



POWERED BY DAIRY



Sports Nutrition Handbook

Fuelling Wise for Sport & Exercise

ndc.ie





Professor Niall Moyna

Head of the School of Health and Human Performance, Dublin City University

“The benefits of regular physical activity are indisputable. Regular physical activity is a key element of a healthy lifestyle and is known to prevent disease, enhance wellbeing and increase lifespan. Indeed, if the known benefits of physical activity could be packaged into a pill, it would be the most prescribed wonder-drug on the planet! Any form of physical activity is better than none. Even short 10 to 15 minute bouts of low intensity physical activity such as walking or housework have substantial health benefits. Ideally, adults should accumulate 30 minutes of physical activity every day; whereas young people should aim for a minimum of 60 minutes of physical activity per day.”



Dr Sharon Madigan

Head of Performance Nutrition, Sport Ireland Institute

“Paying attention to eating and drinking habits can impact greatly on the performance of all athletes at all levels. Food is an effective performance enhancer in many ways. It provides us with energy, it builds and rebuilds the body and it can deliver nutrients that are the building blocks of many of the physiological processes involved in exercise. Training plans rarely stay static so neither should your nutrition routine. All athletes will benefit if they tailor their food intakes to suit their own individual needs and are aware that these needs can change throughout the training and competition seasons.”

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Body Composition

- what's your goal?

Our diet and training habits can greatly influence the amounts of fat and muscle in our bodies. These amounts are particularly important for those involved in sport, as our body composition can influence our performance.

When we consume more energy (calories) than we use, this can result in weight gain over time. Similarly, if we use up more energy than we consume, weight loss results. Our food provides calories, with the macronutrients ('macros') carbohydrate, protein and fat containing various amounts of calories (kcal). Per gram, carbohydrate provides 4 kcals; protein 4 kcals; and fat 9 kcals.

Our goal for body composition will depend on the type of sport we are involved in. For example, those who are light with a lower percentage of body fat typically have an advantage in endurance sports such as long-distance running. Heavier individuals with a high muscle mass can have an advantage for resistance against opponents; or for providing strength for throwing and sprinting.

General ranges for percentage body fat:

	Males	Females
Athletes	6-13%	14-20%
Fitness	14-17%	21-24%
Average	18-24%	25-31%
Obesity	≥ 25%	≥ 32%

Source: American Council on Exercise

Losing Weight: Tips

- Body fat has important roles and dropping too low can have negative health effects. Remember that females require a higher fat percentage than men.
- Losing weight too quickly is unhealthy and can result in a loss of muscle as well as fat, which is undesirable. Be patient and aim for an achievable 0.5-1 kg per week.
- Beware of fad diets as these are generally extreme and difficult to stick to. Avoid skipping meals and follow a balanced diet (see tips on page 4) to ensure nutrient needs are met.
- Being organised and planning ahead are key. Bring healthy snacks to school, work or when travelling (e.g. fruit, yogurt, plain nuts) to avoid unhealthier impulse decisions when hungry.
- Be aware that alcohol also provides calories (1g = 7 kcals). As examples, a pint of beer contains about 210 kcals; while a small glass of wine provides about 85 kcals.

Gaining Muscle: Tips

- Aim for increases of 0.3-0.5 kg per week; and combine with a training programme to ensure body weight gains are muscle rather than fat.
- Increase calorie intake by choosing healthy and nutritious foods. For example, although fat provides more calories per gram, avoid overindulgence in high fat, processed foods as this may result in fat gain rather than muscle gain.
- Protein plays an important role in muscle growth and maintenance. Generally, 1.2-2 g of protein per kilogram of body weight ensures needs are met for gaining muscle (see pages 7-8).
- Increase meal frequency to 4-5 times per day. This helps to avoid stomach discomfort that may result from eating a high volume of food across three meals.
- Try not to compare your results to others as the ability to gain muscle is determined by our individual genetic ability. Be patient and avoid unnecessary 'quick fixes'. If considering the use of muscle-gaining supplements, discuss their safety and effectiveness with a sports dietitian.

Performance Nutrition

- do the basics matter?

Whether an elite athlete, involved in a local sports club or a dedicated gym bunny; a healthy, balanced diet is essential for meeting energy and nutrient demands.

