Transforming Eating Habits: How the Food Industry Can Respond to the Rise of Anti-Obesity Medications

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Executive Summary

Obesity has emerged as one of the most pressing public health challenges of the 21st century. Projections indicate this alarming rise in obesity is set to continue, with prevalence increasing across all demographics and geographies globally.

Coinciding with this crisis is the accelerating adoption of Anti-Obesity Medications (AOMs), particularly glucagon-like peptide-1 (GLP-1) receptor agonists.

Yet, despite the success of such interventions in assisting weight loss, they aren't without their limitations. Most pressing of which might be the emerging nutritional needs of individuals undergoing such treatments.

This Paper Examines:

- The obesity epidemic's negative impact on health, societal, and economic outcomes.
- The role and limitations of AOMs in combating this crisis.
- The growing need for palatable Companion Foods: nutritionally optimized, portion-appropriate products designed to support the needs of AOM patients.

Drawing on these insights, this paper highlights the opportunities food manufacturers have to create much-needed Companion Foods. It also explores why overcoming the inherent challenges of such products and delivering the right balance of nutrition, texture, and flavor requires innovation and close collaboration with trusted ingredient and taste technology partners.

Table of Contents

1. The Global Obesity Epidemic

1.1. Current State and Predictions

The growing global obesity crisis has rapidly become one of the most pressing public health challenges of our time. Once seen as an issue isolated to specific demographics and nationalities, the negative impacts of this trend are now being experienced worldwide.

According to the World Obesity Federation, in less than a decade (by 2035), over 4 billion people, i.e., more than 51% of the global population, may be overweight or obese, with a Body Mass Index (BMI) of ≥ 25 (Fig. 1).

