

NUTRITION

Nature Of Football

A very physically demanding game

- Prolonged and intermittent activities over 90 minutes or more.
- Activities like jumping, sprinting, running and walking use both aerobic and anaerobic energy systems.
- Average distance covered in a 90-minute game by males is 10-12 km and 7-8 km for females.

Energy requirements

Elite players who trains and play at least 5 times a week needs

- 3000-3500 kcal per day (Male)
- 2500-3000 kcal per day (Female)

Peak performance

Among other factors, players need the following for peak performance

- Enhanced glycogen reserves
- Optimal fluid balance
- Optimal oxygen intake capacity

Energy supplies

Energy turnover is very high during a football match. Match activities will cause breakdown of carbohydrates and fats to derive ATP. ATP is needed for muscle contraction. Another limited source of energy is the oxidation of protein.

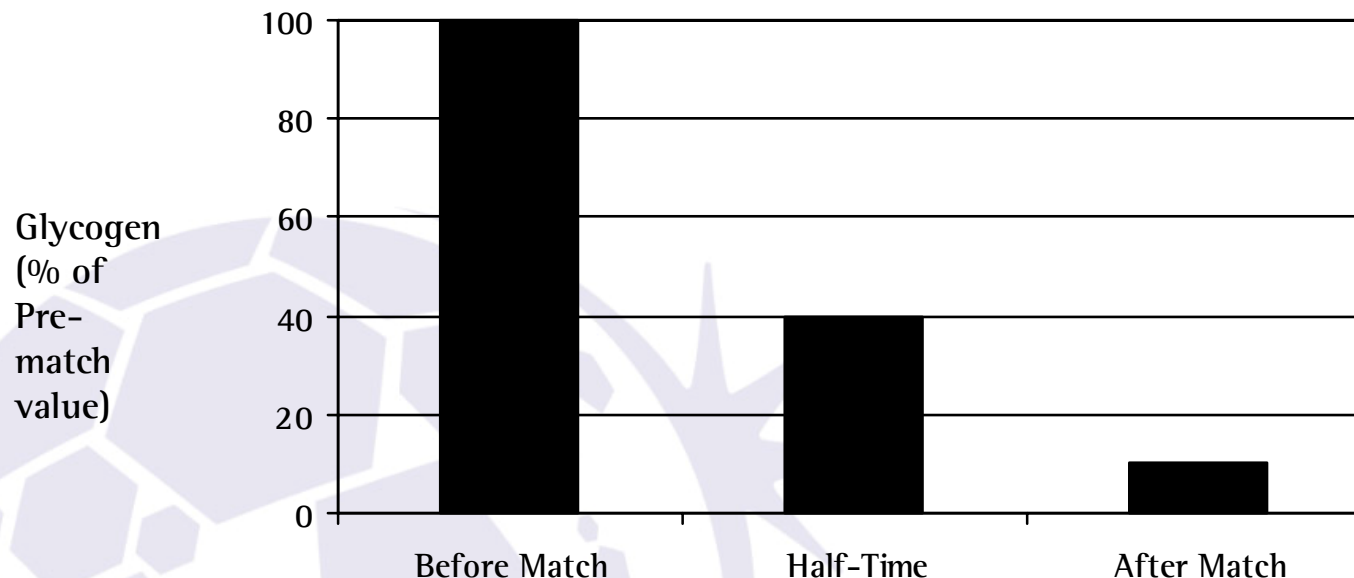
Research

- * Research and tests has shown that
 - Glycogen stores are nearly depleted after a match.
 - Greatest amount of depletion occurs during the first half.
 - Players ran lesser in the second half due to this depletion.
 - Players who had a 65% carbohydrate diet performed 33% more high intensity runs as compared to players who had a 30% carbohydrate diet.

Therefore, proper nutrition is also important in ensuring peak performance

- * Reference: Agvenik (1970), Reilly and Thomas (1976), Balsorn et al (1999)

MUSCLE GLYCOGEN IN A FOOTBALL MATCH



Football Diet

The primary requirement of a footballer is to consume a balanced, varied and nutritionally complete diet that meets the **ADDITIONAL** energy and fluid requirements of the game. Carbohydrate nutrition plays an important role in achieving successful performance.

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Carbohydrates for the footballer

Carbohydrates are a source of energy. They are broken down and stored as Glycogen in the liver. This STORE is very important as the energy stored in the muscles and blood glucose is easily depleted during intensive prolonged exercise. If there is insufficient Glycogen in the liver, then fatigue sets in and activity may have to be stopped. It's like a vehicle running out of fuel, even in its reserve tank.

So a higher quantity of carbohydrate has to be consumed to top up the stores.

What to eat?

