

Would you like some more protein?

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The question of proteins is one that has developed over time. Today, it features in a range of public debates relating to important nutritional, economic and environmental issues. The excessive focus on proteins makes us run the risk of paying less attention to the need to reduce food consumption, as well as avoiding alarming issues surrounding the status of particular types of foods and animal-related concerns.

In debates on how to achieve a sustainable food supply that can feed the entire human population, proteins are ubiquitous, particularly in terms of health and environmental impacts. The focus on these macronutrients contrasts with everyday experience, where people mostly refer to the names of foods, that is, complex, cooked combinations of foodstuffs, ingredients or products. At most, proteins are featured as the main component of specific diets, namely medical (severe malnutrition, old age) and performance-oriented (sports, weight loss) diets.

We analyse this disconnect between academic, political and media discourse on the one hand and the everyday experience of food on the other. In so doing, we shed light on the factors that have led to this focus on proteins, which has given the latter such a significant role in our kitchens and cuisines. This focus is exemplified by the use of the term ‘protein’ to designate all foods of animal origin or ‘plant-based protein’ to refer to pulses only, often excluding cereals – some of which are nevertheless high in protein. These expressions reduce foods to this component of nutritional interest. Conversely, they reduce proteins to the two main categories of animal-based foods and pulses. As a result, these categories are presented as interchangeable. However, while this substitutability may hold true from a nutritional point of view, it cannot always be applied to culinary practices and eating habits when it comes to cooking pulses or meat. Moreover, basing

substitutions between food categories on proteins relegates other nutritional intakes to the background, thus framing protein intake as the most important health challenge. The tendency to reduce foods to just one of their biochemical components conceals other issues associated with their consumption and with contemporary nutrition more generally, which we discuss in this chapter.

A recent history

To understand the focus on proteins, it is useful to look at the history of their discovery. The story of proteins begins in the 1830s, when they were identified by a new discipline – biochemistry. The term itself was proposed in 1838 by a Dutch chemist, Gerardus Johannes Mulder, who demonstrated the presence of these organic molecules in all ‘animal substances’. This ultimately led to the term ‘protein’ being gradually applied to all matter previously described as ‘animal substance’ (Carpenter, 2003). This historical link between animal substance and proteins fostered the analogical relationship between the two and incidentally led to the term ‘protein’ being mapped onto symbols associated with meat, a food that conveys strength (Vialles, 2007), wealth and ease (Goody, 1982). The German chemist Justus von Liebig also worked on proteins from the late 1830s. He defended the idea that proteins were not only the primary component of animal bodies (apart from water) but also the fuel for the biochemical reactions responsible for muscle contraction and therefore animals’ motor skills. This ultimately led him to present proteins as the only true nutrient, an idea that was later disproved (Carpenter, 2003). This pioneering work in the nineteenth century was followed by an inventory of the different proteins, the identification of their roles in a wide range of functions in living organisms and the discovery of their basic components, peptides and – smaller yet – amino acids. Some amino acids are now called ‘essential’ in human nutrition, as regular intake is necessary to maintain good health and the human body is not capable of synthesizing them itself.

After the Second World War, proteins found themselves at the centre of nutritional and development research and public health policies. With the challenge of recovering agricultural production, the issue of protein deficiency became the main concern in the fight against undernutrition in the poorest countries. This focus on the world protein ‘gap’, ‘crisis’ or ‘problem’ was denounced by nutritionist Donald S. McLaren (1974) in a landmark article published in *The Lancet*. According to McLaren, whose stance was subsequently confirmed

by scientific advances, this focus on protein deficiency was the product of an overgeneralization based on cases of severe undernutrition. Scientists particularly concentrated their attention on the kwashiorkor syndrome observed in young children. This syndrome was initially wrongly attributed to a weaning diet that was too low in protein, neglecting other micronutritional, energy or infectious factors (Brown, 1991).

Following McLaren's article, a critical review within the scientific community showed the role of political and financial interests in the focus on the world protein gap, particularly through the funding of research in nutrition and other scientific fields such as the anthropology of health and development (Diener et al., 1980). With the United States having majorly mobilized its agricultural sector to feed the countries devastated by the war, the surpluses generated by the gradual recovery of Europe's production capacity, particularly in the dairy sector, plunged the country into an agricultural crisis. These surpluses were then valorized as milk powder, a product with a very high protein content, and exported to the least developed countries, thus securing outlets for US dairy production and its protein and oil-protein crop suppliers (Diener, 1984).

