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# VEGE STABLE

*Can vegetarian athletes  
adequately fuel performance?*



**For the unprepared athlete, avoiding animal-based foods may lead to nutritional deficiencies that negatively impact on health, injury and performance. Sue Appelboom explores the importance of dietary planning and appropriate supplementation for vegetarians in order to support peak performance.**

Awareness of the dietary risks that vegetarians face is paramount. These include inadequate intake of energy, protein, fatty acids and essential micronutrients. In this article vegetarians are defined as those who avoid animal tissue proteins – meat, poultry and fish – but may consume eggs (ovo-vegetarian) or dairy (lacto-vegetarian) or vegans who consume only plant foods. Reference nutrient intakes (RNIs) are USA recommendations for adults and are total intakes from all sources.

## **Energy**

Carbohydrates and fats are the main sources of energy burnt during exercise. High-fibre plant foods have a low calorie density and are bulky to consume, potentially reducing energy availability. Lightweight rowers who further restrict calories for weight-loss are at the greatest risk of reduced energy. Even when protein intake is adequate, if overall energy intake is insufficient it will lead to protein breakdown to meet energy needs and hence reduced muscle mass. Eating more frequent meals and snacks may benefit vegetarian athletes. High-quality and high-quantity carbs are abundant in whole plant foods such as whole grains, legumes, fruit, vegetables, nuts and seeds. Healthy, high-quality sources of fat are best obtained from nuts, seeds, olives (and their oils), avocados, dairy produce and soya. →

**Protein**

Animal foods are often comprised of highly digestible, quality protein, which contains all the essential amino acids required for growth, repair and regulation of body functions. In contrast, plant foods are 'incomplete' proteins, lacking some of the essential amino acids. Vegans may find high-quality protein intake more challenging than lacto-ovo vegetarians, but by combining cereals with legumes over the course of a day the full gamut of essential amino acids can be drawn on by the body to build complete proteins. For example, beans with quinoa; nut butter with whole grain bread; eaten together with a wide variety of vegetables, nuts and seeds. As plant foods tend to be less digestible than animal foods, vegetarian athletes are recommended to increase total protein intake by about 10% above that of an omnivorous athlete, taking in 1.3g-1.7g per kilo of body weight daily.

**Omega-3 fatty acids**

EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) are anti-inflammatory omega-3 fatty acids, which are essential to brain and cardiovascular health. High food sources come from oily fish so vegetarians must rely on plant sources such as walnuts, flaxseeds, chia seeds and hemp seeds. However, plant sources come in the form of ALA (alpha-linolenic acid) which is incompletely converted to EPA and DHA, potentially leading to insufficiency. Omega-3 supplementation may benefit vegetarians and research suggests an adequate intake of direct EPA and DHA may be 250-500mg of each per day. Remember, most omega-3 supplements are fish oils but algae-cultured vegan sources are available.

**Vitamins and minerals**

Micronutrients are essential to many of the body's biochemical processes, including energy production and the synthesis and repair of tissues. Despite potential shortfalls, lacto-ovo-vegetarians who eat a well-balanced diet can generally meet vitamin and mineral

*Iron deficiency results in reduced oxygen supply to muscles, adversely affecting work capacity and performance.*

requirements without supplementation. However, vegans must rely on fortified foods or supplements for those vitamins found exclusively in animal foods (B12, D3). Lightweighters who also restrict energy intake may benefit from a multi-vitamin-mineral supplement.

**Vitamin B12**

This is key for blood cell production and nervous system function, and is found exclusively in animal foods. Vegans are likely to have a lower B12 status than lacto-ovo vegetarians and must rely on fortified products such as yeast extract, soya milks, vegetable margarines and chlorella. Supplementation is usually necessary and the reference nutrient intake (RNI) is 2.4 micrograms per day. The forms hydroxocobalamin or methylcobalamin are better absorbed than cyanocobalamin.

**Vitamin D**

This is essential for the absorption of calcium and bone health along with immunity and skeletal muscle function. Vitamin D status depends on sun exposure as well as intake from food. Vegetarian vitamin D3 food sources are dairy produce and eggs and, though vitamin D2 is found in mushrooms, the potency is too low to meet requirements. Athletes obtaining adequate sun exposure can probably synthesise

enough D3 during summer but, during the vitamin-D winter (Oct-Mar in the UK), might consider D3 supplementation. The RNI is 600 international units (IU) but the consensus among world experts seems to be 1000-2000 IU/day.

