Science for policy

RÉPUBLIQUE FRANÇAISE
*Liberté*
*Égalité*
*Fraternité*

INRAE

# INRAE for healthy, sustainable school meals

March 2025

# In this dossier

**prepared by Roxane Jupin, Sylvaine Poret et Gisèle Parfait (DAPP), Sophie Nicklaus (Deputy Scientific Director, Food and Bioeconomy), et Véronique Coxam (Human Nutrition Division)**



## Acknowledgements

**We would like to thank all those who contributed to this project:**

Sylvie Avallone, Lionel Bretillon, Véronique Coxam, Nicolas Darcel, Nicole Darmon, Olga Davidenko, Anthony Fardet, Hugues Fortuna, Erwan de Gavelle, Jean-François Huneau, Lucile Marty, Marlène Perignon, Sophie Nicklaus, Claire Planchat, Emmanuel Raynaud et Esther Sanz Sanz.

Collection Science for policy
Dir. of publication: Marion Bardy
Dir. of collection: Gisèle Parfait
Conception:
Roxane Jupin, Sylvaine Poret, Gisèle Parfait
Photos and figures : Françoise Peyriguer
English translation : Lucy Lyall Grant
Design and layout:
EliLoCom - www.elilocom.fr, Roxane Jupin
Printing: Groupe Exprim
March 2025

Cover photo : ©AdobeStock, Robert Kneschke
Photo p2 : ©AdobeStock, Tobias
Photos p5 : ©Claude Almodovar, p9 : ©Clara Papon

From nutrition to food behavior in school catering, INRAE supports public policies to promote sustainable food.

March 2025

# INRAE for healthy, sustainable school meals

*In France today, the stakes involved in school catering involve more than just supplying meals. In addition to the educational issue to encourage future adults to establish healthy eating habits are public health, food security, and ecological issues. It is now a priority to introduce organic and sustainable, quality produce into canteens. INRAE nutritionists, sociologists, agronomists and economists are helping to design, implement and assess public policies in this tightly regulated sector.*

In France today, over 8.5 million young people aged between 3 and 17 attend school canteens, usually 4 or 5 times per week. School catering is therefore an essential driver to respond to the challenges of food security, public health (obesity, cardio-vascular disease, diabetes, etc.) and, more recently, the environment and local development. In point of fact, food lies at the crossroads of health, nutritional, social, economic, environmental and regional issues both in France and globally. In France, many regulations and public policies have provided a framework for school catering. Drawing on over 50 years of scientific research into food, agronomy and the environment, INRAE scientists have been providing support to those involved in school catering public policy for nearly twenty years. This support has been strengthened with the EGalim Law of 2018 and the 2021 Climate and Resilience Law, which promote healthy and sustainable food in canteens.

This case file presents a series of studies, research-action and expert assessments carried out at INRAE in relation to school catering, from the nutritional components of meals to links with short distribution channels and organic farming. They offer guidance to the stakeholders involved and guide public action, from the design of public policies through to their assessment and implementation.

## FROM RESEARCH TO EXPERTISE, TRAINING, AND AWARENESS RAISING

INRAE scientists, nutritionists, agronomists, sociologists and economists participate as experts in the field of school catering. They are represented on various bodies, such as the Conseil National de l'Alimentation, the Conseil National de la Restauration Collective, and the "Vegetarian" working group of the Comité d'Experts Spécialisé "Nutrition humaine" at Anses. They are also present at international level in the Global School Meals Coalition, the International Research Consortium, and the French research network RESCO. At local level, scientists are invited by regional councils or municipalities to train chefs in how to meet the objectives of healthy, sustainable, quality food.

**Sophie Nicklaus**
Deputy Scientific Director, Food and Bioeconomy, INRAE

As a behavioral science researcher, I represent INRAE at the Conseil National de la Restauration Collective (National Council for Institutional Catering). Set up by the Ministry of Agriculture and Food, this committee looks at school catering via the procurement of sustainable or quality produce, the nutritional quality of meals and also food education by monitoring the application of regulations or by suggesting developments. The quality of the school catering offer can have an impact on children's health, but it varies greatly from one canteen to another. Our studies prove that respecting regulations guarantees children's recommended nutritional intake and represents a lever to improve the environmental footprint of school meals. This is a major issue covered in the EGalim Law by the introduction of vegetarian dishes and organic food in canteens. Our research accompanies the State in implementing regulations, and supports actions to promote children's food education.

### SUSTAINABILITY AT THE HEART OF TODAY'S SCHOOL MEALS

From the glasses of milk served in canteens to combat malnutrition and alcoholism in the 1950s to food considered 'healthy and sustainable' in 2018, public policy relating to school catering has evolved. Today's sustainable school meals aim to guarantee food and nutritional security for young people, promote a healthy lifestyle, and help protect biodiversity and ecosystems. They also aim to be culturally acceptable and economically equitable and accessible, while optimizing natural and human resources. Sustainable food comes under the scope of a food system founded on a network of regional collaborations integrating the production, supply, processing, distribution and consumption of food products, as well as the management of food waste. In this sense, it represents a lever for transforming food systems. Canteens are also places where changes in behavior and habits can be initiated to prepare future generations for the necessary transitions in the face of climate crises.

## Guaranteeing the nutritional quality of school meals

Since it began, the aim of school catering has been to cover the physiological and nutritional needs of children to enable them to continue their education in the right conditions. Menus are therefore devised following the recommendations of nutritional experts, and this has been compulsory since 2011. The 2018 EGalim Law added environmental objectives, promoting the transition towards a more sustainable system. Since the 2000s, INRAE researchers have been working with the State and its agents to adapt to and assess these developments.

### SCHOOL CATERING IN FRANCE: FROM RECOMMENDATIONS TO REGULATION

The goal of the first school canteen established in France in Lannion in 1844 was to offer a hot meal to the children most in need. This charitable initiative for the most underprivileged was expanded locally in the 19th century, often with mediocre reception and hygiene conditions.