At the turn of the twenty-first century, studies investigated the satiating power of proteins in connection with the public health problem of obesity. For the same caloric value, protein-rich foods were found to generate a greater and more sustained feeling of satiety than those containing more fats and carbohydrates (Louis-Sylvestre, 2002). Given the excessive and overly rich food intake fuelling obesity, the protein content of diets and foods thus offers an interesting avenue for research into appetite regulation in a context of food abundance.

This brief history of proteins highlights their foundational, scientific and symbolic link with animals, the exaggeration of their role in certain nutrition-related pathologies and the interest in proteins as a way to address the harmful effects of overabundance.

Let us now turn to the contemporary public debates involving proteins, so as to better understand the food issues with which they are associated.

Proteins in contemporary public debates

The first public debate surrounding proteins concerned the sustainability of food, particularly with regard to human health and the environment. These two issues were popularized from the early 1970s, notably in a book by the American Frances Moore Lappé, *Diet for a Small Planet* (1971). This book already pointed

to the negative consequences of excessive meat consumption for both health and the environment, based on the argument of the low efficiency of converting plant-based proteins into animal proteins via livestock farming. This argument, which has become commonplace today, has been revised to consider ‘net feed conversion efficiency’, which takes into account the share of animal feed that humans would not be able to digest directly themselves, such as oilcake or straw (Laisse et al., 2018). Even in its revised form, this argument still calls into question the consumption of animal-based foods. For example, it sheds light on the relative environmental impacts of equal quantities of plant-based proteins and animal proteins. Over the last two decades, the environmental impacts of excessive ‘animal protein’ consumption have been widely documented, starting with the FAO’s global report *Livestock’s Long Shadow* (Steinfeld et al., 2006). In Europe, the report *The Protein Puzzle* (Westhoek et al., 2011) detailed the challenges of rebalancing the share of animal foods in total calorie intake by increasing the share of plant-based foods, using protein quantity as the unit of analysis. It has since become widely accepted in the scientific community that, for both health and environmental reasons, a reduction in per capita consumption of animal-based foods is desirable in the wealthiest countries, where average consumption levels far exceed requirements.¹

A second public debate, closely linked to the previous one, pertains to the geopolitical issues involving proteins. In 2019, during the negotiations on the new Common Agricultural Policy, the president of France defended Europe’s ‘protein sovereignty’. In 2021, a ‘Plant Protein Plan’ was launched by the French Ministry of Agriculture and Food, while the issue of protein autonomy is being addressed at regional or farm level. After the last global conflict, major trade liberalization agreements encouraged an international division of agricultural production. This largely devolved the production of protein-rich animal feed to the American continent, such that European animal production is now largely dependent on imports from the Americas, particularly for soybean (Boucly and Decoret, 2020). With the gradual decrease in per capita consumption of meat and milk, this division of production is now being challenged in Europe, particularly by France, which is seeking to relocalize its production of plant-based protein foods. Proteins are thus becoming a key geostrategic issue, particularly

¹ The European Food Safety Authority (EFSA), the Food and Agriculture Organization of the United Nations (FAO) and the WHO recommend a total protein reference intake of 0.83 g/day/kg of body weight, that is, for a person weighing 67 kg (the average weight of French adults), nearly 56 g/day, with a 1:1 ratio of animal proteins to plant-based proteins. In France, the INCA3 food consumption survey shows that adults consume on average 83.2 g/day.

surrounding oil-protein crops – especially soybean, which also provides raw material for biofuels at the same time. The contentious discussions between the French and Brazilian Presidents in 2020 on the topic of deforestation by fire in Brazil attest to the international significance of the issue.

Proteins are at the heart of a third public debate on food-based self-optimization practices. These practices raise questions about the cult of performance as well as moral and health perfectionism (Dalgarrondo and Fournier, 2019). One example is meal-replacement drinks, products intended as time-saving solutions which present their protein content – often plant based – as the key to their satiating power. Proteins are also central to sports nutrition and weight-loss programmes. Lastly, they feature in discourses on ageing as a necessary ingredient for healthy ageing as a form of performance (beyond the very real and documented issues surrounding the increased protein needs associated with muscle mass loss in very old age).