A variety of factors influence our individual nutritional needs such as gender, age and body size. The type, amount and timing of food will also depend on the competitive level you are involved in and the specific demands of your training schedule.

The first step for optimum performance nutrition is to ensure that nutrient needs are met by including a variety of nutritious foods across meals and snacks. The Department of Health's Food Pyramid is a useful tool to guide balanced, healthy eating choices (see www.healthyireland.ie). The second step is to focus on the timing of food and fluid intakes around training sessions, matches and competitions.

"We appreciate the importance of diet and nutrition when it comes to our performance and we take guidance from the professionals in this area. Eating well is essential and adapting your nutritional intake to your sport is a necessity. In-season or out of season, as well as pre-, during and post-performance, all influence our nutritional considerations."

International rugby player, **Rob Kearney**

clever choices

- Include complex carbohydrate foods (e.g. wholemeal varieties of cereal, bread, rice, pasta, noodles) in meals and snacks to help ensure energy stores are well-fuelled.
- Include protein foods (e.g. milk, lean meat, eggs, beans, lentils, yogurt, cheese, fish) at each meal time to ensure hard-working muscles have a constant supply of protein throughout the day.
- Include a wide variety of fruits and vegetables across meals and snacks for a good range of vitamins and minerals.
- Avoid too many processed foods that are high in fat, sugar and salt e.g. biscuits, cakes, crisps.
- Avoid or limit alcohol as it can dehydrate the body and impair recovery.
- Get cooking! Preparing and cooking your own meals will give you control over what you eat and is a great life-long skill. Batch cooking healthy meals for the freezer can help you stick to your healthy eating plan on busy days.
- If playing sport at a frequent or intense level, consider seeking advice from a sports nutritionist/dietitian who can tailor food and fluid advice to your specific needs and goals.

Carbohydrate - friend or foe?

Carbohydrates have received some unwarranted negative publicity in recent years, with trends towards 'low-carb' and 'no-carb' diets gaining popularity.

In fact, carbohydrates are essential energy providers and are particularly useful for active sports people. Carbohydrate energy is stored as 'glycogen' and blood glucose in the body. These stores can be used up quickly causing fatigue – affecting both performance and stamina.

Carbohydrate requirements will depend on a number of factors such as the amount, intensity and duration of training, as well as body size and non-sport activities.

Average daily carbohydrate requirements for moderate to intense exercise (grams per kilogram of body weight):

Hours of Activity	Carbohydrate Intake (g per kg)
3-5 hours/week	4-5
5-7 hours/week	5-6
1-2 hours/day	6-7
2-4 hours/day	7-8
> 4 hours/day	8-10

Source: Bean A. Sports Nutrition (4th Edition)

Food servings providing approximately 50 g of carbohydrate:

Food	Serving Size
Porridge oats	70 g
Wholemeal bread	120 g
Fruit scone	90 g
Rice, wholegrain	170 g
Pasta	150 g
Baked potato	220 g
Fresh fruit salad	350 g
Honey	4 tbsp
Cereal bar	80 g
Chocolate milk	430 ml
Sports drink	160 ml

Source: McCance and Widdowson's The Composition of Foods (7th Summary Edition)

Glycemic Index (GI)

Carbohydrate foods can be divided into ratings of between 0-100 based on how fast they cause our blood sugar to rise after eating. This rating is referred to as their 'glycemic index'.

Low GI foods (e.g. porridge, yogurt, apples, nuts) give a more gradual rise in blood sugar levels; with high GI foods (e.g. white bread, cereal bars, jellies) rapidly increasing levels. Low GI foods generally contain less sugar, more fibre and nutrients; and are therefore important components of a healthy diet. High GI foods generally contain higher levels of added sugar and are not usually part of a healthy eating plan. However, these foods can be useful in certain situations such as for quick energy release before exercise or where rapid refuelling is needed after exercise.

Lactose – dairy's carbohydrate...

Milk contains the **naturally occurring** sugar, lactose (approximately 5 g per 100 ml). Like all sugars lactose belongs to the carbohydrate family. Generally sugar is **not added** to milk unless specified in the ingredients list e.g. in flavoured milks.

The World Health Organisation (WHO) have focused on restricting 'added' or 'free' sugars plus sugars naturally present in honey, syrups and unsweetened fruit juices. It is important to remember that lactose does not fall into this category of 'added' or 'free' sugars, even though it is still declared as 'sugar' on nutrition labels.

