



STUDY  
PRODUCED  
BY WWF FRANCE  
AND ECO2 INITIATIVE



REPORT

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# TOWARDS A LOW-CARBON, HEALTHY AND AFFORDABLE DIET

A MULTIDIMENSIONAL COMPARATIVE STUDY OF SUSTAINABLE SHOPPING BASKETS:  
CARBON IMPACT, NUTRITIONAL QUALITY AND COSTS.

November 2017

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Working to sustain the natural world for the benefit of people and wildlife.

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# INTRODUCTION

The food sector (agriculture and food – from crop fields to food waste disposal) emits approximately 170 Mt CO<sub>2</sub>eq, which accounts for over 30% of France's domestic greenhouse gas (GHG)<sup>1</sup> emissions. It is therefore essential to reduce emissions in this sector in order to meet the “2°C” target (target enshrined in the Paris Agreement on climate change in which 195 countries agreed to “holding the increase in the global average temperature to well below 2°C”). Each signatory is voluntarily bound to transpose this “2°C” target into a reduction percentage of its own GHG emissions. Through its 2015 law on energy transition for green growth and in fulfilment of the Paris Agreement on climate change (via the INDC<sup>2</sup> of the EU, France is committed to reducing its GHG emissions by 40% between now and 2030 and by 75% between now and 2050<sup>3</sup>.

Against the backdrop of France's food policy consultation process known as “Etats Généraux de l'Alimentation (EGA)”, and with the goal of raising the awareness in the general public on the link between food and climate change, WWF France and ECO2 Initiative have collaborated to develop the present report laying out our “sustainable shopping basket” concept.

This report provides a comparison of different “shopping baskets”, which are representative of a French household's average weekly food purchase and, for each of them, an assessment of their **carbon impact, cost, and nutritional quality**.

This study draws on results from the following studies: LiveWell by WWF<sup>4,5</sup>, Afterres 2050 by Solagro<sup>6</sup> and INCA<sup>3,7</sup> by the ANSES.

The goal of this study is to develop a shopping basket that is sustainable: more respectful of the environment; affordable (not exceeding the cost of the current average shopping basket of a French family); and nutritious (meeting the nutritional needs of the French population).

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<sup>1</sup> Afterres 2050- Solagro, 2014

<sup>2</sup> “Intended Nationally Determined Contributions”: National contributions in terms of reduction in GGEs

<sup>3</sup> The last version of the National Low-Carbon Strategy (SNBC) has set a goal of carbon neutrality by 2050.

<sup>4</sup> [http://livewellforlife.eu/wp-content/uploads/2013/10/LiveWell\\_Report-Sum\\_2013\\_FR.pdf](http://livewellforlife.eu/wp-content/uploads/2013/10/LiveWell_Report-Sum_2013_FR.pdf)

<sup>5</sup> [https://www.wwf.org.uk/sites/default/files/2017-09/WWF\\_Livewell\\_Plates\\_Full\\_Report\\_Sept2017\\_Web.pdf](https://www.wwf.org.uk/sites/default/files/2017-09/WWF_Livewell_Plates_Full_Report_Sept2017_Web.pdf)

<sup>6</sup> <http://afterres2050.solagro.org/a-propos/le-projet-afterres-2050/>

<sup>7</sup> <https://www.anses.fr/fr/content/inca-3-en-image-dans-lassiette-des-français>



## INTRODUCTORY COMMENTS

The present study builds greatly on the Livewell and Afterres 2050 studies. In the “sustainable plate” proposed in Livewell, the nutritional balance was studied in detail down to the micronutrient level and in accordance with the recommendations of ANSES. Conversely, the Afterres plate focused on macronutrients and calcium requirements to define the average nutritional diet of a French person from now until 2050. In both cases, the formulation of a sustainable diet was characterised by an increase in the consumption of vegetable proteins in detriment of animal proteins, an increase in fruits and vegetables and a decrease in products high in fat, sugar and salt.

To draw up our new version of a sustainable plate, which we refer to as a “flexitarian” plate, we have retained the two approaches proposed in Livewell and Afterres 2050 and complemented them by testing several variations, which has enabled us to improve results on the different sustainability indicators that have been used: cost, nutritional quality and carbon impact. The flexitarian plate is therefore a variation that draws from the plates proposed in those two studies.

Even if this new plate entails changes in our nutritional customs and habits that may seem difficult to adopt in the short-term, we wanted to draw a path that spanned 15 to 20 years in order to demonstrate that a sustainable diet is absolutely possible. In essence, this involves reversing the negative food consumption trend followed in the last decades: excess of animal proteins, reduced consumption of leguminous plants and cereals, increase in the consumption of sugary drinks and low-quality processed foods.

It is important to remark that the “flexitarian plate” that we propose here does not imply giving up the pleasure of eating or a compromise to reduce nutritional intake. There is no such trade-off. On the contrary, it is about eating better and healthier high-quality food, whose production conditions are more respectful of the environment. This implies eating fewer animal proteins in favour of vegetal proteins, emphasising in general locally sourced and quality proteins, specifically through the purchase of credibly certified products.

The plate, as formulated in this report, is a moderate dietary change proposal. Indeed, several other combinations are possible. Thus, for instance, it is quite probable that the same sustainability results can be achieved with one portion of the population under a vegetarian path and another portion under a flexitarian one.

We hope that this study, which demonstrates that it is rather feasible to opt for a more sustainable diet, will open the door to numerous debates and further research.

## **VOCABULARY:**

**Plate:** The average daily nutrition for one person.

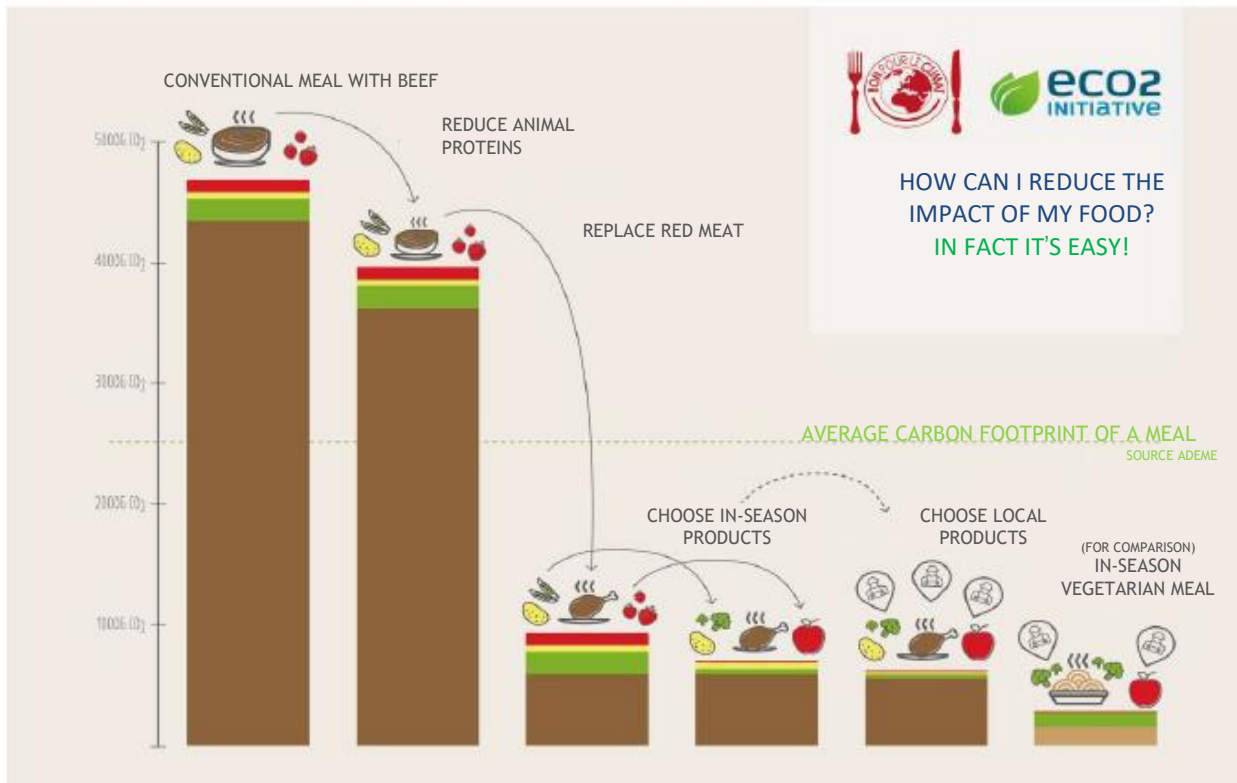
**Flexitarian:** This term refers to a mode of consumption that consists of significantly reducing the portion of animal proteins in favour of vegetable proteins. In this study, the flexitarian plate consists of 2/3 vegetable proteins and 1/3 animal proteins.

**Shopping basket:** The average weekly nutrition for a family of four (2 adults, 1 adolescent and 1 child under 10 years of age).

# SUMMARY

## Context

Today we know that by adopting new food consumption habits it is possible to reduce food-related greenhouse gas emissions and to protect our health and our planet's natural resources. For instance, reducing our intake of animal proteins by increasing that of vegetable proteins (for example, through a combination of cereals and legumes) and/or choosing local and seasonal products are a couple examples of practices that can be key in kick-starting this food habit transition.



Source: Eco2 initiative, 2016

<http://www.eco2initiative.com/single-post/2016/05/26/En-connaissant-le-contenu-de-notre-assiette-nous-pouvons-b%C3%A2tir-un-monde-meilleur-1>

Indeed, an out-of-season tomato, grown in a gas-heated greenhouse emits approximately 5 to 10 times more greenhouse gas emissions (GHG - CO<sub>2</sub>eq) than a local tomato in season. A mango imported by plane involves 60 times more CO<sub>2</sub>eq than a French apple<sup>8,9</sup>.

Nevertheless, public policies on nutrition security in France do not yet integrate environmental impact criteria in their formulation. This is the case for the recommendations from PNNS (National Nutrition and Health Programme).

Even if such recommendations promote an increase in the consumption of vegetable products (cereals, fruits, vegetables and legumes), from a nutritional point of view, the composition of the plate known as “balanced” is still predominantly based on a diet in which meat, seafood and milk products occupy a central place. Moreover, these products have a large impact on ecosystems (e.g. land use change, water consumption, GHG emissions, etc.) but importantly, they also ensue on the food's cost.

<sup>8</sup> [http://www.ademe.fr/sites/default/files/assets/documents/8574\\_alimentation\\_et\\_environment\\_clespouragir\\_17x24web.pdf](http://www.ademe.fr/sites/default/files/assets/documents/8574_alimentation_et_environment_clespouragir_17x24web.pdf)

<sup>9</sup> <https://agribalyse.ademe.fr/app/aliments>

This raises an important question. Is the current food system, which is rooted in the food habits change that began in the 1960s notably accompanied by the industrial livestock farming and fishing boom, more efficient from a nutritional, environmental and economic point of view?

## Previous Studies

We have drawn on two studies which have previously addressed the issue of food sustainability.

The first is the Livewell study carried out by the WWF, which defined the composition of a sustainable plate in 2020 and then again in 2030 with several variations.

The second is the study on the Afterres 2050 scenario, carried out by Solagro, which defines a model for food and agricultural development that would be sustainable by the year 2050.

These two studies are both based on the INCA2 plate study (national study on food consumption) carried out by the French Agency for Food, Environmental and Occupational Health & Safety (ANSES in its French acronym). Livewell and Afterres 2050 have also defined sustainable plates according to various distributions of the major food categories. The main points that these plates have in common are the reduction in animal products (in particular red meat) and the increase in consumption of vegetables, cereals and legumes.

## Why carry out this study now?

The new version of the study (INCA3) was published on 12 July 2017. With the backdrop of the Etats Généraux de l'Alimentation (EGA) – a policy consultation process - which was held in Paris throughout the autumn of 2017, it seemed useful to us to build on the previous work and taking it another step forward, particularly by integrating the concept of sustainable production (organic agriculture, quality certification on livestock farming conditions, certifications of sustainable fishing) as well as considerations on the costs of a sustainable diet for a French household. This is why WWF and Eco2 Initiative joined forces to develop the “sustainable baskets” based on a set of criteria: low carbon, health and nutritional balance, the possibility of incorporating certified products, and obtaining a result with an acceptable cost.

In this study we ask the following questions:

- Is it possible to draw up a “food mix” that can improve the results of the Livewell and Afterres 2050 studies on the 3 sustainability criteria (carbon, nutrition, and cost)?
- Is it possible to improve the carbon footprint of a shopping basket solely through consumption choices (and that of food service offerings) while keeping aligned with the objectives of the Paris Agreement and with France’s law on energy transition for green growth?
- Given the price difference between conventional products and organic label or other certified food products (MSC, Red Label, etc.), what proportion of credibly certified products is it possible to introduce into the sustainable basket without increasing the cost of a current average shopping basket?



## Methodology

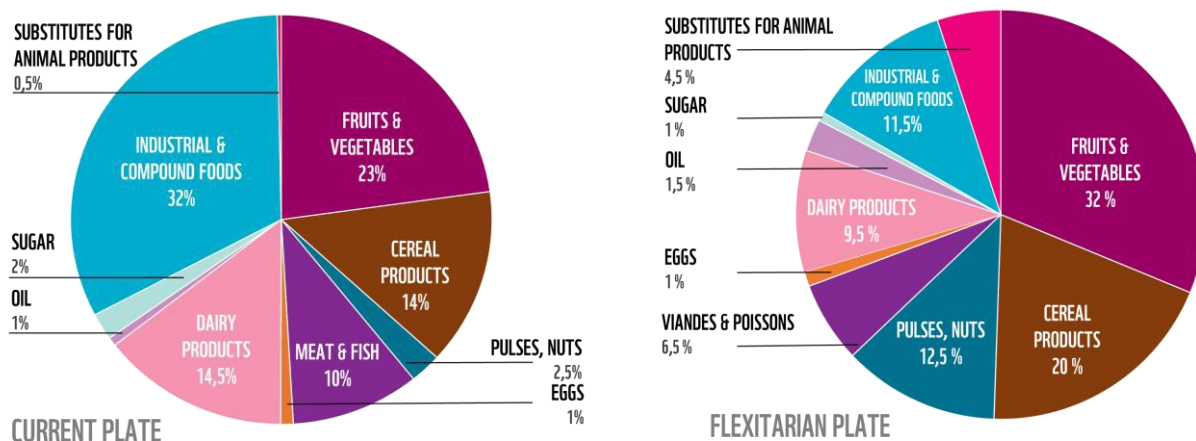
In order to answer these questions we have firstly assessed the INCA2 and INCA3, Livewell and Afterres plates in accordance with the criteria: carbon footprint, nutritional balance and costs.

