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# Surprising new leads uncovered in global obesity epidemic

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Researchers have uncovered surprising new leads in the worldwide obesity epidemic by examining the combination of our rapidly changing environment with our overwhelming appetite for protein.

Published in the *British Journal of Nutrition*, the research from the University of Sydney's Charles Perkins Centre indicates that bottle-feeding, climate change and corporate bottom lines could be among the dark horses of global obesity.

The new leads were uncovered by comparing what is known as the Protein Leverage Hypothesis against our changing environment. The Protein Leverage Hypothesis, developed by Charles Perkins Centre researchers as part of a major breakthrough in nutrition research, identifies our overwhelming appetite for protein as the driving force behind appetite in humans and numerous other animals

Increased atmospheric carbon dioxide, an explosion in ultra-processed foods, and high-protein diets in early life, for example through baby formula instead of breast milk, could all play a role in the world's expanding waistline.

"We have developed a new approach to the obesity issue, which involves the use of geometry to understand nutrition," said lead researcher Professor David Raubenheimer, the Leonard P Ullmann Chair in Nutritional Ecology at the Charles Perkins Centre and a Professor in the Faculty of Veterinary Science and School of Biological Sciences.

"The new geometric approach has produced intriguing leads on what might be contributing to the obesity epidemic.

"We've found that the Protein Leverage Hypothesis can help to bring together separate factors that have been linked to obesity, such as formula feeding and shift work, and make new predictions about what is causing obesity now and what could exacerbate it in future."

Researchers also studied companion animals, which are now impacted by obesity at unprecedented levels. Thirty-three per cent of dogs, 25 per cent of cats, and 45 per cent of horses are now estimated to be obese.

"This research represents a new platform for understanding the obesity epidemic," Professor Raubenheimer said.

"The approach is applicable to humans, but can also help us understand why other animals that share our recently altered environment are getting obese and suffering similar diseases such as diabetes.

"It is clear that obesity is more than just a medical problem, so we're using an ecological approach to understand how human biology - in particular the details of the human appetite - interacts with modern food environments to drive health problems."

Four major observations from the research include:

## Diet in infancy and in-utero could increase the risk of obesity

"We believe our diet early in life and in utero has a profound impact on the amount of protein we need throughout our lives, which in turn influences our energy intake," Professor Raubenheimer said.

"In short, anything that influences how much protein we need can increase our risk of becoming obese. Increased protein intake could lead us to process protein less effectively throughout our lives, which means we'll need more protein. To get the amount of protein we need, we'll be forced to eat more, and by eating more we are more likely to become obese."

For example, infant formula, which contains more protein than breast milk, is associated with increased rates of obesity later in life.

"We now plan to test whether the mechanism for this is through reducing protein efficiency, which causes increased protein need and in turn increased food intake."

## Climate change could be changing the nutritional composition of our food

The dramatic increase in atmospheric carbon dioxide - more than 40 per cent since 1750 - could have significant impacts on the human diet, and in turn on global obesity.

Increased carbon dioxide in the atmosphere has had enormous effects on the growth and nutritional value of plants. While crop yields have increased, they also have a lower ratio of protein to carbohydrates.

"The result of this decline in plants' protein content is that we need to eat more of them to satisfy our nutritional needs," said Professor Raubenheimer.

"Since more than 80 per cent of the calories we consume come from plants, changes in plant composition will have a major impact on the human diet."

## An explosion in ultra-processed foods, driven by economics, is making us fat

"The global rise of ultra-processed products, largely driven by powerful transnational corporations, began in the 1980s and so correlates well with the doubling of international obesity rates," said Professor Raubenheimer.

These ultra-processed foods tend to be low in protein and high in energy density, carbohydrates and fat as a result of the high cost of protein. They are attractive to producers because they are cheap to manufacture and can be engineered to be hyper-palatable for consumers.

"Because of the comparatively low price of ultra-processed foods, we tend to see lower income groups buying foods with lower protein density. This explains the paradox of low socioeconomic groups eating more energy."

Dilution of protein in processed foods also extends to animal feeds, which leads to increased fat in the human diet through elevated fat content in meat.

## Dogs, cats and horses are also affected

The same factors that could be driving human obesity, particularly the high cost of protein and rising atmospheric carbon dioxide, also appear to influence companion animal nutrition.

In dogs, owners' low income is consistently associated with obesity. This is likely a result of quality of food rather than quantity, as cheaper dog food tends to have a lower proportion of protein.

Changes in plant composition resulting from increased atmospheric carbon dioxide are likely to have a particularly pronounced impact on horses.

Provided by University of Sydney