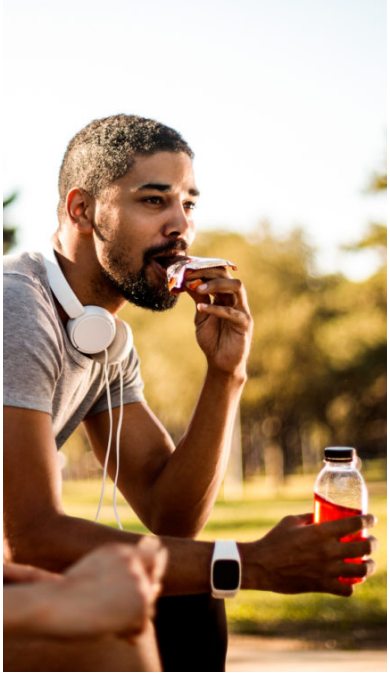


OVERCOMING FLAVOR CHALLENGES

in Performance Nutrition Applications

Sports nutrition brands face three primary product development challenges: 1) selecting ingredients that effectively enhance athletes' performance and recovery 2) offering distinctive, compelling products that stand out among an overabundance of choices and 3) delivering a delicious, satisfying experience that will inspire repeat purchase. Success in this category depends not only on understanding how trending ingredients meet consumers' needs but also on overcoming the problems those ingredients present in formulation.

According to 2019 data from Euromonitor International, strength and muscle tone are key reasons consumers turn to sports nutrition brands, with 45% of men and 38% of women using these products for this purpose. Recovery is another key reason that men (42%) and women (37%) use performance nutrition products. Moreover, over one-third of women (36%) and one-fourth of men (26%) who consume these products cite weight loss as their reason for purchase.

Opportunities abound for food, beverage, and nutrition brands seeking to attract consumers with strong motivations to boost physical activity and performance. However, in order to gain market share, brands must ensure that they formulate with the ingredients that performance nutrition consumers seek and offer flavors that will prompt them to buy again.

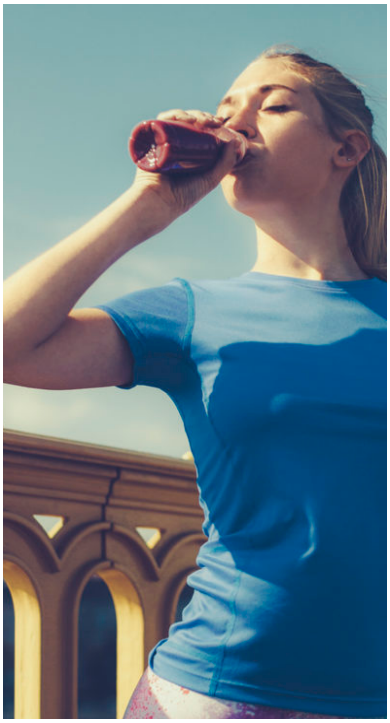
This white paper will discuss which are the "must-have" ingredients for performance nutrition applications, along with solutions to the problems of each in flavor and formulation.

VIRGINIA DARE™

BRANCHED-CHAIN AMINO ACIDS

Nutritional supplementation is growing with the continually rising tide of personal fitness. According to CRN's annual Consumer Survey on Dietary Supplements, 77% of U.S. consumers bought supplements last year. One popular ingredient, branched-chain amino acids (BCAAs), appears on ingredients lists across applications, such as pre-workout powdered drinks and post-workout recovery snacks. What had been a longtime staple for bodybuilders, BCAAs are now broadly used by endurance competitors, CrossFit athletes, and everyday consumers who use supplements to aid their strength training.

BCAAs, which include isoleucine, leucine, and valine, are essential amino acids (EAAs) that the body cannot produce and, therefore, must acquire by nutrition. Research shows that regular, consistent consumption of BCAAs aids in protein synthesis and muscle recovery. The proliferation of club fitness programs such as Orangetheory, which has an astounding five-year annualized 76% growth rate, has been a catalyst to increased interest in strength training. Supplementation, including consumption of BCAAs, has grown in tandem.



The unpalatable bitterness of BCAAs complicates formulations. Some formulators are content to compensate with strong sour and sweet flavors. Sucralose and aspartame are often combined with a hefty dose of citric acid to counteract the acrid notes of the amino acids, particularly leucine. However, consumers complain that applications such as powdered pre-workout drink mixes taste excessively artificial and medicinal.

Due to the reliance on acidulants to counteract the taste of BCAAs and other common performance nutrition ingredients, formulators lean heavily on fruit flavors. The most popular pre-workout drink flavors include fruit punch, blue raspberry, and watermelon. An emerging flavor category in performance nutrition is candy flavors, such as sour gummy, cotton candy, and lemon drop. These flavors appeal to childhood taste memories that can help athletes get into the right mood for training by providing a positive emotional boost along with the physical benefits of BCAAs and other pre-workout ingredients.

