Nutrition Strategies for Rowing

Training Nutrition:
Rowing requires a unique mix of technique, power and endurance, utilising both the anaerobic and aerobic energy systems. Rowers have very high energy and carbohydrate requirements to support training loads and meet body weight and strength goals.

Some rowers (particularly male heavyweights) struggle with the sheer volume of food they need to consume to meet their training demands. Frequent snacks and the use of compact, energy dense food or drinks such as juice, flavoured milk, jam, honey, sports bars and liquid meals are necessary to keep the volume of food manageable.

Nutrition recovery strategies between sessions are extremely important and the rower must have a planned approach to their training nutrition.

Carbohydrate: How much?
Carbohydrate is a critical fuel source for the muscle and central nervous system. Carbohydrate intake before, during and after exercise can be required to meet the fuel requirements of the activity.

A rower can calculate a carbohydrate target in grams, and use food tables or information on food labels to plan to meet this goal. Even better, a rower can see a Sports Dietitian for advice to further narrow this target range according to his/her specific situation, and have an individualised meal plan fitted to their needs.

<table>
<thead>
<tr>
<th>Situation</th>
<th>Recommended Carbohydrate Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily refuelling needs for training programs less than 60-90mins per day or low intensity exercise</td>
<td>Daily intake of 5-7g per kg body mass.</td>
</tr>
<tr>
<td>Daily refuelling for training programs greater than 90-120 min per day</td>
<td>Daily intake of 7-10g per kg body mass.</td>
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<tr>
<td>Daily refuelling for athletes undertaking extreme exercise program: 6-8 hours per day</td>
<td>Daily intake of 10-12+ g per kg body mass.</td>
</tr>
<tr>
<td>Pre-event meal</td>
<td>Meal eaten 1-4 hrs pre-competition 1-4g per kg body mass.</td>
</tr>
<tr>
<td>Carbohydrate intake during training sessions and competition events greater than 1 hour</td>
<td>1g per minute, or 60g per hour</td>
</tr>
<tr>
<td>Rapid Recovery after training session or multi event competition, especially when there is less than 8 hrs until the next session</td>
<td>Intake of 1g per kg body mass in the first 30 min after exercise, repeated every 1-2 hrs until regular meal patterns are resumed</td>
</tr>
</tbody>
</table>
A chart that provides information about the carbohydrate content of common foods can be viewed on [www.ais.org.au/nutrition](http://www.ais.org.au/nutrition). You can use this information to plan a daily menu, or specific pre-competition meals and post exercise snacks and meals.

**Protein:**

Rows in heavy training require extra protein to cover a small proportion of their energy costs of their training and to assist in the repair and recovery process after exercise. Adolescent rower's who are still growing, have additional protein requirements.

*Protein Requirements can be summarised as follows:*

<table>
<thead>
<tr>
<th>Situation</th>
<th>Grams protein per kg body mass per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light training program</td>
<td>1.0</td>
</tr>
<tr>
<td>Moderate to heavy training</td>
<td>1.2-1.7</td>
</tr>
<tr>
<td>Adolescent Rower's</td>
<td>2.0</td>
</tr>
</tbody>
</table>

*Which foods are the best to provide protein?*

The following table indicates the protein content of many foods. Each of the foods provides approximately 10g of protein.

<table>
<thead>
<tr>
<th>Animal Foods</th>
<th>Plant Foods</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 small eggs</td>
<td>4 slices (120g) bread</td>
</tr>
<tr>
<td>30g (1.5 slices) reduced fat cheese</td>
<td>3 cups (90g) wholegrain cereal</td>
</tr>
<tr>
<td>70g cottage cheese</td>
<td>2 cups (330g) cooked pasta</td>
</tr>
<tr>
<td>1 cup (250ml) low fat milk</td>
<td>3 cups (400g) cooked rice</td>
</tr>
<tr>
<td>35g lean beef, lamb or pork (cooked weight)</td>
<td>¼ cup (150g) lentils or kidney beans</td>
</tr>
<tr>
<td>40g chicken (cooked weight)</td>
<td>200g baked beans</td>
</tr>
<tr>
<td>50g grilled fish</td>
<td>120g tofu</td>
</tr>
<tr>
<td>50g canned tuna or salmon</td>
<td>400ml soy beverage</td>
</tr>
<tr>
<td>200g reduced fat yoghurt</td>
<td>60g nuts or seeds</td>
</tr>
<tr>
<td>150g light fromage frais</td>
<td>1 cup (250ml) soy milk</td>
</tr>
</tbody>
</table>

