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Talking Points: Leveraging protein

The importance of protein in regulating our diet

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Summary

The idea of protein leverage, that our daily hunt for protein drives our overall eating patterns, has been circulating within nutrition science for some time but has yet to transition over into the food world. This is likely to change for a number of reasons, not least because it puts forward both a plausible explanation for the impact of highly processed foods on our health, and a practical solution for packaged food companies to work with. In this note, we briefly explain protein leverage and propose three questions the food industry needs to start considering, as we expect the concept to gain wider recognition over time by the consumer.

How do living things know what to eat?

At the start of the new year, consumer interest in weight management, including adopting new dietary patterns, is at a seasonal peak. Let's give some airtime to the intriguing concept of protein leverage and its impact on our diets. Protein leverage suggests our need for protein governs our overall eating patterns and consequently has an outsized impact on the total number of calories we eat. I must confess, I had never heard of the concept until quite recently. This is despite its protagonists, locust-obsessed bugologists of all people, Professors David Rabuenheimer and Stephen J. Simpson, first formulating their arguments way back in 2005, having spent years trying to answer the question, "How do living things know what to eat?" They endeavored to do this by trying to understand the appetites and diets of a range of animals including us humans, both in the lab and the wild. In the process, they stumbled upon some profound insights into global health issues.¹

Of particular relevance to the food industry is their heretical point that when it comes to explaining the dietary causes behind the rise in obesity, we may have possibly drawn the wrong conclusions. By focusing too much on the rising consumption of fat and carbs, we have largely ignored the potential contributory role of protein in causing weight gain. And to take it a step further, to what extent does the way we regulate our consumption of protein help to explain why obesity rates have risen around the world? Since the start of the century, Rabuenheimer, Simpson, and others have accumulated a significant body of research to test and refine their thinking. So, what is protein leverage and what are the implications and opportunities for the food industry?

¹ Simpson SJ, Rabuenheimer D. Obesity: the protein leverage hypothesis. *Obesity Rev.* 2005 May;6(2):133-42. doi: 10.1111/j.1467-789X.2005.00178.x. PMID: 15836464.

Protein is paramount

In a nutshell, the idea behind protein leverage is that our strong regulation of protein drives the overall amount of food we eat, depending on the level of protein in our diet. We continue to eat food until our daily protein requirement has been satisfied, regardless of the total number of calories we eat (our total energy intake). So, when diets become unbalanced and low in protein, and in the absence of natural breaks on our appetite such as fiber, our need for protein can inadvertently lead us to overconsume fats and carbs and eat too many calories. We then run the risk of gaining weight.

According to Rabuenheimer and Simpson's research, humans (like many other animals) have evolved specific appetites for carbs, fats, protein, as well as the micronutrients sodium (salt) and calcium. In their experience, in, let's call it a natural food environment, these five appetites cooperate to help us achieve a nutritionally balanced and healthy diet.² When it is not possible to eat a balanced diet, such as during times of scarcity and/or changing food environments, they contend we prioritize protein over all the other dietary components, including fats and carbs. We are hardwired to eat a daily target amount of protein, in part because protein cannot be stored in the body. This target varies by age, sex, etc., but has been found typically to be about 15-18% of the calories in our diet, a relatively small contributor to our overall energy requirements.

It is this powerful appetite for protein that "leverages" our demand for food, because it doesn't take much protein (protein being the lever) to have a big impact on our overall consumption of calories from the other two main macronutrients, fats and carbs. For example, if we eat a diet high in protein foods (i.e., a diet with a high proportion of energy from protein), beyond the proportion our bodies actually need, we hit our protein target sooner and consume fewer calories and lose weight. The meat loving paleo-crowd knew this already and no doubt in paleo-speak, they would say their diet is "more satiating." We feel fuller faster. But in the protein leverage world, the explanation, though not substantially different, is that we have reached our protein requirement and our appetite for protein has been satisfied.

