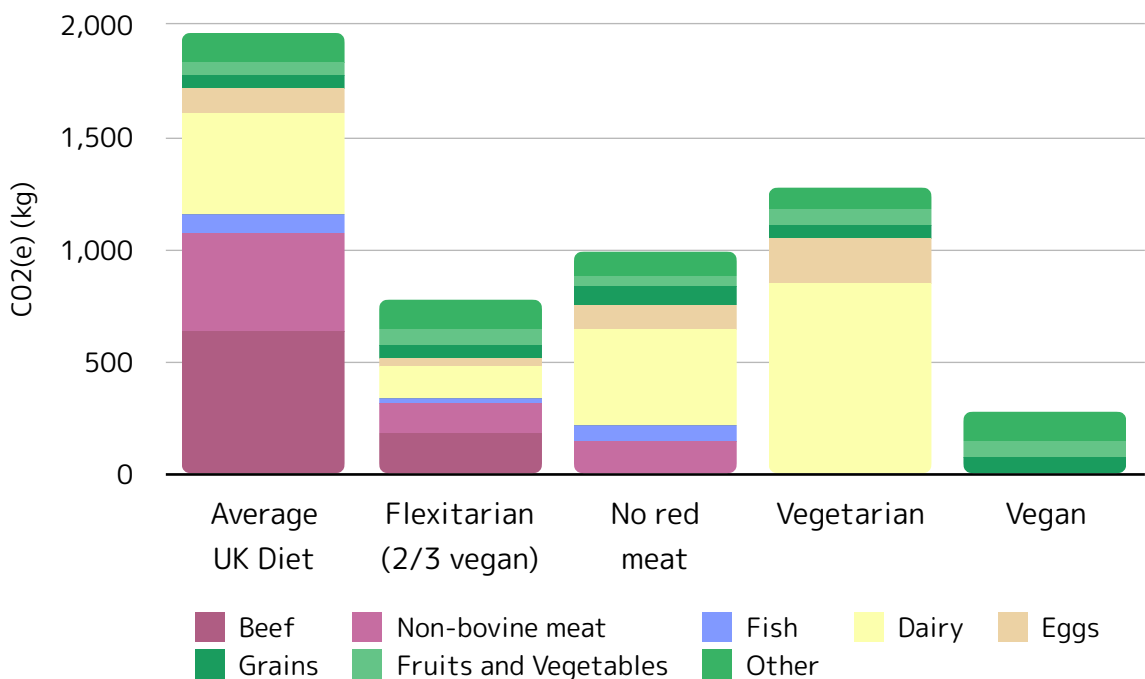
## Environmental Impact

Over 90% of Amazon deforestation is conducted for animal agriculture<sup>21,22,23</sup> and 18% of total greenhouse emissions are attributable to the farming of livestock<sup>24</sup>. As a response to the environmental impact, in a 2019 report, the UN called for people to reduce their meat and dairy consumption<sup>25</sup>. Today, 35% of people are looking at their own diet as an area in which they can reduce their environmental impact.<sup>26</sup>

Considering the resource costs of production, up to 90% of water consumption in the US is used for agriculture and 83% of farmland is for livestock. However, animal-based products only contribute 37% of the protein and 18% of the calories consumed in an average diet<sup>27</sup>. An ATKearney study calculation showed that yields from the 2019 global harvest for animal feed would be sufficient to feed twice as many people if they were allocated for human use<sup>28</sup>.

Simply avoiding meats in one's diet was not necessarily as environmentally friendly as could be presumed, however—according to a Johns Hopkins University study from 2019<sup>30</sup>.

Per-capita yearly carbon footprint for select diets in the UK by food item [30]



Recent developments in lab-grown—so called clean meats—show promise as a less environmentally impactful source of meat. Their production produces 96% lower greenhouse gas emissions, uses 45% less energy, 99% less land use and 96% less water than current meat sources<sup>29</sup>. These show the potential for maintaining a meat-inclusive diet while reducing its footprint is becoming a reality.