Proteins are furthermore integral to the rhetoric mobilized in a fourth public debate on the ‘de-animalization’ of food observed in rich countries such as France (Fourat and Lepiller, 2017). This term refers to the trend towards challenging the centrality of meat and, more broadly, foods of animal origin in eating habits. It has translated into a drop in the consumption of certain foods, such as red meat, and has gone hand in hand with the growing importance of plant-based foods in diets, from the strictest form of veganism to flexitarianism following a ‘less but better’ approach – eating less food of animal origin but of better quality, guided by greater concern for the dignity of animals. The ability of these diets, especially the more plant-based ones, to meet nutritional protein requirements was long questioned. Recent studies have now shown that the practices observed among vegetarians and vegans satisfy their protein and essential amino acid needs² (Mariotti and Gardner, 2020) and that the practices of lacto-ovo vegetarians provide the recommended intakes of macronutrients, including protein (Allès et al., 2017). Public health authorities, as well as dietetics and culinary discourses, now present pulses (peas, lentils, beans, soy etc.) and, to a lesser extent, cereals and nuts as alternative protein sources to meat. The French National Nutrition and Health Program states that ‘pulses are naturally high in fibre and contain plant-based proteins. [. . .] They can also replace meat or poultry; in this case, combining them with a cereal product is advised’ (PNNS, 2021). In Western countries, where foods of animal origin have pride of place in culinary know-how

² For purely vegan diets, other nutrients may be a problem. For vitamin B12, for instance, supplementation is necessary.

(unlike in India, for example), the challenge raised by the growing role of plant-based foods in dietary practices is therefore first and foremost the acquisition of culinary skills and nutritional knowledge.

In connection with this trend towards more plant-based diets, proteins fuel a fifth and final debate, pertaining to the emerging markets for meat and dairy substitutes. For some years now, multinational food companies have taken an interest in plant-based 'milks', as illustrated by Danone's acquisition of the leading American organic plant juice company, WhiteWave. More recently, startups specializing in plant-based meat alternatives, such as Impossible Foods or Beyond Meat, have attracted investors from the digital world, and their products are now distributed by international fast-food chains (Porcher, 2019). In vitro meat, or cultured meat, which is based on techniques to grow animal cells in bioreactors, offers new promises of technological means to escape the need to slaughter animals for meat and to reduce the environmental impact of farming. However, these promises, which are highly dependent on the technical skills of large financial actors, still have a long way to go to prove their validity and raise many questions about the autonomy of eaters (Fournier and Lepiller, 2019). The high 'protein' content of plant-based alternatives to meat and dairy is often advertised as a selling point. As for in vitro meat, it is commonly presented primarily as a 'new source of animal protein' (Post and Hocquette, 2017).

The need for frugality as a social and political issue

Finally, we highlight several reasons for maintaining a critical distance from an excessive focus on proteins. First, critical examination of the world protein gap theory has shown that an exclusive focus on proteins is by no means always an adequate explanation for diet-related health problems, including in situations of undernutrition. The focus on proteins appears even less relevant in situations of food abundance, as protein needs are largely met in populations with access to adequate caloric intake provided by a sufficiently diverse diet. Abundance and overeating pose health and environmental problems that primarily call for decreasing total caloric intake, followed by a reduction in the consumption of animal-based foods (Vieux et al., 2012; Perignon et al., 2017).

Second, the focus on proteins in the formulation of public health standards and marketing campaigns is part of a wider process of the medicalization of food (Poulain, 2009). It further entrenches the idea of individual health as the primary, if not sole, purpose of the act of eating, at the expense of its other

functions – social, convivial, hedonic or even philosophical and spiritual. This process encourages the subjection of eaters to a biomedical normativity, as well as corollary feelings of guilt. Moreover, medicalization is based on an approach to nutrition that is itself reductive, tending to isolate nutrients while neglecting the way in which they are associated within foods or in culinary practices. This leads to overlooking the nutrient density of foods, the key variable in a health-promoting diet (Brown, 1991; Maillot et al., 2006; Tharrey et al., 2017). Protein-rich foods are therefore interesting to consider but more for their micronutrients (with which proteins are associated within these foods), particularly calcium, iron, zinc, vitamin D, long-chain omega-3 fatty acids and vitamin B12.