*Are high protein low carbohydrate diets appropriate for Rowers?*

In the short term high protein, low carbohydrate diets result in loss of water and glycogen. This might result in a decrease on the scales, but does nothing to reduce body fat. In the long term high protein, low carbohydrate diets may result in fat loss. The effect is primarily due to the fact that these diets are low in kilojoules rather than any magical effect from the protein itself. The lack of carbohydrate reduces energy levels, impairs performance and causes lethargy and nausea. High protein, low carbohydrate diets restrict the intake of many nutrients in the diet. These diets will result in muscle mass decrease. High protein, low carbohydrate diets are not suitable for athletes.
**Weight Loss:**
In lightweight rowing the need to maintain low levels of body fat is important. Rowers needing to reduce skinfolds must target excess kilojoules in their diet. In particular, excess fat, alcohol and sugary foods should be targeted and replaced with more nutrient dense choices (see the AIS Sports Nutrition Fact Sheet: “Weight Loss” [www.ais.org.au/nutrition](http://www.ais.org.au/nutrition) for more detailed information).

**Muscle Mass Gain:**
Specific information relating to nutrition strategies for lean muscle mass gain can be found in the AIS Sports Nutrition Fact Sheet: “How to Grow Muscles” ([www.ais.org.au/nutrition](http://www.ais.org.au/nutrition)).

**Pre Exercise Nutrition:**
Depletion of carbohydrate stores is a major cause of fatigue during exercise.

**Eating Before Early Morning Sessions:**
After an overnight fast (sleeping) liver glycogen (energy) stores are substantially depleted. Therefore, pre training carbohydrate intake is important for maintaining blood glucose levels towards the end of prolonged training sessions.

For example, some fruit and a cereal bar on the way to training along with some fluid such as a sports drink would be a good choice. If tolerating solid food before training is difficult a liquid meal alternative such as Protein Plus drink or a smoothie or even a glass of juice can be useful in providing essential carbohydrate.

Making up for the smaller carbohydrate intake before exercise by consuming carbohydrate during the training session (eg: sports drink) is an important strategy. The rower should experiment to find a routine that works and is comfortable for them.

**Other Exercise Sessions**
Food eaten before training should contain carbohydrate. It should also be low in fat and fibre to aid in digestion and reduce the risk of gastrointestinal discomfort or upsets. Fluid needs should also be considered.


**Recovery Nutrition Strategies:**
Recovery is a challenge for rowers who are undertaking two or more sessions each day, training for long periods, or competing in a program that involves multiple races. Between each workout the body has to adapt to the physiological stress. In training, with correct planning of the workload and the recovery time, adaptation allows the body to become fitter, stronger and faster. In competition however, there may be less control over the work to recovery ratio.
Nutrition recovery strategies encompass a complex range of processes that include:

- restoring the muscles and liver with expended fuel (glycogen)
- replacing the fluid and electrolytes lost in sweat
- allowing the immune system to handle the damage and challenges caused by the exercise bout.
- Manufacturing new muscle protein, red blood cells and other cellular components as part of repair and adaptation processes

The importance of each of these goals varies according to the workout. A proactive recovery means providing the body with all the nutrients it needs, in a speedy and practical manner, to optimise the desired processes following each session.

- **Refuelling:**
  To kick start the refuelling process an intake of at least 1g/kg of carbohydrate (50-100g) for most athletes is needed. Athletes should consume this carbohydrate -in their next meal or snack- as soon as possible after a heavy session to prepare for the next.

