dotFIT™ FirstString™

Goal

To provide a product containing ideal performance enhancing nutrition which can be properly integrated within daily meal planning and training protocols, is also NSF Certified for Sport and meets NCAA athletic guidelines for protein and carbohydrate content. Based on the current scientific evidence, FirstString (FS) is designed to provide the ideal rapidly digesting powdered "food-form" training formula for size, strength and performance athletes, further defined as purely anaerobic (e.g. off-season bodybuilders, power lifters, sprinters, etc.), intermittent (most team sports – i.e. combined intermittent aerobic and anaerobic activity such as football, soccer, basketball, baseball, rugby, hockey) and short to medium distance endurance athletes.

FS contains a mix of protein (P), carbohydrates (CHO) and fats (F) that when daily ingestion is timed properly around strenuous activity, FS has the potential to maximize all training-induced results while also helping prepare the body optimally from a nutrition standpoint, for its next training/competitive bout. Used as recommended, FS is strategically formulated so that pre-exercise ingestion helps fills the body's glycogen stores while delivering a rapidly digesting protein containing a high content of essential amino acids (EAA) including the branched chain amino acids (BCAA), particularly leucine, to reduce muscle breakdown during exercise. Post exercise ingestion maximizes the muscle protein synthesis (MPS) response during the important so-called exercise-induced metabolic window (0 to ~90 minutes post activity), when muscle nutrient sensitivity is at its highest point, thus the body's potential for muscle protein synthesis and glycogen replenishment. Therefore, when used as directed within daily meal planning and strenuous activity, FS can maximize the training session, recovery process and overall gains to help each workout/competition improve upon the last. Additionally, FS is ideal as a weight gain supplement to increase food calories for those needing quality weight gain (e.g. muscle).

Rationale

It is well documented that the athletes described above require a specific amount of P, F and CHO based on body weight, activity type, intensity and duration to maximize performance.[1,2,3,4,5,6,7,8] Although a "food form" training supplement should be designed to satisfy these requirements, recommendations are often by-passed based on: 1) body weight or composition goal; 2) preferences; 3) potential for gastric upset; 4) being uninformed, misinformed or simply choosing to ignore them.[1,3,9,10,11,12,13,14,15] Because CHO is the body's preferred energy source, it is clear that athletes who are not focused on weight or body fat reduction require a higher percentage of dietary carbohydrate to protein or fat if they want to perform at their highest potential.[1,4,6,7,8,16] In order to maximize glycogen(energy) stores, especially pre and post exercise, dietary CHO grams per pound of body weight should exceed protein and fat if improving performance is the goal.[1,7,8,17]

The first nutrition goal for all athletes is to cover protein needs or muscle protein synthesis (MPS) cannot optimally proceed, which would make all exercise induced gains fall short of potential or worse, reverse progress.[18,19,20,21] Daily protein requirements to maximize MPS will generally top out at approximately 1 gram per pound of body weight,[2,3,10] except during extreme dieting,[3,10,22] leaving ample room for CHO intake to adequately fill the primary energy system (glycolytic) to provide the body the energy potential to perform throughout the given activity at its highest level.[4,7,8,16-18] (See carbohydrate recommendation below) Once these two macronutrient needs are met, the remainder of allotted calories can come from dietary fats.[1,23,24] Therefore, depending on the activity and its duration, daily CHO intake for most performance athletes (not engaged in prolonged calorie restriction) should range between 50-70% of total caloric intake, protein 15-35% and fats 10-30% (i.e. the remainder).[1-24,25] And finally, although supplemental protein by itself before and immediately following activity can decrease muscle protein breakdown and enhance MPS during the all important metabolic window,[18,19,26,27] supplemental protein with CHO appears to have a greater effect not only on the refilling of glycogen stores, but also MPS due to an enhanced insulin response.[28,29,30,31,32]

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The FS profile of ~2:1 CHO to P ratio and low fat is designed to help fulfill the aforementioned athlete's macronutrient needs throughout the day. Because of its rapid digesting whey protein and specialized CHO mix, FS also provides the perfect pre/post workout formula to maximize the training/competition session and subsequent outcomes. Furthermore, if additional CHO is needed as for endurance athletes or CHO loading, it can be added to the mix as needed.