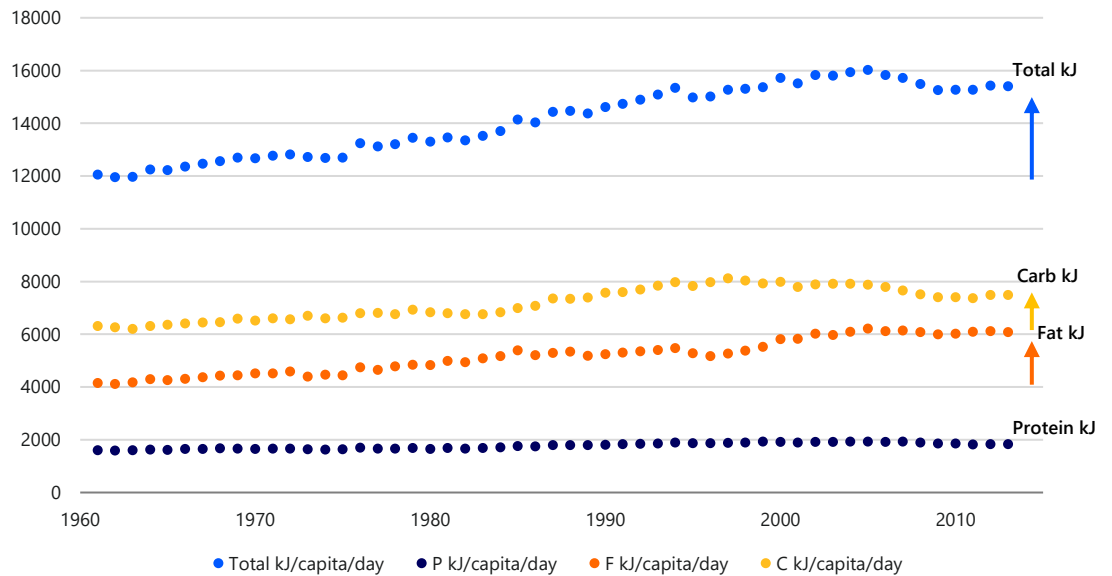
It gets really interesting when we consider the opposite scenario. If our diet is relatively low in protein but high in carbs and fat, we will likely overconsume these foods. We will take on board a lot of calories, in excess of what we normally burn in a day, until our protein needs are satisfied. The authors argue that even a small decrease in the share of protein in our diet leads to a larger intake of calories from fats and carbs, leading to weight gain. In their experience, even diluting protein by a percent or two can drive a 10% or more increase in total calorie intake to get to the same absolute protein intake that the body requires to function.

Helping to understand the rise in obesity

With this new protein leverage lens, the professors started to view the data on our changing food environment over the past few decades during the period of rising obesity, in a different light (see Figure 1). Understandably, most commentators have focused on the growth in consumption of fats and carbs as the drivers behind total energy availability leading to weight gain and almost ignored protein because its consumption levels have remained relatively stable. After all, why would protein have driven obesity if our per capita consumption of protein has been pretty constant?

² The authors argue that the multitude of other important nutrients are correlated with the consumption of these five nutrients, meaning the body just needs to focus on these five and the rest effectively get a free ride.

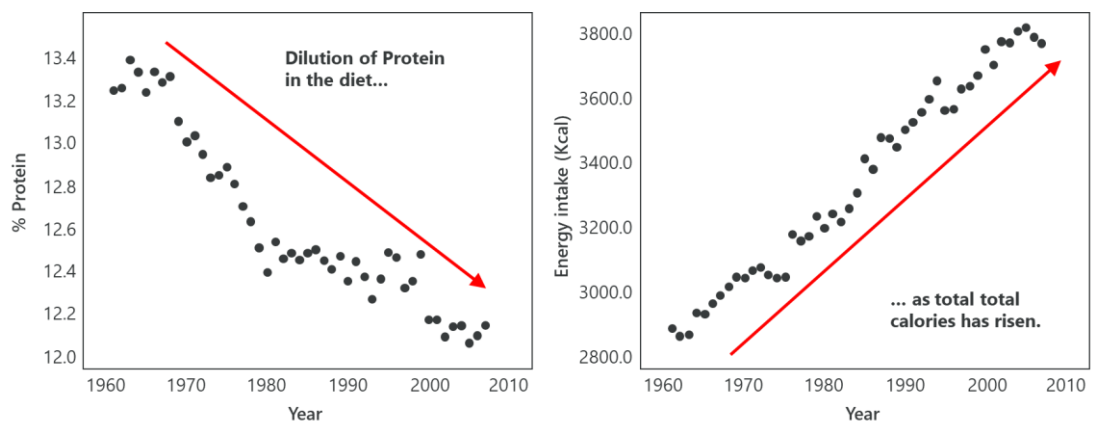
Figure 1: Rising per capita availability of energy from macronutrients in the US has come from carbs and fats



Source: Presentation by Stephen J. Simpson & David Raubenheimer, Charles Perkins Centre, The University of Sydney, using FAO data, 2023

But when digging deeper and incorporating their idea that even a small dilution of protein can have a significant impact on overall energy intake, a different picture emerges. In the US, the authors found that the average proportion of calories from protein in the American diet gradually decreased from 14% in 1961 to 12.5% in 2000, with more calories from fats and carbs making up the difference (see Figure 2). In their words, “the only way Americans could have maintained their target protein consumption was to increase total calorie intake by 14%, creating an energy (calorie) surplus and associated weight gain.”³

Figure 2: In the US, the share of calories from protein has declined (LHS) as energy intake has risen (RHS)



Source: Presentation by Stephen J. Simpson and David Raubenheimer, Charles Perkins Centre, The University of Sydney, using FAO data, 2023

³ Raubenheimer, David; Simpson, Stephen. Eat Like the Animals (pp. 61-62). HarperCollins. Kindle Edition.