PLANT-BASED PROTEIN SUPPLEMENTATION

As overall meat consumption continues to increase worldwide, plant-based protein has also grown. Consumers are increasingly seeking alternatives to animal protein. According to the Good Food Institute's 2019 review of retail scan data, "dollar sales of plant-based foods grew 11% in the past year and 31% over the past two years." In terms of performance nutrition, there has been significant market growth in plant-based protein supplementation.

Peas have come to the fore as a versatile source of plant-based protein for supplementation. The legumes provide a complete protein, are inexpensive, and have a light environmental footprint. Consulting firm McKinsey estimates that pea protein has experienced a 30% CAGR over the past fifteen years. The meteoric growth in demand for pea protein has prompted leading U.S. agriculture companies to make substantial investments in growing and processing yellow peas.

Pea protein presents certain taste and textual challenges for formulators. Efficacious dosages usually require a large amount of the powdered ingredient per serving, which can create a chalky texture. Additionally, peas have an earthy taste that may be unappetizing in certain applications. Since there is little to no natural sweetness in pea protein, formulations can be bland. This is especially a concern in low-carb and keto-friendly applications. Consumers will be conscious of applications with excessive sugar content, so alternative sweeteners must be used. These sweeteners come with their own flavor challenges.

Aromatic foundational flavors, such as cocoa and vanilla, can be effective at masking off notes and balancing the enduring sweetness of sugar alternatives. However, the market is overrun with these flavors. Brands can differentiate in a packed marketplace by adding complementary underlying characteristics to develop a flavor profile that is compelling to consumers.

For example, a tinge of mint or hot pepper can create an uncommon, memorable flavor experience that adds intrigue to the ubiquitous chocolate protein shake. Or, add the indulgent flavor of comfort foods, such as cookies or birthday cake, to a pea protein beverage to appeal to the consumer's need for familiarity and nostalgia. Creativity and balance are the keys to getting right the flavor profile of applications based on pea protein.

HERBAL INGREDIENTS IN PERFORMANCE NUTRITION

The inclusion of trending herbal and plant extracts can further help brands to differentiate their offering. To this end, several herbal ingredients and plant-based extracts are increasingly appearing in performance nutrition applications. Each of these ingredients comes with its own unique characteristics that can be problematic for formulators.

Ashwagandha is an herb from India that is commonly used in Ayurvedic medicine to alleviate stress and improve cognitive function. As a performance ingredient, ashwagandha is believed to increase focus and reduce inflammation. Due to its bitterness, the herb is traditionally mixed with milk, honey, and cardamom to mask its flavor.

Ginseng is another widely used plant-based nootropic from traditional herbal medicine with known beneficial neurocognitive effects on alertness and memory. However, extract made from the root has a sharp flavor that is unfamiliar to the American palate. Studies suggest that the flavor compounds found in chocolate and coffee can be effective in masking the taste of ginseng.

Beets are rich in natural nitrates, which have metabolic benefits for athletes, including improving endurance and muscular power. As such, beetroot powder is often added to performance nutrition applications. A common complaint about beetroot powder is that it "tastes like dirt." This is not due to actual dirt on the beets, but the presence of geosmin, a compound reminiscent of newly tilled soil.

Other on-trend ingredients that present similar flavor challenges include adaptogens, spirulina (algae), cordyceps (mushrooms), rhodiola, and hemp. Developing foundational tastes, such as dark chocolate, nutty flavors, or spice blends, are effective means by which to manage the bitter and earthy notes that accompany these herbal and plant extracts which are rising in popularity for performance nutrition applications.

The table on the following page details several difficult herbal and plant-based ingredients increasingly used in performance nutrition formulation – and suggestions on how to overcome their challenges.

CHALLENGING HERBAL AND PLANT-BASED INGREDIENTS IN PERFORMANCE NUTRITION

INGREDIENT	BENEFIT	FLAVOR CHALLENGE	SOLUTION	APPLICATIONS
Pea protein	Popular source of vegan/ vegetarian-friendly protein	Refined pea protein has a bland, beany taste and lacks sweetness	Aromatic foundational tastes with natural, non-sugar sweeteners	Birthday cake protein shake made with stevia and real vanilla extract
Beetroot powder	Natural source of nitrates, which boost training effectiveness	Presence of geosmin creates soil-like aroma	Use a nutty flavor base	Beetroot and peanut butter pre-workout drink powder
Ashwagandha	Aids mental acuity and reduces inflammation	Strong smell and bitter herbal character	Spice blends that build on traditional recipes	Post-workout recovery beverage with honey, chai, and ashwagandha
Ginseng	Alertness and memory	Sharp taste to which Americans are unaccustomed	Blends well with chocolate and coffee flavors	Dark chocolate and ginseng protein bar
Spirulina and chlorella	Algae ingredients are rich in nutrients and antioxidants	Can dominate the appearance and flavor profile of applications	Blend with other fresh herbal, naturally green ingredients	Spinach and spirulina smoothie; chlorella-infused pesto sauce
Cordyceps, reishi, other fungi	Immunity and recovery	Can be off-putting for people who dislike mushrooms	Mask with savory flavors and aromatic spices	Reishi-infused latte or cold-brew coffee; cordyceps-cinnamon instant oatmeal
Caffeine	More endurance and exercise capacity	Bitter taste	Use strong fruit flavors and high intensity sweeteners	Citrus or berry-flavored ready-to-drink pre-workout shake
Beta-alanine	Performance in high intensity training	Slightly metallic off flavor	Formulate with chocolate or real vanilla extracts to mask flavor	Cocoa protein powder post-workout supplement