The Ferry Laws of the 1880s making education compulsory and free led to school meals becoming widespread. The menus served to children began to be regulated by the Pupil Memorandum drawn up by the Ministry of Education and focusing on the fight against malnutrition. Gradually, school catering came under the aegis of the Ministry of Agriculture, in line with the development of food policies geared towards promoting local, quality agriculture.

It was not until 1999 that these recommendations were revised by the 'Permanent Market Research Group for Foods (GPEM-DA), and included in the 2001 French Nutrition and Health Plan (PNNS) on a voluntary basis. In 2007, the 'Market Research Group for Institutional Catering and Nutrition' (GEM-RCN), which replaced

#### School canteens: relatively low attendance despite pricing efforts

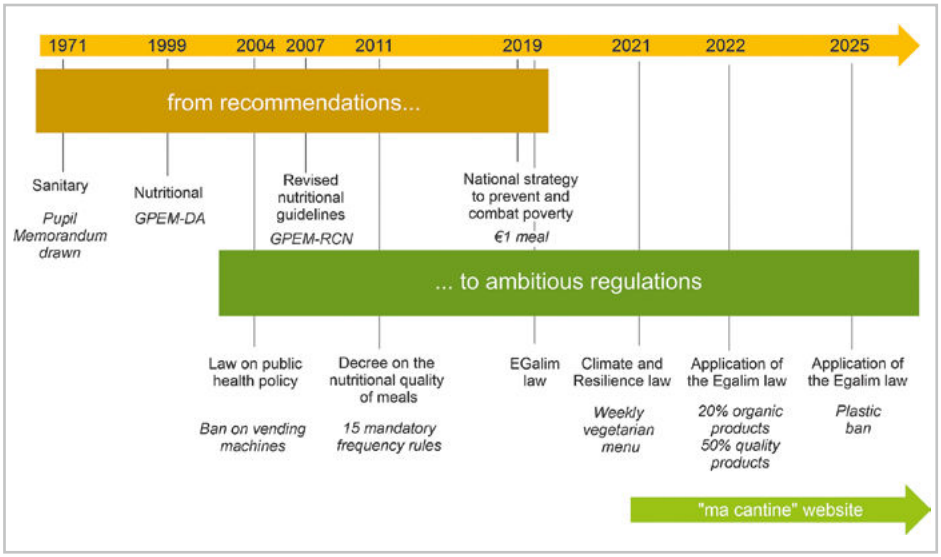
School catering is a form of institutional catering. It stands apart from commercial catering because of its social dimension aiming to offer meals to diners from a specific community (young people, patients, employees, etc.) at a modest price. Accordingly, over 75% of municipalities with more than 10,000 inhabitants employ a social tariff based on family income. Smaller municipalities opt for a single tariff, mostly between €1 and €5. University canteens offer meals for between €3.30 and €1 for scholarship students or those in precarious circumstances (over 54% of meals served).

However, on average, 40% of junior high school students from underprivileged families do not attend the canteen, compared with 22% of students from well-off families and 17% of very well-off families (Cnesco 2017).

the GPEM-DA, stipulated the frequency of 15 dishes or foods in a series of 20 successive meals, i.e. approximately 1 month, as well as the weight of their components. Maximum and minimum frequencies were specified for certain foods.

In 2010, the Directorate General for Health asked INRAE to assess the impact of applying these recommendations on the cost of raw materials for school meals. Cost, often cited to justify the non-application of recommendations, had, until then, never been assessed. The analysis, conducted using 2,500 meal data sheets, showed firstly that compliance with the GEM-RCN recommendations was very low, with no direct link to a 'cost' factor, and secondly that compliance with the recommendations did not increase the cost of meals. In fact, the extra cost of following the recommended frequency of eating more fruit and vegetables was offset by respecting the lower weight of meat portions.

In 2011, as a result of this study, the Order and Decree N°. 2011-1227 of 30 September 2011 'relating to the nutritional quality of meals served in school catering' enshrined in law obligations in terms of nutrition, frequency of dishes served and portion sizes. INRAE researchers demonstrated that these principles, applied in elementary school canteens, covered on average 36% of children's daily energy requirements and 50% of their essential nutrient requirements.




Source : Adapté de la thèse de Romane Poinsot, 2021

School catering is a field successively regulated by the Ministries of Education, Economy, Health and Agriculture-Food. The latter also includes an environmental dimension.

**Nicole Darmon**
Honorary Director of Research,
UMR MoISA, INRAE

At the request of the DGS (Health Department), I applied my research in nutrition and public health to school catering. In connection with the first PNNS (French Nutrition and Health Plan), I took part in revising the 2007 GEM-RCN recommendations for nutrition in school catering. These took the form of maximum or minimum serving frequencies for around fifteen types of dish in a series of 20 successive meals. In 2010, I assessed the impact of the new GEM-RCN recommendations on the cost of meals' raw materials, particularly with regard to the increased frequency of serving fruit and vegetables. This assessment showed that respecting these recommendations did not lead to extra costs, which facilitated the adoption of the decision and the decree that made them compulsory in school canteens. More recently, we've demonstrated and quantified the dual nutritional and environmental advantages of vegetarian meals, confirming the significance of making their weekly serving compulsory in schools as stipulated in the EGalim and Climate and Resilience Laws. School catering in France is exceptional in the world, focused as it is on balance and diversity, two key words for good nutrition at every stage of life.

### Composition of menus based on the 2007 Market Research Group for Institutional Catering and Nutrition (GEM-RCN) recommendations

According to GPEM-RCN's recommendations, a balanced menu is based on:

- 'starter': uncooked or cooked vegetable salad, cold meats, etc.;
- 'protein dish': meat, fish, eggs and foods containing them;
- 'side dish': cooked vegetables, carbohydrates and grain products;
- 'dairy produce or cheese': milk, fresh dairy produce, cheese;
- 'dessert': whole uncooked fruit or fruit salad, cooked fruit, pastries, ice-cream, milk-based dessert, etc.

Bread is served with every meal and water is the only beverage accepted in school catering.