Implications for the food industry

What I've presented here is just the bare bones of the concept, a simplified overview to raise awareness on a topic that to date seems to have passed the food industry by. Let's pause there and think about some of the implications of what this might mean for the food industry; an idea that the authors humbly concede is only "one potential factor among others" contributing to the rising incidence of obesity. Let's consider these three questions:

1. What if protein leverage is one of the mechanisms that helps explain the poor health outcomes associated with a diet high in ultra-processed foods?

One of the appealing aspects of this concept is how it fits into and supports other explanations of the rise in obesity; it helps connect the dots. A topic that immediately springs to mind is one that Rabobank covered back in November 2022, namely ultra-processed foods (UPFs), which typically account for over half the calories in the American diet (See Talking Points: [Don't] Let Them Eat Cake - The Opportunities and Risks of Classifying Food as Ultra-processed.) Although the topic has generated a lot of media attention over the last year or so, plausible explanations of the biological mechanisms that explain the association between consuming UPFs and negative health outcomes are scarce. We believe protein leverage is one possible explanation of the mechanism by which greater UPF consumption leads to greater energy intake and potential weight gain. To turn that into a question: to what extent has the rise in consumption of ultra-processed foods contributed to the dilution of protein in our diets by using relatively cheaper fats and carbohydrates? Some interesting studies in the US and Australia have attempted to answer that question and have found a strong inverse relationship between the consumption of UPFs and the density of protein in the diet.⁴ For the US data they found that, as the percentage of calories from UPFs in the diet rises, three things happened. First, there was a decrease in the percentage of energy from protein. Second, an increase in overall energy intake, and thirdly, little overall change in the absolute level of protein intake. This is exactly how one would have expected protein leverage to work. We have taken on too many additional calories and likely gained weight in search of protein because our diet has been diluted by fats and carbs, especially in energy dense foods with little fiber and/or water content to act as a natural break on our appetite. Clearly, more research is needed to corroborate this and we are certainly not trying to deliver a verdict on the science but to raise awareness.

One implication of this is for the food industry to consider their response to a future scenario where consumers are persuaded by the protein leverage argument. This may lead to a reduction of the consumption of UPFs with a low protein content as a way to increase their dietary protein concentration and prevent excessive energy intake. For large sections of the food, agriculture and livestock industry, especially protein producers that are not producing UPFs, this is likely welcome news and potentially a new marketing opportunity. (Both animal and plant-based; protein leverage appears to be egalitarian on that point: all proteins are created equal.) For manufacturers of more highly processed, protein diluted foods, this brings us to the second question.

2. Reformulation to the rescue?

It follows that if the rise in consumption of UPFs in our diets has led to protein dilution, then one solution worth exploring for food and beverage manufacturers of such products is reformulation. Is it possible to redevelop such foods to help restore greater balance in our diet by raising their relative share of protein? Clearly not every food item has to be nutritionally balanced (we'll give

⁴ Martínez Steele E, Raubenheimer D, Simpson SJ, Baraldi LG, Monteiro CA. Ultra-processed foods, protein leverage and energy intake in the USA. *Public Health Nutr.* 2018 Jan;21(1):114-124. doi: 10.1017/S1368980017001574. Epub 2017 Oct 16. PMID: 29032787; PMCID: PMC10260799

candy a break) but the protein leverage concept actually offers up a potential solution to all the criticism around UPFs. Food companies and their armies of food technologists can explore the technical feasibility and cost implications of raising the proportion of protein in their products. They could fortify their products with protein and/or replace some of the caloric fats and carbs and reduce the energy density of the food with appetite-controlling dietary fiber. Companies should also think about making protein more relevant to their product offerings, such as better protein meal solutions at breakfast, recognizing that consumers might want to prioritize protein at the start of the day to avoid the overconsumption of fats and carbs.

This is quite a radical but exciting option that should, if feasible, provide some welcome news to the packaged food industry and go some way to offset the calls from pundits and public health authorities to completely avoid these foods. This cannot be understated. Assuming the consumer buys into the protein leverage thesis, then the concept gives food companies something to work with. After all, reformulating recipes, including fortification, is well within the food industry's area of expertise. This is what they know how to do. For example, food companies have been responding to the consumer desire for clean labels, reducing the number of ingredients, taking out the artificial ingredients, etc., for some time. Building upon this foundation will address the potential challenges of low protein in UPFs and, according to the protein leverage argument, this may be sufficient to eliminate their obesogenic effects.