Carbohydrates can be found in many kind of foodstuff. Food containing carbohydrates are divided into 3 groups. They are divided based on a numerical index, which indicates the rise of blood glucose after consumption. Logically speaking, for footballers who train and play regularly, the faster the absorption means the faster the stores are replenished.

The 3 groups are:

High Glycemic Index (>70%)

Broken down very quickly, produces a fast and great increase in blood glucose and glycogen levels.

Examples: Potatoes, bananas, raisins, rice, cornflakes, honey, white bread, broad beans, muesli, sports drinks, chocolates, biscuits.

Medium Glycemic Index (56-69%)

Examples: Grapes, oranges, pineapple, ice cream, noodles, oatmeal biscuits, sponge cakes, yam, pasta.

Low Glycemic Index (<55%)

This category, which takes a longer time to break down, shows a slow rise in blood glucose levels.

Examples: Apples, apricots, peaches, plums, grapefruits, yogurt, baked beans, kidney beans, milk, spaghetti, orange juice.

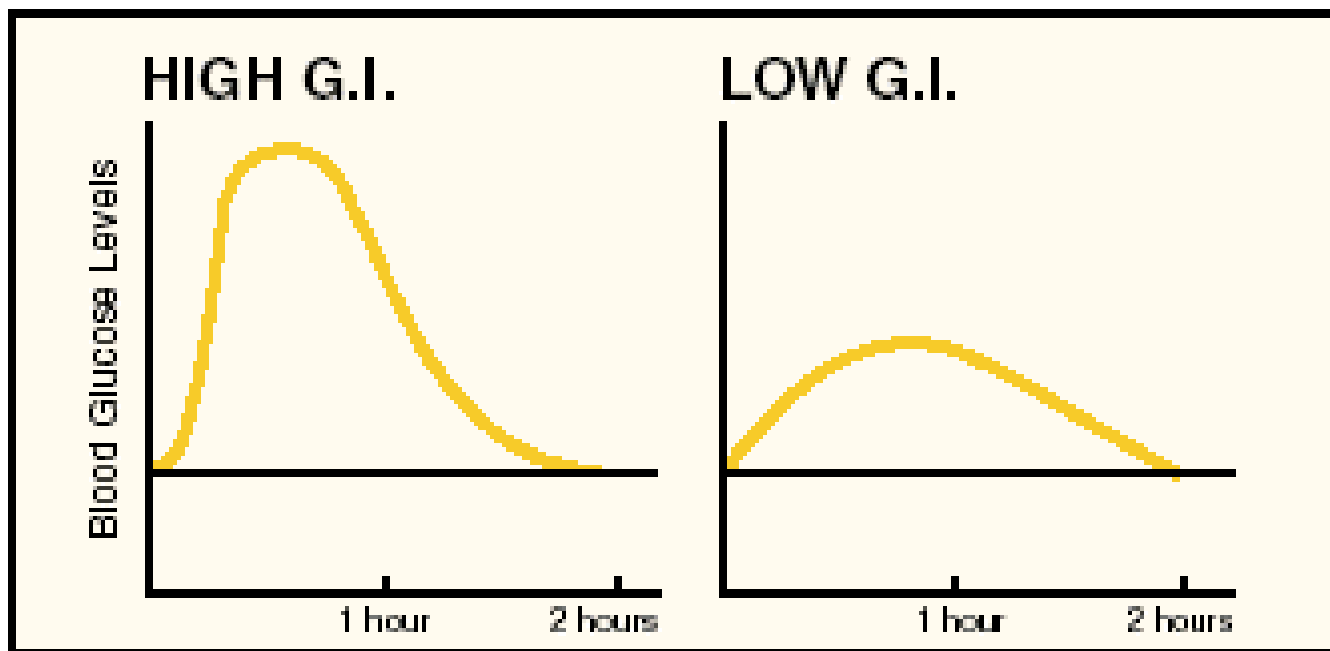


Fig 1: Glycaemic response to different foods.

(From <http://www.sports dietitians.com.au>)

When to eat?

It is difficult and uncomfortable to train/play on a full stomach. It will affect performance, as the digestive system will also tax the energy system.

It takes 1-4 hours for the contents in the stomach to be digested and pass into the small intestine, depending on the type and quantity of food consumed. Take a major meal (lunch, dinner) at least 3-4 hours before training/match.

Liquids and liquid/soft food can be taken closer to training/match activity because the stomach can digest it faster. Alternatively, training/playing on an empty stomach is also not ideal so light snacks, liquids and soft food can be consumed 1-2 hours before training/match.