An INRAE study based on menus served 7 years later in elementary schools in around one hundred municipalities on the outskirts of Paris showed that nutritional recommendations are only partially followed. The canteens managed directly by the municipality rather than by delegation are more compliant with criteria, as are larger municipalities. The complexity of nutritional recommendations and the lack of knowledge and human resources are holding back the application of these recommendations.

## NUTRITION AND THE 'VEGETARIANIZATION' OF MENUS: RESPONDING TO NEW PUBLIC POLICIES

In 2019, in compliance with the EGalim Law, an experiment was conducted over two years in canteens that then had to serve at least one vegetarian menu per week. The objective was to test the acceptability of these menus, assess their effect on waste, diversify proteins, and reduce the cost and environmental impact of food – a measure in line with France's Nutrition and Health Plan 4 and National Program for Food 3. These programs recommend rebalancing the plant-based protein/animal-based protein ratio in our diet, and increasing plant-based proteins in institutional catering. This new provision raises the question of the nutritional balance of vegetarian dishes.

Since 2018, several research and expertise projects have been funded to assess the impact of the vegetarianization of menus on their nutritional quality.

While it was shown in 2010 that compliance with the GEM-RCN recommendations guarantees children's correct nutritional intake, it was important to ensure that the widespread introduction of meat- and fish-free meals did not compromise the nutritional quality of the meal. It was necessary to specify what a 'vegetarian' dish consists of, its composition and the frequency of serving it required to guarantee this intake. These conditions were the subject of a study at INRAE. Thus, in partnership with the multi-actor collective Enscol[1], the nutritional quality of vegetarian dishes served in school canteens was assessed, taking into account their content in animal-based produce (dairy produce, eggs). The optimal frequency to reduce the environmental impact of vegetarian menus was also calculated. It was established that, over a series of 20 meals, the best compromise to reduce environmental impacts while maintaining a high nutritional standard was 12 vegetarian meals, 4 fish-based meals and 4 meat-based meals.

At the same time, the Directorate General for Health and the Directorate General for Food commissioned ANSES (the French agency for food, environmental and occupational health and safety) to provide two scientific opinions: one on the impact of vegetarian menus on the nutritional intake of elementary school children, and the other on the recommended weekly frequency (maximum or minimum) of vegetarian dishes. The working group used a study by the UMR PNCA[2] (AgroParisTech-INRAE) and several databases, including one on the nutritional composition and portion sizes of vegetarian and non-vegetarian dishes served in school canteens, produced by the Enscol collective. The group's conclusions indicated that, in the context of a satisfactory nutritional intake outside the canteen, increasing the number of vegetarian menus in the canteen does not alter the overall nutrient intake in relation to the nutritional references. In the context of this strong hypothesis on the average nutritional intake of a child living in mainland France, it is not relevant to propose a maximum frequency of such menus in the canteen.

In 2021, after the experiment had demonstrated good overall acceptance from the first year, the weekly vegetarian menu eventually became compulsory with the Climate and Resilience Law. A minimal frequency of one vegetarian menu per week was established, with no maximal frequency.

1. Enscol Collective: "Together, laying the foundations for a change in practices to ensure more sustainable school catering".

2. PNCA - Research Unit for Nutritional Physiology and Eating Behavior


### School catering management and organization methods

School catering services may be managed directly by the operator, or under a concession arrangement, i.e. delegated in whole or in part to a service provider via a public service delegation agreement or public procurement contract. Direct management by the municipality is the most common management method declared (AMF Survey 2024). Irrespective of the management method used, meals are prepared and served either on the same site, known as an 'on-site kitchen', or in a 'central kitchen' where the meals are prepared and then delivered to 'satellite kitchens' via either a hot or cold system.

INRAE scientists have been conducting research into the nutritional composition of foods since the 1970s. Their findings have guided public policies to diversify sources of protein.

## Three questions to
### Erwan de Gavelle

Head of the Food Policy Office,
Ministry of Agriculture and Food Sovereignty (MASA)

**School catering is an area in which a number of issues overlap: health, the environment, education, social equity and so on. How is it addressed at MASA?**

As part of the Directorate-General for Food, the Food Policy Office supports the transition to healthy, sustainable food for all. The National Food Program represents our general framework for action. It is broken down into 3 thematic areas: social justice, the fight against waste, and food education, as well as 2 cross-cutting areas: institutional catering, particularly in schools; and Regional Food Projects (PATs). These different areas are interconnected, as are the provisions of the EGalim Law, which, in addition to addressing institutional catering issues, focuses on fair remuneration for farmers. This orientation explains why MASA is leading this policy, but it is not doing so alone. Our office is working with a number of other ministries, for example the Ministry of Health, on the National Health and Nutrition Plan, the Ministry of the Environment on the fight against food waste, the Ministry of Solidarity on the '€1 canteen' scheme, and the Ministry of Education on initiatives to raise awareness of the importance of 'eating better' among children and on revising frames of reference for basic cookery training diplomas.

**How does MASA support public actors in the school catering sector?**

Since 2019, MASA has developed the 'ma cantine' platform. It informs institutional catering managers about the obligations of the EGalim Law, which was expanded on with the Climate and Resilience Law, and equips them to meet these obligations. At the Conseil National de la Restauration Collective (National Council for Institutional Catering), we identify the needs of players in the sector, for example in terms of vegetarian recipes and menus or guidance on public procurement in the institutional catering sector, and work together with the expertise of all stakeholders to develop tools to support them. Practical guides for public catering contracts have been drawn up to help the purchasers concerned achieve their legal objectives. Lastly, the platform is used to collect supply data to monitor efforts to reach targets, and to submit an annual report to Parliament. In 2024, 21% of the institutional catering sector declared their 2023 supplies online, i.e. twice as many as the previous year. Supply rates exceed 25% for sustainable and quality produce, including 12% for organic products. Efforts are therefore well underway and must continue.

