

# Leading the *whey* in tackling obesity



**TEAGASC** researchers provide an update on their investigations into the underlying mechanism for the anti-obesity effect of whey proteins.

A team of researchers led by Kanishka Nilaweera has published a series of articles in *TResearch* in recent years detailing their work on assessing how dietary whey proteins reduce body weight gain. This article summarises recently published data that extends their previous work by showing an underlying mechanism for the above effect. This work will pave the way for the creation of dietary interventions that can contribute to preventing or curing the development of obesity.

### Worldwide obesity problem

The prevalence of obesity worldwide has doubled since 1980. According to a Health Ireland survey in 2015, 60% of the population aged 15 years and over are now either overweight or obese. This is a major health problem because it increases the risk of development of several clinical conditions, such as diabetes and cancer. This highlights the need to develop suitable interventions to cure or prevent the development of obesity.

### Healthy weight for Ireland plan

Given these trends and health implications, the Irish Government published a ten-year policy and action plan for 2016 to 2025 (Department of Health, 2016) to reduce the number of overweight and obese individuals in this

country. This approach was developed following consultation with a wide variety of governmental and non-governmental organisations, including the general public. Importantly, it sets out the “Ten Steps Forward” action plan and additional actions to support the above steps. A key step in this regard is to “embed multi-sectoral actions on obesity prevention with support of Government departments and public sector agencies”. Teagasc is committed to this process through the ‘Vision Programme on Obesity’ by providing valuable knowledge on how obesity develops and, in turn, developing interventions to prevent or cure this disease.

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### Intestine and body weight regulation

The role of the intestine in body weight regulation is well established, given its role in the production of satiety hormones, as well as in nutrient absorption via specific nutrient transporters. The intestine also harbours a large quantity of microbes, and their importance for body weight regulation has been shown using germ-free mice (i.e., mice that have no microbes in their gut). Notably, these mice show reduced fat mass despite consuming more food than conventionally raised mice (which harbour a normal complement of gut microbiota). The data suggest that microbes play an important role in supplying nutrients to the host, since in the absence of this contribution (as in germ-free mice), the mice adapt by consuming more food. Given the interaction between nutrients, intestine and gut microbiota for body weight regulation, one could then envisage that changes to one component (for instance, the diet) would profoundly affect how other components in this chain influence body weight.

Our data suggest that combining low sugar (sucrose) with whey protein intake may help the general public to gain less weight, and turn the obesity tide.

### Anti-obesity potential of dietary whey proteins

Our interest in exploring the anti-obesity potential of whey proteins started in 2012. Since then, we have published a number of research papers exploring how whey proteins reduce weight gain, which we have summarised in articles published in *TResearch* in 2013, 2014 and 2016. Notably, this work led us to focus attention on the intestine as a key mediator of the whey protein effects. Additionally, our previous data suggested a potential interaction between whey proteins and carbohydrate in the diet that could further influence body weight gain. However, it wasn't clear from this work if the interaction related to sucrose content in the whey protein diet. To further investigate this, we designed an experiment to assess whether whey proteins could influence key intestinal components involved in nutrient absorption and if there is an interaction between whey proteins and sucrose that can modify the intestinal components (gut microbiota and nutrient transporters) regulating body weight. Mice were fed a diet with whey protein isolate (WPI) with either high or low sucrose for 17 weeks; the controls received the same diets but with casein (Nilaweera *et al.*, 2017). Irrespective of the sucrose content, animals given WPI had reduced weight gain and fat mass. Notably, intestinal expression of genes involved in glucose transport and fatty acid transport were reduced. Additionally, the composition of the gut microbiota was also altered, where certain

populations linked to the development of obesity were found to be reduced in abundance in the WPI group. Notably, there was an interaction between sucrose content and WPI, whereby lowering the sucrose content in the WPI diet increased energy expenditure (without further affecting the intestinal transporters and the gut microbiota). This further reduced weight gain and fat mass. The data suggest that WPI affects intestinal mechanisms controlling nutrient absorption (nutrient transporters and the gut microbiota), and that by modifying the sucrose content in the WPI diet, there is a further independent effect on fat mass.

### Relevance to policymakers and the industry

A key action plan of the above policy document produced by the Department of Health is to develop ways to reduce sugar content in the diet. Our data suggest that combining this strategy (low sugar [sucrose]) and taking whey protein may help the general public to gain less weight, and turn the obesity tide.

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### References

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