

# **The nutritional demands of rowing**

Wendy Martinson, OBE, Registered Dietitian & Sports Nutritionist

## **Demands of the sport**

### **Characteristics of the sport**

Rowing is one of the most physically demanding sports as it requires all the major muscle groups to be utilised. The sport is highly structured and caters for a wide range of ages and abilities from young children to veterans and from complete novices to elite athletes competing at the Olympic Games. The majority of competitions are held in the summer months between May and September and range from local town regattas to international events such as the annual World Championship's. For international competitions the race distance is 2000m which athletes will complete in 5:30 - 8 min depending on the boat class.

There are different boat classes according to gender, number of rowers in the boat (1, 2, 4 or 8), absence or presence of a coxswain and method of use of the oars

(Sweep rowing uses one oar per person and sculling one oar in each hand).

There are also openweight and lightweight divisions. For lightweights the maximum individual weight is 59kg for females and 72.5kg for males with a crew average of 57kg for females and 70kg for males. Coxswains should weigh a minimum of 50kg for a female and 55kg for a male.

### **Training requirements**

Club level rowers may train twice per day and elite level rowers 3-4 times per day depending on the time in the season. Most high level rowers only have a short off season of 3-4 weeks before training commences again. Training is designed to develop skill, aerobic and anaerobic endurance and muscular power. It will consist of water sessions, use of rowing ergometers, resistance training and some cross training such as running or cycling. Altitude training may also be a feature of the elite level rowers training program

### **Competition**

Club level regattas may only last one day but at elite level these may be multi day regattas ranging from 3 days for the World Cup series to a week for the World Championships and Olympics. There are a series of heats, repechage for additional qualification, semi finals and finals. A crew may race 3-4 times over the period of the regatta. At club level rowers may compete in more than one boat category and may race several times on the same day. Lightweights and coxswains are required to weigh in 2 hours before the race

### **Physiological demands**

Rowing places huge demands on the aerobic and anaerobic systems and a good performance depends on an optimum blend of technique, power and endurance. During the race itself the first 500m and last 300m relies on anaerobic metabolism and the middle 1200m aerobic metabolism. So 75-80% of the energy is provided through aerobic metabolism and 20-25% through anaerobic metabolism and so this is reflected in the training programs that are devised. Rowers tend to be tall with long limb lengths and a large muscle

mass. Openweight rowers have a higher body fat level than lightweights but overall body fat levels decrease over the course of the season. (1, 2)

## **Nutrition and Performance**

### **Key nutritional issues**

#### **Energy requirements**

The actual energy cost of a 2000m race generally lasting 5-8 minutes is only about 200-250kcal, however the lengthy training sessions involved to get to this race pace places huge demands on energy stores. A typical 1-2 hour training session may utilise 1000-2000kcal (3) and so overall energy requirements for a 24 hour period can be large depending on the type of rower and period of training. For example an openweight male may require around 6000kcal per day and an openweight female around 4500kcal

#### **Carbohydrate**

It is well established that carbohydrate is the primary energy source used above 65% VO<sub>2</sub> max (4) and research shows that low carbohydrate diets during an endurance training program is detrimental to improvements in endurance(5) As endurance training is a key element in the life of any rower, if carbohydrate is lacking then performance will suffer.

The recommendations for carbohydrate intake depend on the length and intensity of training and requirements may vary between 7-12g carbohydrate per kg body weight (6).

Elite level rowers will usually train twice in the morning with about 1.5 hours between those sessions and then often do a third session in the afternoon after lunch. A carbohydrate containing breakfast such as cereal/ toast plus juice/water is therefore crucial before the first session and then a 'second breakfast' or recovery meal afterwards before the second session. Cereal with milk/yoghurt or beans/egg/cheese/ham with bread/ toast are good options here to ensure some carbohydrate and protein are consumed.

#### **Pre race nutrition**

Optimising carbohydrate stores in the muscle and liver is a prime goal of competition preparation as carbohydrate is the main energy source used during racing. A carbohydrate intake of 7-10g carbohydrate/kg/day on the days leading up to the race will ensure adequate glycogen stores prior to the race. The carbohydrate loading technique used for endurance events is generally not required for rowing as the race only lasts between 5 and 8 minutes and loading is only of benefit for those events lasting >90 minutes where glycogen stores may become depleted. However it may be a useful technique in longer head races. (2)

#### **Recovery**

Effective recovery is essential especially during periods of intensive training or competition. Carbohydrate stores (glycogen) must be rapidly replenished during these periods to enable quality training to continue over extended periods. The highest rates of glycogen storage occur during the first hour after exercise so consuming carbohydrate as soon as possible after training is crucial particularly as rowers are doing more than one session per day. The aim should be to have 1 - 1.2g carbohydrate per kg body weight

immediately after training and then repeated at regular intervals until a meal is eaten.