On the basis of these assessments we have defined a new plate (called a Flexitarian plate) in which we have tried to incorporate the following parameters:

- Alignment with France's commitments in the context of the law relating to energy transition for green growth and the Paris Agreement on climate change: to reduce GGEs by 40% by 2030 and reduce them by three quarters by 2050
- Meeting the nutritional needs of the French people
- The choice of components and economically affordable quantities
- Taking account of the pressures on marine resources

This plate consists of 163 foods from those consumed the most by the French population. The main characteristics of this plate are a reduction in meat (-45% of the total with -37% of beef and veal), wild-caught fish (-37%), a reduction industrially processed foods containing fats, salt and sugars (-68%), a reduction in products based on refined flours (-35%) in favour of wholegrain flours and an increase in vegetables, cereals and legumes (+93%).

### Division of food categories in the (current) INCA3 and Flexitarian plates



We then analysed the results for a family of 4 people (2 adults, 1 adolescent and 1 child under 10 years of age) and evaluated the various weekly baskets according to the same criteria as the plates studied previously.

Finally we produced a comparative simulation between the costs of shopping baskets containing conventional products and those of baskets containing 50% of certified products.

## Results

The assessment of the plates has demonstrated benefits across all of the parameters for the Flexitarian plate. As well as the costs and the carbon weighting, this plate can be nutritionally adequate.

### Sustainability indicators per adult and per day for the current and Flexitarian plates

Sustainability indicators		Plates		Comparison Flexitarian/ INCA3
		INCA 3	Flexitarian	
Price	€	8,13	<b>6,47</b>	<b>-20%</b>
CO2	g CO2e	4 474	<b>2 884</b>	<b>-36%</b>
	Calories (kcal)	2 153	<b>2 100</b>	<b>-2%</b>
	Protein (g)	76	<b>82</b>	<b>8%</b>
	Of which vegetable protein (g)	20	<b>50</b>	<b>155%</b>
	Fat (g)	83	<b>75</b>	<b>-9%</b>
	Carbohydrates (g)	31	<b>21</b>	<b>-33%</b>
	Saturated fat (g)	243	<b>246</b>	<b>1%</b>
	Sugars (g)	93	<b>52</b>	<b>-44%</b>
	Salt (g)	6	<b>4</b>	<b>-28%</b>
	Fibre (g)	16	<b>34</b>	<b>113%</b>
	Calcium (mg)	804	<b>721</b>	<b>-10%</b>
	Iron (mg)	8,5	<b>14</b>	<b>60%</b>
	B12 (µg)	4,2	<b>4</b>	<b>-5%</b>
	Zinc (mg)	8,2	<b>10,5</b>	<b>28%</b>
	Vitamin D (µg)	3,4	<b>5</b>	<b>45%</b>
	Vitamin A (µg)	701,7	<b>712</b>	<b>1%</b>
	Linoleic acid / α-linolenic acid	9,0	<b>4,2</b>	<b>-53%</b>
	NUTRISCORE (except drinks)	<b>C</b>	<b>A</b>	<b>-</b>

Applied to a family of 4 people (2 adults, 1 adolescent and 1 child), the Flexitarian and INCA3 plates can be represented as a weekly shopping basket. Over one week, the Flexitarian basket makes it possible to reduce their greenhouse gas emissions by 36% and their overall cost by 22%, compared to the INCA3 basket.

## Sustainability indicators for a family of 4 people and per week for the INCA3, Livewell, Afterres 2050 and Flexitarian baskets

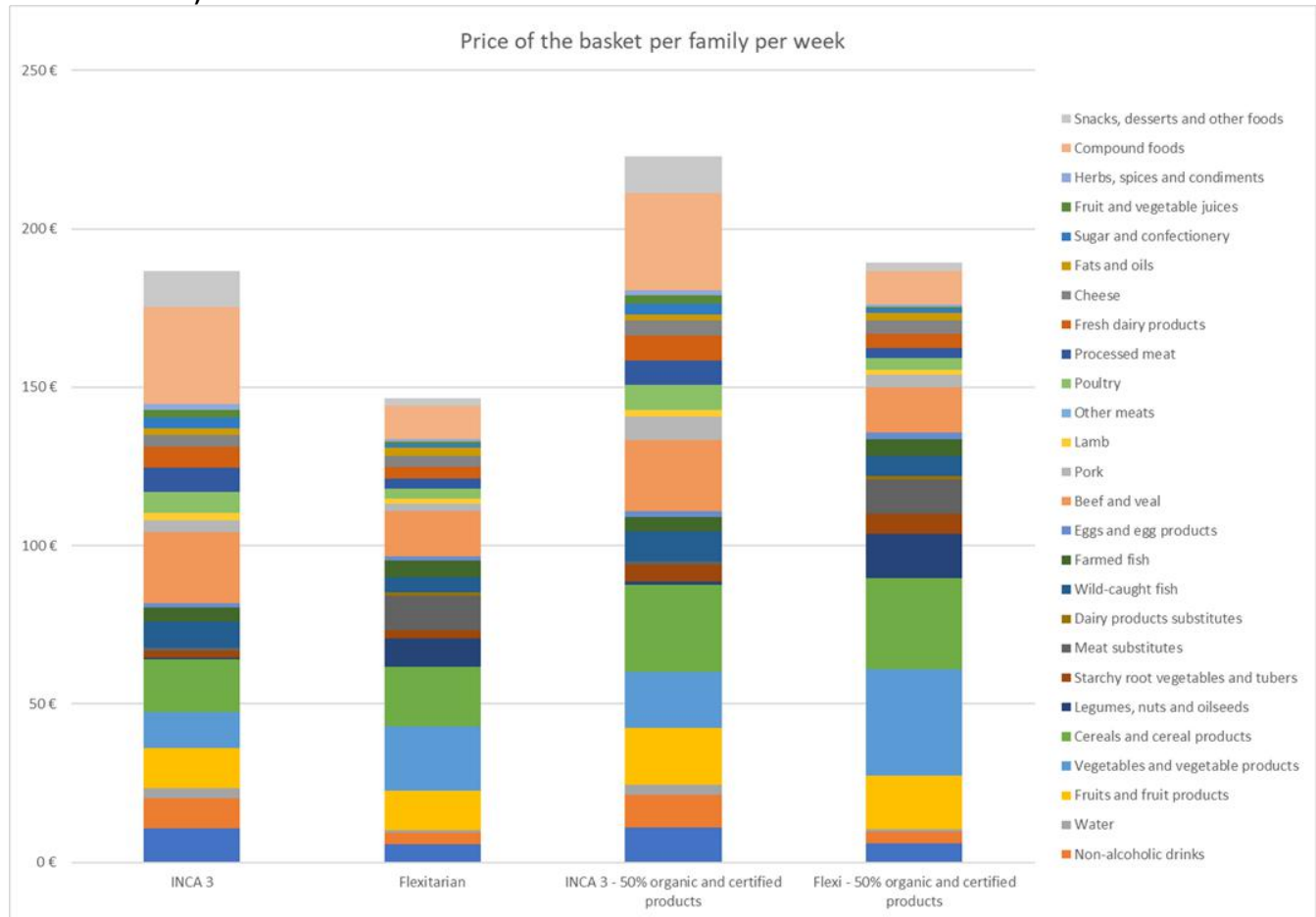
Carbon footprint and cost of a shopping basket for one family per week



The reduction in costs obtained by the composition of the Flexitarian basket in comparison to the current plate makes it possible to introduce around 50% of certified products at a cost that is almost identical to that of the current basket (around €190 for the INCA3 and the Flexitarian<sup>10</sup> basket).

<sup>10</sup>Taking account of the price variations for food products from one store to another, we can consider that the costs are equal.

## Costs of the INCA3 and Flexitarian baskets with the introduction of 50% of certified products (Organic, Red Label and MSC)



## What is involved in moving from the current diet to the Flexitarian diet?

In order to illustrate in simple terms what is meant by Flexitarian, we set out below a comparison between the two diets in terms of frequency of consumption per person, for the food groups that are most affected:

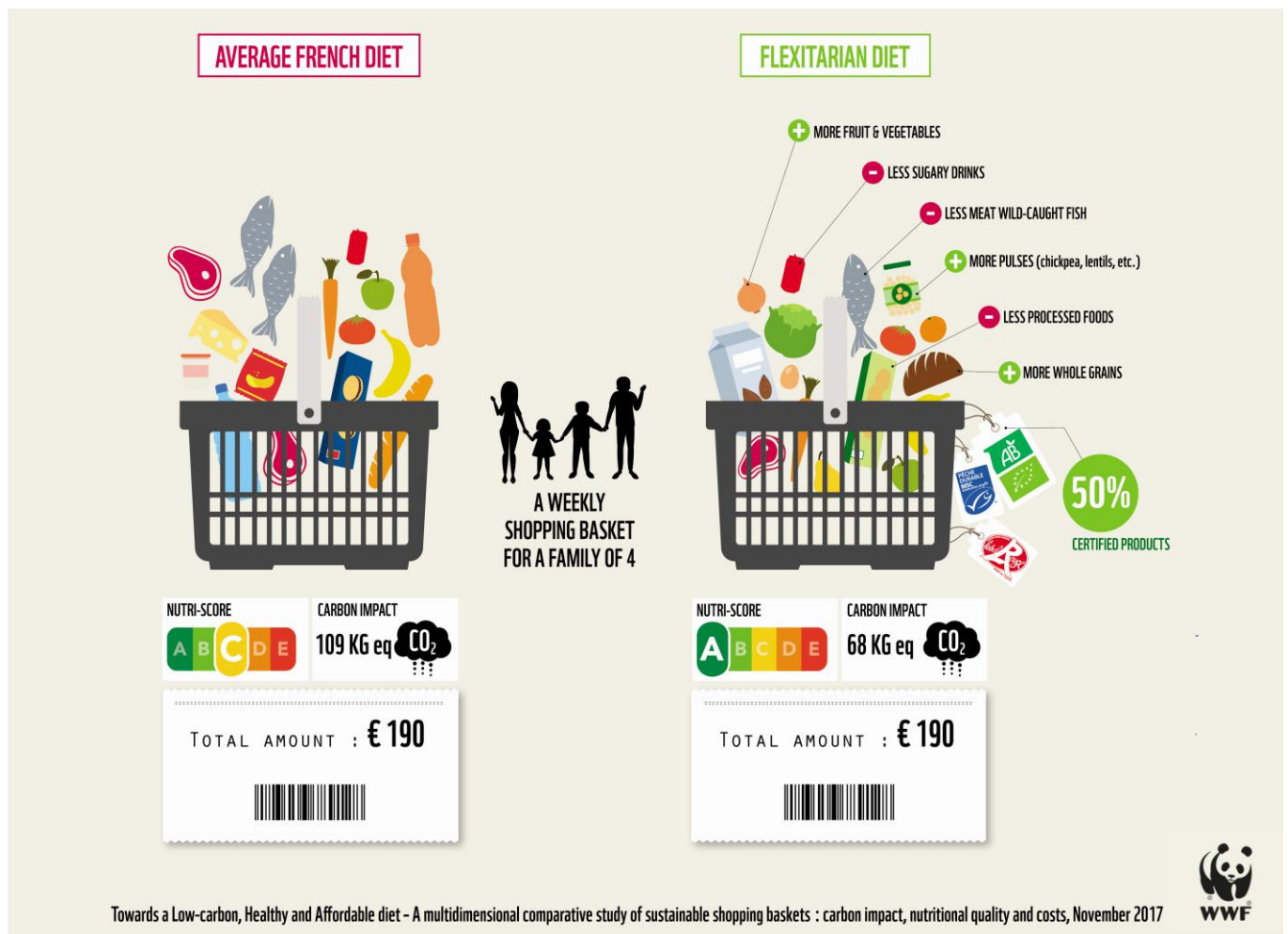
	Current diet		Flexitarian diet	
	Frequency of consumption		Frequency of consumption	
<b>Beef, veal, lamb</b>	1 meal every 3 days	7 meals per week with meat or fish	1 meal every 6 days	4 meals with meat or fish per week
<b>Pork, poultry</b>	1 meal every 2 days		1 meal every 4 days	
<b>Wild-caught fish</b>	1 meal every 6 days		1 meal every 10 days	
<b>Farmed fish and molluscs</b>	1 meal every 16 days		1 meal every 9 days	
<b>Processed and composite food products</b>	1 meal per day	7 prepared meals per week	1 meal every 3 days (prepared dishes)	2 prepared meals per week

This study shows that it is perfectly possible to find a balance which will enable us to :

- Eat in a healthier and more balanced way (satisfying nutritional needs)
- Eat quality products, favouring certified products (Organic, Red Label, etc.)
- Eat more sustainably at the same cost (the cost of the Flexitarian basket does not exceed that of the INCA3 basket)
- Significantly reduce the effects of greenhouse gas emissions from food production
- Ease the pressure on resources, particularly marine resources

Clearly, the Flexitarian basket as it is defined in this study is quite ambitious compared to the current French food diet. The adoption of such a food diet would require cultural and economic changes as well as significant public and private incentives to achieve this goal.

It is therefore perfectly possible to call into question the path followed during the last 50 years regarding industrialisation of food production, the increase in the consumption of animal protein and of industrially processed food products containing sugar, fats and salt. Not only is this to be considered in order to address the environmental and public health challenges of the next decades, but this will also be of benefit to the producers and consumers of a diet that is healthier, in season and local, while at the same time protecting natural resources.



## The choice of plates studied

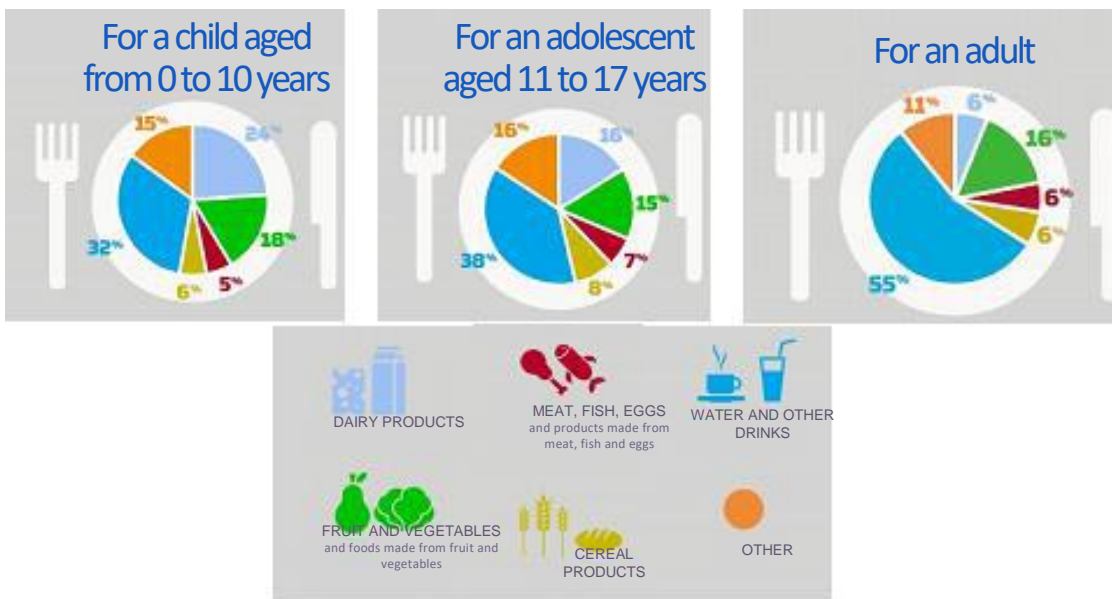
The starting point for the construction of a new sustainable plate, referred to as “Flexitarian”, was essentially to begin with the 3 studies already carried out on the French plates, drawn from the INCA3, Livewell and Afterres 2050 studies.