Third, the focus on proteins encourages the reduction of animals to their biochemical components and thus to their physical materiality. This can lead to the avoidance of increasingly urgent questions, namely regarding the ethics of breeding and killing animals, as well as the legitimacy of food-driven and working relationships with animals (Porcher, 2011). Reducing the animals that are sources of human food to their materiality also leads to overlooking the diverse range of services they provide (landscape maintenance, biodiversity preservation, soil fertilization, farm work etc.) and the associated human–animal relationships.

Finally, this focus on proteins causes foods that play very different culinary roles to be seen as equivalent. This has its benefits, for instance, in rethinking the place of animal and plant-based foods in food repertoires, though it also involves a process of translation into culinary language. But this focus on proteins and equating them raises questions about the interests they serve. This nutritional category can be instrumentalized to generate political and moral opportunities serving economic interests, as in the case, for example, of ultra-processed plant-based products sold as alternatives to animal-based foods or of in vitro meat.

Conclusion

Critical vigilance is thus required in order to ensure that proteins do not distract us from the real issue: the need, in situations of abundance that allow it, to reinvent food models to be less centred on animal foods. These models must promote a certain frugality, making the consumption of those foods more of an exception, more meaningful and, when they involve killing animals, perhaps more solemn. It is important to remember that in situations of food abundance and when diets are sufficiently diverse, the primary challenge is to reduce total

caloric intake. Reducing the consumption of animal proteins does not entail a risk of protein deficiency. It is therefore not necessary to compensate for reduced animal protein intake by increasing plant-based protein intake; on the contrary, meat can be replaced with vegetables.

The authors would like to thank Nicolas Bricas, Damien Conaré, Mathilde Coudray, Nicole Darmon and Marie Walser for proofreading this chapter and for their suggested improvements.

References

- Allès B., Baudry J., Méjean C., Touvier M., Péneau S., Hercberg S., Kesse-Guyot E., 2017. Comparison of sociodemographic and nutritional characteristics between self-reported vegetarians, vegans, and meat-eaters from the NutriNet-Santé study. *Nutrients*, 9(9): e1023. <https://doi.org/10.3390/nu9091023>
- Boucly M., Decoret P.-M., 2020. L'Europe agricole au défi de sa souveraineté protéinique. *Annales des Mines – Réalités industrielles*, 2020(2): 83–87. <https://doi.org/10.3917/rindu1.202.0083>
- Brown K.H., 1991. The importance of dietary quality versus quantity for weanlings in less developed countries: a framework for discussion. *Food and Nutrition Bulletin*, 13(2): 1–9. <https://doi.org/10.1177/156482659101300219>
- Carpenter K.J., 2003. A short history of nutritional science: part 1 (1785–1885). *Journal of Nutrition*, 133(3): 638–645. <https://doi.org/10.1093/jn/133.3.638>
- Dalgalarrondo S., Fournier T., 2019. Introduction. Les morales de l'optimisation ou les routes du soi. *Ethnologie française*, 176: 639–651. <https://doi.org/10.3917/ethn.194.0639>
- Diener P., 1984. Humanism and science in cultural anthropology: the great protein fiasco. *Journal of Social Philosophy*, 15(1): 13–20. <https://doi.org/10.1111/j.1467-9833.1984.tb00683.x>
- Diener P., Moore K., Mutaw R., 1980. Meat, markets, and mechanical materialism: the great protein fiasco in anthropology. *Dialectical Anthropology*, 5(3): 171–192. <https://doi.org/10.1007/BF00257766>
- Fourat E., Lepiller O., 2017. Forms of food transition: socio-cultural factors limiting the diets' animalisation in France and India. *Sociologia Ruralis*, 57(1): 41–63. <https://doi.org/10.1111/soru.12114>
- Fournier T., Lepiller O., 2019. Se nourrir de promesses. Enjeux et critiques de l'introduction de deux innovations dans le domaine alimentaire: test nutri-génétique et viande in vitro. *Socio. La nouvelle revue des sciences sociales*, 12: 73–95. <https://doi.org/10.4000/socio.4529>
- Goody J., 1982. *Cooking, cuisine and class: a study in comparative sociology*, New York/London/Melbourne, Cambridge University Press, 253 p.