Refueling & Rebuilding Muscles

It would be remiss to ignore dietary carbohydrate (CHO) recommendations for maximizing performance since CHO supplies the majority of the energy that powers muscular activity. After substantial energy/glycogen depletion, the mean hourly rate of replacement is ~5–6 mmol (or 5–6%), therefore it can take approximately 24 hours to refill stores.[8] As with MPS, immediately following exercise and up to four hours, there is a high potential for muscle glycogen storage as a result of the depletion-activated stimulation of the glycogen synthase enzyme and exercise-induced increases in muscle membrane permeability and insulin sensitivity.[33,37] This potential can be only be reached if CHO is consumed within this period. If not, refueling rates are significantly lower.[30,37] This "window" of opportunity for glycogen storage during the early post-exercise period is part of the "metabolic window" concept (discussed below) because as with muscle protein synthesis rates, glycogen synthesis rates decrease after this time-frame even if CHO feeding is continued properly.[4,17,30] Therefore, the basic strategy for refueling muscles between exercise bouts for performance athletes is as follows:

Carbohydrates

- Overall CHO intake should be between 50-70%, depending on activity type, duration and intensity, of total calorie intake and spread throughout the day with focus on the pre and post exercise period.[4,17,30]
- 2-4 hours before exercise (depending on gastrointestinal comfort) consume ~0.5 g/lb of body weight of CHO within the pre-workout meal.[30]
- Begin consuming 0.4-0.5 g/lb of body weight of CHO soon after exercise. Endurance athletes would continue this target each of the next 4 hours post exercise, before resuming the normal eating pattern. Anaerobic (e.g. off-season bodybuilders, power lifters, sprinters, etc.), intermittent (most team sports – i.e. combined intermittent aerobic and anaerobic activity such as football, soccer, basketball, baseball, rugby, hockey) athletes following the immediate post CHO and protein dose, could resume normal eating patterns (e.g. every 3-4 hours) that meet overall energy needs.[4,8,17,30]
- Basic CHO recommendation ranges based on body weight and activity fuel needs:[4,8,17]
    - Low intensity activity: 1.4-2.25 g/lb/day
    - Moderate exercise of approximately 1 hour: 2.25-3.0 g/lb/day
    - Endurance-type program (1-3 hrs/day of moderate-high intensity exercise, such as team sport practices, running, etc.): 2.75-4.5 g/lb/day
    - Ultra endurance program (>4-5 hrs/day of moderate-high intensity training): 3.6-5.5 g/lb/day

Protein

Daily protein requirements to maximize MPS will generally top out at ~ 1 g/lb of body weight per day[2,3,10] (15-35% of total calories) except during extreme dieting when protein needs increase in order to preserve LBM,[3,10,22] leaving ample room for the CHO recommendations above when performance is the primary goal.[4,7,8,16-18] Therefore, 1 g/lb/day of body weight is a simple formula that works for almost all athletes and under most conditions and should be divided as follows:

- In order to maximize muscle protein synthesis (MPS) within the so called "metabolic window" (see below for definition) both the pre and post workout supplement should contain a high quality protein (e.g. whey) dose of ~.18-.23 g/lb/LBM depending on age (older persons require more protein).[34,52] For example, a 200 lb exerciser (170 lb of LBM) would consume ~35 g of protein before and repeat exercise.

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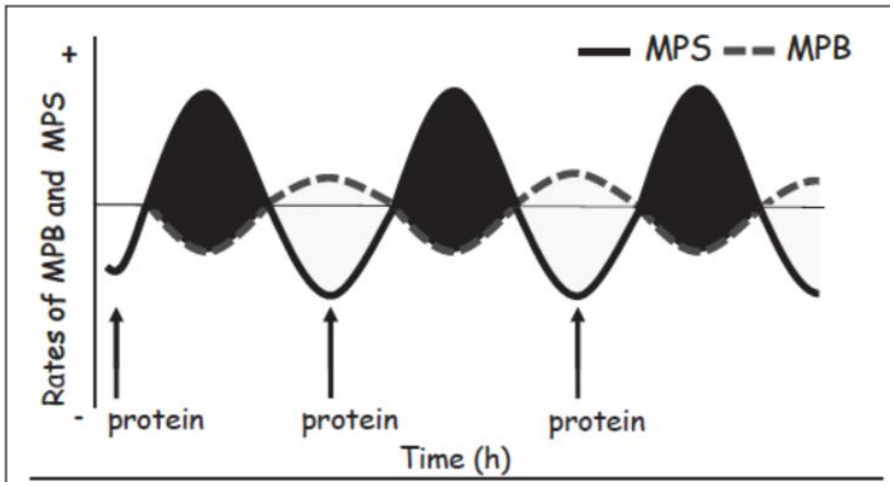
- The remaining protein intake should be spaced evenly throughout the day ~3-4 hours apart with all meals containing equal divisions of remaining total protein (e.g. for the same 200 lb athlete/exerciser, 200 g/day allotment divided by five meals minus the ~70 g consumed pre and post exercise equals ~30 g of protein per meal on workout days and ~40 on non-workout days) including before bedtime if calories allow.[2,3,10,19] Higher protein levels than shown here appear to have no detrimental effects and are often consumed by athletes based on preference, satiety, and the belief that more is needed to cover all MPS bases or simply based on the common attitude that it's "better to be safe than sorry." This is especially true since the only downside would be if the excess protein not used for MPS was taking the place of needed CHO to properly fuel activities and support the anabolic hormonal environment as described throughout this section. (The Practitioner is referred to the WheySmooth section in the PDSRG for complete details on protein recommendation, upper limits and safety.

