

Trends in Sports Drink Formulations

As product developers look to better serve consumer niches with formulated sports beverages, specialty ingredients, from various whey proteins to high value nutrients to an expanding array of sweeteners, are being used by R&D.

Just a few years ago, sports drinks were dominated by the two “ades”—Gatorade and Powerade. Though other drinks tried to compete, they could not trump these two powerhouses and eventually fell unnoticed by the wayside. Now the market includes a much wider variety of sports beverages targeting a greater range of needs, ages and personalities. From kids’ sports drinks to coconut water, the sports drink market is growing in size and adopting beverages that traditionally fit within other categories.

Current Trends

There are a few distinct trends in sports drink formulation. The first and most notable involves categorizing beverages into segments that cater to the needs of athletes by type. Gatorade Tiger (with L-theanine for focus), though now discontinued, was a prime example and captured an audience that was previously lost in a sea of products geared towards endurance athletes and team sports. Another example is the brand new Powerade Play for kids. Play was formulated for kids, but with moms in mind. It contains 20% of the Daily Value (DV) of four B vitamins, 100% DV of vitamin C, 20% DV of zinc, a trademarked electrolyte system and 25% less sugar. Children have a greater risk of dehydration and heat illness than adults and require products made especially for them, making Play a smart addition to the Powerade line.

The second trend feeds off the concept of “nutrient timing”—strategically consuming certain nutrients within proximity of training, to facilitate greater training adaptations and/or shorten recovery time. Thus far, nutrient timing has focused largely on carbohydrates and protein, but, in the future, non-nutrients may be timed, as well. Protein-based recovery drinks or Ready-to-Drink beverages (RTDs), though they do not fit the traditional mold of sports drinks, are the best-known sports drinks in this category and can facilitate training adaptations from endurance, in addition to strength/power training. Many “recovery” drinks are also typically based on nutrient timing research.

A third trend involves a crossover between sports drinks and functional beverages. Glaceau’s vitaminwater, for instance, started as an enhanced water, but the company’s revive® fruit punch became the official hydration partner of the NCAA. This relationship pulled the brand into the sports drink category, with its “revive to survive” theme that rings in the minds of March Madness enthusiasts. Another interesting beverage that athletes are starting to pick up is coconut water that is beneficial for rehydration, because it tends to be a naturally isotonic beverage. (See www.zico.com/benefits/ for one sports beverage company’s discussion on its product). Fruit juices native to other countries, such as açai in Brazil, may likewise be used as a sports beverage.

All three of these trends will continue into the near future, as sports drinks become further segmented with products specifically targeting women, additional products formulated for children and drinks containing even more functional ingredients. In addition, the buzz phrase “nutrient timing” continues to grow in popularity, and research in this area will facilitate future ingredient trends.

Future Ingredient Trends

Nutrient timing, a phrase used to describe decades of research showing athletes have a

“window of opportunity” to replace glycogen stores and maximize muscle protein synthesis, has extended beyond just carbohydrate and protein and delved into how specific types of carbohydrates impact insulin secretion, glycogen replacement and gastric emptying (with faster gastric emptying being equated with less gastrointestinal distress).

In addition, novel research published in 2008 from the University of Birmingham in the U.K. found that incorporating a variety of carbohydrates can enhance carbohydrate absorption and gastric emptying, as well as increase fluid delivery. The conventional recommendations to consume 30-60g of carbohydrate per hour were based on saturation of the glucose transport mechanism. Once this metabolic pathway becomes saturated, the body will not absorb any more glucose for the time being. However, this study from U.K. researchers found that combining more than one sugar (in this case glucose and fructose) allowed for greater carbohydrate absorption, as fructose has its own transport mechanism.

Expect continued research to provide more information on the nutritional properties and metabolism of each type of carbohydrate. Products will be formulated or reformulated to include some types, while leaving out others (notably HFCS). The trend will be towards more “natural sweeteners” for lower calorie beverages. For example, a current trend has been to combine reb-A (rebaudioside-A from the stevia plant) with erythritol, with one advantage being this low-calorie combination better mimics the taste of sucrose. There has been some interest in rebaudioside-C to help reduce caloric levels as a sweetness enhancer, although this compound has not achieved FDA notification GRAS status.

A select list of sweeteners and their characteristics follows. All, except erythritol, are considered non-nutritive, in that they provide negligible calories at their typical use level.

* Acesulfame-K (ace-K), at 0Kcal/g, is some 200 times sweeter than sugar, has a clean taste, produces no glycemic response and is often used in combination with other sweeteners in processed beverages. Additional characteristics and/or applications in beverages include stability under high temperatures, a wide pH range, a long shelflife, synergy with other non-nutritive sweeteners, and it can be used in many beverage applications.

