

Editorial

The Importance of Proper Nutrition in Professional Sports

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Abstract

Proper nutrition plays a fundamental role in the performance, recovery, and overall well-being of professional athletes. *Special attention is given to professional football (soccer), whose high-intensity intermittent nature places unique stress on glycogen metabolism, hydration, and rapid between-match recovery.* This paper explores the impact of dietary choices on athletic performance, common nutritional challenges, periodization strategies, psychological factors, cultural considerations, and evidence-based approaches to optimize health and outcomes in professional sports. An integrative understanding of nutrition empowers athletes to achieve sustained success and longevity in their careers.

Keywords

Nutrition, Professional Sports, Athlete Diet, Performance, Recovery, Periodization

1. Introduction

In the competitive world of professional sports, success is often determined by marginal gains. Among these factors, proper nutrition remains one of the most influential yet frequently underestimated components of performance enhancement [1]. Professional athletes face unprecedented demands on their bodies and minds. They must manage intense training regimens, psychological stress, frequent travel, public scrutiny, and often short recovery windows between competitions. Each of these challenges can impact dietary habits and nutrient availability [1].

Nutrition affects not only physical readiness but also cognitive functioning, decision-making, injury prevention, and long-term health outcomes [2]. Even minor dietary imbalances can lead to suboptimal performance, increased risk of illness, and prolonged recovery. Conversely, strategic nutri-

tional planning has the potential to unlock reserves of strength, endurance, and focus that can distinguish elite competitors from the rest [3].

Over the past two decades, sports science has increasingly emphasized the necessity of tailored, evidence-based nutrition programs [1, 4]. From carbohydrate periodization and protein timing to hydration strategies and micronutrient optimization, the field of sports nutrition has evolved into a complex discipline that requires both scientific understanding and practical application [5].

This paper aims to provide a comprehensive overview of the central role of nutrition in professional sports, with an applied focus on football, the world's most widely played team sport. By consolidating current research and best practices, the goal is to support athletes, coaches, and performance

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staff in integrating nutrition into every aspect of training and competition.

2. Macronutrients and Micronutrients

Carbohydrates, proteins, and fats form the foundation of an athlete's diet. Each macronutrient plays a distinct role in supporting performance, recovery, and adaptation to training stimuli [1].

Carbohydrates serve as the primary fuel source for high-intensity and endurance exercise. Glycogen stored in muscle and liver tissues provides a readily accessible energy reservoir, enabling sustained output during competition and training [4]. Carbohydrate depletion has been shown to contribute significantly to early fatigue and impaired motor performance [3]. For professional athletes, strategic carbohydrate loading before major events can help optimize glycogen stores and delay the onset of exhaustion [8].

Elite football match play typically requires players to cover 10 to 13 kilometers, including ~1,200 meters of high-speed running with over 150 accelerations and decelerations. This physical demand can reduce muscle glycogen to below 10% of resting levels [9]. Consequently, carbohydrate intake of 7-10 g/kg/day for 24-36 hours before competition is essential to maximize stores and prevent early fatigue [4].

Proteins are critical for muscle repair, remodeling, and growth [7]. The process of muscle protein synthesis is stimulated by resistance training and requires adequate dietary protein intake to support adaptation. Additionally, proteins contribute to immune function, enzyme production, and hormonal regulation. For athletes undergoing frequent high-intensity training, protein needs often exceed those of the general population, ranging from 1.4 to 2.0 grams per kilogram of body weight per day [7].

Fats provide essential fatty acids and serve as a dense energy source during prolonged low-to-moderate intensity activity [5]. Omega-3 polyunsaturated fatty acids, in particular, play a role in reducing inflammation and supporting cardiovascular health.

Athletes are encouraged to prioritize healthy fat sources such as fatty fish, nuts, seeds, avocados, and olive oil while minimizing saturated and trans fats that can impair metabolic health [1].

