



FrieslandCampina

Institute

for dairy nutrition and health



nutrition &
endurance sports





Sports and nutrition are very closely linked with each other. Nutrition plays an important role in strength, endurance, recovery and maintenance of good health which in turn supports sports performance. A diet in line with the demands and intensity of exercise is not only important for top athletes, but also for people who regularly participate in sport and exercise.

An endurance athlete often trains for a longer duration at a moderate intensity. It is therefore important for the body to have sufficient energy, nutrients and fluids. So, what are the nutritional recommendations for people participating in endurance sports and when are the best times to eat?

This booklet composed by FrieslandCampina Institute provides the latest advice based on scientific agreement and official dietary guidelines.

Our nutritional recommendations are based on the needs of a person who actively participates in endurance sports. For personal nutritional advice, please contact a registered (sports) dietitian/nutritionist.



“ For a top athlete, good nutrition and a healthy balanced diet are essential. The importance of a varied diet based on consuming sufficient foods from each food group, such as vegetables, fruit and dairy, can provide all the nutrients an athlete needs and is often underestimated. ”

nutrition and sports



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What should a person who is regularly involved in endurance sports ideally eat and drink? The sports nutrition pyramid provides a basis for sports nutrition advice.

Basic nutrition

For all sportspeople, including endurance athletes, a balanced diet in line with the national dietary guidelines is the starting point for healthy nutrition. Aim to eat sufficient amounts of foods from each food group including vegetables and fruit, grains, oil, dairy, meat, fish, eggs, legumes and (unsalted) nuts. Remember to include plenty of variety. These foods will provide the required amount of energy and important nutrients such as proteins, carbohydrates, fats, fibre, vitamins and minerals. In addition it is important to take in sufficient fluids.

Sports-specific nutrition

A person who is training intensively may sometimes require some extra support in the form of specialist sports nutrition products. An endurance athlete will particularly benefit from a good supply of fluids and carbohydrates. Proteins are important in the recovery period. A balanced diet including foods such as grains, legumes and dairy is the basis for providing these nutrients. They can also be obtained from sports nutrition products, such as sports drinks, sports bars or sport gels. In addition, fluid replacement is important, which can be provided by tea and water.

Supplements

When the daily diet does not provide sufficient amounts of particular nutrients such as vitamin C, or a nutritional ergogenic aid such as caffeine, a supplement can be used. However, it is important first to check whether there is any scientific evidence for the efficacy of the chosen supplement.

pay extra attention to carbohydrate

“ Carbohydrates are part of a varied diet and provide a readily available source of energy to support physical activity undertaken by people exercising at all levels. ”

Why carbohydrates?

Carbohydrates provide energy for muscles during exercise. They consist of one or more sugar molecules. A supply of carbohydrate is stored in the muscles and liver as glycogen, which needs to be replenished on a daily basis and after physical activity. Fruit as well as grain products such as bread or pasta are good sources of carbohydrate.

Usually the daily food intake provides sufficient carbohydrate to replenish this supply, but more active endurance athletes generally need more. In addition it is important to drink enough fluid. Endurance athletes are advised to drink a minimum of 5-7 ml water or sports drink per kilogram body weight.

During exercise

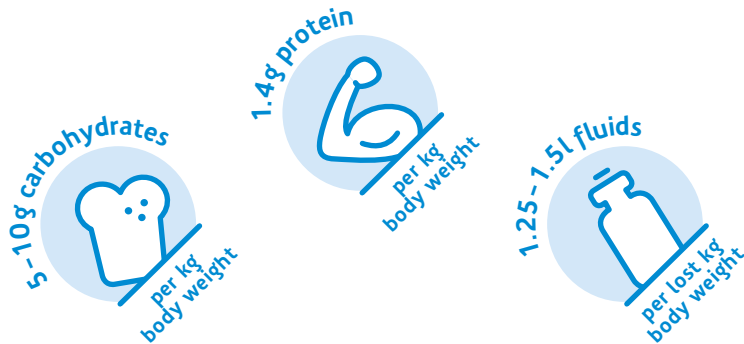
It is especially important to take in carbohydrate during longer training sessions. The table below provides a guideline for intake of carbohydrates during exercise.