### The INCA 3 Study

The national benchmark study which provides a snapshot of the current average food consumption in France is the independent national food consumption study (INCA) carried out by the French Agency for Food, Environmental and Occupational Health & Safety (ANSES). The new version of this study (INCA3) was published on 12 July 2017. This study was able to look at the food habits of 5800 people between 2014 and 2015.

This study and its results allow a profile of the average food consumption of the French population (Figure 1) to be established. The data in this study represent the “current” French plate in the most recent version (the previous INCA2 study assessed consumption between 2006 and 2007).

The complete data is presented in Annex 1 of this report.



**Figure 1 – INCA 3 Study – June 2017: Consumption and lifestyles of the French**

Source: ANSES, *Etude INCA 3 – Juin 2017 consommations et modes de vie des Français*  
<https://www.anses.fr/fr/content/inca-3-en-image-dans-lassiette-des-fran%C3%A7ais>

## Livewell Plate 2030 – 70/30

The second study is that carried out by the WWF and entitled Livewell, which defined the composition of the sustainable Livewell plate in 2020 and then 2030 (Table 1) with several variants. This study had been carried out using the previous study, INCA 2, as a starting point.

- The target for the reduction in greenhouse gas emissions in the food sector is 40% in 2030 compared with 1990
- This reduction is achieved through a combined effort between consumption and production. In the 70/30 variation, 70% of the reduction is obtained through changing the composition of the plate, via a modification in nutritional habits, while the remaining 30% is achieved thanks to technical advances achieved in production activities (agriculture, food-processing, food service)

As the objective of this report is to be as ambitious as possible in relation to changes in nutritional habits, we considered it appropriate to select the Livewell 70/30 scenario in which the reduction of GHG emissions, via nutritional practices, is more significant than that of agricultural production.

**Table 1 – Composition of the Livewell plate for adults in France compared to the INCA2 plate**

Product group	Current	Livewell 2020	Livewell 2030	
	g/day	g/day	g/day	g/day
Legumes, nuts and oilseeds	32	91	189%	91
Fruit and fruit products	137	176	29%	176
Beef & veal	50	30	-40%	29
Pork	14	9	-34%	9
Lamb	5	0	-100%	0
Poultry	29	35	20%	35
Processed meat	36	19	-47%	19
Meat replacers	0	10		10
Fish wild-caught	19	19	0%	19
Fish aquaculture	11	29	166%	29
Dairy	170	180	5%	180
Cheese	25	49	95%	49
Dairy replacers	5	29	480%	29
Eggs and egg products	15	20	35%	20
Sugar and confectionary	24	10	-57%	11
Fats and oils	27	42	58%	42
Fruit and vegetable juices	56	66	17%	66
Non-alcoholic beverages	462	465	1%	465
Alcoholic beverages	118	115	-2%	115
Drinking water	816	816	0%	816
Herbs, spices and condiments	20	33	64%	33
Composite food	0	4		4
Snacks, desserts, and other foods	25	26	5%	26
Grains and grain-based products	226	291	29%	292
Vegetables and vegetable products	149	258	73%	258
Starchy roots and tubers	67	74	12%	74

Source: WWF 2016, *Livewell Plates for France and UK*

**Table 2 – Composition of the different versions of the Livewell plate with divisions between production and consumption for adults in France compared to the INCA2 plate**

Product group	Current	Livewell 2030	Livewell 2030	Livewell 2030	Trend
	Share	50/50	30/70	70/30	
	CF Value 4.67 kgCO <sub>2</sub> eq	4.04 kgCO <sub>2</sub> eq	4.08 kgCO <sub>2</sub> eq	3.63 kgCO <sub>2</sub> eq	
	g/day	g/day	g/day	g/day	(>10%)
Legumes, nuts and oilseeds	32	91	91	90	+++
Fruit and fruit products	137	176	176	175	+++
Beef & veal	50	29	30	18	---
Pork	14	9	9	8	---
Lamb	5	0	0	0	---
Poultry	29	35	35	32	+++
Processed meat	36	19	19	17	---
Meat replacers	0	10	10	10	+++
Fish wild-caught	19	19	19	19	000
Fish aquaculture	11	29	29	29	+++
Dairy	170	180	180	179	000
Cheese	25	49	49	49	+++
Dairy replacers	5	29	29	29	+++
Eggs and egg products	15	20	20	20	+++
Sugar and confectionary	24	11	10	12	---
Fats and oils	27	42	42	42	+++
Fruit and vegetable juices	56	66	66	65	+++
Non-alcoholic beverages	462	465	465	464	000
Alcoholic beverages	118	115	115	114	000
Drinking water	816	816	816	816	000
Herbs, spices and condiments	20	33	33	32	+++
Composite food	0	4	4	4	+++
Snacks, desserts, and other foods	25	26	26	28	00+
Grains and grain-based products	226	292	291	293	+++
Vegetables and vegetable products	149	258	258	253	+++
Starchy roots and tubers	67	74	74	77	+++

Source: WWF 2016, *Livewell Plates for France and UK*



## Afterres 2050

The third study that we have chosen to look at is the one resulting from work by Solagro: Afterres 2050 is a scenario for development of French agricultural and nutritional systems by 2050. In particular it puts the emphasis on the distribution of the various systems of agricultural production (organic agriculture, integrated production, etc.) which will be capable of meeting French food requirements in 2050.

This study is notable for looking at the food system in its totality, both production and consumption at the same time. We have concentrated here on the plate as defined by Afterres 2050 (Table 3), without going into the details in relation to production. The Afterres 2050 plate complements the Livewell plate perfectly because it starts from the same point (INCA 2) and attempts to cover French food requirements.

**Table 3 – The Afterres 2050 plate based on various scenarios**

g/day/adult	2010 (INCA2)	2050			
		Trend	Afterres	SAB	REP
Cereals	281	315	340	340	309
Potatoes	56	64	49	49	54
Sugar	21	23	19	19	19
Animal Fats	11	8	8	8	8
Offal	3	1	1	1	1
Legumes	10	15	41	41	15
Oils	15	19	17	17	17
Vegetables	139	146	170	170	160
Fruit	160	168	196	196	184
Alcoholic drinks	155	155	113	113	124
Stimulants (coffee, tea, cocoa)	259	233	233	233	233
Spices	19	17	17	17	17
Meat	185	185	94	89	139
Dairy products	235	223	122	117	176
Eggs	15	15	11	10	13
Fish & Seafood	31	8	8	8	8
<b>TOTAL</b>	<b>1 598</b>	<b>1 595</b>	<b>1 439</b>	<b>1 428</b>	<b>1 477</b>

• Evolution of the Afterres until 2050- quantities consumed<sup>28</sup>.

Source: Solagro, 2016, *The Afterres 2050 scenario*, 2016 version

[http://afterres2050.solagro.org/wp-content/uploads/2015/11/Solagro\\_afterres2050-v2-web.pdf](http://afterres2050.solagro.org/wp-content/uploads/2015/11/Solagro_afterres2050-v2-web.pdf)

## The sustainable plate – Flexitarian version

Ultimately in this study we are proposing a variation very much inspired by the Afterres 2050 and Livewell 2030 plates, with a significantly reduced consumption of animal protein, allowing not only a response to the challenges of climate change but also to help reduce the need for industrial intensive animal farming.

With this plate, the idea is to envisage an occasional quality meat diet (organic and certified).

This variation, called the Flexitarian plate, has not been the subject of previous studies and is therefore constructed within the framework of this study.

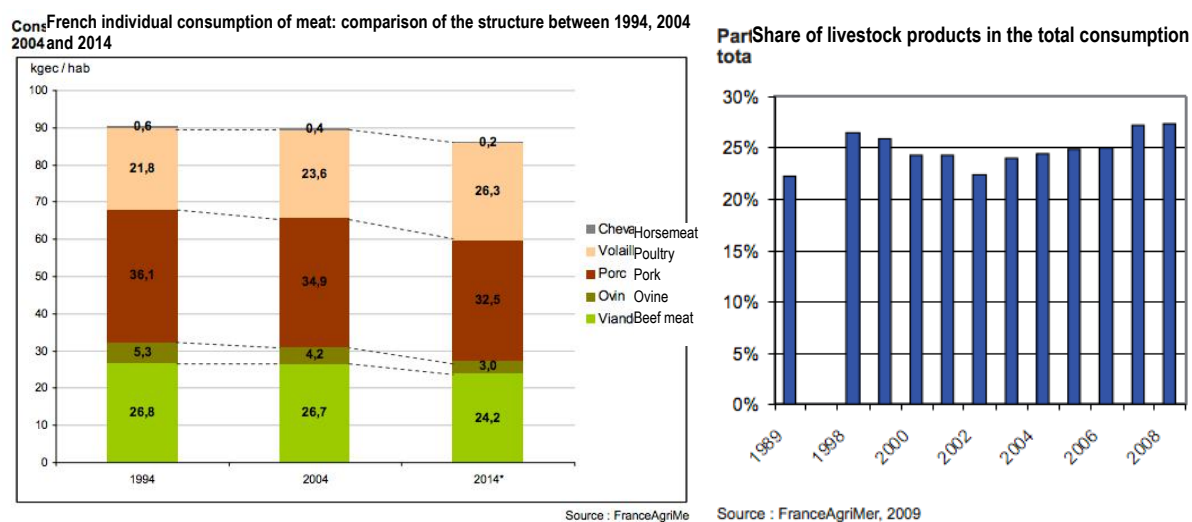
## Homogenizing the food groups and grammages

The main difficulty in the study was finding the best available basis for data homogenisation in order to obtain various comparable plates. Indeed, certain elements contained in the INCA3 plate were not addressed in the Livewell and Afterres plates, notably “composite” foods: soups and broths, prepared dishes, sandwiches, pizzas, etc., which are essentially processed dishes or dishes consumed in restaurants. However, we thought it was relevant to include them in our comparison because the INCA3 study identified a significant increase in the number of these groups.

The other difficulty in the INCA3 study was obtaining a sufficient level of detail for certain food groups not yet published at this stage.

In our case the most important point related to the “red meat (other than poultry)” category. Indeed, the classification of the public INCA3 report does not give the quantities of the sub-groups for meats, especially beef, veal, pork and lamb. We also separated seafood products into two groups not identified in the INCA3 study: farmed fish and fish caught by fishing.

To resolve these issues we used the data on global consumption published by FranceAgriMer (Figure 2) and we applied the ratios of consumption for each food category to the data of the INCA3 groups.



**Figure 2 - Data on consumption for meats**

Source: FranceAgriMer, 2015

<http://www.franceagri.fr/content/download/40104/372599/file/STA-VIA-CONSO%202014-aout2015.pdf>

## Reconstructing the plates

To obtain more data in each food category, we started off with the data from the INCA2 study and the Livewell study, both of which go down to the individual food level (the detailed data from INCA3 not being available yet).

The complete list of 163 foods from the food groups consumed the most by the French is presented in Annex 1 of the study. Each food was then classified on the basis of the reference of the food groups in the Livewell study. The work therefore consisted of translating the data from INCA and from Afterres according to the equivalent groups.

To move from the INCA and Afterres categories to the individual food level, we applied the ratios arising from INCA2, except for the categories of red meat and fish which came from the percentages of consumption from FranceAgriMer. This data can therefore be refined once the INCA3 data details are available. The same precautions should be taken in relation to the results obtained for the Afterres plates.

Based on these hypotheses we obtain a homogenisation of the food groups in the 3 plates (Table 4).

**Table 4 – Composition of the INCA 3, Livewell and Afterres plates based on the Livewell categories**

	g per adult per day		
	INCA 3	Livewell 2030	Afterres 2050
Alcoholic drinks	128	114	113
Non-alcoholic drinks	596	464	233
Drinking water	902	816	816
Fruit and fruit products	144	175	196
Vegetables and vegetable-based products	131	233	170
Grain and grain products	184	293	340
Legumes, nuts and oilseeds	11	90	41
Starchy roots and tubers	46	77	49
Meat substitutes	4	10	-
Milk product substitutes	-	29	-
Fish caught in wild	19	17	6
Fish farming	7	29	2
Eggs and egg products	13	20	11
Beef and veal	34	18	27
Pork	11	8	36
Lamb	4	-	4
Other meat	0	-	-
Poultry	27	32	29
Processed meat*	27	17	-
Fresh milk products	152	179	82
Cheese	31	49	12
Fats and oils	17	42	25
Sugar and confectionery	28	12	19
Fruit and vegetable juices	64	65	-
Herbs, spices and condiments	25	32	17
Composite foods**	257	4	-
Snacks, desserts and other foods	80	28	-
<b>TOTAL</b>	<b>2 941</b>	<b>2 853</b>	<b>2 227</b>

\*Processed meat: charcuterie (ham, salami, terrine, sausage)

\*\*Composite foods: soups, prepared dishes, sandwiches, pizzas, etc.

Significant differences in mass are in evidence between the three plates and according to the food groups, particularly for the composite foods, which are absent in the Afterres plate and much reduced in the Livewell plates.

# Carbon emissions

Next, we carried out an assessment of the carbon footprint<sup>11</sup> of each plate (taking into account 163 food products) thanks to the Etiquettable software developed by Eco2 Initiative which uses emission factors based on data from FoodGES and Agribalyse by ADEME. The results obtained are presented in Table 5.

**Table 5 – Greenhouse gas emissions of the various plates**

Plate	Weight	Greenhouse Gas
	g per adult per day	g CO2 per adult per day
INCA 2 (2010)	2 744	4 498
INCA 3 (2014)	2 941	4 474
Livewell 2030 70/30	2 853	3 636
Afterres 2050	2 227	3 167

Calculations carried out with the calculator



It will be noted in these results that, given the data available for INCA3, the average greenhouse gas emission of the French diet has not changed when compared to INCA2. However, these results are still to be evaluated once the detailed data at the ingredient level is published by the ANSES.

It will be noted as well that the difference in GHG emissions between the Livewell and Afterres plates is in particular due to the difference in grammage between the two studies, but also due to the choice made to more substantially reduce seafood products and milk products in the Afterres study.

The data relating to Afterres needs to be specified as well because we did not have access to the details of the products in each category. The calculations are therefore valid based on the hypotheses that we have made product by product.