**Iron**

This is essential for the formation of haemoglobin in the blood as well as the supply of oxygen to all tissues. Iron deficiency anaemia, more common in women than men, results in reduced oxygen supply to muscles, adversely affecting work capacity and performance. Non-haem iron from plants is poorly absorbed compared to haem-iron from animal foods and must be consumed with vitamin C-rich foods to enhance absorption. As a result of this, there is a raised RNI for vegetarians compared to non-vegetarians, from eight mg to 14mg for men and from 18mg to 32mg for pre-menopausal women. Vegan sources of iron include wholegrain cereals and flours, leafy green vegetables, broccoli, blackstrap molasses, pulses, some dried fruits, nuts and seeds. Supplementation is not usually necessary and should only be undertaken after testing iron status, as excess iron is damaging.

**Zinc**

Vital for energy, a healthy immune system and tissue repair. Poor status leads to decreased muscle strength and endurance. Vegan sources include whole grains, wheat germ, legumes, nuts and seeds. However these foods contain phytates that bind both zinc and iron, limiting their absorption. Lacto-ovo sources also include cheese. The RNI is 11 milligrams for men and eight milligrams for women. Supplementation is not usually necessary to meet requirements but, if it is, should be taken within a general multi-vitamin-mineral.

**Calcium**

This is vital for bone mineralisation, muscle co-ordination and nerve function. Insufficiency is associated with poor bone density and stress fractures. Good sources are abundant in dark green



**EXAMPLE VEGETARIAN MEAL PLAN**

**BREAKFAST**

- Whole grain cereal or porridge oats with fortified non-dairy milk (eg. soya, almond or coconut) topped with berry fruits & nuts.
- or scrambled or poached egg on whole grain toast (LOVs).
- Fruit & vegetable smoothie: 1 piece of fruit (eg. banana, orange, apple), handful of green salad leaves and fresh herbs, ¼ cup seeds (eg. sesame, flax, pumpkin), fortified non-dairy milk

**LUNCH**

- Whole grain sandwiches with vegan turkey or humus spread
- or portion of frittata (eggs, mixed vegetables such as onions, asparagus, peas, broad beans, bell pepper, sweet potato), fresh herbs (LOVs).
- Side salad, wide variety of colour, avocado, mixed leaves (eg. rocket, spinach, watercress), dress with lemon juice and olive, flaxseed, canola or avocado oil.
- Fresh orange or piece of fruit.

**SUPPER**

- Vegetarian chilli made with pulses (eg. kidney, pinto, chickpeas), tofu optional, selection of vegetables (eg. onion, okra, tomatoes, celery, courgette, peppers), spices and fresh herbs; served with brown rice.
- Stewed apples cooked with dried apricots, figs or raisins.

**SNACKS**

- Handful of nuts & seeds (eg. walnuts, almonds, pumpkin, sunflower).
- Fortified non-dairy milk shake or smoothie (fruit/seeds optional eg. berries, sesame seeds/oil)
- Oatcakes with humus.
- Avocado on whole meal toast with olive oil, lemon juice, fresh herbs.
- Handful of dried fruit (eg. apricots, figs, raisins)
- A piece of fresh fruit
- 20-30g dark chocolate (70%+ cocoa)

leafy vegetables, collards, broccoli, okra, tofu, almonds, seeds, figs, legumes and calcium-fortified non-dairy milks. Remember that vitamin D is required for calcium absorption and that high salt, alcohol or caffeine intake disrupt absorption. Vegans tend to fall short of the daily RNI, 1,000mg, and may need to rely on fortified foods or a multi-vitamin-mineral containing calcium.

**Iodine**

This is critical for thyroid function and cellular metabolism. Vegetable sources come from milk (lacto-vegetarians) and sea vegetables such as kelp. One study found 80% of vegans were iodine-deficient, suggesting they may benefit

from a multi-vitamin-mineral containing iodine. The RNI is 150 micrograms per day.

In summary, despite the challenges vegetarianism presents, a carefully planned diet focused on nutritional excellence and appropriate supplementation can adequately fuel athletic performance and avoid potential deficiencies. The serious vegan athlete would do well to invest in a book dedicated to such a topic and which includes comprehensive sample menus for different calorific needs. There are many vegetarian resources online that can be found via a Google search. A list of nutritional supplements tested for banned substances is available at [informed-sport.com](http://informed-sport.com).

**Example vegetarian meal plan**

The menu plan above serves as a guide to the sorts of foods to include daily. It does not give an indication of calorific content as this varies greatly depending on the individual needs of a recreational or elite rower, male or female and open or lightweight. Lacto-ovo vegetarians (LOVs) can also include dairy milk, yogurt, cheese and eggs as alternative protein sources. **ROW360**

**Biography**

*Sue Appelboom is a Registered Nutritional Therapist, practicing clinical nutrition and sport nutrition. She was a member of the GB Rowing Team during the 1990s and competed in the lightweight single scull. [info@neatNT.com](mailto:info@neatNT.com)*