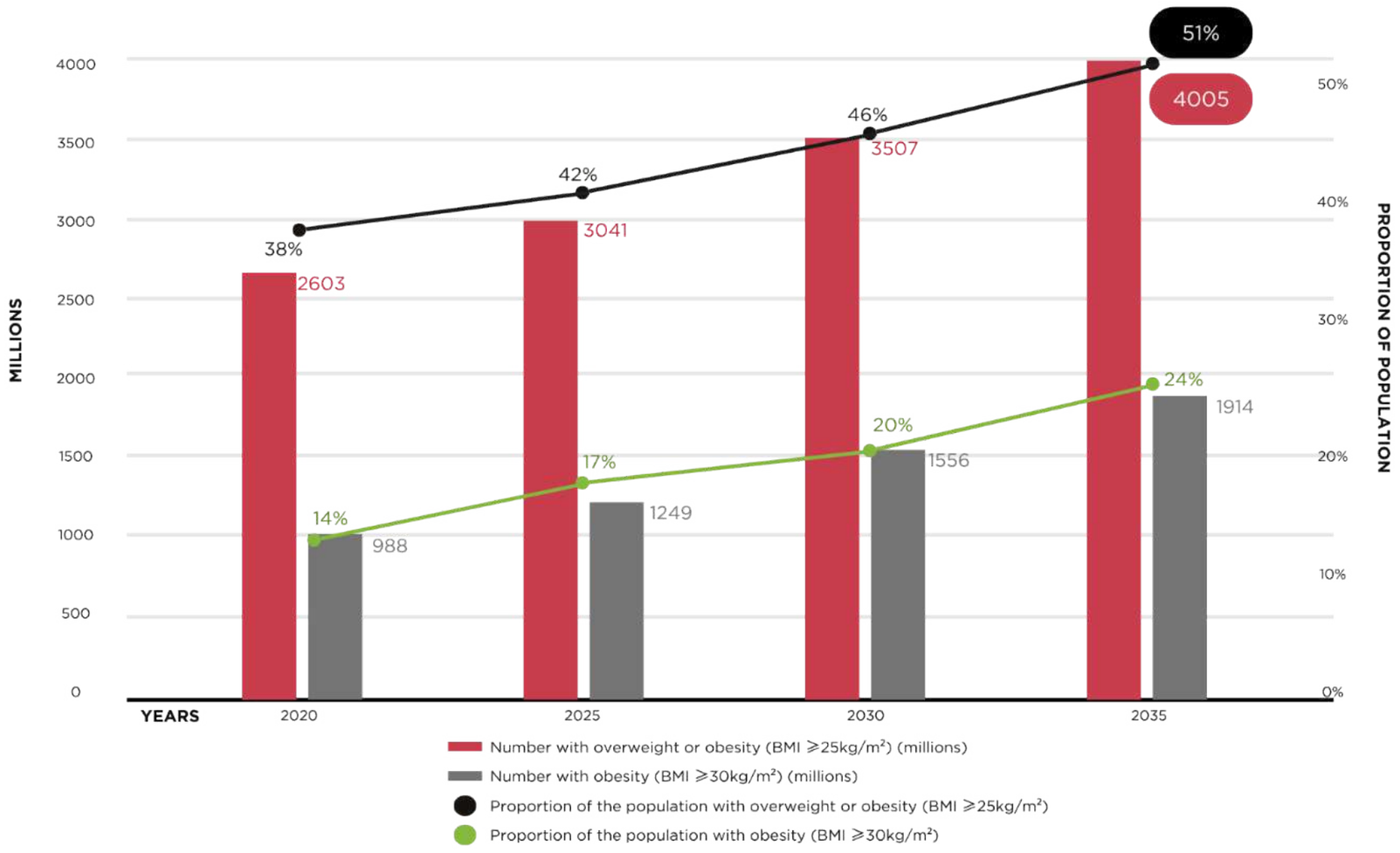

Fig. 1: Global overweight and obese individuals expressed as total number and as proportion of the population (Source: World Obesity Federation, World Obesity Atlas 2023).

While every country is affected by rising obesity rates, some of the steepest increases over the past ten years have occurred in lower-income countries.

Yet, this trend shows it does not discriminate by the strength of a nation's economy. In fact, if current trends persist, The United States also faces particularly severe projections (Fig. 2).

- By 2035, 58% of adults could be obese, reflecting a 2.1% annual increase.
- Childhood obesity is predicted to grow even faster at 2.4% year-over-year.