Metabolic Windows and Timing of Protein and Carbohydrate Intake

Proper diet manipulations with specialized formulas create and take advantage of so called "metabolic windows" throughout the day where muscle cells become highly receptive to the nutrients necessary to maximize recovery,[18,19,20,26-30,35,36,37,38,39,40] including replenishing glycogen stores[1,4-8,23-25,30,36-39] and those used to increase protein synthesis specifically before and after training.[17-20,23-26,28-30,37,41,42,43,44,45,46,47,48,4950,51]

Although muscle protein synthesis (MPS) and breakdown continues throughout the day for all humans, exercise presents an additional opportunity for greater overall MPS.[18-21] A disproportional amount of this incremental MPS opportunity takes place within a two hour so called "metabolic window" starting immediately post activity, peaking within the first 30 minutes and returning to baseline at approximately two to three hours after activity (Figure 2).[19,29,30,37,52,53,54]

Figure 1- Muscle Protein Balance in Healthy Humans



Daily fluctuating rates of muscle protein synthesis (MPS) and muscle protein breakdown (MPB) in normal healthy sedentary humans up to age 30. Notice as protein is consumed there is an increase in rates of MPS and decrease in MPB resulting in net positive nitrogen balance (MPS **>** MPB, black areas). A few hours following protein intake, MPB increases and MPS decreases causing a net negative nitrogen balance (MPS **<** MPB, white areas). During energy balance the area under the curve (AUC) of positive and negative nitrogen balance are equal over the course of the day (MPS **=** MPB; AUC black **=** AUC white) thus maintaining muscle mass until age begins to favor MPB. Adapted from Devries et al. [95]

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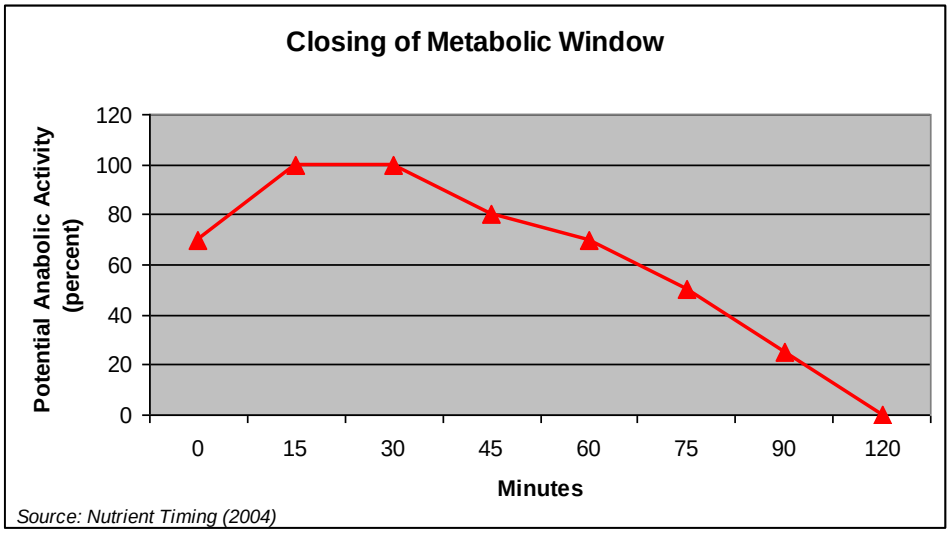
Figure 2 - Muscle Protein Synthesis Exercise-Induced Acute Incremental Potential Post Exercise



MPS and glycogen synthesis potential reach their respective highest points almost immediately post exercise and returning to baseline within 2-3 hours[30,33,37]

This metabolic window is simply a convergence of the impact of both exercise and exogenous amino acids (MPS mechanisms, including a reduction in exercise-induced muscle breakdown, which in itself can allow a greater net synthesis.[18,19,31,32] (For more details on how exercise and AA regulate MPS, breakdown and skeletal muscle balance the practitioner is referred to the AminoBoostXXL document in the PDSRG. In other words with all else being equal, exercise (especially unaccustomed) is an event that creates a short lived exaggerated MPS potential that when in the "immediate" presence of ingested AA, can increase MPS when compared to a feeding outside or later in the "metabolic window," leading not only to the well established acute gain in MPS but potentially incremental to long-term gains.[25,26,29,30,55,56,57]