Micronutrients including iron, calcium, vitamin D, magnesium, zinc, and B-vitamins are vital for energy metabolism, bone mineral density, oxygen transport, and neuromuscular function [1].

Deficiencies in these nutrients can lead to fatigue, impaired immune response, increased risk of fractures, and slower recovery. Female athletes and those following plant-based diets are especially susceptible to iron and vitamin B12 deficiencies [6].

In summary, a comprehensive dietary approach balancing all macronutrients and ensuring adequate micronutrient intake is essential for sustaining performance, optimizing recovery,

and promoting overall health [1, 6].

3. Hydration and Electrolyte Balance

Hydration is a fundamental yet often neglected aspect of sports nutrition. Water is essential for regulating body temperature, maintaining blood volume, supporting cardiovascular function, and enabling efficient nutrient transport and waste removal [1]. Even a small fluid deficit equivalent to 2% of body weight can impair strength, reduce endurance, and compromise cognitive performance [3].

Professional athletes often lose substantial amounts of fluid through sweat, particularly in hot and humid environments or during extended competition [1]. Individual sweat rates vary significantly depending on body size, exercise intensity, climate, and acclimatization.

In addition to fluid loss, electrolytes such as sodium, potassium, calcium, and magnesium are depleted through perspiration [11]. These electrolytes are essential for nerve conduction, muscle contraction, and acid-base balance. Failure to replace electrolytes adequately can lead to muscle cramps, dizziness, and hyponatremia, a potentially life-threatening condition.

Hydration strategies must be individualized based on sweat testing, environmental factors, and sport demands [9]. Pre-event hydration should begin several hours before activity, with regular fluid intake maintained throughout exercise. In prolonged endurance events, electrolyte replacement drinks are recommended to sustain plasma sodium levels and prevent dehydration-related performance decline [3]. Post-activity rehydration should aim to restore fluid balance within a few hours, guided by monitoring body weight and urine color [1].

A proactive, structured approach to hydration and electrolyte management is critical for professional athletes seeking to maintain consistency in performance across diverse conditions.

Football Tournament match schedules often include games every 72-96 hours, sometimes in hot conditions exceeding 30 °C. Midfielders may lose over 2.5 liters of fluid per 90 minutes. Individual hydration plans should aim to replace ~150% of fluid lost during exercise within the first 4 hours post-match.

4. Nutrition Periodization in Sport

Nutrition periodization refers to the systematic adjustment of dietary intake to align with specific phases of training and competition [8]. This approach recognizes that nutritional needs fluctuate over time depending on training volume, intensity, goals, and recovery requirements.

During periods of high training load—such as preseason conditioning or heavy endurance blocks—energy and carbohydrate intake must increase proportionally to meet elevated demands [1, 8]. Sufficient carbohydrate availability

supports glycogen restoration, immune function, and training adaptations [5].

Conversely, strength and hypertrophy phases often necessitate a focus on increased protein intake to facilitate muscle growth and repair [7]. Protein distribution throughout the day, including post-exercise consumption of 20-40 grams of high-quality protein, has been shown to maximize muscle protein synthesis [7, 8].

In competition phases, athletes may utilize carbohydrate loading protocols to supercompensate glycogen stores, while also adopting specific hydration and micronutrient strategies to reduce fatigue and optimize performance [1, 4].

Tapering periods preceding major competitions often involve a gradual reduction in training volume while maintaining high nutrient density. This strategy ensures recovery without compromising energy reserves [8].

Finally, off-season periods provide an opportunity for athletes to recalibrate body composition, address micronutrient deficiencies, and experiment with new dietary strategies without the pressure of immediate performance outcomes [2].

A typical in-season football microcycle (Match Day, MD) includes MD+1 (recovery), MD-3 (high intensity), MD-2 (tactical), and MD-1 (taper). Carbohydrate intake should align accordingly: 3-4 g/kg on MD+1, increasing to 7-8 g/kg on MD-2 [4]. Protein intake should be distributed evenly throughout the day, with ~0.4 g/kg every 3-4 hours, including post-training [7].