# Nutrition

We have also assessed the nutritional data of each plate (Table 6), at the macronutrient level and in accordance with the Nutri-Score<sup>12</sup> approach, for the products consumed (excluding drinks). This nutritional signage (the logo for which shows five ratings from A to E, depending on the nutritional value of the product) was chosen by the Minister of Health to be used by industrial companies as a simplified and voluntary way of displaying the nutritional qualities of a product. The Nutri-Score makes sense in this type of assessment because it involves an overall approach (average plate).

<sup>11</sup> The estimate of the carbon footprint of a particular food is the amount of greenhouse gases (in CO2 equivalent) emitted during the production, processing and transportation stages.

<sup>12</sup> <http://santepubliquefrance.fr/Actualites/Nutri-score-un-nouveau-logo-nutritionnel-appose-sur-les-produits-alimentaires>

**Table 6 – Average daily nutritional contribution and Nutri-Score (except drinks)**

Plate	Weight	Nutrition (per adult per day, drinks included except for Nutri-Score)								NUTRI-SCORE (excluding drinks)
	g	Calories (kcal)	Proteins (g)	Fat (g)	Saturated fat (g)	Carbs(g)	Sugars (g)	Salt (g)	Fibre (g)	
INCA 3	2 941	2 153	76	83	31	243	93	6	16	C
Livewell 2030 70/30	2 853	2 475	88	101	24	265	72	5	30	A
Afterres 2050 <sup>13</sup>	2 227	2 049	63	68	26	264	78	4	18	- <sup>14</sup>

Calculations carried out with the calculator



In these results, the Livewell and Afterres plates improve most of the nutritional requirements from the INCA3 plate, and in particular are in line with the recommendations of the PNNS in relation to the reduction in consumption of saturated fatty acids, sugars and salt. On the other hand they show varying characteristics for the caloric contribution, in proteins or in fibres. Moreover, the results obtained on the Afterres plate (low in total grammage, in protein or in fats) require a more in-depth study of the detailed content of the hypotheses adopted for the constitution of the plate.

## Cost

Just as for greenhouse gas emissions and nutrition, we again used the list of 163 basic food products to assess the average cost of each plate (Table 7).

To build up the database of costs, we collected the retail prices of 163 ingredients. To stay with a cost per plate that is relatively affordable and representative of the average consumption of a French person, we selected as many products as possible from brand distributors intended to represent an average price for each product between hard discount prices and brand prices. The average prices obtained are presented in Annex 2 for each product.

**Table 7 – Weight and price of the 3 plates studied**

Plate	Weight	Price
	g	€
INCA 3	2 941	8.13
Livewell 7030	2 853	7.70
Afterres 2050	2 227	6.18

Here too, the Afterres plate is seen to have a lower average overall price than the INCA3 and Livewell plates. The same reasons that explain the disparity in the GHG emissions also explain the lower price of the Afterres plate, notably because of a greater reduction in animal products, which are more costly than most of the other food categories.

<sup>13</sup> The simulation of the nutritional information is indicative, we did not have access to the detail of the choices for the Afterres 2050 plate

<sup>14</sup> Insufficient detailed data

# The formulation of a new sustainable plate

## Carbon targets in line with COP21

According to estimates by the ADEME<sup>15</sup>, food represents 23% of household greenhouse gas emissions.

The French climate plan, presented in July 2017 by Minister Nicolas Hulot, set a target of being carbon neutral by 2050.

The Paris Agreement would provide for French emissions to be **divided by 4** between 1990 and 2050 with a target decrease of 40% by 2030 compared to 1990.

French emissions due to food and diet in 1990 were estimated at 4.96 kgeqCO<sub>2</sub> per day for each French citizen.

Taking into consideration the french demographic projection, a reduction of 40% in these emissions would result in a figure of 2.47 kgeqCO<sub>2</sub> per day for each French citizen in 2030 and 1 kgeqCO<sub>2</sub> in 2050 compared to 1990<sup>16</sup>.

**For this flexitarian diet, we have therefore set an intermediate target for the “sustainable plate,” situated around the 2030 target.**

## Protection of fishing resources

Currently the ANSES recommends eating fish twice a week (about 200g per week per person).

At the same time, marine resources have never been under such threat. Around 30% of wild fish stocks are overexploited and 60% are fully exploited (around 90% in the Mediterranean)<sup>17</sup>. Clearly it is vital that we change our consumer habits.

We have therefore set ourselves a goal to reduce by a reasonable amount the quantity of wild-caught fish consumed in the plate, in part alignment with the recommendations of the Afterres plate.

## Nutritional balance

As benchmarks we took the ANSES recommendations on macronutrients. Furthermore, in order to not create an imbalance in the plates from a nutritional point of view, we set ourselves the objective of improving on the different criteria identified by the ANSES and already considered in the Livewell 2030 study: to reduce saturated fatty acids, sugars and salt and to increase fibre. We used the Nutri-Score as an additional summary indicator.

The significant reduction in animal proteins also led us to estimate the level of certain micronutrients in the Flexitarian plate. As animal products and products derived from animals make up a significant proportion of the food products contributing vitamins A, B12, D, calcium, iron and zinc in the French diet, we thought it relevant to assess the coverage of nutritional needs for these micronutrients (Annexe 3). Finally, the omega-6/omega-3 ratio, which imbalance is responsible for pathologies (cardiovascular, inflammatory diseases, etc.)<sup>18</sup>, was assessed. The benchmark values are taken from the collective expertise report of the ANSES from 2016<sup>19</sup>.

<sup>15</sup> [http://www.ademe.fr/sites/default/files/assets/documents/ademe-alleger-empreinte-environnement-2030\\_rapport\\_28112014.pdf](http://www.ademe.fr/sites/default/files/assets/documents/ademe-alleger-empreinte-environnement-2030_rapport_28112014.pdf)

<sup>16</sup> Towards a low carbon ,healthy and affordable diet, Volume 2, WWF, Eco2

<sup>17</sup> [http://www.wwf.fr/nos\\_priorites/conservier\\_les\\_ecosystemes/protger\\_les\\_oceans\\_et\\_les\\_cotes/privilegier\\_une\\_peche\\_durable/](http://www.wwf.fr/nos_priorites/conservier_les_ecosystemes/protger_les_oceans_et_les_cotes/privilegier_une_peche_durable/)

<sup>18</sup> [https://solidarites-sante.gouv.fr/IMG/pdf/Rapport\\_du\\_groupe\\_PNNS\\_sur\\_les\\_lipides\\_-\\_1ere\\_et\\_2eme\\_parties.pdf](https://solidarites-sante.gouv.fr/IMG/pdf/Rapport_du_groupe_PNNS_sur_les_lipides_-_1ere_et_2eme_parties.pdf)

<sup>19</sup> <https://www.anses.fr/fr/system/files/NUT2012SA0103Ra-1.pdf>

## Budgetary objective

A study carried out by the UFC, “What to choose in the supermarket” showed that the cost of a basket of organic fruits and vegetables was on average 79% more expensive than a basket of conventional agricultural produce.

In order to integrate a portion of organic or certified produce into the sustainable basket, it was therefore also necessary to aim for a reduction in the overall cost of the sustainable basket (Flexitarian) compared to the current basket from the INCA3 study, without actually setting a specific target *a priori*.

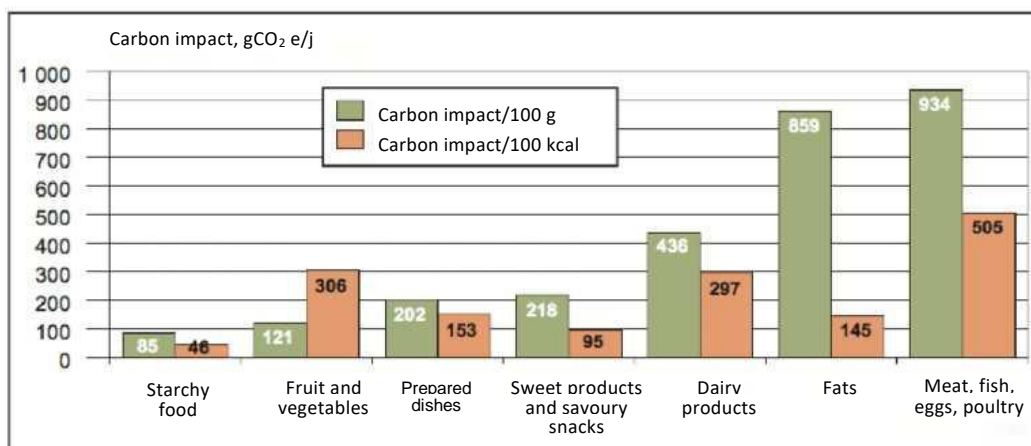
## Identifying the ingredients

A study<sup>20</sup> published in 2013 looked at the correlation between the carbon impact of the French diet and the nutritional quality of the food products in various categories. The study showed that, contrary to what is commonly believed, a “balanced” diet did not necessarily improve the carbon impact of the diet. Indeed, the weighting of food products of animal origin consumed (meat, eggs, fish, poultry and milk products), within the framework of current nutritional recommendations, does not allow a significant reduction in the carbon impact of the overall diet to be achieved.

For a set level of energy intake, the difference in carbon impact between the fruit and vegetables (F&V) category, in which the energy density is relatively low (kcal/100g), and that of animal products diminishes (Figure 3). Consequently, greater consumption of F&V to compensate for the nutritional intake from animal products does not necessarily lead to a reduction in the carbon impact of the diet.

We have reiterated the conclusions of this study which recommend that, within each food category, the consumer should be directed towards those for which the carbon impact shows the greatest reduction and which also allow our nutritional requirements to be met.

When we look at each individual food product more closely, we arrive at the same conclusions as the Livewell and Afterres studies: for a balanced and low-carbon diet, we need to **significantly reduce animal proteins and to increase the vegetable-based alternatives, particularly grains, starches, legumes, and nuts and oilseeds**. Adopting this type of nutritional diet would therefore meet our nutritional needs and also have a lower carbon footprint.



Note: the values are averages. The bars represent the 95% confidence interval (dispersion of actual adult rations).

**Figure 3 – Carbon impact of each food group, expressed per 100g and per 100kcal and weighted by the consumption of the adults (n=1918) participating in the INCA2 survey.**

Source : Florent Vieux, Louis-Georges Soler, Djilali Touazi, Nicole Darmon, 2013, *Impact carbone et qualité nutritionnelle de l'alimentation en France*, NESE n° 37, Janvier-Juin 2013, pp. 185-197

<sup>20</sup> Florent Vieux, Louis-Georges Soler, Djilali Touazi, Nicole Darmon, 2013, *Impact carbone et qualité nutritionnelle de l'alimentation en France*, NESE n° 37, Janvier-Juin 2013, pp. 185-197



## A variation on a sustainable plate

Based on the results obtained in the Livewell and Afterres studies, we started off with the grammages of each plate and the objectives defined on the three criteria of sustainability in order to construct a variation improving on these different parameters. Our analysis of the various parameters showed that the aim of a combined reduction in greenhouse gas emissions and cost could not be achieved except by a more ambitious reduction in animal proteins in the plate.

With the help of the Etiquettable software, which brings together these various approaches, and thanks to the gathering of the average prices per food product, we have envisaged a plate midway between the Afterres and Livewell plates and a vegetarian plate.

This leads us to define a plate, referred to as Flexitarian, which without going as far as a 100% vegetarian diet significantly reduces animal protein. This “flexibility” gives a balanced, culturally acceptable and progressive approach. This plate then enables the following results to be obtained for all three parameters (Table 8). The full nutritional results of the Flexitarian plate as well as the nutritional recommendations are set out in Annex 3.

**Table 8 – Overall results for the 4 plates**

		INCA3 (ANSES)	Livewell 7030	Afterres 2050	Flexitarian Plate	Difference Flexitarian/INCA3
Price	g	2 941	2 853	2 227	2 365	- 20%
	€	8.13	7.70	6.18	6,4	-20%
CO2	g CO2e	4 474	3 636	3 167	2 900	-36%
Nutrition	Calories (kcal)	2 153	2475	2049	2 100	-2%
	Protein (g)	76	88	63	82	8%
	Of which vegetable protein (g)	20	41	35	50	155%
	Fat (g)	83	101	68	75	-9%
	Saturated fat (g)	31	24	26	21	-33%
	Carbohydrates (g)	243	265	264	246	1%
	Sugars (g)	93	72	78	52	-44%
	Salt (g)	6	5	4	4	-28%
	Fibre (g)	16	30	18	34	113%
	Calcium (mg)	804	933	502	721	-10%
	Iron (mg)	8.5	13	8	14	60%
	B12 (µg)	4.2	4.6	2.3	4	-5%
	Zinc (mg)	8.2	9.7	7.1	10,5	28%
	Vitamin D (µg)	3.4	3	1.8	5	45%
	Vitamin A (µg)	701.7	632	588	712	1%
	Linoléic acid / α-linolénique acid	9.0	-	-	4,2	-53%
	NUTRISCORE (except drinks)		C	B	- <sup>21</sup>	A

Calculations carried out with the calculator



When compared to the INCA3 plate, the three sustainability criteria have been improved. Therefore we get a Flexitarian plate at a lower cost, with a reduction in the carbon impact and a better overall nutritional quality. In relation to the micronutrient levels, the Flexitarian plate meets the PRI (Population Reference Intake) in iron, zinc and in vitamins A,

<sup>21</sup> Lack of detailed data to assess the Nutriscore



B12 and D<sup>22</sup>. Only the calcium content is lower than the PRI (-20%)<sup>23</sup>. However, this shortfall should not generate a deficiency as the reduction in calcium loss goes hand in hand with the decrease in the consumption of animal protein<sup>24</sup>, and so the calcium requirements of the Flexitarian will be less.

## Components of the Flexitarian plate

To obtain these results we worked with 163 food products. The details of the grammages per product are indicated in Annex 1. In summary this results in a plate with the following characteristics (Table 9):

**Table 9 – Detailed components of each plate and differences between the Flexitarian plate and INCA 3**

	g per adult per day				Diff. Flexitarian / INCA3
	INCA 3	Livewell 2030	Afterres	Flexitarian	
Alcoholic drinks	128	114	113	75	-42%
Non-alcoholic drinks	596	464	233	197	-67%
Drinking water	902	816	816	816	-10%
Fruit and fruit products	144	175	196	133	-8%
Vegetables and vegetable products	131	233	170	217	66%
Grains and grain-based products	184	293	340	250	36%
Legumes <sup>25</sup> , nuts and oilseeds	11	90	41	160	1379%
Starchy roots and tubers	46	77	49	55	19%
Meat substitutes	4	10	-	40	852%
Milk product substitutes	-	29	-	20	
Fish caught in wild	19	17	6	12	-37%
Fish farming	7	29	2	13	84%
Eggs and egg products	13	20	11	15	19%
Beef and veal	34	18	27	22	-36%
Pork	11	8	36	7	-35%
Lamb	4	-	4	3	-28%
Other meat	0	-	-	0	-63%
Poultry	27	32	29	13	-52%
Processed meat	27	17	-	12	-55%
Fresh milk products	152	179	82	90	-41%
Cheese	31	49	12	26	-15%
Fats and oils	17	42	25	27	64%
Sugar and confectionery	28	12	19	12	-58%
Fruit and vegetable juice	64	65	-	13	-80%
Herbs, spices and condiments	25	32	17	10	-60%
Composite foods	257	4	-	110	-57%
Snacks, desserts and other products	80	28	-	18	-78%
<b>TOTAL</b>	<b>2941</b>	<b>2853</b>	<b>2227</b>	<b>2365</b>	

<sup>22</sup> The vitamin D nutritional benchmark recommendation for the population (PRI: 15 µg/day) is established considering a zero endogenous dermal synthesis. The nutritional reference chosen in this report is 5 µg/day, for an exposed population (Afssa, 2001; NHMRC, 2006; WHO, 2004).