Although protein and/or amino acid feedings alone (absence of CHO) increase MPS within the metabolic window,[58] it appears that the addition of CHO to the pre/post formula elicits a greater positive response.[17,26,29,30,59] Insulin is a powerful anabolic hormone that reduces muscle breakdown and allows the essential amino acid leucine to effectively function as the major trigger of MPS.[29,60,61] Of all the AA necessary for protein synthesis, leucine is considered the most important, and in fact has been indicated as the sole stimulator of MPS.[29,53,61,62,63] At a minimum, the processes of protein synthesis appears highly regulated by leucine.[53,61-64,65] Koopman et al.[48] had eight untrained men randomly assigned to consume one of the three beverages: carbohydrates, carbohydrate and protein or carbohydrate, protein and free leucine following 45 minutes of resistance exercise. The results showed that whole body net protein balance was significantly greater in the carbohydrate, protein and leucine group compared to the other treatments, demonstrating leucine's ability to augment protein synthesis.[48] Similar results have since been duplicated by others.[53,60,61,64] Leucine's role in MPS is primarily via stimulation of the mammalian target of rapamaycin (mTOR) signaling pathway.[53,66,67] Leucine interacts with two mTOR regulatory proteins: mTOR raptor and rashomolog in the brain (or Rheb).[68,69] The proposed amount of leucine per dose to maximize MPS has been estimated to be between 2.5-4.0 grams (depending on size, age and activity) and referred to as the leucine threshold.[18,64,70,71,72]

Leucine cannot regulate protein synthesis effectively without the presence of insulin.[29,60,73] This condition underscores the need for the pre and/or post training supplement to also contain a fast acting CHO source such as a maltodextrin to go beyond simply refilling energy stores and reducing muscle breakdown,[18,19,29,31,32,74,75] but to also favorably alter the overall hormonal environment to help maximize the anabolic net response.[28-39,47,48,57,76,77,78,79,80,81,82]

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Studies Using Co-ingestion:

- Cockburn et al. demonstrated that consuming milk-based CHO and protein after muscle-damaging exercise is beneficial in attenuating decreases in muscle performance and increases in active delayed onset muscle soreness (DOMS).[39]
- Betts et al. reviewed the potential benefits of protein co-ingested with carbohydrate in prolonged exercise recovery and suggested that when CHO intake is low, the inclusion of protein may at least partially compensate for the limited availability of ingested carbohydrate. Additionally, it may increase the drive to exercise; blunt exercise-induced muscle damage; favorably alter metabolism during exercise, or a combination of any of these mechanisms.[40]
- Saunders et al. found that plasma creatine kinase (CK) levels and muscle-soreness ratings increased significantly after the CHO compared to CHO and protein consumption. They also found that late-exercise time-trial performance was enhanced with CHO and protein ingestion compared with a beverage containing only CHO provided at maximal exogenous oxidation rates during exercise. [83] Although Cathcart et al. found no help with DOMS they did find that CHO and protein supplementation compared to CHO alone appears to prevent body mass loss, enhance thermoregulatory capacity and improve competitive exercise performance.[84]
- Costa et al. found that ingestion of CHO and protein immediately after (but not 1 hour after) prolonged strenuous exercise prevented the decrease in neutrophil degranulation but did not alter circulating stress hormone, leukocyte trafficking, or S-IgA responses, thus suggesting positive effects on immune function.[85]
- Blacker et al. found the consumption of whey protein and carbohydrate supplements alone each resulted in faster recovery of the isometric force of the knee extensors compared to a placebo.[86]
- Highton et al. compared the effects of carbohydrate and carbohydrate-protein ingestion on self-regulated simulated multiple-sprint sport performance using the Shuttle Test involving 4 x 15 min blocks of regulated exercise followed by 2 x 15 min blocks of self-regulated exercise. Average running speed declined in the final 15 minutes of the CHO trial only, with protein providing a likely small improvement. The authors concluded "carbohydrate-protein ingestion is likely to enhance multiple-sprint sport exercise performance above carbohydrate, potentially through altered central fatigue or increased protein oxidation."[87]
- As expected, Hiroyasu Mori et al. found that the post-exercise accumulation of muscle protein in trained resistance exercisers was low compared with that of the untrained men. But interestingly, when protein and carbohydrate were consumed immediately after resistance exercise, the effect of protein intake on muscle protein accumulation was high in the trained men, but showed no effect in the untrained men (compared to 6 hours after) suggesting that the "metabolic window "is more important to trained exercisers.[88]
- McLellan et al. in a systematic review on the use of CHO and protein supplements during and after endurance exercise found that when carbohydrate is delivered at optimal rates during or after activity, protein supplements appear to have no added endurance performance enhancing effect.[89]
- In a review by Cermak et al.,[90] they confirm that the availability of CHO during prolonged (>2 hours) moderate to high intensity exercise can significantly improve endurance performance. These athletes are advised to ingest CHO at a rate of 60 g/hr (well trained individuals can metabolize up to 90 g/hr) provided the CHO is in multiple fast oxidizing forms. To support rapid post exercise glycogen repletion during the acute recovery phase from exhaustive exercise, athletes are recommended to ingest 0.5-0.6 g/lb/hr of CHO. Interestingly, they found that CHO ingestion during shorter, (45-60 min, including intermittent/team sports), more intense (>75% peak oxygen uptake) training bouts also improved performance although endogenous stores were not the limiting factor. Therefore, the mechanism is proposed to reside in the central nervous system.[7,90] For athletes with a lower gastrointestinal threshold for CHO ingestion and/or to support muscle protein synthesis immediate post exercise, it is recommended to use less CHO (.35 g/lb/hr of CHO) with protein (0.1-0.2 g/lb/hr) or approximately 2:1 CHO:P.[7,90]

