Dairy includes milk and products derived from milk (e.g., yoghurt, cheese, custard and dairy desserts). Dairy food and fluids contain many nutrients that are important for good health. Specifically, dairy is the richest source of calcium in the Australian diet. It also provides 9 other essential nutrients including protein, vitamin A, Vitamin B12, zinc and magnesium.

Consuming three serves of dairy each day, as part of a healthy balanced diet, will provide most adults with their average daily calcium requirements. One serve is equivalent to 250ml milk, 200g yoghurt, or two slices of cheese (40g).

**Why consume dairy?**

There is growing evidence that suggests dairy can play an important role in sports nutrition. Dairy products are practical, cost-effective and enjoyable, and their nutrient profile can lend itself to meeting many sports nutrition goals.

**Short-term goals:**

1. Before exercise  
2. During exercise  
3. Recovery post exercise (Rehydrate, Refuel and Repair)

**Long-term goals:**

1. Health  
2. Body composition

**Before exercise**

The goal of the pre-exercise meal or snack is to provide carbohydrate (at least 1g/kg body mass) and optimise hydration status, particularly in hot conditions, when opportunities for fluid intake during exercise are limited or when pre-existing dehydration needs to be corrected. It is also important to maintain gut comfort by preventing hunger and minimising the risk of gastrointestinal (GI) upset.

Dairy products (milk, flavoured milk, yoghurt, dairy desserts and liquid meal supplements) provide carbohydrate and fluid to meet fuelling and hydration goals. Most are low in fibre making these products suitable for pre-exercise, and low-fat varieties (compared with standard products) are available and recommended for better absorption. Lactose-free varieties are available for those with GI issues, and liquid-meal supplements provide an alternative for athletes who do not tolerate solids before exercise. Additionally, the low glycaemic index of dairy products may be useful to those athletes who are susceptible to rebound hypoglycaemia, particularly when opportunities to consume carbohydrate during exercise are limited. Click here for more information on Eating and Drinking Before Sport.

**During exercise**

Carbohydrate and fluid intake during exercise can delay the onset of fatigue and enhance exercise performance, especially in events longer than 60-90 minutes. Carbohydrate intake has several physiological benefits including stabilisation of blood glucose, providing a source of fuel and in some situations, sparing muscle glycogen in endurance events, and is likely to enhance the function of the central nervous system. Athletes should aim to minimise the fluid deficit to below a 2% loss of body mass, especially in hot environments.

**Recovery post exercise**

The nutrition goals of recovery are to rehydrate, refuel muscle and liver glycogen stores, repair muscle tissue and encourage the adaptation process. The timeframe between sessions will determine how aggressive the athlete needs to be with each of these goals. If there is less than eight hours between sessions, a pro-active approach to nutrition recovery should be taken, in contrast to a longer recovery period, where the athlete may choose their recovery nutrition strategies according to practicality of eating, appetite and other sports nutrition goals.

If provided with appropriate hygiene and temperature control, and considering GI tolerance, dairy products may be an appropriate alternative during prolonged single- and multi-day events between stages, or at checkpoints throughout the race. In these situations, a more aggressive approach to total nutrient support and flavour alternatives is needed. The change in flavour and texture, as well as the presence of sodium, can aid voluntary intake.

The recovery process can be hindered by practical factors including poor access to food and fluid, the athlete’s appetite, and their post-competition commitments. Food and drinks that are portable, have minimal requirements for storage or preparation, and are quick and easy to consume may help to address these challenges.

**Rehydrate**

Milk and semi-solid dairy products (yoghurt, smoothies, custard) provide both fluid and electrolytes (sodium and potassium) to assist with rehydration. The sodium concentration of milk is similar to conventional sports drinks and fluid retention is aided by other nutrients. The change in texture and flavour compared with sports drinks consumed during exercise may enhance voluntary consumption after exercise.

**Refuel**

Dairy drinks, dairy desserts, and liquid meal supplements can provide a substantial contribution towards refuelling targets either as stand-alone foods or as part of a meal/snack. Particular advantages of dairy as a carbohydrate source include:

- Easy to consume and may appeal in situations where appetite is suppressed;  
- The energy content can be adjusted by making appropriate choices from the types of dairy foods available (e.g. low fat products) or by manipulating fat and sugar content according to the athlete’s needs;  
- Assists in meeting overall nutrient and health goals by providing micronutrients and other dairy constituents (e.g. probiotics);  
- Provides a non-acidic alternative to other carbohydrate fluids (e.g. sports drink) to minimize the effect on tooth enamel; and  
- Contributes to other recovery needs – rehydration and repair.
Repair

Optimising the protein synthetic response to an exercise session requires the provision of essential amino acids. One study has suggested that an intake of ~2g of high quality protein post-resistance exercise enhances the protein response (which is likely to translate into a range of ~15-25g of protein for different sized athletes). Dairy proteins, particularly the whey sub-fraction, have been shown to be superior to other protein sources in maximising the response to resistance exercise. It is likely that these findings can be translated to endurance exercise and synthesis of mitochondrial proteins, promoting adaptive responses to training.