**How does research guide MASA in the field of school catering?**

Research has been key in assessing the positive impact of the first decree on the nutritional quality of school meals, published in 2011. Recent research has also guided the updating of this decree, which is currently being finalized. On the issue of food waste, another key point of the EGalim Law, we lack a structured network in France, but we are working to create more links with research on this topic. Some of the data from 'ma cantine' is freely available for research purposes, and we're working to broaden the scope of accessible data so that it can be used by scientists to gain a better understanding of the obstacles and levers to the procurement of quality produce. We are also interested in the work of the international research consortium on health and nutrition in schools, which objectifies and promotes the French model internationally and provides information on best practices implemented in other countries. We are also interested in the progress being made by the Food Systems, Microbiome and Health (SAMS) Priority Research Program and Equipment (PEPR), which aims to identify the determinants of changes in eating behavior and the conditions under which they could contribute both to the prevention of health risks and encouraging a shift towards more sustainable food systems.

# From farm to fork: supply challenges

The purchasing power of public-sector institutional catering and its regional anchorage make it a lever for sustainable food production and consumption. The 'procurement' section of the EGalim Law, which came into force in 2022, sets a target of 50% quality and sustainable produce, including at least 20% organic produce, in institutional catering. These thresholds, adapted for French overseas departments and regions, aim to reduced $CO_2$ emissions.

**Emmanuel Raynaud**
Economist,
UMR SadApt, INRAE

**My research involves the governance of economic activities, particularly in the food industry. At the moment, I'm interested in the public procurement of food. I'm studying the organization of school canteens, the conditions for procuring sustainable produce and the public policy tools employed by institutions. Public institutional catering is one of the levers for changing behaviors in both supply and demand. However, we've observed that the application of the legislative framework still varies greatly from one local authority to another, for example when it comes to integrating 20% organic produce in the meals served. What are the reasons for these variations? What is the impact of respecting these regulations on local production and the local economy? Are public procurement contracts appropriate? These are just some of the questions whose answers will facilitate the implementation of this public policy.**

To achieve this, local short-circuit supply chains are needed, which represents a challenge for the availability and supply of products.

## LACK OF TRAINING: AN OBSTACLE FOR PROCURING ORGANIC PRODUCE

Several projects carried out by INRAE researchers have analyzed the obstacles and levers hampering or fostering the distribution of organically farmed produce. For elementary school canteens, the BIODET and 4ABIO[3] projects highlighted on the one hand, that metropolitan areas have more restrictive logistics than 'small' rural municipalities, and on the other hand, that the level of organic supply is boosted by the organization of canteens under direct management. However, farmers have found solutions to overcome the technical, human, logistical and financial constraints of supply. A survey carried out in fifteen or so municipalities in the Île-de-France region showed that the supply network itself is not the main obstacle. The main obstacle involves the lack of staff training in 1) making sustainable purchases via a complex public procurement system, with very detailed allotment of public contracts for purchases from small, local producers, and 2) cooking fresh, organic produce.

The ongoing TETRAE FAARC[4] project is researching the economic, agronomic, logistical and organizational obstacles faced by both the supply chain and institutional catering operators in general senior high schools in the Île-de-France region. The range of levers compatible with the public procurement code and the EGalim Law requirements is the subject of a thesis. What are the links between agricultural constraints, management methods, types of canteen procurement and the composition of the meals served? What are the obstacles to applying the EGalim Law with regard to organic and sustainable produce? The project is based on the AMF (mayors of France association) and AgroParisTech survey on catering and data from the macantine.fr site to analyze the EGalim Law's application with regard to sustainable procurement, integrating the diversity of institutions.

## PROCUREMENT AND SUSTAINABILITY: SPECIFIC CHALLENGES FOR OVERSEAS DEPARTMENTS

The fact that France's overseas departments are island locations poses certain problems. In Guadeloupe, for example, agricultural production destined for the domestic market does not cover demand, and particularly acute food-related public health problems (obesity, diabetes, hypertension) have been highlighted. The CALALOU project conducted by INRAE[5] sought to improve the nutritional quality of school meals by means of local agricultural production without increasing the environmental impacts. For the first time, the food-nutrition-agriculture-environment connection was precisely detailed. Here, nutrition is considered a lever to relocalize food in an island context. Scientists studied both 1) the possibility of increasing the supply of local produce in school canteens and 2) the possibility of relocalizing vegetable procurement.

The first section of the research demonstrated that the share of local produce can be doubled to reach 77% in menus, based on a dozen identified vegetables, whilst meeting nutritional challenges (GEM-RCN) and reducing environmental and economic costs. The results obtained by cross-referencing almost 2,000 recipe specification sheets with the Agribalyse Antilles environmental impact database enabled a series of more sustainable menus to be modeled.

3. The BIODET (2020-2022) and 4ABIO (2022-2024) projects were carried out by INRAE's UMR SADAPT, Agronomie and Sayfood.
4. The TETRAE FAARC (2022-2026) project is led by UMR SADAPT.
5. The Calalou project (2021-2024) was coordinated by UMR MoISA.

While the reterritorialization of school catering is, then, theoretically possible, what about local farms' real capacity to meet demand? The majority of farms are small and medium-sized, approximately 5 hectares. Using statistical analysis, scientists showed that 40% of local production of the 10 vegetables identified in the first part of the study covers Guadeloupe's student consumption. The main procurement obstacle is the structuring of the products' distribution and sales network – an obstacle that can be removed by organizing procurement by catchment area.