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- In support of CHO and P co-ingestion post exercise to enhance the anabolic environment, Betts et al. showed that following 90 minutes of treadmill running, CHO and whey protein (~2:1) raised growth hormone levels and lowered cortisol compared to equal energy of CHO alone.[91]

Data Summary

From all the above data it appears that a 2.0-2.5:1 ratio of CHO:P may be an appropriate average daily intake for most performance athletes to maximize MPS and glycogen replenishment. Additionally, this ratio contained in the supplement used during the pre and post exercise period (each protein dose being approximately .18-.23 g/lb of LBM[34,52,92,93,94]) referred to as the metabolic window, may also be most beneficial. Based on the body composition goal, as long as the athlete can afford the calories without compromising total nutrition needs (e.g. higher protein intake necessary to support LBM during severe calorie restriction), the FS formula is ideal for maximizing MPS throughout the day while contributing to the adequate refilling of energy stores. During continuous caloric restriction for competitive physique athletes or others primarily seeking weight loss, WheySmooth or AminoBoostXXL will become the pre/post formula of choice due to lower carbohydrate and calorie content. "Long or ultra" endurance athletes with higher CHO needs and in-season (competition preparation) physique competitors or other weight conscious athletes with higher protein requirements may need to significantly alter this basic recommendation.

Protein in FirstString

The protein in FirstString is predominately whey concentrate. Compared to other proteins, whey protein has been shown to be superior in maximizing muscle protein synthesis (MPS), health and weight control outcomes based on its unique functional properties including: 1) higher essential amino acid (EAA) content (12.4 g/25 g); 2) higher BCAA (5.6 g/25 g); 3) higher leucine (3 g/25 g); 4) faster digestion to timely amplify MPS during metabolic windows; 5) less splanchnic amino acid (AA) extraction so more AA are directly available for MPS; 6) whey concentrate (WC), along with the AAs, contains additional unique growth and health/immune factors[95] (the practitioner is referred to the WheySmooth Section in the PDSRG for complete detailed referenced data for whey protein including mechanisms of action). Therefore, based on efficacy, FS uses an ion-exchange instantized protein blend containing 90% whey concentrate, 5% whey isolate (cold filtered) and 5% casein for immediate and extended release and easy mixing. There is 1.4 g of lactose per serving and therefore unless individuals have been diagnosed with "severe lactose intolerance," which is extremely rare, this amount should have no adverse reaction. As a reference, most lactose mal-digesters (majority of people that consider themselves lactose intolerant) can consume 6-12 grams of lactose without major symptoms. As a reference, one cup of milk or yogurt has 12 and 9 g of lactose, respectively.

Carbohydrate – Maltodextrins

FirstString (FS) is primarily designed to be a fast acting ~2.2:1 CHO to protein supplement that can be altered as needed. The carbohydrate content in FS is strategically designed for, 1) proper calorie to protein ratio but also allows for adjustments (added foods/fluids into mix) as desired; 2) rapid gastric emptying thus oxidation during pre/post workout periods use to help maximize MPS and glycogen replenishment within the "metabolic windows"; 3) flavor and easy mixing properties.

Maltodextrin

Maltodextrin is a polysaccharide. It is a lightly hydrolyzed starch used as an ingredient in many food products as a thickener and carbohydrate source.[96] Maltodextrin is easily digestible, being absorbed as rapidly as glucose but moderately sweet or sometimes bland making it desirable in food manufacturing.[96] Carbohydrates (CHO) in sports are generally placed in two categories - CHO that can be oxidized (used for energy) rapidly (up to ~60 g/hr) and those which are oxidized slower (up to ~40 g/hr).[97] Maltodextrins like glucose, maltose and sucrose fall in the rapid category.[4] These carbohydrates are digested and absorbed at fast rates making them readily available to working muscle and also allow rapid amino acid absorption from co-ingested protein.[98] These qualities, including maltodextrins food mixture compatibility, make maltodextrins ideal in a product like FS which is designed to deliver both timely

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protein and CHO to working muscles and help satisfy a proper daily CHO to protein ratio for performance athletes.[4,96,97]

Dietary Fat Blend

The dietary fats in FS made up of high oleic sunflower oil, medium chain triglyceride and safflower oil supply 11% of total calories in order to allow 1) rapid digestion of combined protein and CHO as too much dietary fat slows digestion; [99,100] 2) enhanced flavoring and mixing qualities of the product.