- Laisse S., Baumont R., Dusart L., Gaudré D., Rouillé B., Benoit M. et al., 2018. L'efficacité nette de conversion des aliments par les animaux d'élevage: une nouvelle approche pour évaluer la contribution de l'élevage à l'alimentation humaine. *INRAE Productions Animales*, 31(3): 269–288. <https://doi.org/10.20870/productions-animales.2018.31.3.2355>
- Louis-Sylvestre J., 2002. Toutes les protéines ont-elles le même pouvoir satiétogène ? *Cahiers de nutrition et de diététique*, 37(5): 313–321. <https://doi.org/CND-10-2002-37-5-0007-9960-101019-ART4>
- Mailliot M., Darmon N., Drewnowski A., Arnault N., Hercberg S., 2006. Le coût et la qualité nutritionnelle des groupes d'aliments: quelle hiérarchie ? *Cahiers de nutrition et de diététique*, 41(2): 87–96. [https://doi.org/10.1016/S0007-9960\(06\)70612-5](https://doi.org/10.1016/S0007-9960(06)70612-5)
- Mariotti F., Gardner C.D., 2020. Adéquation de l'apport en protéines et acides aminés dans les régimes végétariens. *Cahiers de nutrition et de diététique*, 55(2): 66–81. <https://doi.org/10.1016/j.cnd.2019.12.002>
- McLaren D.S., 1974. The great protein fiasco. *Lancet*, 304(7872): 93–96. [https://doi.org/10.1016/s0140-6736\(74\)91649-3](https://doi.org/10.1016/s0140-6736(74)91649-3)
- Moore Lappé F., 1971. *Diet for a small planet*, New York, Ballantines Books, 301 p.
- Perignon M., Vieux F., Soler L.-G., Masset G., Darmon N., 2017. Improving diet sustainability through evolution of food choices: review of epidemiological studies on the environmental impact of diets. *Nutrition Reviews*, 75(1): 2–17. <https://doi.org/10.1093/nutrit/nuw043>
- PNNS, 2021. Les légumes secs (lentilles, haricots, pois chiches . . .), *Manger Bouger*.
- Porcher J., 2011. *Vivre avec les animaux: une utopie pour le XXI^e siècle*, Paris, La Découverte, 168 p.
- Porcher J., 2019. *Cause animale, cause du capital*, Lormont, Le Bord de l'eau, 115 p.
- Post M.J., Hocquette J.-F., 2017. New sources of animal proteins: cultured meat, in Purslow P.P. (ed.), *New Aspects of Meat Quality*, Cambridge, Woodhead Publishing, 425–441.
- Poulain J.-P., 2009. *Sociologie de l'obésité*, Paris, PUF, 385 p.
- Steinfeld H., Gerber P., Wassenaar T., Castel V., Rosales M., Haan C. de, 2006. *Livestock's long shadow: environmental issues and options*, Rome, FAO, 390 p.
- Tharrey M., Mailliot M., Azaïs-Braesco V., Darmon N., 2017. From the SAIN, LIM system to the SENS algorithm: a review of a French approach of nutrient profiling. *Proceedings of the Nutrition Society*, 76(3): 237–246. <https://doi.org/10.1017/S0029665117000817>
- Vialles N., 2007. Des invariants du régime carné, in Poulain J.-P. (ed.), *L'homme, le mangeur, l'animal: qui nourrit l'autre ?*, Paris, OCHA, 197–206.
- Vieux F., Darmon N., Touazi D., Soler L.G., 2012. Greenhouse gas emissions of self-selected individual diets in France: changing the diet structure or consuming less? *Ecological Economics*, 75: 91–101. <https://doi.org/10.1016/j.ecolecon.2012.01.003>
- Westhoek H., Rood T., van den Berg M., Janse J., Nijdam D., Reudink M. et al., 2011. *The protein puzzle: the consumption and production of meat, dairy and fish in the European Union*, The Hague, PBL Netherlands Environmental Assessment Agency, 218 p.

