Nutrition for the Pitch: *A Closer look at the Nutritional Demands of Competitive Soccer*

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Most serious soccer players play in one or more competitive games per week for a large part of the year and will train most days of the week, sometimes, as in training camps, twice a day. The energy demands of training must be met to maintain performance capacity and prevent the development of excessive fatigue. Those who play for fun and train occasionally will find this a good way to stay fit and control weight, but they do not face the same nutritional challenges.

Energy for match play
Football is a game of intermittent work. Players generally perform low intensity activities for more than 70% of the game, but heart rate and body temperature measurements suggest that the total energy demand is high. The high energy demand may be partly explained by the repeated high intensity efforts that players are called upon to perform. A top class player performs approximately 150-250[1] brief intense actions during a game. These efforts place high demands on the anaerobic energy systems, and are a major factor in the fatigue that occurs at all stages of the game.

Carbohydrate is stored in the muscles and in the liver as glycogen. This is probably the most important fuel for energy production and fatigue towards the end of the game may be related to depletion of glycogen in some of the individual muscle fibres. If even a few of these are unable to contract, then sprinting ability is reduced and skill may be impaired. Free fatty acid (FFA) levels in blood increase progressively during a game and partially compensate for the progressive lowering of muscle glycogen, but this is a less effective fuel source. The physical demands during a game vary greatly between players and are related to physical capacity and tactical role in the team. These differences should be taken into account in the training and nutritional strategies of all serious players.

The total distance run by a player during a game depends on many different factors, including the level of competition, the player's position, the playing style, and fitness level of the individual. At the elite level, male outfield players typically cover about 10-13km[1], making soccer an endurance sport. The physical demands are increased by the fact that more than 600m are covered at sprinting speeds and about 2.4 km at high intensity. Over the whole duration of the game, heart rate is about 85% of the maximum rate and the oxygen demand is about 70% of the maximum oxygen uptake (VO2max). These values suggest that the total energy cost of a game for a typical player weighing about 75kg would be about 1,800kcal. The value for players at lower levels of the game is somewhat less than this; because the VO2max is also lower, the total energy expended will be less. Of course, heavier players need more energy for a given distance run, and energy needs also vary greatly between individuals.

Energy Demands of Training
The energy demands of training will vary depending on the intensity, frequency, and duration of the training sessions, but they will also change over the course of the season. Most players will follow a

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weekly cycle that involves a reduced training load to allow recovery from the previous game, days of harder training, and a reduction in training load in preparation for the next game.

In pre-season, the training load is usually at its greatest as players strive to reach full fitness for the opening games of the season. Energy demands in a training session focused on fitness may exceed those of a hard game, sessions where the emphasis is on recovery and regeneration or on skill, the energy cost will be less.

Energy Needs
The foods we eat and the fluids we drink provide for the immediate energy needs of the body as well as influencing body energy stores. Energy stores play a number of important roles related to exercise performance, since they contribute to

- Size and physique (e.g. body fat and muscle mass)
- Function (e.g. muscle mass)
- Fuel for exercise (e.g. muscle and liver carbohydrate stores)

The energy needed for training and match play must be added to the energy required for normal daily activities. This will depend on physical activity at work and on other lifestyle factors.

How much food a player needs will depend largely on the total energy needs, and there is no simple formula to predict this. Energy needs depend not only on the demands of training and match play, but also on activities outside of the game. For those who train infrequently, or where training sessions are short or easy, the energy demands will not be high. Similarly, energy needs are lower during periods of inactivity such as the off-season or while a player is injured, and players should adapt their food intake accordingly.

Resources
[1] Energy Demands for Training and Match Play, FIFA Nutrition for Football Guide: A practical guide to eating and drinking for health and performance.

More Soccer, and Soccer specific exercises can be found at the home of PTS Soccer at
www.performancetrainingsystems.net/PTS_Soccer.php