

Executive
Summary

- Insight into the changing face of meal-replacement products.
- Striking a balance between calories and nutrients in meal replacements.
- Using fiber and protein to promote satiety.

Pinch Hitters: Building High-Performance Meal Replacements

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Photo: Danisco

Mealtime: what a quaint notion. With chaotic schedules and admonitions to “graze” making mincemeat of the three squares, sitting down to an actual meal has acquired the air of nostalgia. But a body’s still gotta eat (or drink), so a whole category has arisen to cater to a harried society’s need for easy-to-consume products that take the place of what we used to call breakfast, lunch or dinner. Of course, some of us have been dispatching with mealtime via snacks for years. But in an era that prizes “performance,” the market for meal replacements presents an irresistible opportunity to package high-powered nutrition into convenient formats that do the job in a pinch.

Changing face of meal replacement

Meal replacements are nothing new. From Alba 77 and Carnation Instant Breakfast to Slim-Fast, Ensure and the many iterations thereof, products have long promised to deliver nutrition without the tedious prep or consumption time required of traditional meals. What makes contemporary meal replacements different, though, is their mainstream appeal.

“Today, we have a growing population of health-conscious consumers who are constantly on the go,” says Sarah Hines, market analyst, Danisco, USA, New Century, KS. “They need—and want—meal replacements more often.” Contrast this with the days when meal replacements were relegated to the pharmacy’s “medical foods” shelf or were gulped down glumly by dieters who remained at their desks while coworkers headed to the sandwich shop for a proper lunch.

Today’s meal-replacement consumer actually flaunts his choice, a reflection not only of a schedule that screams, “in demand,” but a sign of nutritional savvy, too. “Consumers are more knowledgeable,” Hines says. “They constantly question labels and the nutrition facts on many types of products; meal replacements are no exception.” In fact, meal replacements may receive heightened scrutiny given the nutritional expectations we place on them.

“Consumers want to make sure they are getting the nutrients they would expect from a full meal,” Hines says, “but they also want to make sure that these meal replace-

ments aren't eating up their entire calorie counts for the day."

Current meal replacements also forge a new path in the creativity with which makers design and promote them. "We are seeing new and innovative ways to market these meal replacements, and innovative ways to sell them, such as through vending machines and concession stands," Hines says. "They can provide a way to boost a consumer's exercise program, adding extra fuel, building muscle, and in some cases almost acting as a functional food or beverage, as well as a meal replacement."

Bars and beverages are still the standard delivery vehicles, but they're stretching the boundaries of their respective categories. "Bars and beverages that deliver a specific nutrient have gained traction," says Kāti Ledbetter, product development scientist, ADM, Decatur, IL. "An example is an instant stick pack that contains fiber and flavor and can be added to water."

Making calories count

But products that bill themselves as meal replacements still must work overtime to stand apart from all the other bars

and beverages filling store shelves. For example, Ledbetter says, "A meal replacement must deliver a balance of protein, fat, carbohydrates and fiber, as well as a balanced combination of micronutrients, as the products must deliver what a person generally would get in a well-balanced meal."

Adds Ram Chaudhari, Ph.D., senior executive vice president, chief scientific officer, Fortitech, Schenectady, NY: "Nutrient density is key. The calories are going to be there, but wherever those calories come from, you give much more benefit from a nutritional and meal replacement point of view if you have nutrient-dense calories." That starts with the basic macronutrients, and here again he echoes the call for balance.

"How you get those calories—whether from simple sugars, fat, protein—they must be balanced in such a way that each meets the guidelines for nutrition," Chaudhari says. With all the talk about "empty calories" and unmet fiber needs, for instance, he thinks manufacturers should consider delivering more calories with whole grains and complex carbohydrates than simple sugars.

Calorie totals should suit the target audience. "The caloric value depends upon the overall functionality of the meal-

replacement product,” Ledbetter says. “What is the real consumer goal here: weight loss or muscle building?”

Chaudhari suggests deriving 50% to 60% from a combination of complex and simple carbohydrates, 10% to 15% from “biologically active” protein and the remainder from a mix of saturated and unsaturated fat.

As for “diet” or “lite” formulations, Ledbetter says the quantities, again, can vary. “Bars and meal replacement beverages can range from 150 to 300 kcal per serving,” she says.

Micromanagers

Macronutrient calories are only part of the picture. “You need micronutrients because those are the cofactors necessary to get the maximum benefit from macronutrients,” Chaudhari says. How much to add? A full 100% would be “overload,” he says, setting 50% as the absolute top. The optimal level lies between 25% and 30%, he thinks—about what you’d get in a meal—“because you’re going to eat something else besides this one meal replacement throughout the day.”