NUTRITIONAL ERGOGENIC AIDS

Serious athletes look to nutrition as a means of improving performance, exercise capacity, and getting better overall results from training. There are several nutritional ergogenic ingredients for which strong scientific evidence exists to support their efficacy and safety as supplements. These are among the most widely studied and commonly used supplements for building muscle and enhancing performance.

Creatine monohydrate is one of the most potent, widely used ergogenic supplements available to athletes for increasing lean muscle mass and performance capacity. Its safety and efficacy are well-documented in clinical literature. To be most effective, athletes should consume creatine on a daily basis, with a higher dosage loading period of five to seven days followed by a lower dosage for maintenance. Creatine is most commonly sold as a standalone powder or capsule but can also be formulated into pre-workout powders and protein shakes.

In addition to creatine, athletes who seek to add lean muscle through resistance training should consider supplementing their nutrition with beta-alanine, a nonessential amino acid that has potential to boost performance in high intensity training. Beta-alanine has been shown to reduce neuromuscular fatigue, especially in older adults. It is mostly sold as a powdered supplement or as part of a pre-workout formulation. Beta-alanine has an off-taste that can be masked with strong, sweet flavors.

Similarly, formulating with caffeine, a popular pre-workout stimulant, can also leave an atypically harsh taste that requires masking. Clinical studies show that when ingested prior to a workout session, caffeine can increase endurance and exercise capacity. However, it is intensely bitter and requires significant flavor modulation. Caffeine should be consumed 30 to 90 minutes prior to exercise.

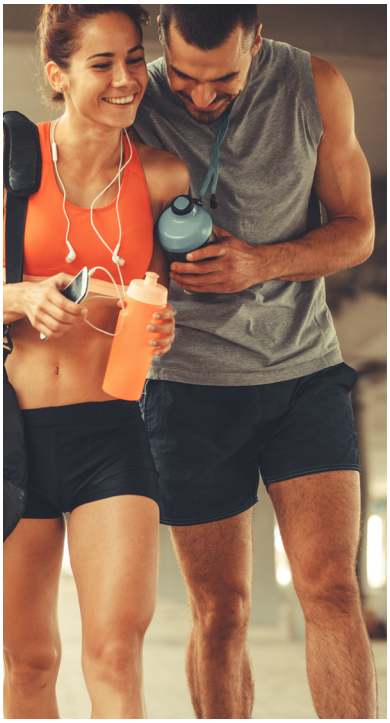
Adenosine-5'-Triphosphate (ATP) is a supplement that frequently appears in muscle-building supplements. ATP is the source of energy in muscle cells and supplementation may boost blood flow and decrease fatigue during lifts. Studies also suggest that ATP has benefits for recovery from high volume training. While ATP has little to no taste, it is frequently formulated with other ergogenic ingredients with unappetizing flavors.

Ergogenic nutritional aids most commonly appear in pre-workout supplement powders. However, formulators are not limited to this format. Caffeine and creatine can be effectively formulated into glucose and electrolyte sports beverages and energy gels. Beta-alanine (as well as other EAAs) and ATP can be easily formulated into ready-to-drink beverages and shake powders. To stand out among other performance nutrition products, brands should consider innovation in format as well as function and flavor.

EXPERIENCE IN PERFORMANCE FORMULATION

The category is saturated with simplistic flavors like "chocolate," "cherry," or "fruit." Furthermore, today's consumers are discerning and will not settle for performance products that do not deliver results. Brands that seek to successfully enter the space must break through the clutter with potent, alluring, and memorable applications. These brands must offer the ingredients that consumers seek, in amounts that are efficacious, and with an experience that is pleasing and rewarding.

The flavorists and food technologists at Virginia Dare, who have decades of experience in delivering preferred taste, are well acquainted with formulating novel approaches to performance nutrition that overcome some of the most significant challenges in this category. Virginia Dare's diverse Taste Foundations and Taste Improvement platforms can provide formulators with a bevy of options for masking and improving the flavor of the most popular, and most challenging, ingredients.



From sophisticated classic flavors like French vanilla to emerging profiles like toasted marshmallow, Virginia Dare can help formulators find taste solutions for today's active consumer. To learn more about our expertise and how we can help formulate performance nutrition applications, please reach out to us.

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