## Two questions to
### Hugues Fortuna

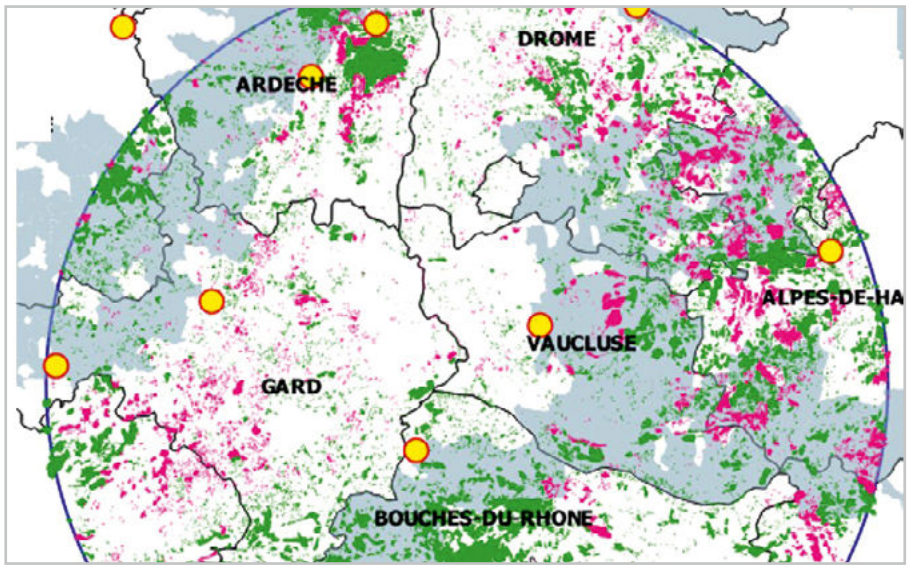
Director of the Municipal Catering Service, Avignon

**How does the city of Avignon put school catering into effect in the region?**

After many years in large private catering firms, I arrived in Avignon in 2013, where I was involved in ending public service delegation for its school catering. At the time, the new municipality wanted to bring the management method back in-house and support a policy of "eating better in the canteen". It was an inspiring challenge to link up school catering, the environment, and public health. Everything needed to be reimagined. Kitchen staff are essential when moving from merely putting products together to preparing them. The municipal dietician draws up the food plan, which the chefs transform into menus in the various canteens. Particular attention is paid to local sourcing and product quality. For example, 100% of the meat we serve is organic and reared some twenty kilometers from the kitchen. The Agrilocal platform helps put us in contact with short-circuit farmers/producers. Apprentice butchers from the Avignon training center then carve up the beef before it's served in the canteens. This creates a dynamic that enhances the local economic fabric. Today, over 70% (by weight) of our dishes is locally produced and of high quality. We're also working on low-carbon, plastic-free deliveries by bicycle, and are supporting employment by purchasing raw fruit and vegetables packaged by disabled workers.

**How does the city of Avignon make use of the research into school catering?**

The city of Avignon has been collaborating with the research since 2016, and even more so since it joined the European program Foodshift2030. This project supports innovative local procurement experiments in several cities with a view to making these actions widespread. The scientists carry out their research in our institutions and we submit concrete questions for them to investigate. For example, following a study by an economist, we opted to pool certain services with municipalities in the surrounding area. Sociologists and nutritionist made the connection between young people's significant consumption of processed and sugary products and their rejection of quality food offered in the canteen. The "canteen breakfast" project was tested to roll out the quality offer even further; the same goes for table service to combat waste, and the use of stainless steel food trays instead of plastic ones. By studying or co-constructing our actions, the scientists add weight to our choices. They validate and help us achieve the model we wish to develop. Avignon is a medium-sized city with limited financial resources, like many others in France that could draw inspiration from our experiments.



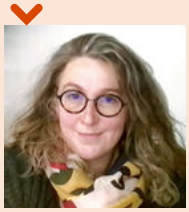

Source : Esther Sanz Sanz, Claude Napoléone, INRAE, 2024

Mapping a local authority's food catchment area to organize the relocation of its procurement in line with the local agricultural supply.

based on Ferrandaise beef offered in 12 canteens in the Clermont-Ferrand area. A satisfaction survey of more than 700 children revealed 72% positive results for the menu. The experiment also highlighted a shortage of butchers and delivery drivers, and enabled direct sales at fair prices to be developed with the Ferrandaise farmer-producers. In light of this success, support for canteen cooks has been put in place to roll out the 'Burgundy Menu' in local elementary schools.

A second experiment is underway for a 'vegetarian menu'. This menu will be devised using an analysis of the procurement strategies of local authorities and chefs in the region, which has a low level of vegetable farming.

These two experiments are causing a shift in the region's entire ecosystem: relocating food also means relocating processing. Processors and intermediaries can play a crucial role in food quality and sustainability by offering locally produced ingredients that differ are different depending on the season, and therefore more varied, in keeping with local farming and biodiversity.



**Claire Planchat**
Doctor in Social Geography, UMR Territoires, INRAE

**Anthony Fardet**
Doctor in Human Nutrition, UNH, INRAE

We set up the Plan'eat Kids Living Lab where we study the food behaviors of children aged between 6 and 15. This Living Lab brings together around 300 children and over 60 stakeholders: teachers, researchers, politicians, farmers, citizens, etc. Together, we're devising actions to nudge children towards healthier, more sustainable food behaviors by means of both their individual constraints and their food environment. For example, they are offered local, quality meat and a vegetarian menu. The role of the researcher in a Living Lab is above all that of observer, organizer and facilitator. Our holistic, iterative approach enables us to move forward together. We also design experiments and action protocols to remove obstacles and identify levers to implement the actions devised by the group. Professional players ask their questions, and we accompany them in their real-life situations. Concrete cases and theory are thus combined with regard to the food transition.

## SCHOOL CANTEEN, A SHOWCASE FOR LOCAL AGRICULTURE AND LIVESTOCK FARMING

How do environmental, socio-cultural and individual factors affect an individual's food choices? How can behaviors be changed? To answer these questions, the European project PLAN'EAT (2022-2026) has set up 9 Living Labs, and a Policy Lab based in Brussels. Each of the Living Labs studies the eating habits of specific population groups.