- **Rehydration:**
  Most athletes finish a training or competition session with some level of fluid deficit. Comparing pre and post exercise measurements of body weight can provide an approximation of the overall fluid deficit. Athletes may need to replace 150% of the fluid deficit to get back to baseline.

- **Immune System:**
  The immune system is suppressed by intensive training. This may place athletes at risk of succumbing to an infectious illness during this time. Consuming carbohydrate during and/or after a prolonged or high intensity work out has been shown to reduce the disturbance to immune system markers.

- **Muscle Repair and Building:**
  Prolonged and high intensity exercise causes a substantial breakdown of muscle protein. During recovery phase there is a reduction in catabolic (breakdown) processes and a gradual increase in anabolic (building processes). Early intake of good quality protein foods helps to promote the increase in protein rebuilding. Protein consumed immediately after the session (or in the case of resistance training sessions, immediately before the session), is taken up more effectively by the muscle into rebuilding processes, than protein consumed in the hours afterwards.
However the protein needs to be consumed with carbohydrate foods to maximise this effect. Carbohydrate intake stimulates an insulin response, which potentiates the increase in protein uptake and rebuilding.

**Nutritious Carbohydrate – Protein Recovery Snacks** (contain 50g carbohydrate + valuable source of protein):

- 250-300ml liquid meal supplement (eg: Protein Plus Drink)
- 250-300ml milkshake or fruit smoothie
- 1-2 sports bars (check labels for carbohydrate and protein content)
- 1 large bowl (2 cups) breakfast cereal with milk
- 1 large or 2 small cereal bars + 200g fruit flavoured yoghurt
- 1 bread roll with cheese/meat filling + banana
- 300g (bowl) fruit salad with 200g fruit flavoured yoghurt
- 2 x crumpets with peanut butter and 200ml flavoured milk

**Hydration Strategies:**

Drinking regularly during exercise, athletes can prevent the negative effects associated with dehydration and performance can be improved. Every rower should make fluid replacement a key priority during training and competition. Long training sessions on the water lead to significant sweat losses.

The table below shows sweat losses and fluid intakes recorded on AIS rowers in different environmental conditions. Despite having drink bottles available, athletes failed to consume enough fluid to keep up with their sweat losses, particularly in hot weather. Note however, that even in cold weather considerable sweat losses were seen.

<table>
<thead>
<tr>
<th>Session</th>
<th>Season</th>
<th>Sweat losses men (ml/hr) (range)</th>
<th>Fluid intake men (ml/hr) (range)</th>
<th>Sweat losses women (ml/hr) (range)</th>
<th>Fluid intake, women (ml/hr) (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training</td>
<td>Hot conditions 32°C</td>
<td>1980 (990-2150)</td>
<td>960 (410-1490)</td>
<td>1390 (740-2335)</td>
<td>780 (290-1390)</td>
</tr>
<tr>
<td>Training</td>
<td>Cool conditions 10°C</td>
<td>1165 (430-2000)</td>
<td>582 (215-1265)</td>
<td>780 (360-1550)</td>
<td>405 (145-660)</td>
</tr>
</tbody>
</table>

Dehydration impairs the body’s ability to regulate heat resulting in increased body temperature and an elevated heart rate. Associated negative effects include: increased perceived exertion, reduced mental function (decreased
motor control, decision making and concentration). Gastric emptying is also slowed, resulting in stomach discomfort. All of these effects lead to an impairment in exercise performance. The negative effects of dehydration on performance are exacerbated further in hot conditions.

Fluid requirements vary markedly between rowers and in different exercise sessions. It is impossible to prescribe a general fluid replacement plan that will meet the needs of all rowers. Rowers can estimate their own fluid requirements by weighing themselves pre and post exercise sessions. Each kilogram lost is approximately equivalent to 1 litre of fluid. Once a rower’s individual sweat losses are known, a plan can be prepared to help him/her to achieve better fluid replacement in following exercise sessions.

Where possible it is better to begin drinking early in exercise and adopt a pattern of drinking small volumes regularly rather than trying to tolerate larger volumes in one hit.