Co-factors Including Sweeteners

Co-factors in a protein/CHO powder are combined in minute amounts to deliver satisfying taste and texture, mixing ability, uniform nutrient distribution, proper ingredient flow and stability including during cooking or baking, and a practical product shelf life.

Sweeteners

Sweeteners used in FS appear at the end of the ingredient list as they are included in negligible amounts per serving and thus have no effects within the body other than taste. For more information on non-nutritive sweeteners, click here. Non-nutritive sweeteners (NNS) are those that sweeten with minimal or no carbohydrate or energy. NNS are regulated by the Food and Drug Administration (FDA) as food additives. The FDA approval process includes determination of probable intake, cumulative effect from all uses and toxicology studies. Seven NNS are approved for use in the United States with acesulfame K and sucralose being among the most popular.[101] They have different functional properties for use in enhancing food products. All NNS approved for use in the United States are determined to be safe.[101,,102]

Acesulfame Potassium (Ace-K)

Acesulfame potassium is approximately 200 times sweeter than sugar and is often combined with other sweeteners as an additional flavor enhancer in foods, and because it is heat stable (stays sweet even when used at high temperatures during baking).[103] Ace-K is typically used in frozen desserts, candies, beverages, and baked goods. More than 90 studies support its safety and used in FirstString to support baking capacity and sweetness.[104].

Sucralose

Sucralose is also a NNS, and is made from sucrose by a process that substitutes three chloride atoms for three hydroxyl groups on the sucrose molecule.[105] Sucralose is 450–650 times sweeter than sucrose, possesses a pleasant sweet taste and a quality and time intensity profile that is similar to that of sucrose, making it a popular NNS.[106] Sucralose has been extensively studied with more than 110 safety studies reviewed by FDA in approving the use of sucralose as a general purpose sweetener for food.[101,105] A primary advantage of sucralose for consumers is its exceptional stability. It retains its sweetness over a wide range of temperature and storage conditions and in solutions over time. This stability allows manufactures to create better tasting foods and beverages and maintain the fresh flavor. Like Ace-K, sucralose is heat stable making it an ideal sugar substitute in baked goods.[106,107]

Carboxymethyl Cellulose

Carboxymethyl cellulose (CMC) or cellulose gum is a cellulose (fiber) derivative. CMC is used in food as a viscosity modifier or thickener, and to stabilize emulsions (emulsifier) in food products. CMC is used extensively in gluten free and reduced fat food products such as FirstString.[108] Use of CMC also ensures smooth dispersion in flavor, and improves texture and overall quality.[108]

Xanthan Gum (XG)

Xanthan gum is a water soluble, high molecular weight natural polysaccharide produced by fermentation process.[109] Due to its soft texture, xanthan gum is widely used as a thickener or viscosifier in the food industry.[110] XG also

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functions as a stabilizer for many different formulations with applications in pharmaceuticals, dietary supplements and food products such as FirstString.[111]

FirstString & NSF Certification for Sport

NSF Certified for Sport

Although all dotFIT (dF) products are formulated and manufactured with the same rigor, FirstString along with a select group of other dF products undergo an additional test and 3rd party certification for another type of assurance. See http://www.dotfit.com/NSF_Certified_for_Sport for complete line of dotFIT NSF Certified for Sport (NSFCS) products. In addition to the dF standard of evidence-based programming, formulas, and 3rd party testing, the addition of the NSFCS process ensures collegiate and professional athletes that they are protected from unwarranted suspensions due to banned substances in supplements. Therefore, not only are the contents tested to match the label, the program includes a test for banned substances that can creep into products during the manufacturing process because of unprotected, non-segregated mixing rooms or worse, deliberate spiking of illegal ingredients. Collegiate, professional, other drug-tested athletes and their team management require this assurance in order to protect themselves from tainted products commonly found in commercially available dietary supplements in mass-market outlets.[112,113,114,115,116]

About NSF

To meet the growing demands of athletes, coaches and all those concerned about safety and banned substances in sports supplements, NSF International created the NSF Certified for Sport® Program. The program's objective is to certify that participating sports supplement manufacturers have met NSF's stringent independent certification process guidelines, which were developed through a consensus process involving regulatory, sports industry and consumer groups. This program, which focuses primarily on the sports supplement manufacturing and sourcing process, provides key preventive measures to:

- Protect against the adulteration of products
- Verify label claims against product contents
- Identify athletic banned substances in the finished product or ingredients

NSF developed and maintains the only accredited American National Standard to certify dietary supplements, NSF/ANSI Standard 173. NSF's history of independence led to a partnership with the National Football League (NFL) and the NFL Players Association (NFLPA) to develop and administer the NFL/NFLPA Supplement Certification Program, specifically for professional football but used across all sports.