In France, the Plan'eat Kids[6] Living Lab, based in Auvergne, studies children aged between 6 and 15. Led by INRAE and in partnership with Grand Clermont's PAT and the Livradois Forez national park, it brings together a collective of 60 stakeholders and around 300 elementary and high school students. The collective is experimenting with the theme of 'eating less but better meat'. This approach is helping raise the profile of the Ferrandaise, a hardy local breed of cattle reared, in part, in the partner PAT. Since the commercialization of this breed had already been discussed at regional level, the Living Lab was an opportunity to test it by designing a 'Burgundy Menu'

6. Plan'eat Kids Living Lab is led by a nutritionist from UMR UNH and a social geographer from INRAE's UMR Territoires.

### Regional Food Projects (PATs), support initiatives for local procurement

Since the 1960s, food production, processing and consumption sites have progressively drifted apart. To meet the challenges of food systems' self-sufficiency and sustainability, regions have gradually begun to relocate their agri-food systems. Regional Food Projects (PATs), a tool for both this 'reterritorialization' and public policy, were launched in 2014. Since then, INRAE scientists have been supporting the emergence, implementation and assessment of these projects. For more information, please consult the case file on INRAE's work on PATs here: https://hal.inrae.fr/hal-04482463v1

### Ten years of Research-Action with the city of Avignon

A trust-based partnership between INRAE researchers (UR Ecodéveloppement, UMR MoISA) and Avignon council has been built up since 2016 through several research-action projects* relating to public institutional catering. A Living Lab has emerged from these initial collaborations, enabling the city to benefit from financial resources and expertise to carry out innovative actions while offering researchers a framework to support and study them.
Some actions, initially focused on supplying canteens locally and transforming menus, have shown that:

1. the cross-functional and collective approach has enabled local supply chains to be structured (e.g. the creation of a partner vegetable-processing plant),

2. the motivation of the staff responsible for public procurement has a major impact on the success of these initiatives.

With, on average, 5,000 meals served per day and 50% 'quality', certified and local products in nursery and elementary school canteens, Avignon has reached a threshold. As a result, the city's interests and those of the research team have shifted to other issues such as the impact of the food environment on the quality of children's diets, and the determinants of canteen attendance.
* Projets Fondation de France ALIVILLE (2016-2019), Horizon 2020 FOODSHIFT (2020-2024), Horizon Europe FEAST (2022-2027) et PRIMA BlumiMed (2025-2028)

## 'Eating behavior', a systemic approach to food

'Eating behavior', also known as food or feeding behavior, refers to the various decisions that precede or accompany the act of eating. We make at least 200 food decisions every day, most of them unconscious and through habit. Changing eating behaviors in school or university canteens is partly a matter of changing the food on offer and the framework within which it is offered. A number of INRAE teams are involved in these initiatives, particularly for the 'vegetarianization' of menus, one of the central themes of the EGalim Law.

### INTRODUCING NEW TASTES TO CHANGE EATING BEHAVIORS: THE 'SUPER SCHOOL CANTEEN' PROJECT

The Super School Canteen (*Chouette cantine*[7]) project is part of the vast Territoire d'Innovation (Innovative Region) program 'Dijon, Sustainable Food 2030'. It implements initiatives to educate people about the taste and pleasure of healthy, sustainable food in school canteens. The partnership research focused on several assessments carried out in 38 schools: 1) the nutritional quality and carbon impact of vegetarian and non-vegetarian menus produced at the central kitchen, 2) children's appreciation of main courses and 3) parents' desire for more vegetarian menus. These assessments served as the basis for taste education workshops.
The results show that, on average, a third of energy requirements and almost half of daily requirements for 23 nutrients are covered by vegetarian and non-vegetarian menus. Daily protein requirements are also well covered: over 120% for meat and fish meals and 95% for vegetarian meals, all in a single meal. Vegetarian meals also emit half as much greenhouse gas (0.9 vs. 2.1 kgC02 eq). Lastly, children's opinions of the dishes and their side dishes were collected using a system of terminals installed for the year in the canteens. On average, vegetarian dishes were rated as highly as non-vegetarian ones.
On the strength of these findings, the scientists were able to recommend serving 2 vegetarian menus per week, while maintaining one menu with fish, one with white meat and one with red meat; recommendations that can be applied in practice because they have been drawn up with professionals in the sector, thus making it possible to go beyond regulations and reduce school meals' carbon footprint while developing a taste for vegetarian dishes.

7. The Chouette Cantine (Super School Canteen) project is led by INRAE's Centre for Taste and Feeding Behavior (CSGA).

### 'Dijon, Sustainable Food 2030' innovative food region

The 'Dijon, Sustainable Food 2030' project is led by Dijon Métropole with INRAE Bourgogne-Franche-Comté's Centre for Taste and Feeding Behavior (CSGA) as scientific leader. With a budget of 35 million euros, its aim is to accelerate agro-ecological and food transitions with the cooperation of around forty local partners involved from 2019, and for 10 years. They come from a variety of backgrounds: research, higher education, vocational training, farmers, cooperatives, competitiveness clusters, businesses, consumers, citizens, etc. The project forges a strong link between transforming diets and regional transformation. Devised on a regional scale, it integrates the continuum from production to consumption via processing and distribution, with 24 major actions ranging from soil analysis to the promotion of a balanced diet for all.

**Lucile Marty**
Behavioral Nutrition Researcher, CSGA, INRAE

After my thesis on children's food behaviors and a PhD in interventional research in England, I've been working on the transition towards more sustainable diets since 2020. I've supervised two theses on the vegetarianization of meals in Dijon's school canteens and university restaurants (CROUS). These research-actions aim to have an effect on systems as well as change diners' food behaviors. We work with catering professionals to carry out diagnostics, construct common objectives, collect and process data, and make recommendations. We thus advised two vegetarian meals per week in school canteens. The objective of 30% vegetarian meals per day in 2025 and 50% in 2030 set for all CROUS restaurants now exceeds the EGalim Law goals. This fascinating fieldwork enables us to conduct innovative academic research while changing actors' catering practices as well as the behaviors of younger generations, closely connecting research and impact.