The addition of protein to the recovery mixture (10-20g) has been shown to enhance muscle recovery and reduce protein breakdown (2). Milk or yoghurt based drinks will provide protein as well as some carbohydrate or commercial recovery drinks could also be used.

### **Making weight**

Light weight rowers have the challenge of making weight and have to weigh in at a specific weight 2 hours prior to the race. This can be easier for some than others. A long term strategy for weight management over the season is required to prevent unhealthy practices in crash dieting before a competition. To this end, the international federation of rowing association (FISA) have produced guidelines specifying that an athlete be no more than 5kg above weight for 5-6 months before competition and no more than 3 kg above weight for 2-3 months before competition.(6)

In the 2 weeks prior to an event it is important that rowers are not more than 1-2 kg over the required weight. A small amount of weight can be lost in the 2-3 days before weigh in by manipulating the following

- Contents of the gastrointestinal system. Following a low fibre diet 1-2 days prior to weigh in may reduce overall weight by 0.5 – 1kg depending on usual fibre intake.
- Physical weight of food consumed leading up to weigh-in
- Fluids and hydration status. If 'sweating down' is required prior to weigh in, the aim should be to minimise any effect on performance by limiting weight loss required through fluid losses to less than 2% body weight.
- Weight of muscle (and liver) glycogen and associated water that is stored with the glycogen

### **Post weigh in recovery strategies**

The time between weigh in and competition should be used to optimise hydration and refueling status particularly if a degree of dehydration and food and fluid restriction has been necessary.

The process of rehydration should begin immediately after weigh in and should aim to replace 150% of the volume of any fluid deficit incurred.

Carbohydrate (1g/kg) should be consumed to top up glycogen stores and sodium is also required to enhance the hydration process. Sports drinks are useful for this purpose as they contain both carbohydrate and sodium but solid food should be consumed too if possible.

If weigh in is required on successive days or weight loss is greater than 2% body weight then recovery nutrition must be aggressive to avoid detrimental effects on performance. Several studies on lightweight rowers have shown that a recovery strategy providing 2.3g carbohydrate per kg, 34mg sodium per kg and 28.4 ml fluid per kg can help reduce the detrimental effects of a 4% weight loss on rowing performance (7, 8)

### **Replacement of fluid**

Exercise performance is impaired if there is only a 2% decrease in body weight (due to fluid loss) and losses in excess of 5% can decrease the capacity to exercise by 30%(9)

Therefore during training, fluids should be replaced in sufficient amounts to minimise weight loss to less than 2% body weight to prevent adverse affects on both physical and mental performance (10) The amount required will depend on sweat rate, which can vary between 1200-2000ml per hour for males and 800-1400ml per hour for females depending on the environmental conditions (2) The consumption of sports drinks during training will help to provide the carbohydrate required for training as well as enhancing the process of hydration

### Summary

There are many nutritional challenges faced by rowers on a day to day basis. Ensuring a good nutritional strategy is in place can have a major effect on the effectiveness of the day to day training program as well as when it really matters during competition.

### References

- 1 Know the Game Rowing (in association with the ARA) 1<sup>st</sup> Edition 2007
- 2 Burke L, Practical Sports Nutrition 2007
- 3 Hill R, Davies P. Energy intake and energy expenditure in elite lightweight female rowers. Med. Sci. Sports Exerc., vol 34, no 11 2002
- 4 Jacobs, K. A., Sherman, W. M.: The efficacy of carbohydrate supplementation and chronic high-carbohydrate diets for improving endurance performance. Int. J. Sport Nutr. 9, 92-115, 1999.
- 5 Helge, J W, et al. Interaction of training and diet on metabolism and endurance during exercise in man. J Physiol 492:293- 306 1996
- 6 Ryan M. Sport's nutrition for endurance athletes. 2007
- 7 Slater G et al. Acute weight loss followed by an aggressive nutritional recovery strategy has little impact on water rowing performance. Br J Sports Med. 2006:40 55-59.
- 8 Slater G., et al. Influence of nutrient intake after weight in on lightweight rowing performance. Med & Sci Sports Exerc.2007. Vol. 39
- 9 Jeukendrup A, Gleeson M. Sport nutrition An introduction to energy production and performance. Human Kinetics 2004
- 10 ACSM position stand. Special communications. Exercise and fluid replacement. Med. Sci. Sports Exerc. 2007

This fact sheet is the view of the author and is for information only