Duration of exercise	Quantity of carbohydrate	Type of carbohydrate
< 45 minutes	No nutrition required	
45 - 75 minutes	Very little or rinse the mouth	Most types
1 - 2.5 hours	30 - 60 g/hour	Most types
> 2.5 hours	60 - 90 g/hour	Glucose and/or fructose

Source: ACSM, 2016.
NB These recommendations have been drawn up for elite athletes training intensively; most recreational sportspeople will need less carbohydrate.

what is best to eat and drink after exercise?

“ Start with a proper warm-up, but also take enough time to cool down to ensure more effective removal of waste products from the muscles. This prevents sport injuries and lowers the risk of tensed, fatigued and stiff muscles. ”



Fluid

When sweating not only fluids are lost, but also minerals, such as sodium, chloride and to a lesser degree potassium. The amount of fluid lost depends on the duration and intensity of the exercise, ambient weather conditions, body weight, fitness levels and individual sweat rates. During intense exercise a person can lose as much as 0.3 to 3 litres of fluid per hour. To replace lost fluids the advice is to drink 1.25 to 1.5 litre of fluid per lost kilogram body weight.

Carbohydrate and protein

To help the body to recover after intense exercise the muscles need to repair and regenerate and energy (glycogen) stores replenished. Aim to eat a meal or snack within 30 minutes to 2 hours after exercise, for example a bowl of low fat yoghurt or quark, or a sports bar with extra protein. This helps the body to replenish the store of carbohydrate and protein more rapidly. Endurance athletes need 1.4 grams protein per kilogram body weight. Athletes who exercise in a moderately intense way need 5-7 grams carbohydrate per kilogram body weight. Athletes training at a higher intensity are advised to consume 6-10 grams carbohydrate per kilogram body weight.



daily diet for an **endurance** **athlete**

“ A healthy balanced diet provides energy and nutrients for physical activity. Additionally, it is important for endurance athletes to take in sufficient carbohydrate and fluid. ”

Almost everything we eat and drink provides energy. The amount of energy a person requires depends, on a number of factors including age, body mass and level of exercise intensity. On average, an adult man uses 2500 kcal per day and an adult woman 2000 kcal. A person participating in endurance exercise sports would need a higher energy intake. The example daily menus given on the next pages are designed to meet the nutritional requirements for active male and female endurance athletes. Would you like to find out more about your personal requirements? A registered (sports) dietitian/nutritionist can help you.

what does a man need to eat?

This is an example daily meal plan for an active 35 year old male endurance athlete, weighing 75 kilos and height 1.80 m. The menu provides 2878 kcal, 18 percent of energy as fat, 463 grams carbohydrate and 128 grams protein.



breakfast

- 1 slice of wholemeal bread with cheese spread and cucumber
- 1 bowl of low fat strained yoghurt (150 ml) with 3 tbsp of muesli and 2 tbsp of raisins
- 1 pear
- Water or coffee/tea without sugar and milk

energy	537 kcal
carbohydrate	93 g
protein	34 g

between meals

- 1 wholemeal cracker with margarine and jam
- 3 dried figs
- 1 banana
- Water or coffee/tea without sugar and milk

energy	373 kcal
carbohydrate	77 g
protein	6 g

lunch

- 1 slice of wholemeal bread with fresh goat's cheese, 1 teaspoon of honey, pine nuts and rocket
- 1 small wrap with cottage cheese and slices of tomato
- 1 bowl of raw vegetables
- 1 glass of semi-skimmed milk (150 ml)

energy	387 kcal
carbohydrate	46 g
protein	21 g

between meals

- 1 slice of wholemeal bread with margarine and apple spread
- 1 wholemeal biscuit
- 1 mandarin
- Water or coffee/tea without sugar and milk

energy	180 kcal
carbohydrate	31 g
protein	6 g

training 1 – 2.5 hours

- 1 bottle (330 ml) of high-energy sports drink

energy	218 kcal
carbohydrate	54 g
protein	0 g

dinner

- 4 serving spoons of rice
- 1 piece of fried tilapia fillet (120 g)
- 3 serving spoons of stir-fried vegetables with oriental sauce (200 g)
- Water

energy	591 kcal
carbohydrate	93 g
protein	37 g



Recipe on the next page!