### Personal Health

Besides the considerations for animal welfare and the impact on the environment, 41% of people aiming to reduce their animal-based food intake are doing so out of concerns for their own health<sup>15</sup>.

Studies are beginning to show reduced risks of certain diseases given a plant-based diet. A 2019 study indicated a 23% reduction in the risk of developing type 2 diabetes through a vegan diet<sup>31,32</sup>. Additionally, a further study showed that participants whose diets consisted primarily of plant-based foods were 32% less likely to die from heart disease<sup>33,34</sup>.

Beyond direct health benefits in reducing the risks of certain diseases, a study showed that a vegan diet can also be a key to losing weight. Participants following a vegan diet lost an additional 4.2kg compared to a control group over an 18 week period<sup>24</sup>. Measurements have also suggested that those following less animal-product heavy diets have on average lower BMI scores—an indication of lower rates of being overweight<sup>46</sup>.

Average BMI by Diet [46]



# Implications of Changes in What People Eat

## THE CURRENT SITUATION

There are multiple implications of these changes in peoples' eating profiles. Some are directly noticeable as one restricts one's diet, whereas others are more indirect, but can have serious consequences.

Especially among those introducing new restrictions to their diets—for example through going more plant-based, or when preparing foods for specific allergies—finding appropriate and viable ingredient alternatives can be quite daunting. The primary methods to finding ingredient alternatives are through researching curated substitution lists on websites and blogs, reading dietary and allergen books and through word of mouth. These long static lists of suggested alternatives for various food groups—e.g. red meats—provide multiple substitution options but often do not guide towards any one in particular. Since these lists are subject to becoming outdated, newly developed foods—such as meat alternatives—are rarely added to these lists and are therefore often not suggested.

Another option when preparing food with a restricted diet, is to search for suitable recipes given a set of dietary preferences and requirements. Despite many attempts to cater to these dietary requirement nuances, the most common approach by recipe providers is to either offer sets of recipes that suit a particular diet, adhere to the requirements of a specific allergy—for example gluten or soy—or simply try to be completely allergen free. These blanket approaches are becoming less and less adequate. In many cases they will not match the specific eating profiles that individuals can have. In the end, recipe providers really do have 1,000,000 different types of user.

Looking for specific recipes when suffering from allergies or having specific dietary preferences should not require more time, experimentation or patience.

That being said there are also more specialised platforms, allowing for users to put in multiple constraints and are fairly good at filtering out unsuitable recipes. However, since the filtering is done on a recipe basis, the primary constraint is that the amount of suitable recipes gets smaller as the number of dietary requirements increase. This of course decreases the likelihood that the remaining recipes are still what the user sought and at the same time increases pressure on recipe providers to continuously add more recipes to keep this user.

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Regardless of whether eating profile restrictions are driven by need or by choice, the exclusion of certain foods can leave people at risk of missing out on key nutrients.

### Potential Nutrient Deficiencies through Food Group Avoidance

foods excluded in a vegetarian diet

foods excluded in a vegan diet

Meats	Seafood	Eggs	Dairy	Soy	Wheat	Nuts
Iron	Niacin	Vitamin B12	Calcium	Thiamine	Thiamine	Niacin
Zinc	Vitamin B6	Riboflavin	Protein	Phosphorus	Riboflavin	Vitamin E
Vitamin B12	Vitamin B12	Selenium	Fat	Riboflavin	Niacin	Magnesium
Protein	Vitamin E	Folate	Vitamin A	Magnesium	Iron	Manganese
	Phosphorus	Biotin	Vitamin D	Vitamin B6	Selenium	Chromium
	Selenium	Protein	Vitamin B12	Iron	Folate	
	Iodine	Fat	Riboflavin	Folate	Biotin	
		Pantothenic Acid	Phosphorus	Calcium	Protein	
			Pantothenic Acid		Fat	

Without either pro-active research on behalf of the individual, or easily accessible help to find nutritionally supplementary alternatives to avoided foods, people's diets may not actually be becoming healthier.