Effective nutrition periodization requires close collaboration between athletes, coaches, and qualified sports dietitians to ensure that dietary interventions are precisely matched to training objectives and personal physiology [8].

5. Psychological Aspects of Eating Behavior

Nutrition is not only a physiological process—it is deeply influenced by psychological, social, and cultural factors. For professional athletes, the pressure to maintain a particular body composition, adhere to weight classifications, or achieve an aesthetic ideal can lead to maladaptive eating behaviors and disordered eating patterns [6].

Eating disorders such as anorexia nervosa, bulimia nervosa, binge eating disorder, and orthorexia nervosa are recognized clinical conditions that can severely compromise health and performance. Even subclinical patterns of chronic energy restriction or excessive focus on “clean eating” can result in nutrient deficiencies, hormonal dysregulation, and impaired immune function [6].

The Relative Energy Deficiency in Sport (RED-S) framework describes a syndrome in which chronic low energy availability negatively impacts metabolic rate, menstrual function, bone health, immunity, protein synthesis, and cardiovascular health [7]. RED-S can affect both female and male athletes across disciplines.

Psychological factors contributing to disordered eating include perfectionism, performance anxiety, low self-esteem, and exposure to critical feedback from coaches, teammates, or the public [7]. Social media further amplifies pressures by idealizing specific body types and dietary trends.

To address these challenges, multidisciplinary support is essential. Qualified sports dietitians, psychologists, and medical professionals should work collaboratively to screen for risk factors, provide evidence-based nutrition education, and foster a team culture that values health and sustainable habits over appearance alone.

Mindful eating, intuitive nutrition approaches, and cognitive-behavioral interventions can empower athletes to develop a positive relationship with food while supporting optimal performance [8].

6. Nutritional Challenges in Professional Environments

While the science of sports nutrition is well-established, the realities of professional athletic life often pose significant obstacles to implementing best practices [1, 2].

Frequent travel is a central challenge. Athletes competing internationally face jet lag, irregular meal times, limited access to familiar foods, and logistical constraints that complicate consistent nutrition [3]. For example, a football team traveling across multiple time zones during a tournament must coordinate meal timing and composition to mitigate circadian disruption and sustain energy levels [1].

Another issue is the availability of high-quality food options in training facilities, hotels, and competition venues [2]. Reliance on catering services or packaged meals can limit dietary variety and nutrient density [1].

Time pressures are also considerable. Between training sessions, media obligations, medical treatments, and recovery protocols, athletes may have little time to plan, prepare, or consume balanced meals [2].

Moreover, misinformation about nutrition is pervasive. Social media influencers, unqualified “gurus,” and commercial interests often promote unproven supplements, restrictive diets, and pseudoscientific trends [3, 4]. Athletes inundated with conflicting advice may struggle to distinguish evidence-based recommendations from marketing [1].

Strategies to overcome these barriers include employing full-time sports dietitians to coordinate individualized plans, providing educational workshops, establishing team meal protocols, and supplying travel kits with portable, nutrient-dense options [8].

Ultimately, proactive planning and institutional support are crucial to translating nutritional knowledge into consistent practice in high-performance environments [9].

7. Cultural and Regional Differences

Athletes hail from diverse cultural backgrounds that shape their dietary habits, preferences, and beliefs about food [2]. Understanding and respecting these cultural factors is critical for designing nutrition strategies that are both effective and sustainable [1].

For example, the Mediterranean diet, prevalent in Southern Europe, emphasizes olive oil, whole grains, legumes, fish, fruits, and vegetables, supporting cardiovascular and metabolic health [5].

Conversely, athletes in Nordic regions often consume diets rich in dairy, root vegetables, and whole grains. In East Asian cultures, rice, soy products, and a variety of vegetables form the dietary base, with limited reliance on dairy [12].