<sup>23</sup> See details in Annex 3 based on the ANSES recommendations

<sup>24</sup> Several experts (WHO, [FAO](#)) are of the opinion that an increase in the consumption of acidifying animal proteins would limit the absorption of calcium. With an intake of animal protein lower than 40g/day, WHO consider a PRI in calcium between 670 and 1000 mg/day.

<sup>25</sup> The legumes are rehydrated and cooked

The main characteristics of this plate are:

- A 36% reduction in the consumption of beef and veal
- A 37% reduction in the consumption of wild-caught fish
- A decrease in animal protein in all its forms with the exception of farmed fish (particularly molluscs)
- An decrease in the consumption of dairy product (-36%)
- A decrease in processed products, industrial products, fats and sugars (-68%)
- A decrease in the consumption of strong alcoholic drinks and sugary drinks
- A significant increase in the consumption of grains, vegetables and legumes (93%)
- A decrease in the consumption of pan bread and refined flour (-35%) in favour of wholegrain bread (with an overall increase in the consumption of grains)
- A reduction in the consumption of bottled water and an increase in the consumption of tap water

## Extrapolating the results to a family's weekly basket

In order to illustrate the development of this plate in a more clear and informative manner and also to include children and adolescents in the results, we have extrapolated the results to a family composed of a man, a woman, an adolescent and a child under 10 years of age, in accordance with the categories of the INCA study (Table 10). The term "basket" will be used hereinafter to refer to this family.

We therefore started off with the quantities consumed per food category by each family member in order to recreate the weekly basket of a family. The distribution of the food groups, the carbon impact and the cost of the INCA3 and Flexitarian baskets are presented in Figures 4, 5 and 6 respectively.

The details of the family basket and the proportions of each group can be found in Annex 2.

**Table 10 – Extrapolating the results to a family’s weekly basket (2 adults, 2 children)**

	kg per family / week		kg CO2eq per family / week		Price of the basket per family per week (€)	
	INCA 3	Flexitarian	INCA 3	Flexitarian	INCA 3	Flexitarian
Alcoholic drinks	1,8	1,07	2,3	1,3	10,8	5,7
Non-alcoholic drinks	11,6	3,8	4,5	1,4	9,4	3,6
Water	20,4	18,4	5,5	3,6	3,10	0,7
Fruit and fruit products	3,4	3,1	1,4	1,4	12,8	12,4
Vegetables and vegetable products	2,7	4,6	2,7	3,9	11,2	20,5
Grains and grain-based products	4,5	6,2	12,6	12,9	16,7	18,7
Legumes, nuts and oilseeds	0,2	3,2	0,1	1,4	0,5	8,9
Root vegetables and starchy tubers	1,1	1,3	0,4	0,5	2,1	2,5
Meat substitutes	0,1	0,9	0,06	0,6	1,1	10,9
Dairy product substitutes	-	0,4	-	0,2	-	1,08
Wild-caught fish	0,4	0,2	3,5	2,2	7,9	4,5
Farmed fish	0,1	0,3	0,9	2	4,6	5,3
Eggs and egg products	0,3	0,3	0,6	0,7	1,1	1,4
Beef and veal	0,7	0,5	20,9	13,2	22,5	14,3
Pork	0,2	0,1	1,4	0,9	3,8	2,3
Lamb	0,1	0,07	3,1	2,2	2,2	1,6
Other meats	0,01	0,00	0,03	0,01	0,1	0,06
Poultry	0,7	0,3	3,09	1,4	6,7	3,1
Processed meat	0,6	0,3	3,2	1,4	7,6	3,2
Fresh dairy products	5,6	3,3	10,9	5,8	6,5	3,7
Cheese	0,6	0,5	2,7	2,4	3,9	3,3
Fat and oils	0,3	0,9	2,00	2,5	1,9	2,6
Sugar and confectionery	0,6	0,22	0,9	0,4	3,4	1,2
Fruit and vegetable juices	2,1	0,43	3,1	0,6	2,5	0,6
Herbs, spices and condiments	0,61	0,25	1,6	0,3	1,8	0,8
Composite food	5,98	2,5	12,9	3,5	30,6	10,5
Snacks, desserts and other products	2,63	0,6	7,2	1,5	11,4	2,4
<b>TOTAL</b>	<b>68</b>	<b>54</b>	<b>109</b>	<b>69</b>	<b>186,7</b>	<b>146,5</b>

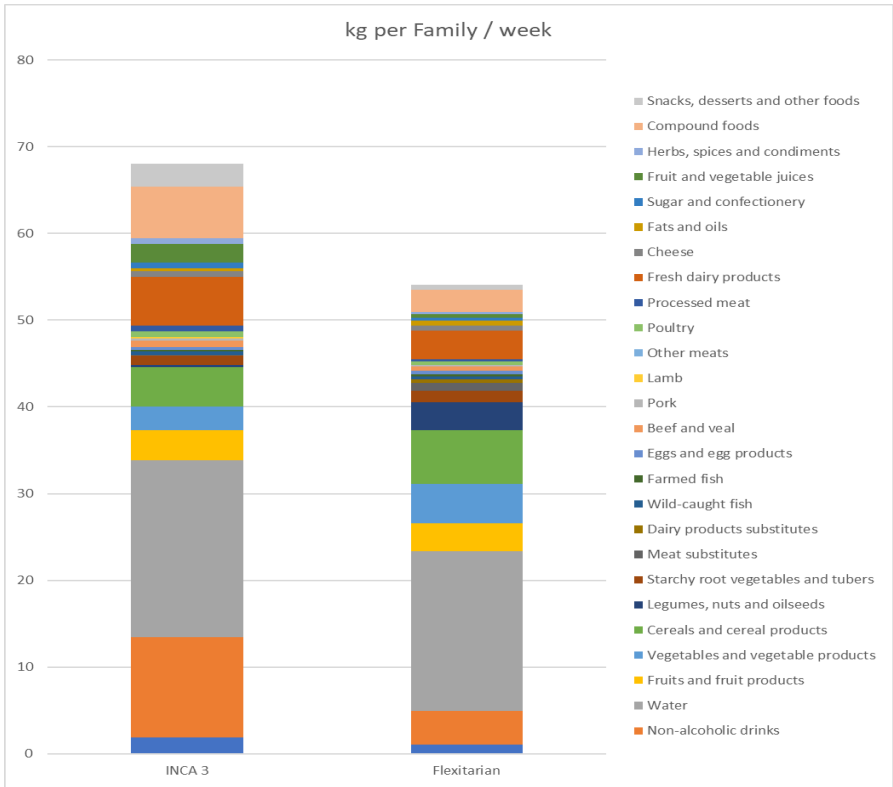


Figure 4 – Distribution of food groups (kg) in the INCA3 and Flexitarian baskets

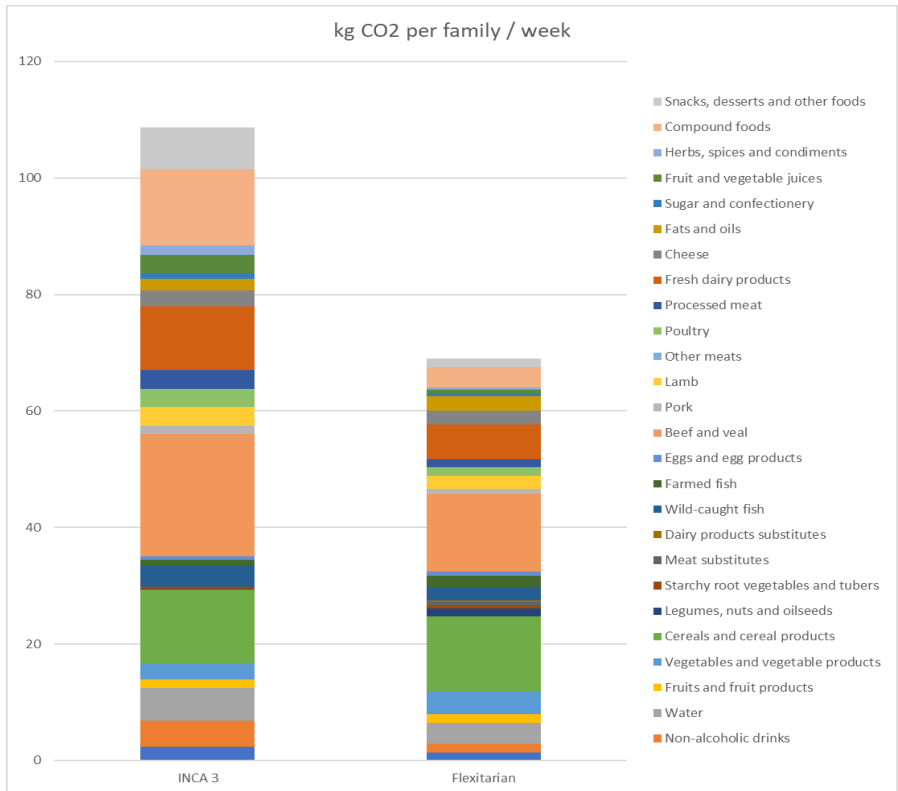
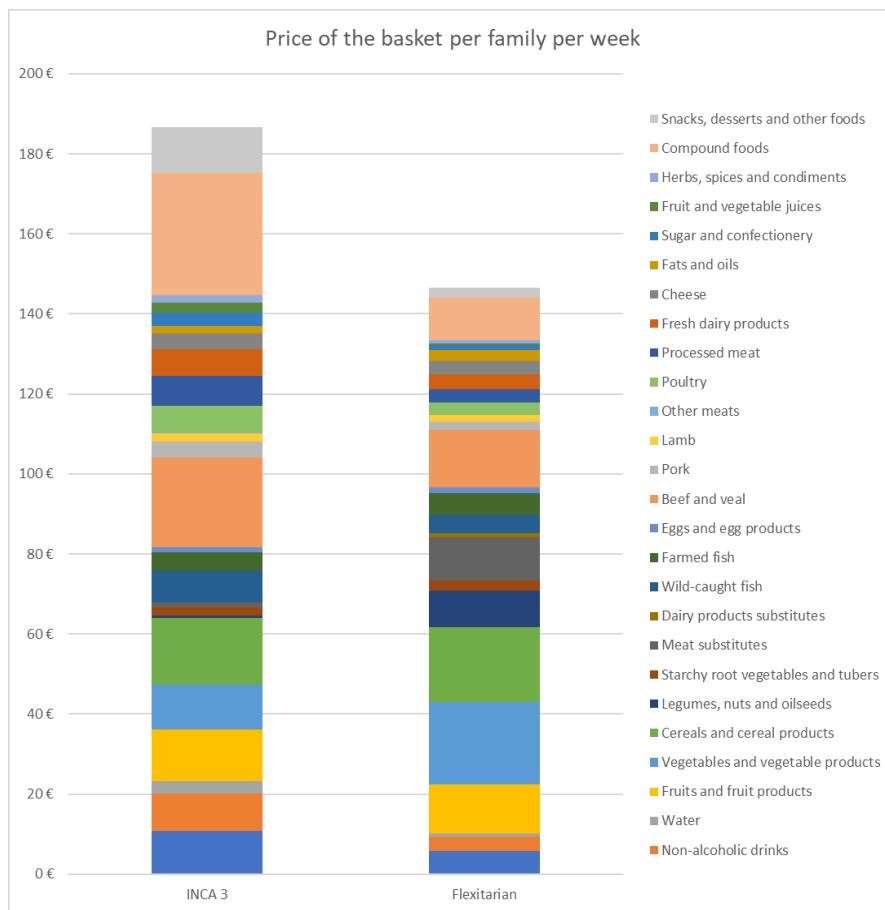


Figure 5 – Carbon footprint of the INCA3 and Flexitarian baskets, in kgCO2e, per food group



**Figure 6 – Weekly budget for a family, in Euros, per food category**

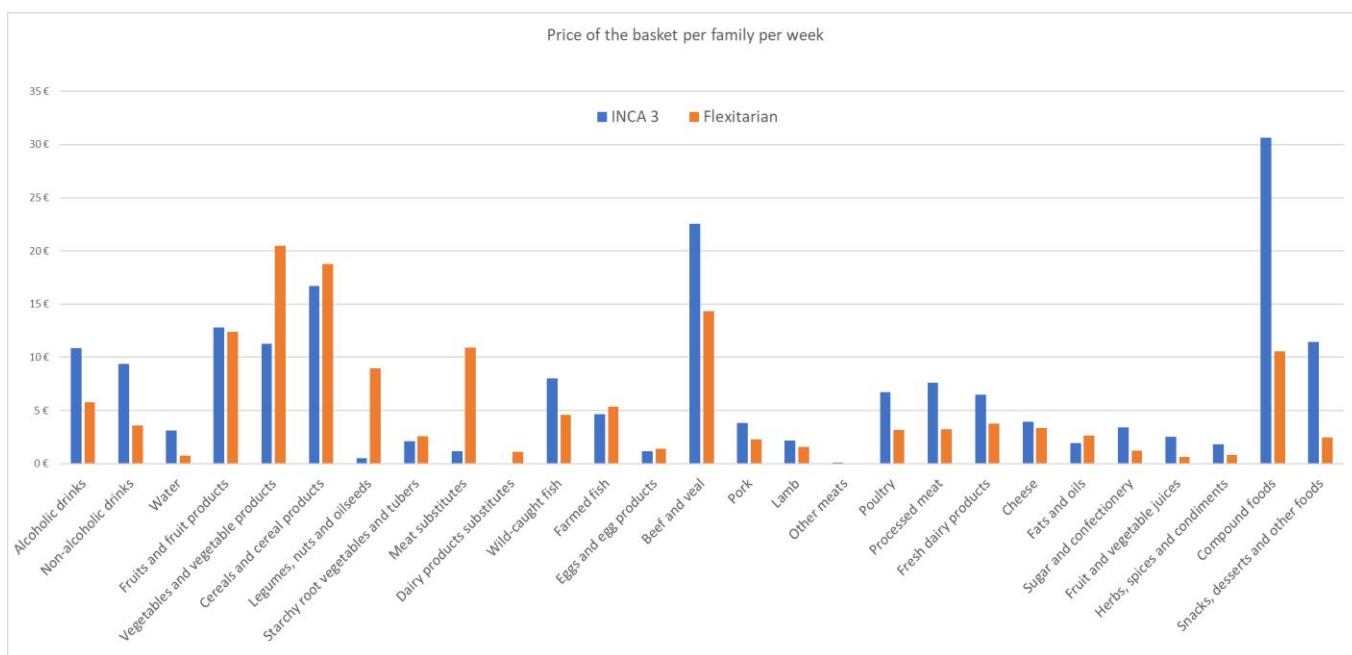
## Analysis of the lower cost of the basket

In order to fully understand the results obtained we have analysed the impacts of these changes on the cost of the basket in more detail (Figure 7).