**What to Drink?**
Research shows that fluid intake is enhanced when beverages are cool (~15°C), flavoured and contain sodium. This makes sports drinks an ideal choice during exercise. In addition to replacing fluid and electrolytes lost through sweat, sports drink also contains carbohydrate which allows refuelling to take place during exercise.

Water is still a suitable option during exercise. However water drinkers need to be aware that water does not stimulate fluid intake to the same extent as sports drinks. Drinking to a plan is therefore crucial when drinking water. Don’t rely on thirst.

Cordial, soft drinks and juice generally contain greater than 10% carbohydrate and are low in sodium. This can slow gastric emptying and makes these drinks a less suitable choice, especially for high intensity activity.

**Other Useful Hydration Strategies:**
- Drink with all meals and snacks. Consume 300-400ml of fluid in the hour before training commences to ensure you begin each session hydrated.
- Take sufficient drink bottles to training. Keep some in the coaches boat for top ups.
- Take a few seconds every 15-20mins or between pieces for a drink break. Alternatively, try using a drink container like a hydration-pack, which is worn on the back, to avoid having to take your hands off the oar to drink.
- Re-hydrate fully after the session.
- Sports drinks are the recommended fluid choice during rowing.
- Lightweight rowers should not consider a lower weight at the end of a workout to be a good sign. Even though dehydration is an inevitable part of making weight for competition, it is counterproductive and unnecessary in the training setting.
**Competition Nutrition:**
Rowers should go into each race with fluid and fuel stores topped up, and feeling comfortable after their last meal. With the regatta or competition lasting a number of days, the challenge is to recover between each day’s sessions and to prepare for the next race (see Recovery Nutrition Strategies section above).

Generally a meal that provides carbohydrate should be consumed 2-3 hours before a race, eg: breakfast cereal, toast, muffins, sandwiches, yoghurt, fruit, pasta and creamed rice. Some rowers need to take special care with pre race eating, as it can be very uncomfortable to race with a full stomach. Low bulk choices such as liquid meals and sports bars can be useful in these situations.

Rowers need to organise themselves to have appropriate food and fluids available at all times during competition. Many athletes find that they easily lose weight over the course of a competition due to being unable to consume their usual high energy diet (as they are spending much of the day in preparation and the race itself) To help avoid this from happening take along a supply of cereal bars, liquid meal supplements sports bars, fruit bars, dried fruit, sandwiches, yoghurt, juice etc...

Be aware of your fluid needs (see Hydration Strategies section above). You can be dehydrated from your rowing efforts, making weight practices or just from sitting in the sun watching competition.

**Supplements:**
While a lot of sports foods and supplements do not live up to their emotive claims, some of these products are valuable in helping an athlete achieve their nutritional goals and optimal performance. State of the art information on Sports Foods and Supplements can be found in the AIS Sports Supplement Program information and the AIS “Supplements in Sport – Why are they so tempting?” fact sheet, which are both located at: [www.ais.org.au/nutrition](http://www.ais.org.au/nutrition).

Some sports foods and dietary supplements play a role in providing a practical alternative to food (eg: sports drinks, sports gels, sports bars, and liquid meal supplements). Rowers may find these products valuable in helping them achieve their nutrition goals in a busy day or during an exercise session. They are an alternative to every day foods, which might need to be combined and juggled to produce the same nutritional composition, or which might be too impractical to consume directly before or during intense exercise. Sometimes the convenience factor is the selling point.

Some rowers however use these products outside the conditions in which they are likely to achieve a direct sport nutrition goal (eg: eating sports bars as a snack). In these situations sports foods may simply be a more expensive version of food. Over-consumption of any sports foods can lead to dietary
imbalances as well as being an unnecessary burden on the wallet. Specific sports nutrition advice from a Sports Dietitian will make the rower aware of the best uses of these special sports foods.

**Sports Dietitians:**
While this information provides a good general overview to sports nutrition for rowing, a more individualised nutrition plan will help to maximise your rowing performance. Your State Institute or Academy will have the expertise to help you. Additionally Sports Dietitians Australia (www.sportsdietitians.com.au) has a list of accredited Sports Dietitians throughout Australia that can provide you with this service.

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