Religious practices also influence dietary patterns. Some athletes may observe fasting periods, such as Ramadan, requiring adjustments in meal timing, hydration, and training schedules [3]. Others may avoid certain foods due to religious prohibitions.

Professional sports teams must account for these factors by offering culturally appropriate meal options, involving athletes in menu planning, and educating staff about cultural sensitivities [11].

Integrating cultural preferences with evidence-based nutrition guidelines promotes compliance, enhances satisfaction, and strengthens trust between athletes and support teams [10]. This cultural competence is a hallmark of high-quality sports nutrition programs [10].

8. Supplementation and Ergogenic Aids

While whole foods should remain the foundation of any athlete's diet, targeted supplementation can play a valuable role in optimizing performance and recovery when used appropriately [1].

Supplements are defined as concentrated sources of nutrients or other substances with a nutritional or physiological effect. They can include vitamins, minerals, amino acids, herbal extracts, and ergogenic aids designed to enhance exercise capacity [2].

Among the most studied and widely used supplements are:

- 1) Creatine Monohydrate: Proven to increase intramuscular phosphocreatine stores, improving performance in short-duration, high-intensity activities like sprinting and weightlifting [1].
- 2) Beta-Alanine: A precursor to carnosine, it helps buffer muscle acidity, delaying fatigue during high-intensity efforts [5].
- 3) Caffeine: A central nervous system stimulant that can improve alertness, reduce perceived exertion, and enhance endurance [3].
- 4) Omega-3 Fatty Acids: Known for anti-inflammatory properties and potential benefits to cardiovascular and cognitive health [6].

- 5) Whey Protein: A high-quality protein source supporting muscle protein synthesis and recovery post-exercise [7].

However, the supplementation landscape is fraught with risks. Contaminated or mislabeled products have led to unintentional doping violations, threatening careers and reputations. As such, athletes are strongly encouraged to select supplements certified by reputable third-party testing organizations (e.g., Informed Sport, NSF Certified for Sport) [11].

Additionally, excessive or unnecessary supplementation can disrupt nutrient balance, interfere with medications, or result in adverse effects [11]. Therefore, any supplementation strategy must be:

- 1) Evidence-based — supported by robust scientific research [2, 8].
- 2) Individualized — tailored to the athlete's unique needs and goals.
- 3) Professionally supervised — guided by qualified sports dietitians and medical professionals [12].

When applied judiciously, supplementation can complement a balanced diet and contribute to incremental gains in performance and recovery.

9. Emerging Trends and Research

Sports nutrition is a rapidly evolving field, with emerging trends and scientific discoveries continually reshaping best practices [12].

One notable area of research is gut microbiota modulation. The trillions of microorganisms residing in the gastrointestinal tract play a critical role in digestion, immune function, and metabolic health.

Emerging evidence suggests that manipulating the gut microbiome through diet, probiotics, and prebiotics may influence inflammation, nutrient absorption, and recovery [4].

Personalized nutrition—using genetic, metabolic, and microbiome data to tailor dietary recommendations—is gaining traction. Advances in nutrigenomics and metabolomics promise to refine how practitioners customize nutrition plans to match an athlete's unique biological profile [5].

Interest in plant-based diets has also surged, driven by ethical considerations, environmental concerns, and evidence suggesting benefits for cardiovascular health and inflammation reduction [6]. Athletes such as Novak Djokovic and Venus Williams have popularized predominantly plant-based eating patterns, demonstrating that high-level performance is achievable without animal products. However, careful planning is necessary to ensure adequate intake of protein, iron, vitamin B12, calcium, and omega-3 fatty acids.

Other research focuses on periodized carbohydrate restriction (train low, compete high) to improve metabolic flexibility and fat oxidation capacity [4, 5]. While promising, this strategy remains controversial and requires further validation in elite populations.

Collectively, these trends highlight the importance of on-

going education, critical appraisal of new research, and an openness to evolving practices in sports nutrition [1, 2].