The significant reduction in the overall cost is mainly due to reduced consumption in the following categories:

- Composite food
- Meat and dairy products
- Alcoholic drinks
- Soft drinks
- Snacks and desserts
- Wild fish

It is also to be noted that the majority of these modifications correspond to the nutritional recommendations of the PNNS (except for fish, and to a certain extent red meat), which is in line with the results obtained in terms of nutrition.



**Figure 7 – Detailed variation in weekly cost between the INCA3 and Flexitarian baskets, per food group**

In comparison with to the INCA3 basket, the Flexitarian basket enables improved performance in terms of a reduction in greenhouse gases and improved nutritional quality, but also shows a positive impact on the food budget of households, with a 22% reduction in cost.

## Introduction of quality products (organic, Red Label, sustainable fishing)

The composition of the Flexitarian plate resulted in a 21% reduction in the daily food budget for an adult and a 22% reduction in the average cost of a weekly basket for a family of 4 including 2 children.

Based on this basket, we collated the prices in organic farming, Red Label or MSC for a large proportion of the 163 food products in our study (with the exception of certain non-marketed products).

We have therefore recalculated the price of the Flexitarian basket by choosing approximately 50% of the weight of the basket made up of organic or certified products (Table 11), including with:

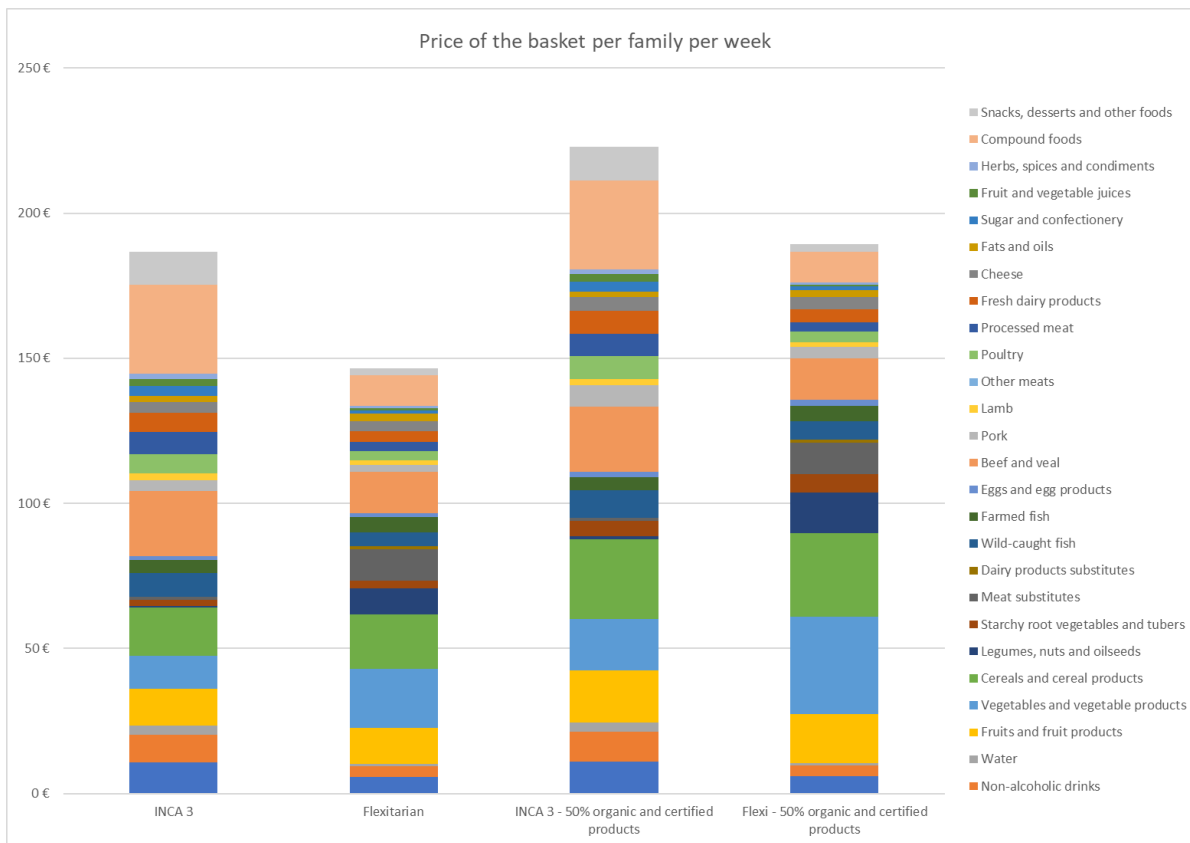
- Organic: 100% of the fruit and vegetables, fruit and vegetable juices, grains, legumes, root vegetables and tubers, eggs, milk and milk products, red meat and pork, 25% of the cheeses and 50% of the alcoholic and non-alcoholic drinks
- Red Label: 100% of the poultry
- MSC: 100% of the wild-caught fish

**Table 11 – Percentage (in weight) of certified products, by category**

	Percentage (by weight of the basket) of organic/certified for the Flexitarian basket by category
Alcoholic drinks	50%
Non-alcoholic drinks	50%
Fruit and fruit products	100%
Vegetables and vegetable products	100%
Grain and grain products	100%
Legumes, nuts and oilseeds	100%
Root vegetables and starchy tubers	100%
Wild-caught fish	100%
Eggs and egg products	100%
Pork	100%
Poultry	100%
Fresh milk products	100%
Cheese	25%
<b>Percentage of certified products in the whole basket</b>	<b>50%</b>

These calculations have permitted us to observe that, in the Flexitarian basket, it was possible to introduce around 50% of Organic, Red Label (RL) and MSC (46.3% Organic, 1.4% RL and 0.5% MSC) with practically **the same final budget** as INCA3. This was even taking into account the current price difference between organic and conventional, which is currently very significant (from 10% to 100% more expensive). Therefore, with around 50% of certified products, the Flexitarian basket would cost a family 187 Euros per week, practically the same price as for today's basket, which consists solely of conventional products (Figure 8).

On the other hand, the introduction of organic products while maintaining the current nutritional trend (INCA3) would increase the household budget by 20%.



**Figure 8 – Comparison of the weekly budgets between baskets with conventional products and baskets with 50% labelled products included.**



## CONCLUSION AND OUTLOOK

This study, which is based on previous studies carried out by WWF and Solagro - Livewell and Afterres 2050 plates - has laid the groundwork to move a step forward down the pathway towards more sustainable diets.

The main conclusion to be drawn is that it is feasible to find a balance that allows the average French family to:

- Eat in a healthier and more balanced way
- Eat quality products, while protecting the environment and the production conditions (organic, certified) at an acceptable cost
- Significantly reduce greenhouse gas emissions from food
- Ease the pressure on resources, particularly marine resources

We are well aware that the “Flexitarian” basket, as defined in this study, is ambitious when compared to current food habits and that the adoption of this type of diet would require cultural and economic changes as well as significant public and private incentives. However we believe it to be a good starting point for setting a course towards sustainable food systems. In a way, it is nothing else than a matter of taking the opposite sense of the path that has marked the past 50 years, with the industrialisation of food production and the disproportionate increase in the consumption of animal protein, sugary products, fats, salt and mass-produced products.

This study has focused on the content composition of the plate and while integrating the evolution of food demand. However, it has not taken into account the progress that is required from a supply point of view, including agricultural production, livestock farming, the food-processing industry and the food service industry. Likewise, it has not taken into account the foreseeable reduction of organic product prices, the reduction of greenhouse gas emissions from production, the improvement in nutritional quality, the change in production conditions, animal well-being and the reduction in the use of pesticides and chemical fertilisers.

Nor does this study encompass the problem of food waste and the critically necessary changes that need to take place across all agricultural sectorial branches. Progress on all these fronts would contribute to the improvement of the performance of the sustainable plate, particularly their carbon footprint.

In terms of methodology, a certain number of hypotheses have been put forth, which we trust may lead to further research that looks into our results in more depth:

- In this study we have envisaged a combination between the Livewell 2030 plate, the Afterres plate, and a vegetarian plate. We identified a combination that met the three criteria in a satisfactory way, but it is likely not the only possible solution. It would be interesting during a follow-up study to define a general indicator bringing the 3 criteria together and to explore what an “optimal” plate may look like, in order to move further on the improvement of the various criteria.
- The nutritional study of the plate was carried out based on macronutrients, the Nutri-Score and on several basic micronutrients that are important to track when following a diet with a reduced amount of animal protein. In a future study it would be interesting to go into the recommended intake for all of the micronutrients in more detail and to refine the adequate volumes.
- The volumes per food product in the INCA 3 study were not available at the time of the study, so we had to use the ratios from the INCA 2 study. An update to these results will be necessary once the details of the products in each category of the INCA 3 study are published.

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# ANNEX 1: Source data

**Table 12 – INCA2 plate consumption, per food group**

Table 8. Rates of consumption (%), average consumption (SD) and median (g/d) by sex of 43 food groups in adults aged 18-79 (n=1918)

	Men				Women				Together			
	Cons. rate.	Avg.	SD	Med.	Cons. rate.	Avg.	SD	Med.	Cons. rate.	Avg.	SD	Med.
Bread and crisp bread	98.5%	145.3	99.2	130.0	98.6% ns	87.4***	55.3	75.7	98.5%	115.0	81.4	98.6
Breakfast cereals	12.4%	4.4	19.0	0.0	20.8%***	5.2 ns	13.8	0.0	16.8%	4.9	16.1	0.0
Pasta	78.7%	46.4	52.4	35.7	76.3% ns	30.1***	28.5	28.6	77.4%	37.8	40.7	28.6
Durum wheat and cracked wheat	62.9%	28.5	42.8	21.4	65.7% ns	21.1**	26.0	14.3	64.4%	24.7	34.0	14.3
Other cereals	2.5%	0.4	3.9	0.0	2.9% ns	0.7 ns	4.7	0.0	2.7%	0.5	4.4	0.0
Pastries	44.1%	13.1	24.4	0.0	48.1% ns	10.7*	16.6	0.0	46.2%	11.8	20.1	0.0
Sweet biscuits, crackers and bars	53.0%	9.0	22.7	1.4	60.8%**	9.1 ns	14.4	2.9	57.1%	9.0	18.2	2.1
Pastries and cakes	71.8%	37.7	44.3	25.7	79.9%***	37.2 ns	35.4	27.9	76.1%	37.5	39.2	27.1
Milk	47.9%	89.9	176.0	0.0	52.1% ns	81.9 ns	115.5	7.5	50.1%	85.7	143.1	1.7
Ultra-fresh dairy products	76.8%	73.3	94.2	50.0	88.7%***	89.8***	71.7	75.0	83.0%	81.9	82.0	64.3
Cheese	92.7%	41.0	35.5	34.3	91.2% ns	26.6***	21.3	22.2	91.9%	33.4	28.8	27.1
Eggs and derivatives	62.0%	16.2	19.4	14.3	65.6% ns	14.5 ns	15.8	8.6	63.9%	15.3	17.4	8.6
Butter	81.8%	12.0	13.8	8.7	81.7% ns	10.2**	9.7	7.4	81.7%	11.0	11.6	7.9
Oils	81.5%	10.6	11.7	7.4	87.5%**	10.8 ns	9.0	8.6	84.7%	10.7	10.2	8.1
Margarine	39.1%	4.7	9.3	0.0	42.2% ns	4.2 ns	7.1	0.0	40.7%	4.4	8.1	0.0
Other fats	2.9%	0.2	1.3	0.0	2.7% ns	0.1 ns	0.8	0.0	2.8%	0.1	1.0	0.0
Meat	93.8%	61.2	46.3	53.3	90.4%*	39.1***	26.6	34.4	92.0%	49.7	37.5	42.1
Poultry and game	76.4%	39.1	43.4	29.0	74.8% ns	25.3***	26.4	18.6	75.6%	31.9	35.0	21.2
Offal	16.3%	3.3	9.4	0.0	15.6% ns	2.6 ns	6.4	0.0	16.0%	2.9	7.8	0.0
Prepared meat/delicatessen products	93.3%	41.8	35.9	35.0	89.2%**	27.5***	20.7	22.8	91.1%	34.3	28.8	28.6
Fish	76.6%	26.6	27.8	21.4	81.8%*	26.5 ns	22.4	21.4	79.3%	26.5	24.7	21.4
Crustaceans and molluscs	31.5%	4.4	10.0	0.0	35.3% ns	4.5 ns	8.8	0.0	33.5%	4.5	9.3	0.0
Vegetables (excluding potatoes)	98.5%	138.4	94.9	126.4	99.2% ns	140.2 ns	78.8	131.9	98.9%	139.3	85.7	128.6
Potatoes and similar	92.2%	67.1	56.7	57.1	89.1% ns	50.3***	40.3	42.9	90.6%	58.3	48.3	47.5
Vegetables	31.7%	11.5	24.4	0.0	27.9% ns	8.0**	15.7	0.0	29.7%	9.7	19.8	0.0
Fruit	83.2%	145.9	165.4	112.7	90.4%***	143.0 ns	124.0	114.2	87.0%	144.4	142.2	113.1
Dried fruit and oilseed grains	34.7%	3.1	7.9	0.0	28.2%*	2.3*	5.7	0.0	31.3%	2.7	6.7	0.0
Ice cream and frozen desserts	28.6%	9.2	23.7	0.0	36.0%**	8.2 ns	15.1	0.0	32.5%	8.7	19.0	0.0
Chocolate	44.0%	6.1	15.4	0.0	52.1%**	5.3 ns	9.2	0.7	48.2%	5.7	12.1	0.0
Sugars and derivatives	85.2%	22.5	25.2	16.4	85.5% ns	18.9**	18.7	13.7	85.3%	20.6	21.7	15.0
Waters	94.0%	767.8	621.5	675.7	97.3%**	807.5 ns	536.9	697.1	95.7%	788.6	572.8	680.0
BRSA <sup>(19)</sup>	68.1%	158.2	247.1	68.6	75.1%**	123.2**	183.8	68.6	71.8%	139.8	212.4	68.6