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Stirring up the World of Recipes

# BonAPI

## A NEW SOLUTION

BonAPI brings additional functionality to recipes, allowing them to adapt their ingredients to suit any dietary preferences and requirements. It does so by offering ingredient alternative suggestions in 7 languages to any ingredients that do not adhere to a user's eating profile.

BonAPI does not offer recipes but rather brings dynamic ingredients to them as a feature. This is achieved most effectively through direct integration with the existing recipe, however the BonAPI technology can also be leveraged on as a stand alone widget that can be added as an element to a website.

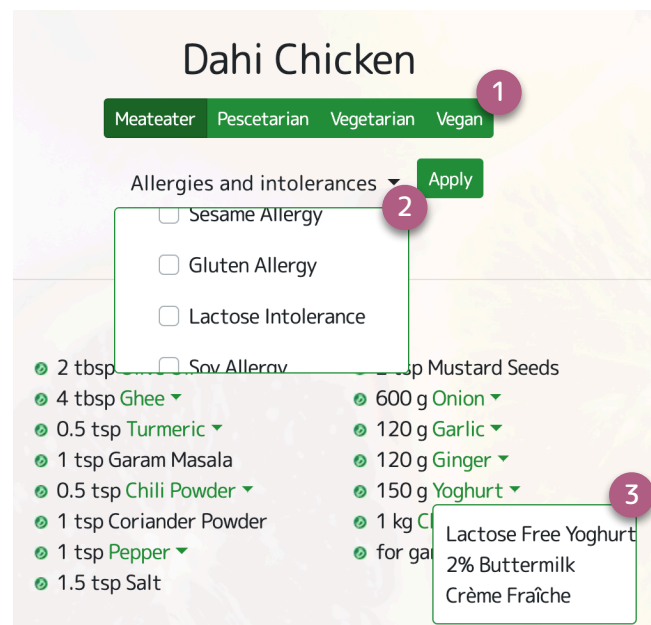
### Dynamic Ingredients API [↗](#)

Through directly integrating the Dynamic Ingredients API solution, users are given immediate access to ingredient alternative suggestions, allowing them to tweak the recipe to suit their eating profile. Below is an example of how an integrated Dynamic Ingredients API solution in a recipe can work.

1. Through selecting one's diet, all non-conforming ingredients are directly replaced with suitable alternatives.
2. Select relevant allergies and intolerances from an available 13 that should be avoided, and apply to substitute any unsuitable ingredients with viable alternatives.
3. Select any ingredient to receive further ingredient alternative suggestions.

These are constantly updated to adhere to any dietary preference and allergy or intolerance requirements specified.

The Dynamic Ingredients is a RESTful API solution returning JSON format responses. This allows for the design and presentation of the integration to match the current recipe format. Furthermore, ingredient composition data is also available, allowing for any nutritional changes in the recipe to be communicated.



## Ingredient Alternatives Widget [↗](#)

The BonAPI technology is also available in the form of an integrable widget. This allows users to find individual ingredient alternative suggestions based on input dietary constraints. Below is an example of a 'search area' with the definable parameters.

1. Search for alternatives to over 1,000 ingredients and variants
2. Define dietary preference
3. Apply relevant allergies and intolerances
4. Apply required preparation technique constraints from 21 options

The Ingredient Alternatives

Widget is available through an iFrame integration—in only 1 line of code—and can be customised to suit any design or presentation preferences as well as display your logo.

Through BonAPI, we aim to provide up to date and insightful ingredient alternative suggestions, while matching the target ingredient's functional workings within the dish, as well as looking to supplement foregone nutrients.

Through integration of BonAPI, recipes are able to adapt to anybody's unique eating profile.