before going to sleep

- Hot coffee
- 1 currant bun with margarine
- 1 small handful of unsalted nuts

energy	592 kcal
carbohydrate	69 g
protein	23 g



hot coffeechoc

Ingredients

for 1 person

250 ml of skimmed or semi-skimmed milk

1 tablespoon of brown sugar

1 tablespoon of cocoa powder

1 tablespoon of (decaf) instant coffee

Preparation

Heat up the milk in a non-stick saucepan. Mix the sugar, cocoa powder and instant coffee with a few tablespoons of hot milk in a glass or mug. Stir well and pour the remainder of the hot milk on this. Beat the rest of the hot milk in the pan with a whisk and pour the milk foam over the drink. Sprinkle with a little cocoa powder.

Also required

saucepan with a non-stick base

Nutritional value

energy	236 kcal
fat	6 g
carbohydrate	34 g
protein	13 g

what does a woman need to eat?

This is an example daily meal plan for an active 35 year old female endurance athlete, weighing 65 kilos and height 1.70 m. The menu provides 2552 kcal, 18 percent of energy as fat, 396 grams carbohydrate and 127 grams protein.



breakfast

- 1 slice of wholemeal bread with margarine and apple spread
- 1 bowl of low fat strained yoghurt (150 ml) with 2 tbsp of muesli and 3 tbsp of raisins
- 1 mandarin
- Water or coffee/tea without sugar and milk

energy	620kcal
carbohydrate	106g
protein	33g

between meals

- 3 dried figs
- 1 apple
- Water or coffee/tea without sugar and milk

energy	219kcal
carbohydrate	49g
protein	4g

lunch

- 1 toasted sandwich made of 2 slices of wholemeal bread and a slice of 30% fat cheddar cheese and slices of tomato
- 1 wholemeal cracker with cottage cheese
- 1 glass of semi-skimmed milk (150 ml)

energy	414kcal
carbohydrate	46g
protein	26g

between meals

- 1 wholemeal biscuit
- 1 small bunch of white grapes
- Water or coffee/tea without sugar and milk

energy	136kcal
carbohydrate	25g
protein	3g

training 1 - 2.5 hours

- 1 bottle (330 ml) of high-energy sports drink

energy	218kcal
carbohydrate	54g
protein	0g

dinner

- 1 large wrap
- 80 g fried fillet of chicken
- 1 tbsp of pesto
- 1 serving spoon of stir-fried vegetables with mushrooms
- 1 serving spoon of chickpeas
- 1 bowl of raw vegetables
- Water

energy	431kcal
carbohydrate	63g
protein	33g



Recipe on the previous page!

before going to sleep

- Hot coffeecchoc
- 1 slice of wholemeal bread with fresh goat's cheese and honey
- 1 small handful of assorted nuts and raisins

energy	553kcal
carbohydrate	52g
protein	27g

what is **your** daily intake?