## RESEARCH INTO STUDENT BEHAVIORS: PARTNERSHIP WITH CROUS TO TEST VEGETARIAN MENUS

In line with the EGalim Law, CROUS (university students' social services institution) aims to increase to 30% the proportion of vegetarian meals served in 2025 with, at the same time, a reduction in the carbon impact, acceptable prices and meals' high nutritional quality. In close collaboration with the Bourgogne-Franche-Comté CROUS and its team of chefs who produce approximately 2,500 meals per day, INRAE scientists experimented by doubling the vegetarian offer (from 24% to 48%) to assess its acceptability by students. Over the four weeks of the experiment, the team observed that students significantly increased their selection of vegetarian dishes after availability was doubled, from 23% to 45%. The questionnaires filled in by students after each meal - nearly 20,000 - indicated that satisfaction with the offer and their liking of the dishes selected remained stable. It is not, therefore, students who are creating obstacles to menus' vegetarianization. Another finding was that the vegetarian dishes on the CROUS menu may be cheaper and of better nutritional quality depending on the recipes chosen. At the end of the experiment, CROUS decided to set the target of offering 30% vegetarian portions per day.

## LOOKING AT THE IMPACT OF SOCIAL NORMS AND INFLUENCES

The social context affects food preferences and contributes to constructing or changing eating habits, especially among young people in the process of learning to eat independently. Multidisciplinary projects bringing together human and social sciences, behavioral sciences and computer sciences[8] have recently been developed to analyze the influence of social norms and peers on the dissemination of dietary messages and eating behaviors. School and university canteens that cater for young people from different social backgrounds and impose vegetarian fixed-price menus represent an ideal field in which to study these influences. Numerous questions emerge, such as the link between students' social status and their food choices, the influence of supply on choice, the palatability of vegetarian dishes for young people, and the best ways to raise awareness about 'eating well'.
To respond to these questions, the scientists conducted their studies as closely as possible with these young people, through observation in real situations, quantification of the selected nutritional compositions, and experiments enabling them to assess the impact of dietary messaging on children in the canteen. Modeling individual or group behaviors made it possible to simulate changes of setting, such as the organization of a self-service restaurant, and identify the most effective ones. It appears that the strongest influences are those of other diners' choices, and physical constraints in the queue. Combined with incentive schemes (nudges) for young people, this innovative research could be used to accompany initiatives aimed at healthy, sustainable eating.

8. These projects were led by scientists from UMR PNCA, GAEL, IATE, SADAPT and PSAE.

### A new partnership between INRAE and the National Center for University and School Work (CNOUS)

At the Salon International de l'Agriculture 2025, the CNOUS, and through it all the Regional Center for University and School Work (CROUS), and INRAE signed a five-year framework agreement on sustainable and accessible food for students. The collaboration will focus on understanding the determinants of a more sustainable offer, diversifying meals, supporting cooks in changing their practices, and raising students' awareness of more sustainable food. The 900 university canteens are ideal places to support the transformation and anchoring of new eating habits among students.


Source : : Reportage « Chouette cantine » : vers une restauration scolaire plus durable » INRAE, Pierre de Pascau, 2022

Assessing the appreciation of school meals to monitor the effects of introducing children to new tastes and healthier food.

## School meals: France, an international driving force

In France, while compulsory schooling has allowed the quality of school meals to be studied, elsewhere in the world, providing a meal is above all a way of increasing school attendance. School meal policies thus differ greatly from one country to another. The COVID pandemic and closure of schools did, however, shed light on the importance of school meals for child health. Science is at the heart of this global issue, supporting governments at international level.

### AN INTERNATIONAL COALITION AND RESEARCH CONSORTIUM TO GUIDE PUBLIC POLICY

In 2021, the UN's Global School Meals Coalition was created at the request of the President of the French Republic. Over one hundred countries progressively joined the coalition. At their request, a global research consortium on health and nutrition in schools was created. Its goal is 1) to provide independent and credible data to guide the design of national public policy for school health and nutrition, and 2) to outline the impact of school meal programs on children and on the transformation of food systems.

This international group of experts assesses the effectiveness of school meal programs on children's and young people's learning around the world. It also guides political decision-makers in the implementation of health, nutrition and education policies. The consortium relies on seven Communities of Practice (COP) of international experts, including the "Good Examples" COP co-piloted by the Institut Agro de Montpellier. Using a series of case studies compiled by each country in the Coalition, it inventories national programs and their success factors and obstacles, and shares their outcomes. Together, these national experiences should help formulate guidance for public policies on school meals.

### URBAL: a method to assess the impact of sustainable food system innovations

The URBAL method makes it possible to map stages, catalysts and obstacles to assess the impacts of social innovations implemented in sustainable food systems. It is aimed at practitioners, decision-makers, and scientists working on food systems. The method was tested on actions in the "Ma Cantine Autrement" program set up in 2016 by the city of Montpellier. This program aimed to reduce food waste and promote sustainable eating through 25 innovations. Two years after the project's launch, INRAE scientists proposed a participatory assessment of the impact paths of each of the 25 innovations. Based on participative workshops and interviews with groups of children, obstacles and levers were identified in order to adjust the program and launch a discussion about the indicators to measure the program's follow-up. As a result of the study, a school catering monitoring committee was set up, and visits to central kitchens with the children were organized.

### RESCO: A FRENCH RESEARCH NETWORK ON SCHOOL MEALS

Le réseau RESCO est constitué The RESCO network was set up in 2021 by the by the UNESCO Chair in 'World Food Systems' at the Institut Agro de Montpellier, at the request of the Permanent Representation of France to the United Nations in Rome. This network brings together around fifty scientists from INRAE, CIRAD, IRD, and agronomy universities and schools (AgroParistech, Institut Agro), who carry out multi-disciplinary studies with school catering stakeholders in France and abroad.

The network coordinates French support at the international research consortium, represents France at international events concerning school meals, and encourages collaborations between French scientists. A request was made for the RESCO network to author the "French narrative" on implementing school meal programs. It was published in 2023 by three researchers and a political scientist (Institut Agro Montpellier, OCDE, INRAE). It presents several topics: the history, design and implementation of programs, the objectives of school catering, meal characteristics and serving regulations, public policies governing school catering, in particular health and nutrition regulations, and compromises to reconcile nutrition and the environment. The scientists drew three conclusions: 1) the EGalim Law boosts the partial reterritorialization of procurement, which can involve PATs; 2) centralized purchasing means better prices for quality produce and improved inventory management; 3) inequalities in access persist due to unevenly deployed social pricing and a need to improve operations in some overseas territories (Mayotte, French Guiana).