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## ALGORITHM

Each time alternatives to an ingredient are requested, BonAPI analyses and compares potential substitutes on 5 different criteria: nutrients, minerals, vitamins, flavour and structure as well as their respective attributes. The best matches combined with curated results are then returned as suggestions.

To refine the resulting ingredient alternative suggestions and to make sure they meet the users requirements, diet, allergies and intolerances, as well as specific cooking techniques, can be applied as parameters.

### Algorithm Flow



Define which language to receive results in. Choose from:

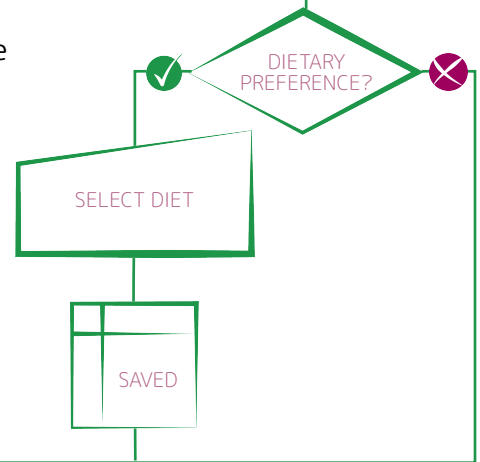
- English
- German
- French
- Dutch
- Spanish
- Italian
- Latvian

### Dietary Preferences

Dietary preferences can be restricted to only include ingredients suitable for a specific diet. Currently, diets can be restricted to the following:

- Pescetarian diet
- Vegetarian diet
- Vegan diet

By default all ingredients are searched through to find the best alternative suggestions.

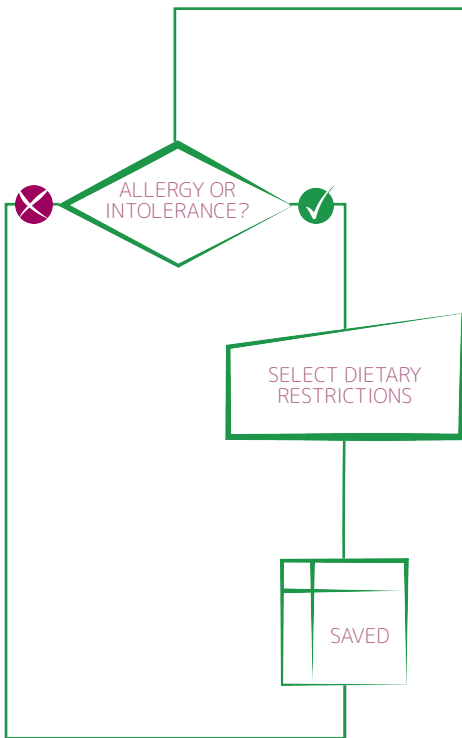


### Allergies & Intolerances

One or more allergies and intolerances can be selected from a total of 13. Currently included allergies and intolerances are:

- Mollusc Allergy
- Celery Allergy
- Gluten Allergy
- Mustard Allergy
- Fish Allergy
- Crustacean Allergy
- Sulphites Allergy
- Soya Allergy
- Peanut Allergy
- Sesame Allergy
- Egg Allergy
- Tree-nut Allergy
- Lactose Intolerance

Ingredients containing the selected allergies or intolerances will not be included in the results.