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Samples

3-4 hours before training/match

Breakfast	Lunch/Dinner
Cereals with low fat milk. Bread with peanut butter, jam. Bread roll, croissant, pastries. Fresh fruit. Fruit/vegetable juice, plain water, low-fat yogurt.	Rice with accompaniment, (not too oily & spicy). Noodles in gravy/soup. Lean meat (small portions and trimmed of fat). White meat (chicken, duck), fish (steamed, grilled). Baked potatoes, pasta. Fruit juice, plain water, sports/isotonic drink.

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2-3 hours before training/match

Breakfast	Lunch/Dinner
Bread. Bread roll, croissant, pastries. Fruit/vegetable juice, plain water Sports/isotonic drinks.	Noodles in gravy/soup. White meat (chicken, duck), fish (steamed, grilled). Baked potatoes, pasta. Fruit juice, plain water, sports/isotonic drink, non-aerated soft drink.

1 hour before training/match

Light Meal/Snack
Fresh fruit. Sandwiches (Egg, cheese, vegetable). Fruit juice, plain water.

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These are sample meals that can be taken BEFORE activities. Replenishment of the Glycogen stores can be achieved by eating food from the Low Glycemic Index group 3-4 hours earlier. As the activity time approaches, food from the High Glycemic Index now should be consumed and in smaller portions. This will help performance because of the additional carbohydrate fuel that are now available in the stores for the later parts of training or match.

Meals AFTER activities

Energy stores are almost depleted after prolonged and intense activities. It is very crucial that this store is quickly replenished so that players can recover and be prepared for the next bout of activity, sometimes less than 24 hours later.

Within the first 2 hours after activities, the body produces a higher amount of Glycogen Synthase, an enzyme that helps glycogen absorption. Body cells are also more active in absorbing nutrients. Glycogen absorption/storage capability increases to 300% due to these. So players should take advantage of this 'OPEN' period by eating food from the High Glycemic Index group (Please refer to the list above). The replenishment process should continue for the next 24 hours.

HYDRATION

The Human Body

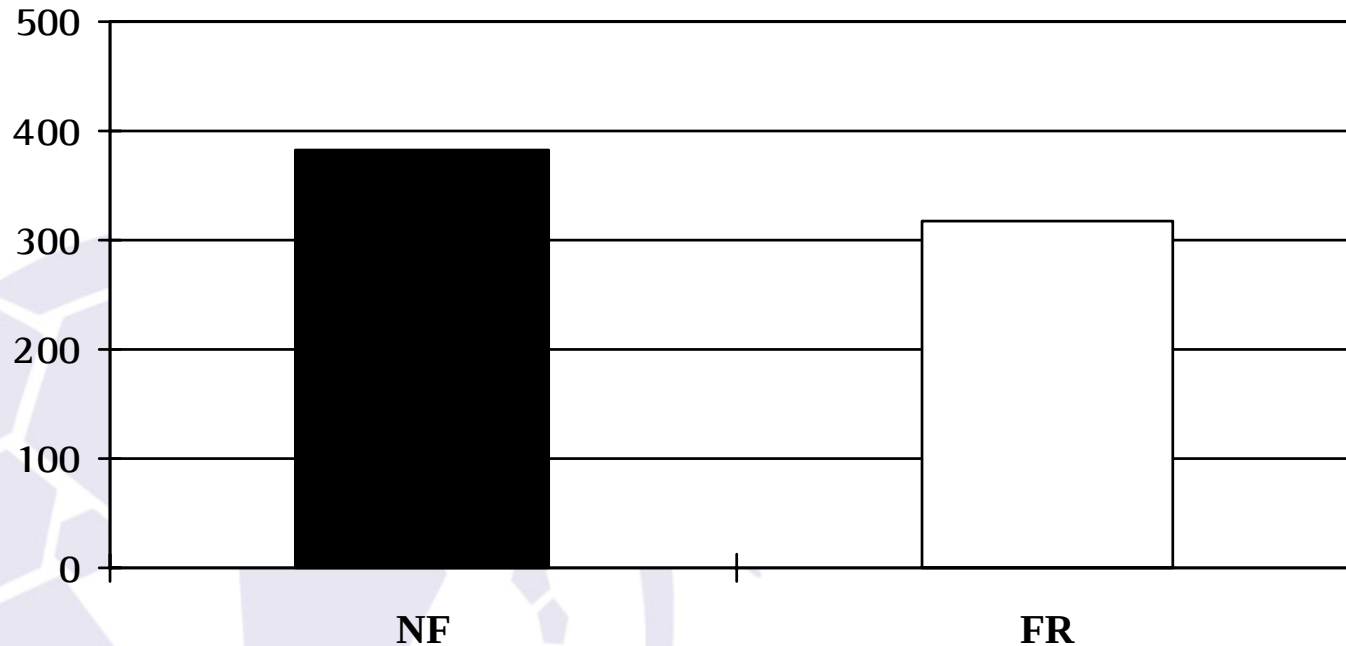
- 70% of the body is water.
- Water is needed for digestion, absorption, transportation, cell-formation, circulation and waste removal.
- Drinking fluids and consuming certain kind of food introduce water into the body (Hydration)
- Sweating, breathing and urinating remove water from the body (Dehydration)

Dehydration

Physical activity burns energy (1 ml of water is lost when 1 calorie is burnt)

A lot of fluid is lost through sweating and the process of burning energy (an average of 2500 ml is lost per match). This loss of water will reduce and affect performance both physically and mentally. If this loss is not replaced, there will be higher consumption of muscle glycogen when compared to a well-hydrated body.