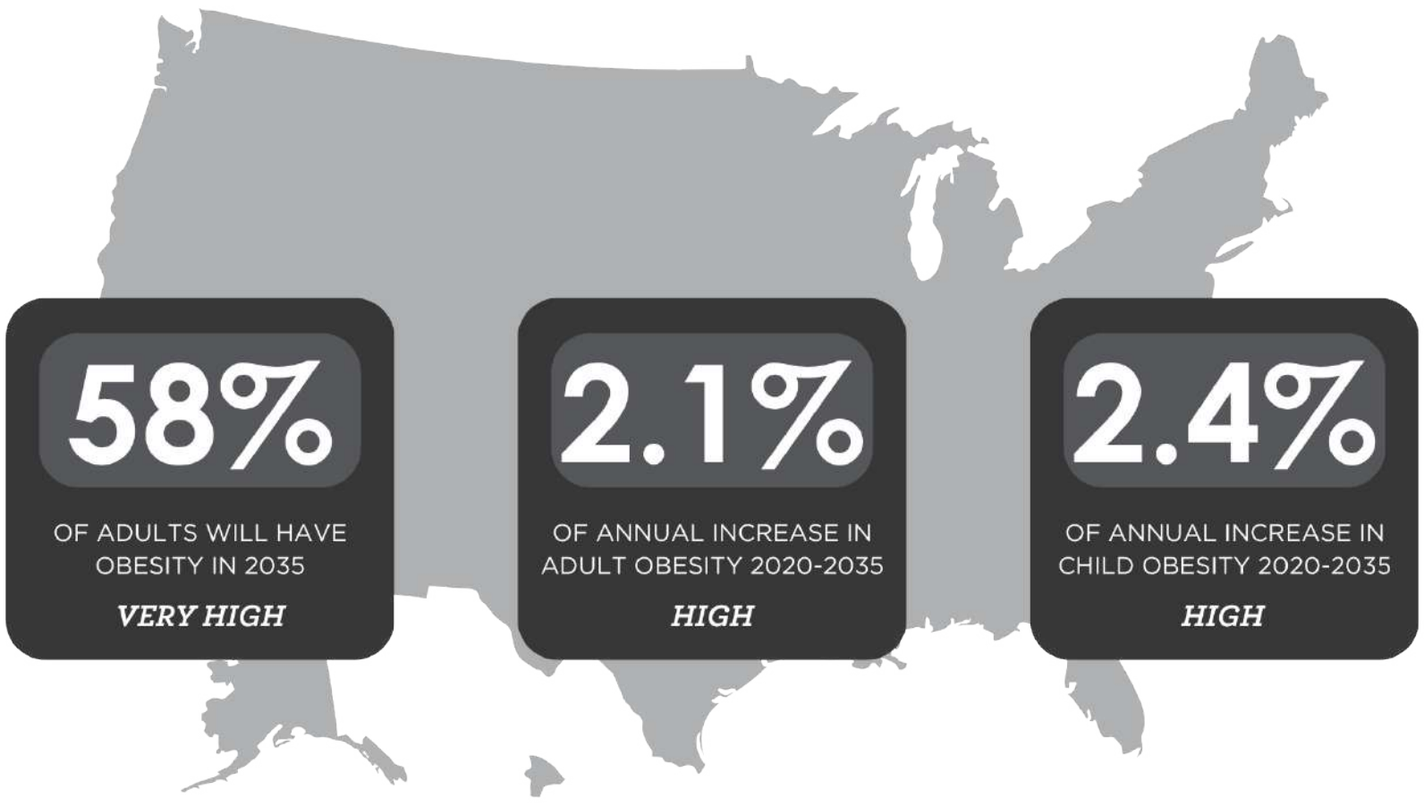

Fig. 2: Obesity epidemic in the United States (Source: World Obesity Federation, World Obesity Atlas 2023).

Although these are only projections, this current trajectory paints a bleak picture for health across all generations.

1.2. Negative Impacts

Obesity can cause a range of personal suffering that affects both daily life and emotional well-being. Physically, patients with obesity often experience chronic pain, limited mobility, fatigue, and sleep difficulties that make ordinary activities more challenging.

More specifically, per the U.S. Centers for Disease Control (CDC), obesity at all ages increases the risk for:

- High blood pressure and high cholesterol (risk factors for heart disease)
- Type 2 diabetes
- Breathing problems (asthma, sleep apnea, etc.)
- Joint problems (i.e. osteoarthritis and musculoskeletal discomfort)
- Gallstones and gallbladder disease

Adults with obesity, in particular, have higher risks for stroke, many types of cancer, premature death, and mental illness such as clinical depression and anxiety.

The scientific literature also shows that obesity can interfere with critical developmental processes in children. This includes potential long-term metabolic and epigenetic changes, extends the duration of physiological stress, and affects both physical and cognitive growth.

These psychological and physical issues may manifest as:

- Anxiety and depression
- Low self-esteem
- Lower self-reported quality of life
- Social problems (bullying and stigma)
- Chronic obesity through adulthood

Emotionally, obesity can lead to low self-esteem, sadness, or anxiety, often intensified by feeling judged or misunderstood. Social situations may become stressful, leading to avoiding events, travel, or activities once enjoyed. Everyday tasks - finding comfortable clothing, fitting into seats, or staying active - can become frustrating. All of this can create an ongoing internal struggle, including guilt, discouragement, or a sense of being trapped, especially when efforts to change feel unsuccessful.

In addition to the personal suffering of those impacted by overweight and obesity (BMI 25), the economic implications of the obesity crisis are equally concerning.

The global financial impact of overweight and obesity was estimated at USD $1.96 trillion in 2020, potentially exceeding USD $4 trillion by 2035. This represents a reduction in Global Domestic Product (GDP) from 2.4% to 2.9% over the same period (Fig. 3)

The obesity epidemic also results in significant economic losses, resulting from:

- Higher direct healthcare costs
- Increased indirect costs due to:
  - Absenteeism
  - Reduced productivity
  - Premature retirement
  - Early mortality

	2020	2025	2030	2035
Economic impact (US$ at 2019 value) (trillions)	US$ 1.96	US$ 2.47	US$ 3.23	US$ 4.32
Impact as proportion of reduced global GDP	2.4%	2.5%	2.7%	2.9%

Fig. 3: Global cost of high BMI ≥ 25 (Source: World Obesity Federation, World Obesity Atlas 2023).

Alleviating the personal pain and economic strain resulting from rising obesity is the catalyst behind the incredible success of anti-obesity medical interventions.