The NSF Prohibited Substances List includes banned substances, identified by leading sports organizations, such as the World Anti-Doping Agency (WADA), the NFL and Major League Baseball (MLB). The NSF Certified for Sport™ Program certifies products and inspects facilities for a range of substances. Click the link for more on NSF Certification program. http://www.nsf.org/business/athletic_banned_substances/index.asp?program=AthleticBanSub

NCAA Bylaw 16.5.2.2

FirstString along with most dF nutrition bars also conform to the NCAA Bylaw 16.5.2.2 for collegiate athletes. The Bylaw simply states that if schools are going to provide a supplement containing protein for athletes, it must not contain more than 30% of the calories from protein. Click here for more details: http://fs.ncaa.org/Docs/NCAANewsArchive/2000/division+i/interpretations%2B-%2B8-14-00.html

FirstString Summary

FirstString is NSF Certified for Sport and complies with the NCAA Bylaw 16.5.2.2 related to the protein content of a supplement. FirstString's (FS) macronutrient profile of approximately 60% CHO, 30% protein and 10% fat is in

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accordance with current scientific evidence and recommendations that supports maximizing muscle protein synthesis (MPS) and performance for the majority of athletes and especially those with the primary goal of increasing size, strength and speed. This formula has particular relevance for athletes of all ages involved in "intermittent sports" (e.g., team sports) where the actions are generally intermittent high-intensity movements while executing sport-specific skills over a prolonged period of time of 1-3 hours (e.g. football, basketball, soccer, rugby, hockey, lacrosse, baseball, etc.). Performance during intermittent sports is dependent upon a combination of anaerobic and aerobic energy systems that are powered primarily by carbohydrate, thus requiring a continuous intake of between 50-70% of total caloric intake (TCI). FirstString's macronutrient profile is also ideal for the primarily anaerobic athlete, who is not restricting caloric intake, such as off-season bodybuilders, power lifters, sprinters, etc. and most mid-range endurance athletes. During prolonged dieting for aggressive weight and body fat goals, athletes would switch to WheySmooth and/or AminoBoostXXL. Long or ultra-endurance athletes who require higher CHO intake can add CHO to the FS mix as needed (e.g. CHO powders of choice, fruits, juices, etc.) or simply maintain daily desired macronutrient profile with daily foods when incorporating FS.
Whey proteins have proven to be superior to other protein sources in stimulating MPS and therefore FS uses an ion-exchange instantized protein blend containing 90% whey concentrate, 5% whey isolate (cold filtered) and 5% casein for immediate and extended release and easy mixing along with co-factors that give the product its desirable taste, texture and stability. The CHO source is predominately maltodextrins for fast acting fueling and refueling of muscles. The combination of FS fast acting CHO and protein sources make it ideal to timely amplify MPS during the so-called metabolic window. Finally, because of the macronutrient profile, FS is also designed to supplement the overall diet in a manner that can maximize long-term muscle gains by giving the user the ability to timely add protein and CHO in percentages that have been shown to be the most conducive in supporting a continuous anabolic environment.

Typical Use

FirstString is for athletes of all ages including those who are drug tested and whose primary goals are maximizing growth and performance including muscle protein synthesis (MPS) and recovery from strenuous activity.

- As a pre-workout supplement, consume the amount below 30-40 minutes prior to activity based on body size:
  - 100-150 lbs - 1.5 scoops
  - 151-200 lbs - 2 scoops
  - 200-250 - 3 scoops
  - Greater than 250 lbs - 4 scoops
- Immediately following training, repeat the same dose unless also using AminoBoostXXL (see muscle stacking) at which time you would consume FS 30 minutes following the immediate AminoBoostXXL post exercise dose.
- As a meal replacement or weight gain supplement, use as needed throughout the day to meet individual goals for protein, CHO, calorie and nutrient timing.
- Anyone wanting a great tasting, convenient meal replacement and/or additional protein source.