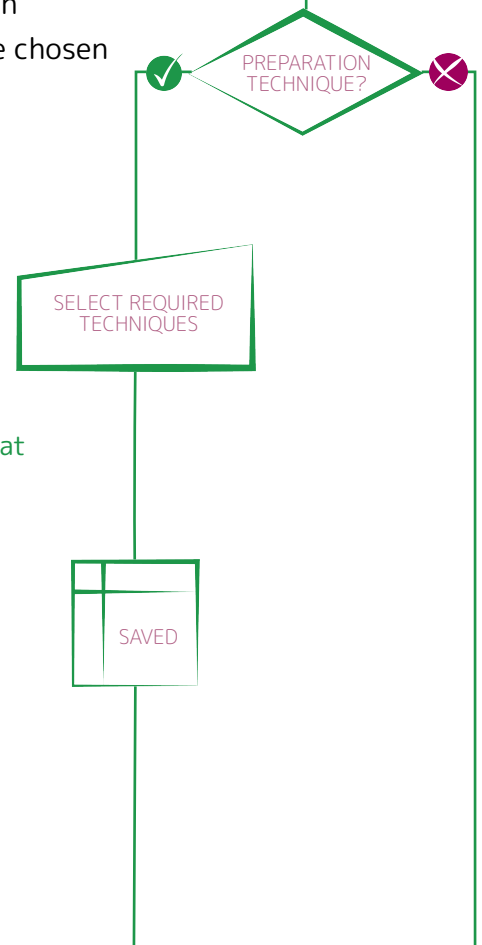


## Preparation Techniques

Should alternatives need to suit a specific preparation technique, one or more preparation techniques can be chosen from a selection of 21 different methods.

- ✓ Baking, Dry
- ✓ Grilling, Dry
- ✓ Smoking, Dry
- ✓ Sweating, Dry with Fat
- ✓ Deep Frying, Dry With Fat
- ✓ Pan Frying, Dry With Fat
- ✓ Sous-vide, Moist
- ✓ Boiling, Moist
- ✓ Simmering, Moist
- ✓ Braising, Combined
- ✓ Raw
- ✓ Searing, dry
- ✓ Broiling, Dry
- ✓ Roasting, Dry
- ✓ Searing, Dry With Fat
- ✓ Sautéing, Dry With Fat
- ✓ Stir Frying, Dry With Fat
- ✓ Steaming, Moist
- ✓ Stewing, Moist
- ✓ Poaching, Moist
- ✓ Raw, Pickling

Only ingredients that allow for the selected types of preparation technique will be included in the ingredient alternatives suggestions.



## Algorithm

Once all parameters have been defined, the ingredients requiring alternatives can be passed through to the algorithm. Whether it be a full ingredients list from a recipe to filter for non-compliant ingredients, or a search for a single ingredient, alternatives are found in the same manner. Paired with curated results, the composition and flavour profiles are analysed to find the most suitable ingredient alternative suggestions for each relevant ingredient.

### >1,100 Raw Ingredients and Variants

- ✓ 13 Nutrients
- ✓ 26 Vitamins
- ✓ 4 Dietary Preferences
- ✓ 21 Preparation Techniques
- ✓ 11 Minerals
- ✓ 18 Flavours
- ✓ 13 Allergies and Intolerances
- ✓ 7 Languages

When computing the best matching ingredient alternatives, the matching score of each criteria is equally weighted. However, the weighting of the attribute and

PARAMETERS & INGREDIENT(S) SENT TO BONAPI FOR ANALYSIS

BONAPI RETURNS INGREDIENT ALTERNATIVE SUGGESTIONS

Summary

sub-attribute scores within each criteria is relative. The following data section illustrates each attribute and sub-attribute and their relative weights in more detail, assuming complete information. Should a target ingredient have incomplete data, alternatives are found based only on the available data. Meanwhile, potential alternatives with incomplete information receive a penalty to avoid mis-attributed best matches.

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Beyond working primarily with raw ingredients, BonAPI also offers 'custom alternatives'. The goal is to help offer alternative options when they are not satisfied by the current available offering. For example, for the functional properties of eggs in cooking—to bind other ingredients—vegan alternatives are fairly limited. For these custom alternatives—which can be considered as mini-recipes—succinct instructions with measurements are provided. These are dynamically filtered on dietary requirements and their compositional data is available for comparison.

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## DATA

BonAPI generates suitable alternative suggestions based on 5 criteria in 2 main pillars of ingredient information type: their composition and flavour profiles.