2. Rise of Anti-Obesity Medications (AOMs)

As a result of the global obesity epidemic, AOMs are witnessing rapid adoption, with global Compound Annual Growth Rates (CAGR) projected at 40 - 45% across all regions (Fig. 4). In the US, more than 10% of the population is currently prescribed AOMs to help combat obesity.

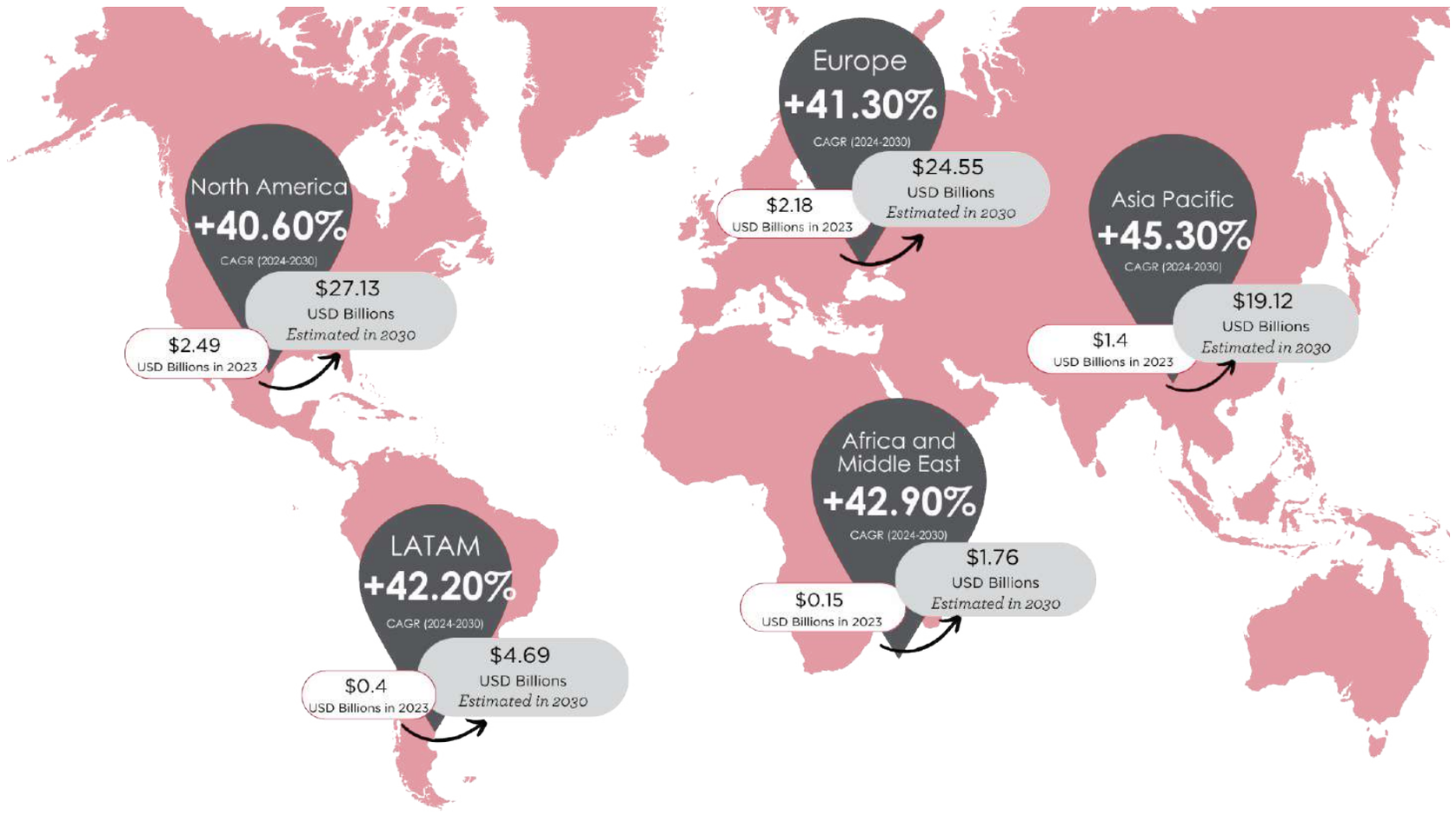

Fig. 4: Global Market for Anti-Obesity Medications (Anti-obesity Medication Market Size & Outlook, 2030).