Precautions

Older data suggested an increase in calcium loss with high protein intakes, which may predispose the individual to an increased risk of osteoporosis.[117]However, more recent studies have found the link between protein intake and bone health to be positive[118,119] or no effect.[120,121] The Institute of Medicine's and other related studies have concluded that levels of dietary protein are not associated with a decrease in renal function with age.[122,123,124 ,125,126,127,128,129]

Contraindications

FirstString is contraindicated in people who cannot consume milk proteins.

Adverse Reactions

There should be no adverse effects in healthy users at the recommended doses unless allergic to milk proteins.

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Upper Limit/Toxicity

Currently there is no upper limit established for protein.[129]

Summary

Purpose

- All athletes with primary goals of maximizing training induced muscle protein synthesis (MPS), replenishment of energy stores, recovery and acute and long-term performance and weight/body composition goals.
    - Fast acting whey protein and maltodextrins are used to timely amplify MPS during metabolic windows before and after exercise and throughout the day as necessary.
- The base product CHO to protein ratio (~2:1) supports the maximum anabolic response making it ideal as a weight/muscle gain supplement.
    - Two (2) scoops provide 21 g of whey protein, 45 g of CHO, 150-200 mg of calcium, making up 290 quality calories
    - Ability to deliver the surplus of nutrients required to be incorporated into muscle tissue rather than body fat when appropriate resistance exercise or activity is included and total daily calories are appropriate.
- Targeted to all athletes, and is particularly suited for youth, collegiate and professional athletes since it is NCAA approved and NSF Certified for Sport (NSFCS)
- As a supplement, FirstString can help maximize a child's athletic development including overall growth potential, activity preparation and recovery. A healthy and important addition to the diet of youth athletes as it supplies valuable dairy proteins and calcium, i.e. great tasting "delivery system" for often missed but sorely needed developmental nutrition.

Unique Features

- CHO content satisfies the necessary profile for maximizing protein synthesis while fitting into a "low sugar" claim, which will appeal to prevailing perceptions
    - 2 scoops: 21 g of protein, 45 g of CHO and only 3 grams of sugar
- Sophisticated ideal blend of the highest quality fast and extended acting proteins
- No aspartame and relatively low in sodium
- Co-factors ensure nutrient uniformity and stability with great taste and easy mixing
- No gas or bloating as is common with other protein powders
- As with all dotFIT products, FirstString is designed in a synergistic relationship with all other dotFIT products and a person's traditional food intake. dotFIT powders are NOT spiked with unnecessary nutrients. Most other products in this space (e.g. bars, shakes, ready-to-drinks, etc.) are heavily spiked with many nutrients that can lead to undesirable levels within the body when combining multiple manufacturers, products and normal food intake.
    - When consuming only dotFIT products as directed with one's normal daily food intake, the recipient is assured of keeping the body at a safe and optimal nutrient level.
- NCAA approved protein product and NSF Certified for Sport (NSFCS), which is an additional product guarantee for drug tested athletes. Click here for the dotFIT NSFCS section.
- Formulated and manufactured for great taste and pleasing texture in a regularly inspected NSF certified facility, in compliance with Good Manufacturing Practices (GMPs) exclusively for dotFIT, LLC

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Nutrition Facts

Nutrition Facts		
Serving Size:	2 Scoops (73.5g)	
Servings Per Container:	About 32	
	Calories 290	Fat Cal. 30
Amount Per Serving		**% Daily Value**
Total Fat	2.5 g	4%
Saturated Fat	0.75 g	4%
Trans Fat	0 g	**
Cholesterol	63 mg	21%
Sodium	125 mg	5%
Total Carbohydrate	44.5 g	15%
Dietary Fiber	0 g	0%
Sugars	3 g	**
Protein	21 g	42%
Vitamin A (as Beta Carotene)	300 IU	6%
Vitamin C (as Ascorbic acid)	3 mg	5%
Vitamin D (as Cholecalciferol)	20 IU	5%
Vitamin E (as D-Alpha Tocopheryl succinate)	1.5 IU	5%
Vitamin B1 (Thiamine Hydrochloride)	0.075 mg	5%
Riboflavin	0.085 mg	5%
Niacin (as Niacinamide)	1 mg	5%
Vitamin B6 (as Pyridoxine HCl)	0.1 mg	5%
Vitamin B12 (as Cyanocobalamin)	0.3 mcg	5%
Biotin	15 mcg	5%
Pantothenic acid (as d-Calcium Pantothenate)	0.5 mg	5%
Calcium (as Calcium Lactate Gluconate)	150 mg	15%
Iron (as Ferrous Sulfate)	0.5 mg	3%
Iodine (as Potassium Iodide)	32.5 mcg	22%
Magnesium (as Magnesium Phosphate)	20 mg	5%
Zinc (as Zinc Sulfate)	0.75 mg	5%
Copper (as Copper Gluconate)	0.1 mg	5%
Aminogen® (13 Units)	125 mg	**

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