Which vitamins and minerals to include presents a creative marketing opportunity for manufacturers—and a chance to put the emerging science on “personalized nutrition” to use. As Tracy Mosteller, senior applications specialist for beverages, Danisco, says, “Nutrient considerations are based on the target demographic, as in high calcium for growing kids, iron and calcium for women, and B vitamins for energy in products targeted toward men.” Probiotics can add an immune or digestive angle, while prebiotic fiber appeals to those seeking digestive health and satiety, she adds.

Hitting the satiety spot

Satiety is an asset no meal replacement can be without. This seems intuitive, considering that a compact bar or beverage not only must supply the nutritional equivalent of a meal, but should stanch cravings from one eating occasion to the next. If you believe the optimists, satiety may help combat obesity by controlling hunger and bringing energy intake in line with expenditure.

But what seems intuitive in theory isn’t always easy to bring about in formulation. Fortunately, fiber and protein ingredients help. “By combining the properties of proteins and fibers, products are being developed to meet consumers’ satiety and weight-management needs,” Ledbetter says. “Various studies have shown that adding fiber sources to the

diet decreases energy intake and increases production of multiple satiety hormones.”

ADM produces a digestion-resistant maltodextrin that’s 90% soluble dietary fiber and “essentially tasteless, colorless, odorless and transparent in solution,” Ledbetter says. Studies show it mediates regularity and blood glucose and serum lipids levels. The upshot: “It may impact satiety by decreasing hunger, prolonging satiation or increasing satiety signals from the gut,” she says.

A polydextrose ingredient from Danisco, “can help reduce energy intake by aiding the manufacture of foods and beverages that are less calorically dense and that have a lower glycemic response,” says Michael Bond, senior business director, functional fibers, Danisco Sweeteners. Human clinical studies have demonstrated the satiety-enhancing capabilities of polydextrose, allowing for a total caloric reduction of between 5% and 25%, he says.

“Inulin also may be worth including in meal replacements because it is a prebiotic fiber that helps promote digestive health by stimulating the normal, beneficial bacteria in the digestive tract,” says Deborah Schulz, product manager, Cargill Health & Nutrition, Minneapolis. It has functional benefits for formulators, too, restoring texture to reduced-sugar and -fat formulations. “Liquid inulin can bind bar ingredients together, as well,” she says. And it does its work under the radar. “Inulin is known as the ‘invisible’ fiber because it has a clean flavor and less impact on the functional properties of foods compared to other, and particularly insoluble, fibers,” she says.

And don’t forget protein. The National Dairy Council, Rosemont, IL, reviewed scientific literature and concluded that protein promotes satiety more effectively than carbohydrates or fat, reinforcing a 2002 Institute of Medicine (IOM) report that concluded the same. According to the National Dairy Council, whey protein may stimulate several gastrointestinal hormones thought to regulate

appetite control. While its full complement of essential amino acids and high biological value make it easy for the body to use, it’s easy on product developers, too. Whey’s neutral flavor complements fruit profiles, and its solubility and clarity are ideal in meal-replacement beverages.

A stable foundation

That raises a critical question: beverages or bars? “Bars tend to be more satisfying because consumers are eating

versus drinking,” Mosteller says. “It gives them the feeling that they’ve had a full meal, where with beverages, the satisfaction of chewing is absent.” Beverages also introduce “extra process considerations that can affect shelf life,” she adds. “Beverages must be UHT- or retort-processed with high heat to obtain shelf stability. Bars have a much lower water activity, so the shelf life considerations are more focused on quality than microbial spoilage.”

Either way, meal replacements, with their welter of nutrients, “can be very complicated applications,” says Ledbetter. “Selecting the right ingredients for the finished product is key to success. An example is deciding if a soluble, insoluble or fiber blend works best in an application, or deciding which protein source will give the best sensory attributes while delivering the needed nutrients.”

Chaudhari notes that protein ingredients with more free amino acids and short peptides can trigger Maillard browning and bitterness. Fat also may misbehave. “Depending on the ratio of saturated versus unsaturated, it could produce oxidative interactions,” he says. And although micronutrient catalysis in our cells is a

good thing, in meal replacements ... not so much. Iron, for example, may react with unsaturated fatty acids to cause rancidity; antioxidants protect us against oxidation, but “they can work as pro-oxidants, too,” he notes, “creating rancidity or cardboard sensory properties in the finished product.”

Manufacturers can mitigate such interactions through wise ingredient choices. Again, consider iron. “You have 10 or 15 different ingredient types to choose from, depending on what type of product you’re making, whether it’s liquid or powder or grain-based or dairy-based,” Chaudhari says. “Then you choose the appropriate amount, and premixes aid stability. The challenges to meal replacement remain, but we continue learning more and more.”

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