10. Case Studies from Football and Athletics

Case studies of elite athletes and professional teams illustrate the central role of nutrition in modern sport.

Cristiano Ronaldo, widely regarded as one of the greatest footballers of all time, attributes much of his longevity to disciplined nutrition. His diet emphasizes lean proteins such as fish and chicken, complex carbohydrates like whole grains and vegetables, and regular hydration. Ronaldo also practices precise meal timing and recovery protocols, demonstrating the synergy between training, nutrition, and rest [1, 9].

Serena Williams, a 23-time Grand Slam champion, has adopted a predominantly plant-based diet to support recovery and cardiovascular health. Her example underscores the growing acceptance of alternative dietary models in professional sport [6].

Eliud Kipchoge, the marathon world record holder, follows a high-carbohydrate diet consistent with the traditional Kenyan staple foods of ugali (cornmeal porridge), rice, and vegetables. His success exemplifies the performance benefits of culturally appropriate, carbohydrate-rich eating patterns in endurance sports [1].

Professional football clubs such as Manchester City and FC Barcelona employ full-time nutritionists, chefs, and sports scientists to monitor players' body composition, hydration status, and energy availability. These organizations provide individualized meal plans, educational resources, and continuous monitoring, illustrating the degree to which nutrition has become professionalized and integrated into performance infrastructure.

Football (soccer) is an intermittent, high-intensity team sport requiring both aerobic endurance and anaerobic bursts of activity [10].

- i. *Energy expenditure & glycogen:* Elite players burn 1,100-1,400 kcal per match and may deplete up to 90% of muscle glycogen. Low glycogen has been linked to a 2.3x increased risk of hamstring injuries in the final 15 minutes of games.
- ii. *Match-day fueling:* Recommended intake includes 2-3 g/kg of carbohydrates 3-4 hours pre-match, with an additional 30-60 g of simple carbohydrates within 60 minutes of kick-off. During play, carbohydrate intake of 30-60 g/hour (glucose: fructose blend) is optimal.
- iii. *Half-time strategy:* Consuming 300-500 ml of an isotonic drink (6-8% carbohydrate, 20-30 mmol/L sodium) improves late-game sprint performance and passing accuracy.
- iv. *Recovery:* Within 30 minutes post-match, athletes should aim for ~1 g/kg carbohydrate and 0.4 g/kg protein, plus ~150% of fluid lost. Tart cherry juice and

omega-3s may help reduce inflammation and speed recovery.

- v. *Travel & jet lag:* Chrononutrition strategies and melatonin-rich foods (e.g., pistachios) may assist with circadian rhythm adjustment during international travel.
- vi. *Academy athletes:* Iron deficiency affects up to 15% of female adolescent footballers. Biannual screening is advised to prevent anemia and impaired performance.

Collectively, these examples affirm that strategic nutrition planning is a decisive factor in sustaining elite performance over the long term [10].

11. Conclusion

Proper nutrition is indispensable for professional athletes seeking to maximize performance, accelerate recovery, and sustain long-term health [1-3]. It is no longer sufficient to rely on training alone; diet must be recognized as an equal pillar of success alongside physical conditioning, skill development, and psychological preparation.

In football, the integration of evidence-based nutrition is now standard practice among elite clubs, with individualized fueling strategies essential to support dense match schedules, injury prevention, and consistent high-level output [9, 11].

The science supporting evidence-based nutrition is robust and continues to evolve, offering increasingly precise strategies to match the demands of diverse sports disciplines. From carbohydrate periodization and protein distribution to hydration monitoring and micronutrient optimization, every aspect of nutrition contributes to the athlete's capacity to train harder, recover faster, and compete more effectively [1].

Equally important is the recognition that nutrition is personal and contextual. Cultural background, psychological factors, individual preferences, and practical constraints all shape how athletes approach food. Tailoring interventions to fit these realities increases adherence and ensures that dietary plans remain sustainable over time [2].