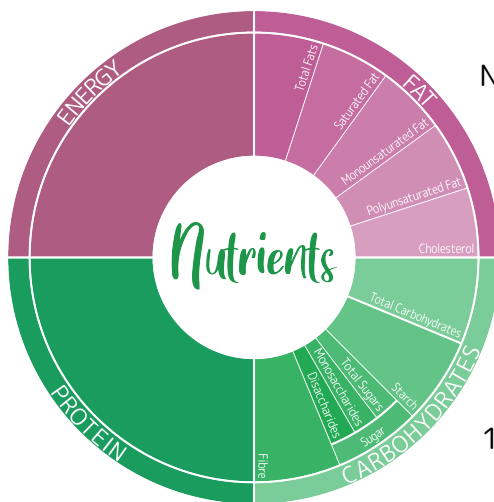
Nutritional composition data has been gathered from multiple sources so as to generate complete and representative nutritional profiles of ingredients. Sources:

- [FoodData Central, USDA](#)
- [Swiss Food Composition Database](#)
- [Canadian Nutrient File Database](#)
- [SELFNutritionData](#)
- [The Dutch Food Composition Database \(NEVO\)](#)

The ingredient flavour profiles are based on the flavour bearing molecules that they contain. BonAPI uses multiple sources in order to collect the different information types required to understand and construct them. Sources:

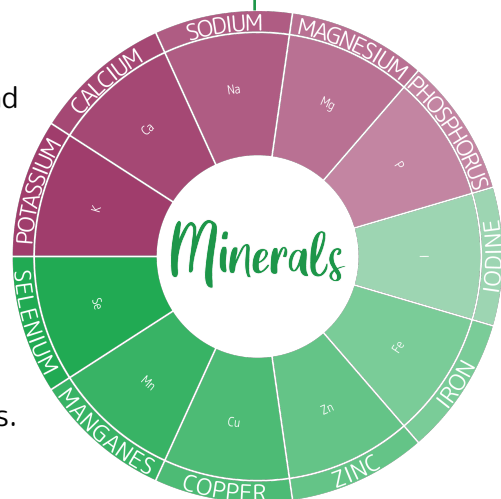
- [FlavorNet](#)
- [FlavorDB](#)
- [The Good Scents Company](#)
- [FooDB](#)

## Data Structures



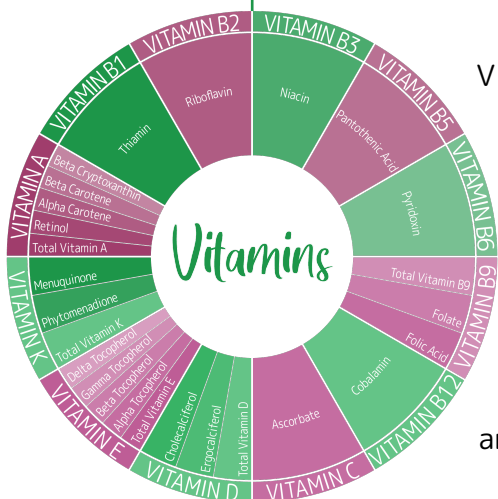
Nutrients are substances that we need for energy, growth and bodily functions. Macro-nutrients are those nutrients we need in larger quantities and can be broadly broken down into carbohydrates, fats and proteins. The macro-nutritional information of the ingredients we use to find viable alternatives is based on a total of 13 attributes and sub-attributes.

Minerals are a part of the micronutrients and broadly consist of the major minerals and 'trace elements'. The major minerals are calcium, phosphorus, potassium, sodium and magnesium. Among the trace elements are iron, copper, zinc, manganese, iodine and selenium. BonAPI uses 11 different mineral attributes when finding alternatives.