**Sylvie Avallone**
Head of the "Good Examples" Community of Practice of the School Health and Nutrition Research Consortium and the French network RESCO, Institut Agro Montpellier

As a professor of food science and nutrition, my research focuses on children's nutrition in developing countries. The closure of schools during COVID highlighted the importance of school meals in schoolchildren's nutrition. With a strong public policy in place, France launched a global coalition in 2021 to encourage governments to reinvest in school meal programs. To support this, an international research consortium was set up and now numbers approximately 1,000 researchers from all over the world. A French network of around 100 scientists has also been established to contribute to sharing knowledge. Case studies on the food programs of 45 countries have been compiled and we're sharing the best practices identified to guide the governments of countries that sometimes have no program at all in this domain. French research has been informing public decision-making in this field for a long time. However, even though the French model is inspiring other countries, we can also learn from comparison with others.

© Adobe Stock, Kasto

The COVID crisis highlighted the importance of school meals in children's nutrition. Since 2021, research has been organized worldwide to help governments roll out school meal programs.

## Challenges for sustainability

This overview of research carried out at INRAE, often in collaboration with scientific partners or school catering stakeholders, illustrates a field where research and action intersect, driven by public policy in favor of healthy farming and food.
This research has supported the design, implementation and assessment of recommendations and public policies relating to school catering, which has such a special place in France. School meals have proved to be a crucial lever for encouraging younger generations to take a fresh look at their diet. Scientists are imagining, experimenting with, qualifying and accompanying changes in menu composition, process organization and education for public stakeholders. Their work has also supported the goal to shift agri-food systems via school catering towards greater sustainability, hand in hand with developing regions and their agricultural and food production.
Challenges remain, however, with regard to certain sustainability issues such as alternatives to plastics, combating waste, attendance equality and social pricing, educating children in healthy eating, and staff training ■

## BIBLIOGRAPHY


Anses, *Rapport d'appui scientifique et technique relatif aux fréquences alimentaires recommandées en restauration scolaire dans le cadre de l'expérimentation du menu végétarien*, saisine 2020-SA-0101, Maisons-Alfort : Anses, 2021, 47 p

Arrazat Laura, Cambriels Claire, Le Noan Christine, Nicklaus Sophie, Marty Lucile (2024). Effects of increasing the availability of vegetarian options on main meal choices, meal offer satisfaction and liking: a pre-post analysis in a French university cafeteria. *International Journal of Behavioral Nutrition and Physical Activity*, 21 (1), 75

Avallone Sylvie, Giner Céline, Nicklaus Sophie, Darmon Nicole (2023-10). *Étude de cas sur l'alimentation scolaire, France*. Prepared by the Research Consortium for School Health and Nutrition, an initiative of the School Meals Coalition, 16 p

Chiaverina Pierre, Raynaud Emmanuel, Fillâtre Marie, Nicklaus Sophie, Bellassen Valentin (2022-06-29). The drivers of the nutritional quality and carbon footprint of school menus in the Paris area. *Journal of Agricultural & Food Industrial Organization*, 21 (2), pp.147-169

Conseil National de l'Alimentation, Avis n°77, *Les enjeux de la restauration collective en milieu scolaire*, 2017

Dahmani Justine, Nicklaus Sophie, Grenier Jean-Michel, Marty Lucile (2022-10-10). Nutritional quality and greenhouse gas emissions of vegetarian and non-vegetarian primary school meals: A case study in Dijon, France. *Frontiers in nutrition*, 9, pp. 997144

Darmon Michel, Darmon Nicole, (2004). *Utilisation de la programmation linéaire pour évaluer l'intérêt nutritionnel des recommandations en vigueur dans la restauration scolaire en France* [rapport]

Darmon Nicole, Allegre Laëtitia, Vieux Florent, Mandon Lionel, Ciantar Laurent. (2010). Suivi des recommandations du GEMRCN pour la restauration collective : quel impact sur le coût des repas dans les écoles primaires ?, *Cahiers de Nutrition et de Diététique*, Volume 45, Issue 2, Pages 84-92

Darmon Nicole, Vieux Florent, Poinsot Romane, Cocchiello Lugdivine, de Alexandris Constance, *et al. Composition nutritionnelle des plats complets végétariens et non-végétariens proposés en restauration scolaire : une étude du collectif EnScol*. 2020.

Marty Lucile, Dahmani Justine, Nicklaus Sophie (2024). Children's liking for vegetarian and non-vegetarian school meals at the scale of a French city. *Appetite*, 200, pp.107547

Mouléry Michel, Sanz Sanz Esther, Debolini Marta, Napoléone Claude, Josselin Didier, Mabire Luc, Vicente-Vicente José Luis (2022). Self-Sufficiency Assessment: Defining the Foodshed Spatial Signature of Supply Chains for Beef in Avignon, France, *Agriculture* 419

Poinsot Romane (2021). *Place de l'offre végétarienne en restauration scolaire pour concilier nutrition et environnement : le cas français* [thèse de doctorat, Université Montpellier]

Valette Elodie, Blay-Palmer Alison, Lepiller Olivier, Intoppa Beatrice, Roudelle Ophélie, *et al. Guide méthodologique URBAL : Evaluer l'impact des innovations pour des systèmes alimentaires durables*. CIRAD; Wilfrid Laurier University; L'Institut Agro-Està. 2023, 38 p

Vieux Florent, Dubois Christophe, Duchêne Christelle, Darmon Nicole (2019). Implications nutritionnelles des directives françaises sur l'offre alimentaire en restauration scolaire et place des plats protidiques. *Cahiers de Nutrition et de Diététique*, 54(1), 22-34

Direction de l'Appui aux Politiques publiques
Centre siège d'Antony
1, rue Pierre Gilles-de-Gennes
92160 Antony

Rejoignez-nous sur :

https://app.inrae.fr/

**Institut national de recherche pour l'agriculture, l'alimentation et l'environnement**

RÉPUBLIQUE FRANÇAISE
*Liberté*
*Égalité*
*Fraternité*

INRAE