	Men				Women				Together			
	Cons. rate.	Avg.	SD	Med.	Cons. rate.	Avg.	SD		Cons. rate.	Avg.	SD	Med.
Alcoholic drinks	82.3%	255.6	290.4	182.1	61.1%***	63.2***	93.9	17.1	71.2%	154.8	220.1	64.3
Coffee	84.5%	279.5	290.3	250.0	76.0%***	229.3***	277.3	133.6	80.0%	253.2	283.7	188.6
Other hot drinks	52.1%	74.7	168.6	1.7	66.3%***	179.3***	267.8	35.7	59.6%	129.5	238.5	8.6
Pizzas, quiches and savoury pastries	51.1%	28.3	46.1	11.4	52.3% ns	18.5***	23.4	7.9	51.7%	23.2	34.8	10.0
Sandwiches, snacks	38.4%	21.5	45.2	0.0	35.6% ns	11.9***	22.8	0.0	36.9%	16.5	34.0	0.0
Soups and broths	49.2%	86.7	140.2	0.0	55.3% ns	85.6 ns	115.9	42.9	52.4%	86.1	126.3	28.6
Compound foods	86.6%	80.8	81.6	64.6	83.0% ns	58.4***	51.6	42.9	84.7%	69.1	66.3	54.3
Desserts, crèmes desserts and gelatinised milks	49.7%	26.0	44.3	0.0	54.3% ns	24.4 ns	37.9	14.3	52.1%	25.2	40.6	10.0
Compotes and cooked fruits	26.0%	9.6	23.0	0.0	39.2%***	16.6***	35.1	0.0	32.9%	13.3	30.9	0.0
Condiments and sauces	91.6%	19.9	20.0	16.1	94.5% ns	18.9 ns	13.7	16.8	93.2%	19.4	16.5	16.4
ADAP <sup>(2)</sup>	9.0%	0.8	11.3	0.0	15.4%**	4.5 ns	46.0	0.0	12.3%	2.8	36.3	0.0
<b>TOTAL</b>	/	<b>2,923</b>	<b>842</b>	<b>2,819</b>	/	<b>2,583***</b>	<b>730</b>	<b>2,531</b>	/	<b>2,745</b>	<b>795</b>	<b>2,672</b>

1)

Non-alcoholic refreshing beverages. In total, 55.1% of adults aged 18-79 years consume fruit juices (pure or from concentrate), with an average amount of 59.1 g/d (ET=90.5, median=6.9). 44.1% of adults consume other soft drinks (nectars, fruit drinks, soft drinks and colas), with an average consumption of 80.7 g/d (ET=187.5, median=0.0).

(2) Foods aimed at a particular diet.

Test for male/female differences: ns (not significant), \*(p <0.05), \*\* (p <0.01), \*\*\* (p <0.001)

Source: Afssa, INCA Study 2, 2006.07.

Source: INCA 2: <https://www.anses.fr/fr/system/files/PASER-Ra-INCA2.pdf>

**Table 13 – INCA3 plate consumption, per food group**

Table 37. Consumer rates and average daily consumption by food group, for all individuals and for consumers only, for adults aged 18 to 79 (n=2.121)

Food group	Set of individuals					Only consumers		
	Consumer rate <sup>1</sup>		Consumption (g/d)			Consumption (g/d)		
	%	95% CI	Avg.	Standard Deviation	Median	Avg.	Standard Deviation	Median
Refined bread and crisp bread	92.9	[91.2-94.4]	108.1	97.2	80.9	116.3	96.0	89.6
Wholemeal or semi-wholemeal bread and crisp bread	16.0	[13.8-18.5]	6.3	20.9	0.0	39.5	37.5	28.0
Breakfast cereals; cereal bars	15.0	[12.9-17.4]	4.8	15.6	0.0	32.2	27.5	22.0
Pasta, rice, wheat and other refined cereals	69.0	[66.1-71.7]	62.7	71.0	42.0	90.8	69.0	71.4
Pasta, rice, wheat and other wholemeal or semi-wholemeal cereals	3.4	[2.6-4.4]	1.6	11.0	0.0	47.1	38.0	39.3
Buns, pastries, cakes and sweet biscuits	79.8	[77.2-82.2]	57.0	59.5	40.4	71.4	58.4	55.3
Milk	43.7	[40.6-46.9]	75.3	144.5	0.0	172.3	176.3	137.6
Yogurts and white cheeses	68.6	[65.2-71.9]	76.7	78.7	57.5	111.8	71.4	89.3
Cheese	80.4	[78.0-82.5]	30.9	31.3	24.3	38.5	30.4	31.7
Desserts and crèmes desserts	33.1	[30.0-36.4]	17.2	33.9	0.0	52.0	40.8	36.6
Ice cream, frozen desserts and sorbets	20.3	[17.8-23.2]	5.3	14.0	0.0	26.1	20.4	19.1
Animal fats	67.6	[64.5-70.5]	9.0	13.5	4.2	13.3	14.6	9.1
Vegetable oils	76.3	[73.2-79.1]	7.5	9.7	4.5	9.9	10.0	6.7
Eggs and egg-based dishes	31.1	[28.2-34.1]	12.6	25.8	0.0	40.6	31.8	34.3
Meat (excluding poultry)	68.3	[65.3-71.2]	47.3	55.8	34.3	69.2	55.1	54.6
Poultry	49.1	[45.9-52.3]	26.0	36.0	0.0	52.9	34.9	45.1
Prepared meat/delicatessen products	66.9	[63.9-69.8]	27.3	36.4	16.1	40.9	37.8	31.4
Fish	42.5	[39.5-45.5]	23.0	37.0	0.0	54.0	39.2	47.4
Crustaceans and molluscs	13.8	[11.6-16.3]	3.7	14.9	0.0	26.9	31.5	17.1
Offal	8.0	[6.3-10.0]	2.7	11.0	0.0	33.7	21.9	30.3
Vegetables	93.4	[91.5-94.9]	130.7	112.9	107.7	140.0	111.2	117.4
Legumes	14.7	[12.4-17.4]	7.7	24.9	0.0	52.4	43.5	42.5
Potatoes and other tubers	57.5	[54.4-60.6]	45.8	73.4	21.4	79.7	81.6	58.6
Fresh and dry fruits	78.6	[75.9-81.0]	129.9	132.5	100.5	165.4	128.4	134.0
Compotes and fruit in syrup	19.8	[17.5-22.4]	13.6	37.0	0.0	68.7	55.7	57.1
Nuts, grains and oleaginous fruits	20.9	[18.7-23.4]	3.1	8.8	0.0	15.0	13.9	10.7
Confectionery and chocolate	61.6	[58.6-64.5]	8.6	16.4	1.8	13.9	19.0	7.9
Sugar and sweeteners	82.3	[80.0-84.4]	19.5	22.3	12.4	23.7	22.5	17.8
Bottled water	64.7	[61.5-67.9]	424.8	532.5	222.9	656.2	534.9	521.2
Tap water	69.7	[66.3-72.9]	477.2	581.6	284.8	684.7	585.9	529.7
BRSA	41.1	[37.5-44.8]	110.5	247.7	0.0	268.9	326.8	181.4
Fruit and vegetable juices	50.3	[47.0-53.7]	63.9	99.5	0.9	127.0	108.1	104.0
Alcoholic drinks	56.4	[52.9-59.8]	128.4	247.5	28.9	227.5	293.3	143.9
Hot drinks	95.2	[93.7-96.4]	485.9	360.7	439.4	510.4	352.3	459.5
Soups and broths	35.7	[33.0-38.4]	100.0	176.0	0.0	280.5	190.3	245.3
Meat-based dishes	19.5	[16.9-22.4]	14.4	37.8	0.0	74.1	54.2	64.3
Fish-based dishes	13.7	[11.7-16.0]	9.3	32.7	0.0	67.9	62.1	48.6
Vegetable-based dishes	24.8	[22.5-27.3]	25.5	58.4	0.0	102.8	76.3	85.7
Dishes made from potatoes, cereals or legumes	46.2	[42.9-49.5]	47.2	72.5	0.0	102.2	76.0	85.7
Sandwiches, pizzas, pies, pastries and crackers	59.7	[56.5-62.7]	60.8	87.3	17.9	101.8	92.7	75.7
Condiments, herbs, spices and sauces	92.8	[91.1-94.2]	24.8	29.9	15.2	26.7	30.2	17.1
Substitutes* for animal products made from soya and other plants	4.1	[3.2-5.2]	4.2	30.4	0.0	103.1	111.5	71.0
Prepared dishes and children's desserts	0.4	[0.2-0.9]	0.5	8.4	0.0	120.2	70.7	130.0
<b>TOTAL RATION</b>			<b>2,941.6</b>	<b>913.0</b>	<b>2,864.9</b>			

<sup>1</sup>The consumer rates are calculated on the basis of 2 or 3 days of reminders available for each of the individual

\* Substitutes in terms of food use and behaviour and not in terms of nutritional equivalence

Source: INCA3 study (2014-2015), Anses processing

Source: INCA 3: <https://www.anses.fr/fr/system/files/NUT2014SA0234Ra.pdf>

**Table 14 – List of ingredients and quantities**

Category	Food	INCA 3 (extrapolated from INCA2 data) in g/	Flexitarian, in g/d
Alcoholic drinks	Wine	83,3	50
Alcoholic drinks	Beer	30,6	20
Alcoholic drinks	Tequila	6,4	2
Alcoholic drinks	Cider	4,2	3
Alcoholic drinks	Cocktail	3,9	0
Non-alcoholic drinks	Coffee	345,3	100
Non-alcoholic drinks	Tea	161,1	80
Non-alcoholic drinks	Cola	55	8
Non-alcoholic drinks	Soft drinks	26,5	5,2
Non-alcoholic drinks	Hot chocolate	8,5	3,3
Water	Tap water	451,1	714,5
Water	Bottled water	450,9	101,5
Fruit and fruit products	Apple	48,7	50
Fruit and fruit products	Banana	13,6	10,1
Fruit and fruit products	Mandarin	11,5	11
Fruit and fruit products	Compote	11,4	5
Fruit and fruit products	Pear	10,2	12
Fruit and fruit products	Peach	10	13,6
Fruit and fruit products	Jam	9,9	4
Fruit and fruit products	Orange	9,2	7
Fruit and fruit products	Grapes	7,8	7
Fruit and fruit products	Kiwi	6,2	7
Fruit and fruit products	Strawberry	5	6
Vegetables and vegetable products	Tomato	29,1	30
Vegetables and vegetable products	Green beans	5,3	12
Vegetables and vegetable products	Carrot	19,03	35
Vegetables and vegetable products	Lettuce	12,6	18
Vegetables and vegetable products	Onion	9,14	11,8
Vegetables and vegetable products	Melon	7,4	9,6
Vegetables and vegetable products	Leek	6,8	12,5
Vegetables and vegetable products	Garden peas	1,9	25
Vegetables and vegetable products	Vegetables	6,7	
Vegetables and vegetable products	Cauliflower	6,6	10
Vegetables and vegetable products	Courgette	6,5	10
Vegetables and vegetable products	Mushroom	5,9	15
Vegetables and vegetable products	Endive	5,1	6,6
Vegetables and vegetable products	Cucumber	4,4	8,2
Vegetables and vegetable products	Spinach	4,2	8
Vegetables and vegetable products	Broccoli	3,5	25
Vegetables and vegetable products	Pepper	3,5	4,5
Vegetables and vegetable products	White cabbage	0,0	12
Vegetables and vegetable products	Beetroot	0,0	10
Cereals and cereal products	White bread	71	50
Cereals and cereal products	Rice	18,6	45
Cereals and cereal products	Patisserie/Cake	16,3	10
Cereals and cereal products	Dry pasta	15,6	20
Cereals and cereal products	Wholemeal bread	11,5	45
Cereals and cereal products	Fruit tart	9,6	3
Cereals and cereal products	Biscuit	6,9	5
Cereals and cereal products	Couscous	5,2	7,2
Cereals and cereal products	Flour	5,1	7
Cereals and cereal products	Brioche	4,8	4
Cereals and cereal products	Pancake	3,8	1

Cereals and cereal products	Hamburger roll	3,6	1
Cereals and cereal products	White sandwich loaf	3,3	2
Cereals and cereal products	Chocolate cake	2,9	2
Cereals and cereal products	Flan	2,8	2
Cereals and cereal products	Croissant	2,6	2
Cereals and cereal products	Corn flakes	0	4
Cereals and cereal products	Multigrain bread	0	30
Cereals and cereal products	Cracotte	0	2
Cereals and cereal products	Other bread	0	8
Cereals and cereal products	Product from bread	0	0
Legumes, nuts and oilseeds	Lentils	1,5	30,0
Legumes, nuts and oilseeds	Beans	1,1	25,0
Legumes, nuts and oilseeds	Mungo beans	0,7	2,6
Legumes, nuts and oilseeds	Peanuts	0,2	2,2
Legumes, nuts and oilseeds	Chestnuts	0,1	0,5
Legumes, nuts and oilseeds	Chickpeas	0,1	25,0
Legumes, nuts and oilseeds	Split peas	0	35,0
Legumes, nuts and oilseeds	Nuts	0	2,5
Starchy root vegetables and tubers	Potatoes	30,3	38,0
Starchy root vegetables and tubers	Mash potato	8,3	8,9
Starchy root vegetables and tubers	French fries	7,2	7,7
Meat substitutes	Vegetarian burger	3,9	40,0
Meat substitutes	Vegetarian sausage	0,3	0,0
Dairy product substitutes	Vegetable milk	0	10,0
Dairy product substitutes	Vegetable yoghurt	0	10,0
Wild-caught fish	Fish meat	8,1	1,5
Wild-caught fish	Salmon	5,0	1,5
Wild-caught fish	Tuna	3,5	1,0
Wild-caught fish	Cod	2,9	1,0
Wild-caught fish	Cod liver	0	5,5
Wild-caught fish	Herring	0	0,5
Wild-caught fish	Mackerel	0	1,0
Wild-caught fish	Shrimp	0	0,2
Farmed fish	Fish meat	7,2	6,3
Farmed fish	Molluscs	0	7
Eggs and egg products	Egg	12,6	15,0
Beef and veal	Beef	30,2	19,0
Beef and veal	Veal	3,6	2,5
Pork	Pork	10,9	6,0
Pork	Pork liver		1,0
Lamb	Lamb	4,2	3,0
Other meats	Other meats	0,2	0,0
Other meats	Rabbit	0,1	0,1
Other meats	Horsemeat	0,0	0,0
Poultry	Chicken	19,3	10,0
Poultry	Turkey	7,6	3,0
Processed meat	Pork ham	13,8	4,0
Processed meat	Sausage	8,2	5,0
Processed meat	Terrine	2,8	1,8
Processed meat	Salami	2,5	1,6
Fresh dairy products	Milk	84,2	60,0
Fresh dairy products	Natural yoghurt	45,5	20,0
Fresh dairy products	Fruit yoghurt	22,3	10,0
Fresh dairy products	Fermented dairy products		0,0
Cheese	White cheese	8,5	8,0
Cheese	Camembert	4,8	5,0
Cheese	Cheese	3,3	3,0