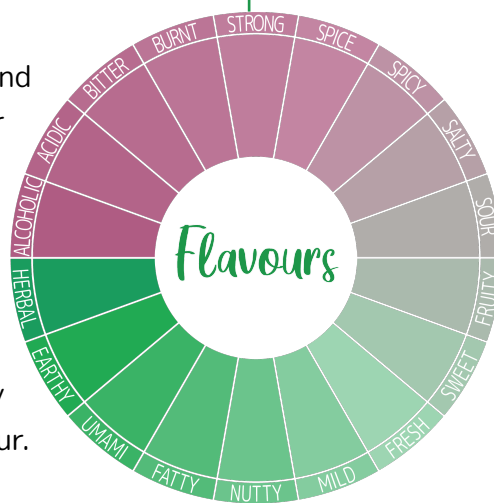
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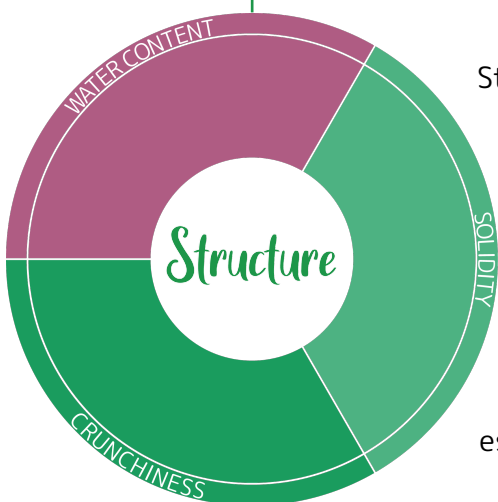


Vitamins are also a part of micronutrients and broadly consist of fat-soluble and water-soluble vitamins. Fat-soluble vitamins include vitamins A, D, E and K while water-soluble vitamins include vitamins C and B (including folic acid). BonAPI uses information on 26 vitamin attributes and sub-attributes when finding alternatives for an ingredient.

Through analysing the flavour molecules found in foods, BonAPI has developed flavour profiles for the available ingredients. These 18 attributes are the result of examining over 700 different flavour descriptions of molecules found in foods and assigning them to the ingredients based on their presence. This captures the relative intensity of each flavour.



Structure is a key criteria that defines an alternative's functional suitability in replacing the target ingredient. BonAPI uses the ingredients' water content as well as attributed scores based on their structure to capture both solidity and crunchiness. This helps to identify viable alternatives that share common structural traits—especially important in the cooking process.



All these data points are available through BonAPI's solutions and can be used to help communicate nutritional changes in a recipe through ingredient alternative suggestions.

## UPCOMING FEATURES

We are constantly working on improving BonAPI and expanding on its offering. While data and improvements in integration are ever-developing, we are also looking to leverage on the underlying BonAPI technology to continue bringing relevant ingredient alternative suggestions to different areas and cater to specific needs. The next steps in BonAPI's development include:

- Development of health and fitness ingredient alternative solutions. This will allow users to define target nutritional content and find alternative suggestions that are lower in fat, higher in protein, richer in calcium to name a few—and combinations thereof.
- Further developments in the recipe analysis functionality of the BonAPI algorithm, bringing better classification to the role ingredients play within a recipe. Progress in understanding how ingredients interact, especially through the cooking process, will allow for ever more applicable ingredient alternative suggestions.
- Developing recipe profile analysis, returning nutritional composition information, as well as diet, allergy and intolerance profiles to allow recipe providers an easy way to communicate the dietary characteristics of the dish to users.
- Introduction of environmental impact scores of different ingredients. These will help label ingredients by their cost to the environment, helping users make informed decisions when using this as a driver when searching for ingredient alternatives.

The joys of cooking and preparing new dishes should not be limited by dietary preferences and requirements, especially in today's world of ever-growing viable alternatives to many food groups. Through integration of BonAPI, recipes will be able to adapt to anybody's unique eating profile and so unlock these experiences to everyone.

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# Contact Information

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Introduction

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KvK/CoC number: 78117739

Court of registration: Court of Rotterdam

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