Protein

- why, when and how much?

As well as relying on our muscles for support and movement in everyday tasks, those involved in sport and exercise need strong, healthy muscles to withstand training and performance demands.

Along with a balanced diet that provides enough energy, protein is an essential nutrient that contributes to the normal growth and maintenance of muscles.

Timing and quality are important when it comes to protein and the optimal approach is to spread intakes across the day rather than consuming a large amount at one meal. This enables the body to supply a constant amount needed by active muscles throughout the day. Consuming protein (approximately 20-25 g) following an intense session is particularly useful to assist muscle growth and repair.

Protein requirements are estimated based on individual body weight; with slight variations depending on the type and intensity of activity. General ranges for daily protein requirements per kilogram of body weight are provided below:

Group	Protein Intake (g/kg/day)
Inactive men and women	0.8-1.0
Moderate-intensity, endurance and team sports	1.2-1.7
Strength, power and resistance	1.2-2.0

Source: Adapted from the Australian Institute of Sport

Foods such as lean meat, fish, eggs, milk, cheese and yogurt are among the best protein providers as these are 'complete' protein sources – providing all of the amino acids (building blocks of protein) that the body needs. Other protein sources include beans, lentils, nuts and seeds.

Protein content of foods:

Food	Portion Size	Protein (grams)
Chicken breast, grilled	100 g - medium size	32
Beef steak	100 g	34
Cod/salmon	100 g	24
Tuna, canned	120 g	30
Boiled eggs	2 eggs - average size	14
Cheddar cheese	25 g	6
Milk (whole/low-fat)	200 ml	7
Yogurt, plain, low-fat	125 g	6
Yogurt, Greek-style	125 g	7
Cottage cheese	75 g	7
Baked beans	150 g	8
Pumpkin seeds	40 g	10
Mixed nuts	40 g	10
Chickpeas	150 g	11

Source: McCance and Widdowson's The Composition of Foods (7th Summary Edition)



Fat

- do we need it?

Fat is essential for our health, with a number of important roles including brain function, cell structure and the absorption of certain vitamins. However, including the right type and amount of fat in the diet is important.

Some tips:

- As fats and oils are high in calories try to use these sparingly. When cooking with oil choose oils such as olive, sunflower or rapeseed.
- Try steaming, baking, boiling or grilling as alternatives to frying.
- Opt for lean meat, poultry and fish instead of processed meats such as ham, bacon and sausages.
- Choose foods with healthy fats such as oily fish (e.g. salmon, mackerel), nuts, avocados. Limit foods that contain less healthy fats such as biscuits, cakes, chocolate, crisps and fried foods.

Fat Fact

While carbohydrates are used as the main energy source for high intensity exercise, during low intensity and prolonged exercise fat stores can play an important role in providing energy. With training the body's ability to use fat as fuel improves. This can be beneficial as carbohydrate stores (glycogen) are in much shorter supply than fat stores – allowing us to spare glycogen and delay fatigue.



Hydration

- how important is it?

Sweating is a natural reaction during exercise to prevent the body overheating, but it does mean we lose fluid and salts (electrolytes) that need to be replaced.

Being even slightly dehydrated (as little as 2 % body weight lost as sweat) can negatively impact aspects of performance such as decision-making, concentration and reaction times. Sweat rates vary from person to person, so it can be useful to develop a personalised fluid strategy based on training sessions. However, some general tips include:

- Ensure you are hydrated when beginning a sports session by drinking 1.5-2 L of fluid over the 24 hours beforehand.
- Monitor urine colour; a straw yellow colour is an indicator of good hydration levels.
- Drink about 500 ml 2 hours before exercise to allow time to urinate if needed and always bring your own bottle in your training kit.
- Don't wait to drink until you feel thirsty. Drink small sips of water at breaks of activity e.g. 100-200 ml every 15-20 minutes.
- If exercising longer than 60 minutes, a sports drink may be useful to provide carbohydrates and electrolytes; or you can make your own drink by mixing 800 ml of water, 200 ml of sugar-containing fruit squash and a pinch of salt.
- Rehydrate after sport to replace fluid lost e.g. 400-800 ml per hour of exercise completed. Water or skimmed milk are good options.
- As we lose electrolytes (sodium, potassium and chloride) as 'body salts' when we sweat, these need to be replaced by consuming foods or fluids containing electrolytes. For example include a pinch of table salt (sodium chloride) to season your recovery meal; or choose milk which naturally contains potassium.