Leading the charge among AOM adoption are the now ubiquitous, GLP-1 receptor agonists.

3. GLP-1 Receptor Agonists: How they work

GLP-1 receptor agonists were originally, and still are, prescribed for patients suffering from type 2 diabetes to improve glycemic control. They work by mimicking the function of GLP-1, a naturally occurring hormone that plays a key role in regulating blood sugar, appetite, and digestion. These medications stimulate insulin release from the pancreas, thereby lowering blood glucose levels. GLP-1 receptor agonists also suppress glucagon release and prevent postprandial glucose spikes.

GLP-1 receptor agonists have also been shown to slow down gastric emptying, increase satiety after eating, and reduce appetite. This results in reducing calorie intake and treating obesity (Boer & Holst, 2020).

The success in helping patients lose weight has many viewing GLP-1 medications as the “silver bullet”. However, despite the impressive results of these interventions, it’s important to note that obesity is a multifactorial disease. Meaning, rather than a single one-size-fits-all remedy, lasting results may require integrated interventions such as dietary modification, exercise, pharmacotherapy, behavioral support, and, in some cases, bariatric surgery.

One interesting avenue some are exploring is increasing the production of GLP-1 naturally through the diet.

4. Dietary intervention for sustained secretion of GLP-1

Stimulating the body’s natural production of the GLP-1 hormone is an intriguing way to support patients on their weight-loss journeys. Under normal conditions in obese individuals, there aren’t adequate nutrients present in the lower gastrointestinal tract to interact with enteroendocrine L-cells and secrete the GLP-1 hormone. However, through targeted dietary intervention, the presence of various nutrients such as carbohydrates, dietary fibers, lipids, proteins, or phenolic compounds in the distal regions of the small intestine and the colon could result in sustained GLP-1 secretion and improved weight loss.

This solution could be achieved through a slow digestion-oriented approach as proposed by Qin et al. More specifically, adding encapsulated nutrients or slowly digestible macronutrients to the diet, such as viscous dietary fibers or resistant starch, could slow the digestion of food components. Subsequently, this could increase the presence of these nutrients in the lower gastrointestinal tract. The high density of L-cells in this region, combined with increased nutrient availability from slow digestion, could enhance the secretion of GLP-1 from enteroendocrine L-cells (Qin et al., 2021).

The potential of these dietary solutions could prove essential, especially when one considers the numerous challenges AOM patients are facing.

5. Challenges related to AOMs

Despite their undeniable success, there are numerous reported challenges associated with AOMs. Physically, these primarily consist of gastrointestinal side effects such as nausea, constipation, and diarrhea.

AOM patients also face a high risk of regaining weight after discontinuation of the medication. This is a major reason why patients are required to maintain ongoing lifestyle changes to sustain a healthy BMI. Also, there is emerging evidence in the scientific literature that treatment with AOMs may affect taste - and potentially smell - in some patients.

Lastly, we must address a significant underlying challenge, which I refer to as the AOM patient’s dilemma.

5.1. The AOM Patient's Dilemma

One of the primary ways GLP-1 therapy helps patients lose weight is by dramatically reducing appetite and, as a result, meal size. However, this also creates a unique set of dietary challenges for these patients. Among these is reduced portion tolerance, where large meals can cause discomfort or nausea.

Since smaller portions may provide insufficient macro- and micronutrients, AOM patients may be at risk of nutrient dilution. While a suppressed appetite can lead to reduced food intake and desirable weight loss, insufficient nutrients can adversely affect physiological functions and overall well-being.

In other words, AOM patients still need to eat, even if they don't want to.

Moreover, as reported by Khan and Doty (2024), GLP-1 receptor agonists can significantly impair all five basic taste qualities of sweet, salty, sour, bitter and umami.

The combination of these challenges creates a demand for foods that are nutrient-dense, portion-appropriate, and palatable.

6. Companion Foods to address AOM patients' needs

The challenges associated with the AOM Patient's Dilemma, as outlined in section 5, are addressed by Companion Foods - products intentionally formulated to meet the nutritional, sensory, and functional needs of AOM patients.