* Aspartame, at 4Kcal/g, is 160-220 times sweeter than sucrose, does not produce dental caries and has a limited effect on blood sugar. It is claimed to enhance, extend and intensify fruit flavors, such as cherry and orange. It can be used in milk products, although some aspartame may be lost over time (depending on storage temperatures and pH). Decreasing the pH of milk from 6.7 or 6.6 to 6.4 increases the stability of aspartame and lessens the loss of sweetness.

* Erythritol, at 0.2Kcal/g, is 60-80% as sweet as sugar and may also function as a flavor enhancer, stabilizer, thickener and texturizer. It is non-cariogenic, has a very low laxative effect, very low glycemic index and does not raise blood glucose or insulin levels. It has been suggested that erythritol be combined with reb-A in beverages.

* Saccharin, at 0Kcal/g, is 200-700 times sweeter than sugar and produces no glycemic response. Although it is still used in many products, it rarely is used in sports beverages.

* Sucratose also has no calories. It is some 600 times sweeter than sucrose, produces no glycemic response and has great heat stability. Other properties include a long shelf-life and stability in acidic products. It can be used in a wide range of beverages, including dairy-based drinks.

* Reb-A (rebaudioside-A) has zero calories. This stevia glycoside is approximately 200 times sweeter than sugar and is the only non-nutritive sweetener that can be considered “organic” and also GRAS. As noted, use of reb-A is increasing and is often combined

- * *Lo han* fruit extract is some 300 times as sweet as sucrose, one supplier says. It comes from monk fruit (*luo han guo*), has recently received FDA-notification GRAS status and is starting to appear in some sports beverages.
- * Neotame is an artificial sweetener approved for food use in the U.S. It is some 7,000-13,000 times sweeter than sucrose and fairly heat-stable, but is not widely used. (Also see the chart "Nutritional Carbohydrates and Sports Performance.")

In addition to the distinctions between carbohydrates, scientists are still making a case for the best type of protein. Current contenders are whey, casein and soy. Each of these has been shown to enhance muscle protein synthesis in at least one population (trained, untrained, older, younger, etc.). Whey is the clear leader among sports enthusiasts, although soy-based proteins are gaining some ground. Interest in milk proteins is also growing, based upon research into the effectiveness of chocolate milk and milk with cereal as recovery meals. According to Jeff Stout, Ph.D., director of the Metabolic and Body Composition Laboratory at the University of Oklahoma, "The majority of the research on sports beverages has demonstrated that post-exercise carbohydrate-milk protein drinks are the most effective nutritional strategy, by acutely replenishing energy (glycogen) and enhancing the anabolic effect of exercise and chronically augmenting training adaptations." In addition to whole protein, specific amino acids, especially the branched-chain amino acids, will likely be formulated into more beverages in the future.

Drinks combining ingredients that offer a variety of benefits may also be on the market soon. These drinks would fill a void in the current market, for the person who wants protein, carbohydrate, electrolytes, anti-inflammatory ingredients and possibly caffeine, all in one convenient bottle. Anti-inflammatory compounds have yet to pick up steam as expected, and future drink incorporations in this area will likely be based on compounds from tart cherries and pineapple (with the enzyme bromelain), other enzymes, omega-3 fatty acids and caffeine. Research on omega-3s has moved from recovery to the much more serious head injury-prevention area.

Though caffeine is one of the oldest known ergogenic aids, new benefits are constantly popping up in research. This multi-faceted ingredient can increase alertness and focus, minimize feelings of fatigue during long bouts of exercise, enhance glycogen resynthesis beyond what carbohydrates alone can do and decrease delayed onset muscle soreness. Caffeine is one simple ingredient with many benefits.

How can a company make a drink that is a contender for shelf space? "Me-too" products are capturing a specific market segment, whether that means children, women, tennis players or multi-sport high school students. Although taste remains important, athletes have moved beyond taste and into functionality. Products can further step away from the competition by incorporating specific types or blends of protein, carbohydrates, sweeteners and electrolytes. There may be missed opportunities in the area of electrolytes, where drinks with higher levels of sodium could be positioned for heavy sweaters. Most notable, however, is the addition of specialty ingredients, from L-theanine (for focus) to enzymes that fight inflammation and time-released beta alanine to buffer fatigue. Few drinks within the current sports beverage segment tackle pain and inflammation in a noticeable way, and if there is one common denominator from recreational athletes up to the pros, it is some type of soreness and pain.

The challenges of athletes to weekend warriors means such consumers will continue to look to sports beverages for solutions, which, in turn, will provide opportunities for the formulators of such products.

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