What should I consider?...

Before – fuel up

Meals or snacks consumed before sport should be carbohydrate-based (e.g. wholemeal bread, pasta, rice, cereals, potatoes) and ensure enough time for digestion to avoid feelings of discomfort during exercise.

- Consuming a carbohydrate-rich meal which contains some protein is often advised 3-4 hours before a sports session. Examples include: a rice/pasta meal with a tomato-based sauce and lean meat; baked sweet potato with beans/tuna and grated cheddar; eggs (e.g. poached, boiled or scrambled) on toast; soup with a cheese/egg/meat sandwich.
- If eating 1-2 hours beforehand, the above ideas can be reduced in portion size or opt for: a fruit-vegetable smoothie; breakfast cereal with milk; slice of toast with jam/peanut butter.
- If your session is early in the morning or you need a pre-performance snack 30-60 minutes beforehand, ideas include: a banana; a yogurt; some fruit juice; or a small serving of overnight oats.

During – keep hydrated

There is generally no need for an energy top-up during a session that lasts less than 60 minutes, but continue to hydrate with water at breaks of activity e.g. 150-200 ml every 15-20 minutes. Carbohydrate intake may be useful during intense exercise lasting longer than 60 minutes: mandarins/orange segments, jellies, sports drinks/gels may be practical options.



After - recovery

Effective recovery from an intense exercise session is essential to perform at your best in the next training session, match or competition.

- After exercise, there are three main priorities to consider, often referred to as the 3 'R's of recovery: **Refuel** energy stores; **Repair** muscles; and **Rehydrate**.
- Carbohydrate and protein are the main nutrients to consider: carbohydrate assists with the refuelling of energy stores, while protein plays an important role in muscle growth and maintenance.
- As the body replenishes carbohydrate stores (glycogen) at a faster rate immediately after exercise, aim to eat carbohydrate-based foods with some protein within 30-60 minutes after exercise to begin refuelling energy stores and assisting muscle repair. Follow up with a substantial meal based on carbohydrate foods such as bread, pasta, rice or potatoes; paired with lean protein sources such as meat, fish or poultry; and include a variety of vegetables to contribute to vitamin and mineral intakes.

Recovery meals and snacks

Dr Sharon Madigan, Head of Performance Nutrition, Sport Ireland Institute provides some ideas below:

- 2 boiled eggs; 2 slices wholemeal toast; ½ an avocado
- Smoothie: 150 mls Greek-style yogurt; 250 mls milk; 140 g mixed berries
- Overnight oats: 80 g oats; 250 mls milk; 1 tablespoon chia seeds; 1 tablespoon honey
- Large baked potato; 5 tablespoons baked beans; 25 g cheddar cheese