The core design principles of companion foods are as follows:

- Smaller Portion Sizes: To align with reduced stomach capacity and satiety changes.
- High Nutrient Density: To deliver adequate protein (˜ 20g) in support of muscle mass preservation during weight loss, fiber, vitamins, and minerals in fewer calories.
- Appealing Taste and Texture: To maintain eating enjoyment while meeting dietary goals.
- Convenience: Snacks, smoothies, shakes, prepared meals.

Crafting companion foods that successfully hit on each of these principles can be difficult, especially when it comes to taste.

6.1. Taste challenges

While foods with high nutrient levels may offer the physiological benefits AOM patients need, they often come at the cost of reducing taste, texture, and overall enjoyment.

For example, plant-based proteins can impart beany, green, earthy, and bitter off-notes. The addition of certain herb extracts, vitamins, and minerals often contributes to undesired bitter and metallic tastes. Fig. 5 provides an overview of off-notes created by common ingredients, as well as by macro- and micronutrients.

INGREDIENT CATEGORY	EXAMPLES	OFF-NOTES
Polysaccharides	Starches, fibers	Cardboardy
Plant-Based Proteins	Pea, fava bean, chickpea, lentil, rice	Beany, green, earthy, bitter
Vitamins	Vit B1, B2	Bitter, sulfury
Minerals	Iron, copper, magnesium	Metallic, bitter
Amino Acids	Beta-alanine, branched-chain amino acids (Leu, Ile, Val)	Metallic
High-Intensity Sweeteners	Stevia, monk fruit, aspartame	Bitter, licorice
Acids	Lactic acid, Acetic acid	Sour

Fig. 5: Taste challenges associated with high nutrient-dense foods (adapted from Grizio M., 2022).

Designing companion foods that meet the needs of AOM patients requires that they are not only nutrient-dense but also taste great. Given the challenges associated with these food products, achieving success is far from easy. It requires close collaboration between food manufacturers and their trusted ingredients and flavors partners.

6.2. Edlong's Dairy Taste Technologies and Partners

Through innovation, experience, and strong relationships across the food and beverage industry, Edlong continues to be at the forefront of addressing the challenges facing companion food developers.

Edlong combines internal IP in bioconversion technologies with specialized knowledge in flavor creation to develop market-leading taste solutions. Edlong's Flavorists, Application Scientists and Sensory Experts are also leveraging globally recognized partner organizations and state-of-the-art facilities such as the Monell Chemical Senses Center in the US, NIZO in the Netherlands, Teagasc in Ireland, and Tecnológico de Monterrey in Mexico.

The results of these efforts are dairy taste technologies proven to deliver superior results in a variety of food applications. More specifically, these include high impact flavors that deliver a desired, consumer preferred sensory profile, off note maskers, and enhancers of creamy mouthfeel, sweetness, or saltiness perception (Fig. 6).

Fig. 6: Edlong's suite of dairy taste technologies.

These dairy taste technologies can be potential game changers for companion food developers, and the growing number of people that may come to rely on these products.

6.3. Masking and Flavor Modulation in High-Protein Rice Milk

To demonstrate effectiveness in masking and taste enhancement in high-protein foods, Edlong's R&D team developed rice milk with a high level of pea protein (6g per 8oz serving). Per Fig. 7, the sensory data from a trained expert panel indicated that the addition of Edlong's masking and Sweet Spot® taste technology reduced negative sensory attributes (grain, earthy, cooked vegetable protein, cardboard, bitter) and improved positive sensory attributes (milk, cream, butter, vanilla, brown sugar, sweet).

The resulting high protein rice milk product aligns well with the needs of AOM patients, delivering both meaningful nutritional benefits and a positive consumption experience.