Cheese	Gruyere	2,3	3,0
Cheese	Goat's cheese log	1,9	0,7
Cheese	Emmental	1,8	2,0
Cheese	Cheese spread	1,1	0,4
Cheese	Coulommiers	1,0	0,4
Cheese	White cheese with fruit	0,9	
Cheese	Roquefort	0,8	0,7
Cheese	Raclette cheese	0,8	0,7
Cheese	Comte	0,7	0,7
Cheese	Mozzarella	0,7	0,7
Cheese	Tomme de Savoie	0,6	0,2
Cheese	Brie	0,5	0,2
Cheese	Cheddar	0,4	0,2
Cheese	Bleu d'Auvergne	0,4	0,2
Cheese	Reblochon	0,4	0,1
Fats and oils	Butter	7,7	8,0
Fats and oils	Olive oil	3,6	6,0
Fats and oils	Margarine	2,1	2,0
Fats and oils	Vegetable oil	1,7	2,0
Fats and oils	Sunflower oil	1,4	1,0
Fats and oils	Rapeseed oil		8,0
Sugar and confectionery	Treacle	13,7	4,0
Sugar and confectionery	White sugar	11,7	6,0
Sugar and confectionery	Milk chocolate	2,8	1,9
Sugar and confectionery	Dark chocolate		0,0
Fruit and vegetable juices	Orange juice concentrate	33,1	3,0
Fruit and vegetable juices	Orange juice	10,9	5,0
Fruit and vegetable juices	Multi-fruit juice	7,2	0,0
Fruit and vegetable juices	Fruit juice concentrate	7,1	0,0
Fruit and vegetable juices	Fruit juice	5,6	5,0
Herbs, spices and condiments	Light salad dressing	16,2	2,0
Herbs, spices and condiments	Béchamel	4,9	0,0
Herbs, spices and condiments	Mayonnaise	3,7	2,0
Herbs, spices and condiments	Ketchup		2,0
Herbs, spices and condiments	Curry sauce		4,0
Compound foods	Soup	100,0	60,0
Compound foods	Meat-based dish	14,4	0,0
Compound foods	Fish-based dish	9,3	0,0
Compound foods	Vegetable-based dish	25,5	15,0
Compound foods	Dish based on potatoes, cereals, legumes	47,2	15,0
Compound foods	Sandwich	30,4	10,0
Compound foods	Pizza	30,4	10,0
Compound foods	Fried egg		0,0
Snacks, desserts and other foods	Crème dessert	40,8	10,0
Snacks, desserts and other foods	Cake	14,4	2,0
Snacks, desserts and other foods	Ice cream (milk)	13,3	2,0
Snacks, desserts and other foods	Sorbet	11,5	2,0
Snacks, desserts and other foods	Crisps		2,0
		2 941.3	2 375



**Table 15 –INCA 3 data for the extrapolation to a family basket (2 adults, 1 child under 10 years of age and one adolescent)**

INCA3 category	INCA3 adults (g)	INCA3 child (g)	INCA3 Ado (g)	Family (g)
Meat (excluding poultry)	47.3	23.6	38.7	156.9
Offal	2.7	0.4	0.6	6.4
Soups and broths	100	33	38.2	271.2
Meat-based dishes	14.4	10.8	13.3	52.9
Fish-based dishes	9.3	4.1	5.9	28.6
Vegetable-based dishes	25.5	18.7	18.6	88.3
Dishes made from potatoes, cereals or legumes	47.2	40	55.9	190.3
Sandwiches, pizzas, pies, pastries and crackers	60.8	29	72	222.6
Meat (excluding poultry)	47.3	23.6	38.7	156.9
Meat (excluding poultry)	47.3	23.6	38.7	156.9
Offal	2.7	0.4	0.6	6.4
Alcoholic drinks	128.4	0.1	4	260.9
BRSA	110.5	85	154.7	460.7
Hot drinks	485.9	105	119.3	1196.1
Refined bread and crisp bread	108.1	38.5	69.4	324.1
Wholemeal or semi-wholemeal bread and crisp bread	6.3	1.7	3.6	17.9
Breakfast cereals and cereal bars	4.8	7.7	14.8	32.1
Pasta, rice, wheat and other refined cereals	62.7	48.8	91.8	266
Pasta, rice, wheat and other wholemeal or semi-wholemeal cereals	1.6	1	1.7	5.9
Bottled water	424.8	192.2	206.2	1248
Tap water	477.2	265	447	1666.4
Cheese	30.9	14.9	17.4	94.1
Fresh and dry fruits	129.9	68.2	73.2	401.2
Compotes and fruit in syrup	13.6	47.5	17	91.7
Condiments, herbs, spices and sauces	24.8	12.6	25.3	87.5
Fruit and vegetable juices	63.9	73.3	104.1	305.2
Vegetables	130.7	57.5	78.5	397.4
Legumes	7.7	3.8	4.1	23.3
Nuts, grains and oleaginous fruits	3.1	0.6	0.8	7.6
Animal fats	9	5.1	4.8	27.9
Vegetable oils	7.5	3.3	4.7	23
Eggs and egg-based dishes	12.6	7.5	11.3	44
Fish	23	13.3	17.1	76.4
Crustaceans and molluscs	3.7	1.3	0.9	9.6
Meat (excluding poultry)	47.3	23.6	38.7	156.9
Offal	2.7	0.4	0.6	6.4
Milk	75.3	193.9	135.1	479.6
Yoghurts and white cheeses	76.7	90.5	77	320.9
Potatoes and other tubers	45.8	23.4	43.3	158.3
Buns, pastries, cakes and sweet biscuits	57	61.3	72.4	247.7
Desserts and crèmes desserts	17.2	24.9	21.1	80.4
Ice cream, frozen desserts and sorbets	5.3	6.9	7.5	25
Prepared dishes and children's desserts	0.5	20.9	0.1	22
Substitutes* for animal products made from soya and other plants	4.2	3.6	1.7	13.7
Confectionery and chocolate	8.6	12.2	18.4	47.8
Sugar and sweeteners	19.5	5.5	6.9	51.4
Prepared meat/delicatessen products	27.3	17.6	20.4	92.6
Meat (excluding poultry)	47.3	23.6	38.7	156.9
Offal	2.7	0.4	0.6	6.4
Poultry	26	14.2	30.7	96.9

## ANNEX 2: Prices used in the cost analysis

Note: Own brand prices collected in large retailers (in €/kg). The prices are neither hard discount prices nor brand prices.

**Table 16– Table of prices collected for each food product, market and labelled.**

Food	Conventional price (€/kg)	Organic, Red Label (chicken), MSC (fish) price (€/kg)
Wine	6.21	6.52
Beer	2.03	4.09
Tequila	21.04	27.35
Cider	3.60	3.01
Cocktail	8.17	10.62
Coffee	0.52	0.65
Tea	1.44	1.87
Cola	0.46	1.49
Soft drink	0.88	1.01
Hot chocolate	2.51	3.99
Tap water	0.00	0.00
Bottled water	0.30	0.00
Apple	2.89	3.99
Banana	1.99	3.49
Mandarin	6.98	7.98
Compote	1.80	2.77
Pear	3.99	5.99
Peach	3.19	4.15
Jam	2.88	6.08
Orange	2.50	5.99
Grapes	7.98	7.98
Kiwi	7.65	10.29
Strawberry	5.98	7.77
Tomato	3.49	4.49
Carrot	1.49	2.69
Lettuce	6.76	5.96
Onion	0.80	3.29
Melon	3.74	4.11
Pear	2.99	6.60
Vegetables	2.99	4.95
Cauliflower	2.46	3.33
Courgette	4.99	6.99
Mushroom	6.98	17.96
Endive	4.39	13.98
Cucumber	5.00	12.45
Spinach	15.98	19.12
Broccoli	5.99	7.98
Pepper	4.39	7.99
White cabbage	2.49	5.54
Beetroot	3.96	3.90
White bread	3.46	4.40
Rice	2.78	2.98
Patisserie/Cake	3.47	12.32
Dry pasta	1.60	1.74
Wholemeal bread	1.89	4.51
Fruit tart	13.64	17.73

Biscuit	4.17	8.02
Couscous	1.49	2.88
Flour	0.62	1.35
Brioche	3.20	9.12
Pancake	6.97	13.67
Hamburger roll	3.85	11.96
White sandwich loaf	1.60	3.14
Chocolate cake	9.02	14.60
Flan	2.15	5.24
Croissant	5.02	6.53
Corn flakes	5.20	4.80
Multigrain bread	4.50	4.67
Cracotte	2.50	6.43
Other bread	1.89	4.51
Product from bread	1.89	4.51
Green beans	1.75	2.05
Garden peas	2.36	5.63
Lentils	2.04	3.25
Beans	1.86	3.35
Mungo beans	6.98	12.29
Peanuts	6.07	26.00
Chestnuts	12.38	16.05
Chickpeas	2.42	3.22
Split peas	3.98	4.38
Nuts	9.58	9.36
Potatoes	2.00	3.99
Mash potato	2.32	8.88
French fries	1.13	3.30
Vegetarian burger	11.95	14.55
Vegetarian sausage	14.30	14.30
Vegetable milk	1.75	1.83
Vegetable yoghurt	3.00	4.36
Fish meat (wild fish)	15.66	20.78
Salmon	24.89	21.25
Tuna	15.00	26.52
Cod	17.47	17.47
Cod liver	16.60	26.20
Herring	10.25	17.45
Mackerel	8.30	11.83
Shrimp	17.14	24.75
Fish meat (farm fish)	19.00	-
Molluscs	17.14	24.75
Egg	3.79	5.69
Beef	29.55	40.88
Veal	25.81	0.00
Pork	15.31	29.25
Pork liver	6.95	0.00
Lamb	22.71	0.00
Other meats	10.60	27.33
Rabbit	27.25	0.00
Horsemeat	10.60	0.00
Chicken	7.75	7.75
Turkey	14.33	19.68
Pork ham	13.71	35.00
Sausage	9.83	15.11
Terrine	8.00	30.36

Salami	14.00	21.25
Milk	1.06	1.12
Natural yoghurt	1.17	1.60
Fruit yoghurt	1.48	2.44
Fermented dairy products	1.17	1.60
White cheese	1.87	3.88
Camembert	5.80	9.20
Cheese	5.80	9.20
Gruyere	8.05	12.60
Goat's cheese log	9.00	17.53
Emmental	8.84	17.00
Cheese spread	7.00	15.75
Coulommiers	5.26	10.69
White cheese with fruit	1.48	2.44
Roquefort	14.07	17.08
Raclette cheese	12.00	21.96
Comte	12.60	21.95
Mozzarella	7.68	9.92
Tomme de Savoie	13.20	0.00
Brie	7.15	12.50
Cheddar	5.60	24.70
Bleu d'Auvergne	10.48	24.40
Reblochon	12.24	29.58
Butter	6.72	9.68
Olive oil	6.20	6.56
Margarine	3.64	9.59
Vegetable oil	2.67	5.07
Sunflower oil	1.96	3.81
Rapeseed oil	2.00	3.41
Treacle	8.16	12.56
White sugar	0.83	3.83
Milk chocolate	6.27	20.10
Dark chocolate	4.27	8.55
Orange juice concentrate	0.99	2.34
Orange juice	1.35	2.18
Multi-fruit juice	1.65	3.08
Fruit juice concentrate	0.99	2.34
Fruit juice	1.65	3.08
Light salad dressing	2.14	7.10
Béchamel	4.50	-
Mayonnaise	4.23	7.82
Ketchup	2.43	7.48
Curry sauce	3.91	0.00
Soup	1.13	2.71
Meat-based dish	7.63	-
Fish-based dish	8.63	16.45
Vegetable-based dish	8.51	10.25
Dish based on potatoes, cereals, legumes	8.43	14.95
Sandwich	8.07	22.96
Pizza	5.09	9.23
Fried egg	3.79	5.69
Crème dessert	3.12	6.64
Cake	6.60	15.76
Ice cream (milk)	4.30	7.56
Sorbet	5.92	15.36
Crisps	4.73	19.76

## ANNEX 3: Nutritional quality

Table 17: Coverage of nutritional needs for macronutrients and certain micronutrients in the Flexitarian plate

	INCA 3 plate	Flexitarian Plate	Flexitarian / INCA3	% de PRI* provided by the Flexitarian plate	PRI (% TEI** of the flexitarian plate)
Calories (kcal)	2 153	<b>2 100</b>	-2%		2 100-2600
Proteins (g)	76	<b>82</b>	8%		10-20% AET (52g-105g)
Including vegetable proteins (g)	20	<b>50</b>	155%		–
Vegetable oils (g)	83	<b>75</b>	-9%		35-40% AET (82 g -93g)
Saturated fat (g)	31	<b>21</b>	-33%	<b>-25%</b>	≤12% AET (≤ 28 g)
Carbohydrates (g)	243	<b>246</b>	1%		40-55% AET (210 g -288g)
Sugars (g)	93	<b>52</b>	-44%	<b>-1%</b>	< 10% AET (<52,5 g)
Salt (g)	6	<b>4</b>	-28%	<b>-41%</b>	< 7,3
Fibres (g)	16	<b>34</b>	113%	<b>14%</b>	30
Calcium (mg)	804	<b>721</b>	-10%		670 – 1000***
Iron (mg)	8,5	<b>14</b>	60%	<b>27%</b>	11
B12 (µg)	4,2	<b>4</b>	-5%	<b>67%</b>	2,4****
Zinc (mg)	8,2	<b>10,5</b>	28%	<b>13%</b>	9,3*****
Vitamin D (µg)	3,4	<b>5</b>	45%	<b>0%</b>	5,0
Vitamin A (µg)	701,7	<b>712</b>	1%	<b>2%</b>	700,0
Linoleic acid / α-linolénic acid	9,0	<b>4,2</b>	-53%		<5

\*Nutritional benchmark recommendation for the population (PRI - Population Reference Intake): daily intake that covers the needs of 97.5% of the population (average nutritional need to which we add 2 standard deviations). The PRIs mentioned in this table are averages of the PRIs for men and women (*Rapport d'expertise collective de l'ANSES, 2016*).

\*\* Total energy intake (TEI): This “energy intake” enables us to estimate the energy intake (kcal) for an adult over a day.

\*\*\* Under the WHO recommendations, an animal protein intake lower than 40g/day would induce a reduction of the Calcium's PRI. Thus, for the flexitarian diet, we can consider a PRI in calcium between 670 and 1000 mg/day.

\*\*\*\* The value is based on Afssa (2001) and OMS (2004)

\*\*\*\*\* In view of the significant proportion of legumes in the flexitarian diet, the average thresholds for phytate levels (600 mg/d) were retained in order to establish the PRI in zinc.

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