EFFECT OF FLUID INTAKE ON NET MUSCLE GLYCOGEN UTILIZATION DURING EXERCISE



(From Hargreaves et al. 1996)

NF = No Fluid Replenishment 

FR = Fluid Replenishment 

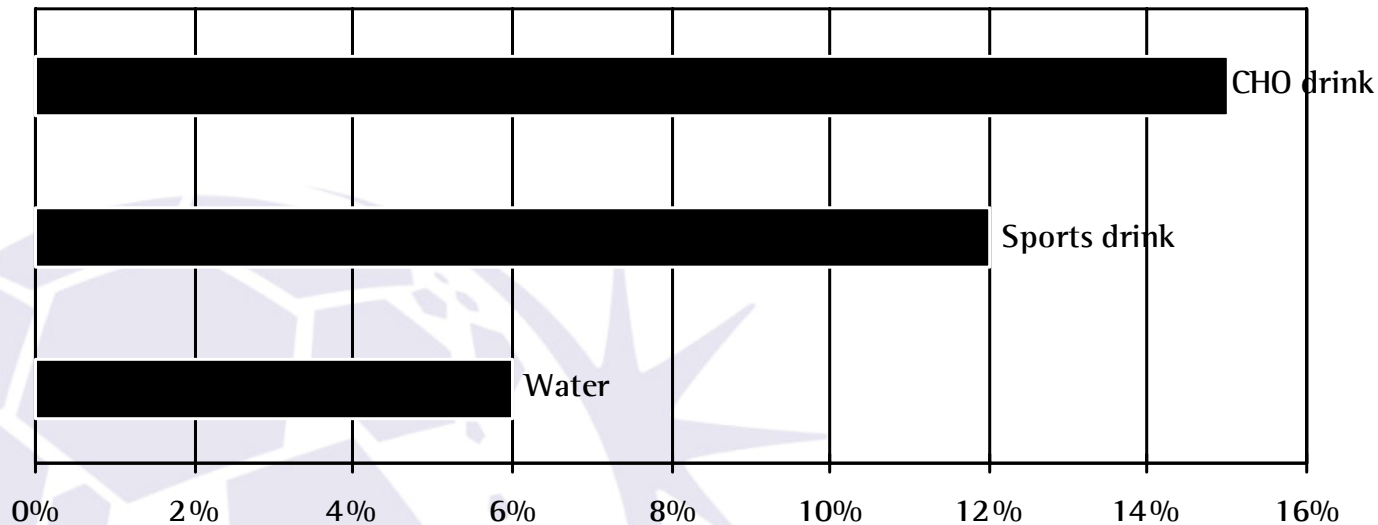
Hydration

The process of hydration must take place before, during and after activities. Consumption of carbohydrate solution/isotonic drinks assist in faster absorption/re-hydration.

Before	During	After
400-600 ml 2 hours before activity	150-250 ml every 20 minutes (intervals/water breaks during training and during stoppages in the match)	*1000 ml after activity or as per individual requirements

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% PERFORMANCE IMPROVEMENT



(From Dr. Bob Murray)

Sweating leads to loss of salt (sodium), which results in muscle cramps. Depending on climatic conditions (temperature, humidity), reports showed that salt loss during training in club team is around 5 gm and this can be obtained from re-hydration drinks or food.

FLUID REPLACEMENT FORMULA

* The exact amount for each individual should be determined by weighing the player before and after training/match (with minimal undergarments). The difference in weight loss can be equated to loss of fluid ($1 \text{ gm} \doteq 1 \text{ ml}$). For example, if a player weighs 70 kg before and now weighs 69 kg, a 1 kg or 1000 gm shortfall is shown. Add the amount of fluid consumed DURING the activity. For example, if 750 ml is consumed and using the equation above, then 1750 ml must be replaced for this particular player.

Weight before activity	= 70 kg
Weight after activity	= 69 kg
Difference	= 1 kg or 1000 gm = 1000 ml
Add fluids consumed	= 750 ml
Total fluids to be replaced	= 1000 ml + 750 ml = <u>1750 ml</u>