	Portion size	Energy (kcal)	Carbohydrate (g)	Protein (g)
Fish, legumes, meat, nuts, dairy and egg				
Milk (semi-skimmed)	1 glass, 150 ml	69	7	5.2
Buttermilk	1 glass, 150 ml	56	7.5	5.1
Yoghurt (semi-skimmed)	1 glass, 150 ml	77	6.4	6.8
Quark (semi-skimmed)	1 portion, 150 ml	111	6.0	21.9
Cheese spread (reduced fat)	For 1 slice of bread, 15 g	23	1.2	2.2
Cheddar cheese (half fat) 20%	For 1 slice of bread, 20 g	55	0	6.5
Cheddar cheese (reduced fat) 30%	For 1 slice of bread, 20 g	63	0	5.6
Gouda cheese	For 1 slice of bread, 20 g	75	0	5.1
Cottage cheese	For 1 slice of bread, 20 g	21	0.6	1.9
Egg	1, 50 g	66	0	6.3
Tofu	1 slice, 75 g	55	0.5	6.1
Hummus, salt-free	For 1 slice of bread, 20 g	66	2.0	1.5
Lentils	1 serving spoon, 60 g	60	10.5	4.6
Salmon	1 piece, 105 g	228	0	21.4
Chicken breast	1 piece, 100 g	148	0	32.0
Unsalted nuts	1 small handful, 25 g	145	2.9	6.0
Peanut butter	For 1 slice of bread, 20 g	121	1.5	5.0
Spreading and cooking fats				
Margarine	For 1 slice of bread, 6 g	43	0	0
Olive oil	1 table spoon, 10 g	90	0	0
Drinks				
Water/tea	1 glass, 150 ml	0	0	0
Coffee (without sugar and milk)	1 cup, 125 ml	1	0.1	0.2
Vegetables and fruit				
Kale	1 serving spoon, 85 g	28	1.2	2.9
Broccoli	1 serving spoon, 50 g	14	1.4	1.6
Tomato	1 piece, 70 g	10	2.1	0.3
Avocado	½, 90 g	172	1.7	1.4

	Portion size	Energy (kcal)	Carbohydrate (g)	Protein (g)
Raw vegetables	1 bowl, 70 g	13	1.5	0.6
Blueberries	1 bowl, 100 g	40	9.1	0.9
Banana	1, 130 g	105	26.4	1.6
Apple	1, 135 g	69	15.7	0.8

Grain products and potatoes

Bread (wholemeal)	1 slice, 35 g	76	14.7	3.3
Oatmeal	1 table spoon, 15 g	57	10.6	1.6
Muesli	1 table spoon, 15 g	54	10.6	1.5
Potatoes, mashed	1 serving spoon, 55 g	56	8.7	1.0
Pasta	1 serving spoon, 45 g	72	14.3	3.0
Brown rice	1 serving spoon, 60 g	94	21.2	1.9

Other foods

Vegetarian burger, coated with breadcrumbs	90 g	169	11.7	11.1
Energy bar with muesli	1 piece, 25 g	100	18.1	1.2
Candy bar	1 piece, 20 g	95	12.9	1
Cheesecake	1 slice, 115 g	251	24.6	6.3
Gingerbread	1 slice, 25 g	92	20.8	0.9
Currant bun	1 bun, 60 g	168	31.6	4.8
Chocolate, dark	1 small bar, 25 g	133	11.7	1.6
Crisps, regular	1 bag, 25 g	125	14.5	1.8
Jam	For 1 slice of bread, 15 g	39	10.3	0.1
Brie	For 1 slice of bread, 30 g	91	0	5.0
Orange juice	1 glass, 200 ml	72	17.2	1.8
Drinking chocolate (semi-skimmed)	1 glass, 150 ml	111	16.4	5.5
Custard (semi-skimmed)	1 pot, 150 ml	142	24.8	6.0
Butter	For 1 slice of bread, 6 g	45	0	0

Sports-specific nutrition and supplements

Sports drink, high-energy	1 bottle, 330 ml	218	54.4	0
Sports gel	1 sachet, 90 g	184	44.8	0.5
Protein drink	1 bottle, 330 ml	186	20	20

Source: Dietplan7 Forestfield software Ltd and data from the manufacturer.
NB: The composition may vary per brand. This table of food composition data gives you a general idea of your intake. For personal advice please contact a registered (sports) dietitian/nutritionist.

your personal advice

Our recommendations in this booklet are based on a person who is actively engaged in endurance sports. For personal advice, please contact a registered (sports) dietitian/nutritionist. He or she can add in your personal requirements, so you have all the information required in one small, handy booklet.

Energy requirements	kcal
Fat	g
Carbohydrate	g
Protein	g
Fluids	ml
Comments	





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Version, May 2018