3. Are we likely to see mainstream consumers adopting "The Protein Leverage Diet?"

Probably not anytime soon, unless Taylor Swift or Oprah or one of the many other influencers on social media gets excited about it and shares with their millions of followers. As with all things in food, how the consumer will interpret and respond to this concept is the million-dollar question. Here are four things to consider:

- **Consumers are primed for protein.** To the good fortune of the protein industry, including protein supplement manufacturers, many consumers are already convinced of the benefits of protein. They are already primed about the importance of protein, given the flurry of popular diets that, to varying degrees, tap into the power of protein to help promote muscle building and weight loss. According to the IFIC's annual consumer survey, about one-third of US adults say "good source of protein" is a top choice in how folk define healthy. Similarly, Circana reports that about 40% of consumers say they are "trying to get more" protein in their diet, ranking third highest after vegetables and fruits.
- **This is a "Goldilocks" rather than a "more protein" story.** One can have too much of a good thing, even protein. Protein leverage is not necessarily suggesting that high protein diets are the solution but the more nuanced point of achieving "just the right amount" of protein, of meeting one's daily protein requirements.⁵ This may prove a harder point to sell to the consumer. Past experience would suggest that most consumers are really bad at counting calories and it is unlikely that they are going to be any better at figuring out the right percentage of protein in their diet. Even more so as our protein needs are a moving target that changes throughout our lifetimes, as well as varying by our sex, level of activity, genetics, etc.
- **Personalized nutrition is a good fit.** On a brighter note, protein leverage is all about personalization and potentially lends itself to the growing interest in personalized nutrition. Advances in technology are helping to make this easier for consumers to adopt, cost barriers notwithstanding. Take the startup US-based Calorify for example, the first company to provide

⁵ There are a number of reasons why excessive protein consumption is not thought to be a good idea, but a key consideration is the possibility that "eating too much protein switches on biological processes that hasten aging and shorten lives." For a full explanation, see Raubenheimer, David; Simpson, Stephen. *Eat Like the Animals*. HarperCollins.

home testing kits that quantify one’s metabolism (measuring total calories eaten, calories burned, as well as activity levels). To date, early adopters are, as one would expect, people who are looking for greater accuracy to improve their performance, such as professional athletes for whom every calorie counts. Similarly, GenoPalate, also in the US, uses one’s DNA data to provide personalized food recommendations. More mainstream options that make personalizing one’s diet easier include the growing number of AI-driven consumer software apps, such as BingAI or ChatGPT. Figure 3 shows an example of a meal plan set with specific calorie and protein requirements (although the macronutrients or calorie counts are not shown in the figure, BingAI did do a good job of matching the requested protein requirement). This technology will only get better over time and likely be incorporated into retailer and restaurant apps such as Carrefour’s Hopla.

- **The affordability challenge.** To some extent, the cost issue is the same one we posed in the previous note on UPFs. “To what extent will processed foods have to differ from the ones we eat today to ensure they remain affordable but are not associated with poor health?” Out of the three macronutrients, protein is the relatively expensive one. Cost alone helps to explain why food manufacturers would want to replace it with cheaper fats and carbs, especially when advances in food technology have allowed greater mimicry of the protein, including its taste. Back in 2010, the USDA found that: “whereas carbohydrates, fats, and sugars were associated with lower food prices per 100g, protein, vitamins, and minerals were associated with higher food prices per 100g, after adjustment for energy.” That is unlikely to have changed. Any attempt to raise the protein content of the relatively affordable UPFs is going to be a challenge for consumers, especially during a cost of living crisis. Unless, of course, food manufacturers are prepared to take a hit on their margins.

Figure 3: AI’s plausible attempt at creating a weekly meal plan based on prompt, “Give me a 7-day meal plan based on the Mediterranean diet with a daily calorie intake of 2500 calories and an average of 15-20% calories from protein.”

	Breakfast	Lunch	Dinner
Sunday	Greek yogurt with honey, walnuts, and berries	Grilled chicken salad with mixed greens, cherry tomatoes, cucumber, and feta cheese	Baked salmon with roasted asparagus and quinoa
Monday	Whole-grain toast with avocado and poached eggs	Chickpea and vegetable soup with whole-grain bread	Grilled lamb chops with roasted sweet potatoes and green beans
Tuesday	Omelet with spinach, mushrooms, and feta cheese	Tuna salad with mixed greens, cherry tomatoes, and olives	Grilled shrimp skewers with zucchini and brown rice
Wednesday	Greek yogurt with granola and mixed berries	Grilled vegetable wrap with hummus and whole-grain pita	Baked chicken with roasted Brussels sprouts and sweet potato
	Whole-grain waffles	Quinoa with black bean	Grilled swordfish

Source: BingAI 2024

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