Milk

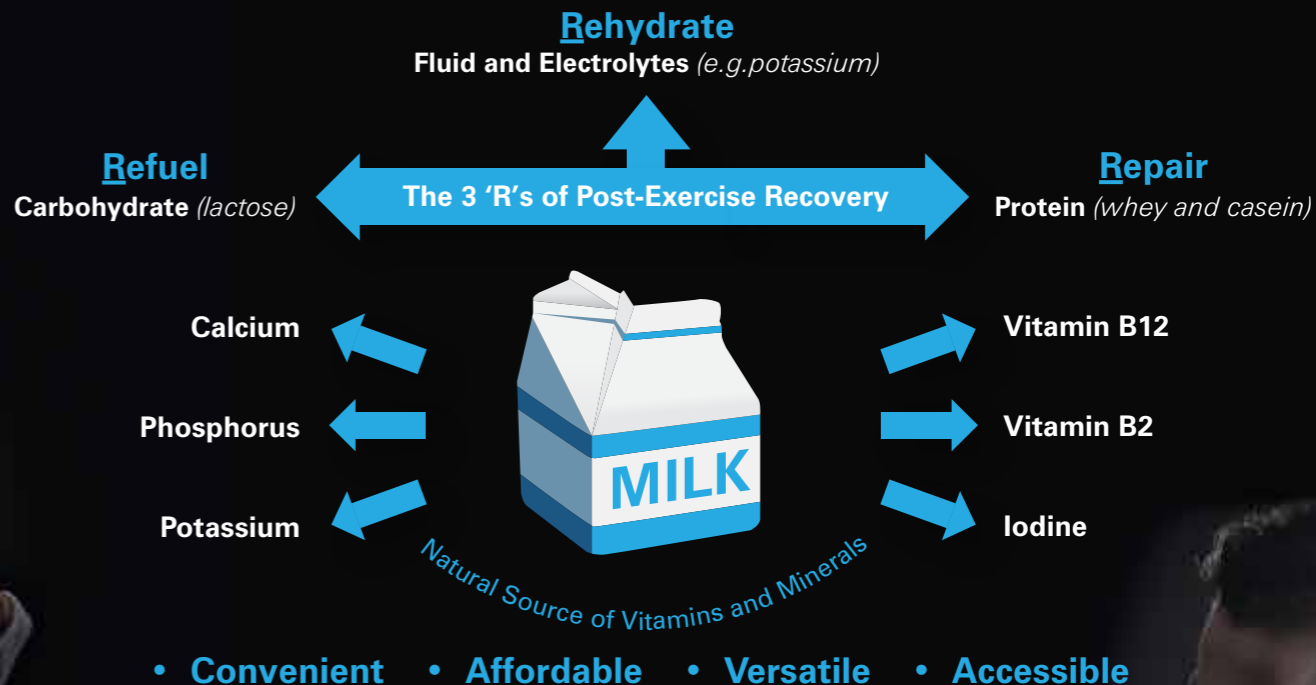
- nature's recovery drink?

Interesting research is emerging on the specific benefits of milk in sport, with potential roles in the areas of recovery nutrition being explored.

Milk naturally contains nutrients that can help address the 3 'R's of post-exercise recovery:

- 1) REFUEL:** Milk contains lactose which can help to start the refuelling of carbohydrate stores. Flavoured milks – which contain higher carbohydrate amounts in the form of added sugar – may be useful after a very intense session, or when quick recovery is needed.
- 2) REPAIR:** Milk provides the high-quality proteins, whey and casein. Protein plays a valuable role in the normal growth and maintenance of muscles.
- 3) REHYDRATE:** Milk is a fluid (naturally composed of about 87 % water) and naturally contains electrolytes such as potassium.

As well as being an affordable, natural, versatile and widely available choice after exercise, milk provides a range of vitamins and minerals which have roles in health that are particularly useful for those who are active. For example, milk provides calcium, protein and phosphorus to support **bone health**; vitamin B2 to assist with **energy release**; iodine to contribute to normal **cognitive (brain) function**; and vitamin B12 to support normal functioning of the **immune system**.



Did you know?

The Department of Health's guidelines for healthy eating recommend 3 servings from the 'milk, yogurt and cheese' food group; with 5 servings recommended for those aged 9-18 years. Examples of a single serving include: 200 ml of milk; 125 g of yogurt; or 25 g of cheddar cheese.

Supplements - worth the hype?

Supplements include a wide range of pills, powders, bars, drinks and gels and can be classed as nutrients, functional foods, sports foods and ergogenic aids.

It is important to remember that supplements do not offer a shortcut to good performance: talent, training, good nutrition and adequate rest are all essential. Generally, if following a balanced, varied diet and unless a nutrient deficiency is identified, there is no need to take any nutritional supplements. Athletes may find some food supplements such as protein powders or sports drinks convenient on occasions where food sources are not readily available or if quick recovery is required between sessions.

If training at a competitive or intense level, a sports dietitian can offer advice on supplement use depending on individual needs. Before using any supplement, athletes should consider if they are shown to be effective, safe and legal (see www.sportireland.ie).

For those under the age of 18 years, supplements are not advised and all nutrient needs should be met from dietary intakes.

Further Reading

The National Dairy Council
www.ndc.ie

Sport Ireland
www.sportireland.ie

Australian Institute of Sport
www.ausport.gov.au/ais

Department of Health (2016) The Healthy Eating Guidelines and Food Pyramid
www.healthyireland.ie

Irish Nutrition and Dietetic Institute - Factsheets
www.indi.ie/fact-sheets

Safefood
www.safefood.eu

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