The integration of emerging technologies, such as genetic profiling and microbiome analysis, holds promise for more personalized approaches in the years ahead. However, the foundation of effective sports nutrition remains unchanged: a balanced diet built on whole foods, informed by scientific evidence, and supported by qualified professionals [5].

By embracing a holistic approach that considers biological, psychological, and social factors, athletes and their support teams can harness the power of nutrition to unlock performance potential and protect long-term health [6].

AI Tools Usage

The author declares that generative AI tools (ChatGPT by OpenAI) were used exclusively for language editing, grammar correction, and assistance with phrasing in the preparation of this manuscript. No AI tools were used for data analysis, interpretation of results, or literature synthesis. The author takes full responsibility for the content of the work, including all ideas, arguments, and conclusions pre-

sented.

The preparation of this text complies with the COPE position on authorship and the use of AI tools, as well as the ICMJE recommendations.

Author Contributions

Andriy Batsula is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The author declares no conflicts of interest.

References

- [1] Thomas, D. T., Erdman, K. A., & Burke, L. M. (2016). Position of the Academy of Nutrition and Dietetics, Dietitians of Canada, and the American College of Sports Medicine: Nutrition and Athletic Performance. *Journal of the Academy of Nutrition and Dietetics*, 116(3), 501-528. <https://doi.org/10.1016/j.jand.2015.12.006>
- [2] Maughan, R. J., & Burke, L. M. (2012). Sports Nutrition: More Than Just Calories - Triggers for Adaptation. *Nestlé Nutrition Institute Workshop Series*, GU, 73-85. <https://doi.org/10.1159/000337227>
- [3] IOC Consensus Statement on Sports Nutrition (2010). *Journal of Sports Sciences*, 28(sup1), S3-S4. <https://doi.org/10.1080/02643758.2011.610340>
- [4] Burke, L. M. (2015). Re-examining high-fat diets for sports performance: Did we call the 'nail in the coffin' too soon? *Sports Medicine*, 45(1), 33-40. <https://doi.org/10.1007/s40270-014-0257-0>
- [5] Spriet, L. L. (2014). New insights into the interaction of carbohydrate and fat metabolism during exercise. *Sports Medicine*, 44(Suppl 1), 87-UG. <https://doi.org/10.1007/s40270-014-0154-1>
- [6] G. Mountjoy, M., Sundgot-Borgen, J., Burke, L., et al. (2014). The IOC consensus statement: beyond the Female Athlete Triad—Relative Energy Deficiency in Sport (RED-S). *British Journal of Sports Medicine*, 48(7), 4U1-4U7. <https://doi.org/10.113G/bjsports-2014-0U3502>
- [7] Phillips, S. M., & Van Loon, L. J. C. (2011). Dietary protein for athletes: From requirements to optimum adaptation. *Journal of Sports Sciences*, 29(sup1), S2U-S38. <https://doi.org/10.1080/02643758.2011.610204>
- [8] Jeukendrup, A. E. (2017). Periodized nutrition for athletes. *Sports Medicine*, 47(Suppl 1), 51-G3. <https://doi.org/10.1007/s40270-017-0GU4-2>
- [9] Bradley, P. S., Di Mascio, M., Peart, D., Olsen, P., Sheldon, B. (2010). High-intensity running and skill performance in soccer. *J Sports Sci*, 28(8), 821-830.
- [10] Mohr, M., Krstrup, P., Bangsbo, J. (2003). Match performance of high-standard soccer players. *J Sports Sci*, 21(7), 519-528.
- [11] Carling, C., McCall, A., Le Gall, F., Dupont, G. (2016). Injury incidence in professional European soccer. *Br J Sports Med*, 50(6), 390-397.
- [12] Barnish, M. S., Turner, S., Barnish, J. (2020). Nutrition interventions and injury risk in football: A systematic review. *Sports Med*, 50(9), 1733-1748.