Dairy offers many practical advantages for athletes attempting to ingest protein after exercise. Many dairy products have good storage life (UHT), and are available in single serving sizes, with a known content of protein (and other nutrients). In addition, liquid and semi-liquid forms can be quickly consumed in cases of appetite suppression, and sweetened dairy products are generally appetizing.

A practical note on recovery...

When choosing recovery foods, it is important to consider the type of exercise undertaken, the goals of the session and what time of day it is. Do you need a recovery snack? Or can your next meal be your recovery? The nutritional content, demands of the session and the athlete’s overall energy budget should be considered when choosing an appropriate recovery snack.

Practical recovery snack ideas (~10g protein):
- 200g tub yoghurt - 40g Ricotta on 2 slices fruit toast
- 200g drinking yoghurt - 250ml tetra pack flavoured milk
More substantial snacks with ~15-20g protein:
- 70g cereal with 200ml milk - 600ml flavoured milk/smoothie

Long-term goals

Health

A diet adequate in energy, carbohydrate, protein, fluid and micronutrients can attenuate the acute and chronic immunosuppression seen with exercise. Dairy products have an advantage over other foods, as they provide a combination of nutrients, rather than one in isolation.

Since dairy foods provide the major source of calcium in our diets, these products are vital for good bone health. In addition, Vitamin D-fortified dairy products may be useful in the prevention and treatment of injuries associated with sub-optimal intake of these nutrients (eg. ‘Boost’ and ‘Anlene’).

Body Composition

The role of dairy in manipulating body composition is an emerging area of research. Early evidence suggests that consumption of recommended intakes of dairy (or perhaps, more specifically, the whey sub-fraction) enhances gains in lean body mass and increases functional strength outcomes, as well as playing a part in reducing body fat levels.

The practical benefits of dairy

- The variety of dairy products (e.g. cheese, milk, yoghurt, etc) as well as the range within each product (low fat, reduced fat, full fat) allows the athlete to choose an appropriate option to meet their needs. The energy content can be further increased by adding other components (e.g. fruit or flavoured topping to a smoothie or milkshake).
- Lactose-free dairy products are available for those who do not tolerate lactose.
- Flavoured milk and smoothies provide an alternative for athletes who dislike milk on its own.
- Long life milk products are portable, have a long shelf-life, and are well suited for sporting situations involving travel and when refrigeration is not available.
- Single serve portions are practical for the athlete or sports team, and provide known nutrient profiles of the product.
- Milk drinks can be served cold or warm to suit the environmental conditions. This can assist with temperature regulation and voluntary intake.
- Dairy products provide a cost-effective and enjoyable recovery option for athletes.
- Cheese has a high salt content, and may be added to post-exercise meals and snacks to aid electrolyte replacement and the retention of fluid.

Table 1. Nutrient profile per serve of commonly available dairy products

<table>
<thead>
<tr>
<th>Product</th>
<th>Energy (KJ)</th>
<th>CHO (g)</th>
<th>Protein (g)</th>
<th>Fat (g)</th>
<th>Calcium (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC milk* (250ml)</td>
<td>680</td>
<td>12</td>
<td>8</td>
<td>10</td>
<td>285</td>
</tr>
<tr>
<td>RF milk* (250ml)</td>
<td>510</td>
<td>14</td>
<td>10</td>
<td>4</td>
<td>343</td>
</tr>
<tr>
<td>Skim milk* (250ml)</td>
<td>455</td>
<td>14</td>
<td>11</td>
<td>0</td>
<td>377</td>
</tr>
<tr>
<td>RF chocolate milk (250ml)</td>
<td>635</td>
<td>21</td>
<td>8</td>
<td>5</td>
<td>285</td>
</tr>
<tr>
<td>RF fruit yoghurt (200g)</td>
<td>660</td>
<td>27</td>
<td>10</td>
<td>2</td>
<td>310</td>
</tr>
<tr>
<td>RF cheese (30g slice)</td>
<td>425</td>
<td>0</td>
<td>9</td>
<td>7</td>
<td>261</td>
</tr>
<tr>
<td>LF custard (200ml)</td>
<td>680</td>
<td>29</td>
<td>8</td>
<td>2</td>
<td>265</td>
</tr>
</tbody>
</table>

*Powdered milk, when made to directions, has the same nutritional profile as liquid milk.

Key references