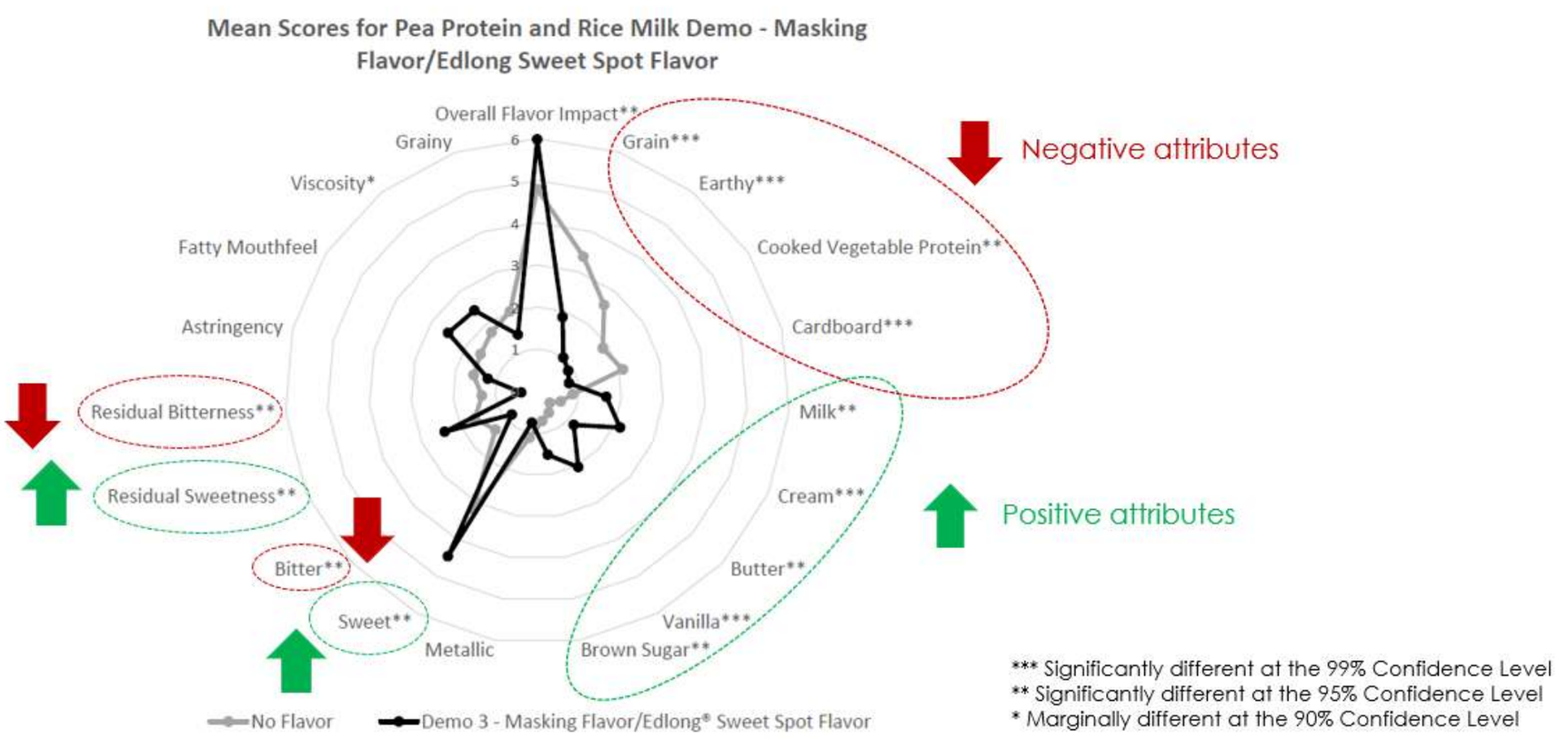

Fig. 7: Sensory analysis of rice milk with high level of pea protein with and without Edlong's masking and Sweet Spot® taste technology.

7. Conclusion

Obesity is a global public health and economic crisis, driving urgent demand for effective solutions. As Anti-Obesity Medication (AOM) use accelerates - led by the rapid adoption of GLP-1 agonists - patients are experiencing not only weight loss and health benefits but also new nutritional and behavioral challenges. This growing population represents an emerging, distinct consumer segment with evolving expectations for how food should support their physical and emotional well-being.

For food manufacturers, this presents a unique opportunity to lead by developing Companion Foods designed specifically to meet the needs of AOM patients. Achieving this will require close collaboration with ingredient and taste technology partners to deliver the right balance of nutrition, texture, and flavor.

Edlong is at the forefront of this movement, offering a suite of natural dairy taste technologies derived from bioconversion to empower food developers in creating delicious, satisfying Companion Foods that can truly make a difference.

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