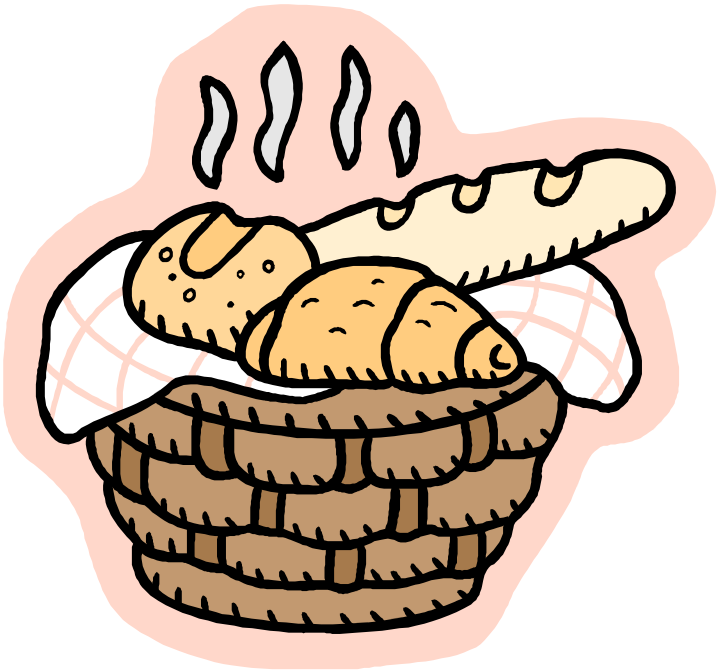
Ross Davenport
Nutrition



Contents:

A Suitable Method of Recording Nutritional Intake & Energy Expenditure Over One Week Training Period:

Nutrition

Monday			
Activity:			
Sleeping	From 9:30pm → 5:30am	8Hours	1.9 x 480 = 912kcal
Washing & Brushing Teeth	From 5:30am → 5:40am	10 Minutes	2.3 x 10 = 23kcal
Changing	From 5:40am → 5:45am	5 Minutes	2.3 x 10 = 23kcal
Eating	From 5:45am → 5:55am	10 Minutes	2.0 x 10 = 20kcal
Driving	From 5:55am → 6:05am	10 Minutes	2.4 x 10 = 24kcal
Changing	From 6:05am → 6:10am	5 Minutes	2.3 x 5 = 11.5kcal
Stretching	From 6:10am → 6:15am	5 Minutes	3.0 x 5 = 15kcal
Swimming	From 6:15am → 8:15am	2 Hours	12.9 x 60 = 774kcal 10.6 x 60 = 636 Session Total = 1410kcal
Showering	From 8:15am → 8:25am	10 Minutes	2.3 x 10 = 23kcal
Changing	From 8:25am → 8:30am	5 Minutes	2.3 x 10 = 23kcal
Driving	From 8:30am → 8:45am	15 Minutes	2.4 x 15 = 36kcal
Eating	From 8:45am → 9:00am	15 Minutes	2.0 x 15 = 30kcal
Watching TV	From 9:00am → 10:00am	1 Hour	1.9 x 60 = 108kcal
Sitting at Computer	From 10:00am → 11:00am	1 Hour	2.3 x 60 = 138kcal
Watching TV	From 11:00am → 11:45am	45 Minutes	1.9 x 45 = 855kcal
Driving	From 11:45am → 12:00am	15 Minutes	2.4 x 15 = 36kcal
Walking	From 12:00am → 12:05am	5 Minutes	6.9 x 5 = 34.5kcal
Lectures	From 12:05am → 2:00pm	1 Hour 55 Minutes	2.6 x 115 = 299kcal
Eating (Sheet 3)	From 2:00pm → 2:05pm	5 Minutes	2.0 x 5 = 10kcal
Walking	From 2:05pm → 2:10pm	5 Minutes	6.9 x 5 = 34.5kcal
Changing	From 2:10pm → 2:15pm	5 Minutes	2.3 x 10 = 23kcal
Swimming	From 2:15pm → 4:15pm	2 Hours	10.6 x 45 = 477kcal 14.0 x 75 = 1050kcal Total = 1527kcal
Showering	From 4:15pm → 4:30pm	15 Minutes	2.3 x 15 = 34.5kcal
Changing	From 4:30pm → 4:40pm	10 Minutes	2.3 x 10 = 23kcal
Driving	From 4:40pm → 5:00pm	20 Minutes	2.4 x 20 = 48kcal
Watching TV	From 5:00pm → 5:15pm	15 Minutes	1.9 x 15 = 28.5
Cooking	From 5:15pm → 6:00pm	45 Minutes	4.1 x 45 = 184.5
Eating (Sheet 4)	From 6:00pm → 6:45pm	45 Minutes	2.0 x 45 = 90kcal
Watching TV	From 6:45pm → 8:00pm	1 Hour 15 Minutes	1.9 x 75 = 142.5
Working on Computer	From 8:00pm → 8:55pm	55 Minutes	2.4 x 55 = 132kcal
Washing & Brushing Teeth	From 8:55 → 9:15pm	20 Minutes	2.3 x 20 = 46kcal
Sleeping	From 9:15pm → 5:40am	8 Hours 25 Minutes	1.9 x 505 = 959.5kcal

* Note I used all the pervious energy expenditure calculations from the handout I attained in Anthony Bush's lecture. "Energy Expenditure in Household, Occupational, Recreational and Sports Activities" (McArdle. et al. 1996)
Energy Expenditure Totals:
February 24th – 30th 2003

Monday	-	5606.8 kcal
Tuesday	-	4998.8 kcal
Wednesday	-	5805.5 kcal
Thursday	-	3609 kcal
Friday	-	5340.5 kcal
Saturday	-	2156 kcal
Sunday	-	3174 Kcal
Total	-	30690.6 kcal a week

DAY	IN	OUT	DIFFERENCE
MONDAY	5446	5606.8	-160.8
TUESDAY	3947	4998.8	-1051.8
WEDNESDAY	5724	5805.5	-81.5
THURSDAY	2942	3609	-667
FRIDAY	2744	5340.5	-2596.5
SATURDAY	5890	2156	3734
SUNDAY	2054	3174	-1120
TOTAL WEEKLY	28747	30690.6	-1943.6

As you can see I expend more energy than I consume. This is a bad thing, as I'm training when I'm not getting in enough fuel.
When doing this weekly intake of fuel I had a bad cold. I think this is why I didn't eat enough. When I had my cold I was still training hard. I think I should have had a couple of session off or forced myself to eat more (see next page for analysis). In the week I did feel that I didn't have enough energy compared with other weeks.

<u>Analysing Your Diet With Regards to Macro Nutrient Intake, Fluid Intake And Energy Balance.</u>

With regards to analysing my macro nutrient intake and fluid intake, I have cross check my intake of food and type of food with the food packets and boxes.

The Following pages relate to my Nutritional Intake over the monitored week, each meal is recorded, and referenced against my weekly energy expenditure.

When I first started at Bath I began to struggle with fatigue after making the jump to training with an elite university squad. As my training sessions increased from 6 to 10 per week, my times bega n to drop off and I struggled during sessions.

After examining my diet I found additional carbohydrates were needed to cover from my extra training needs. In particular, more carbohydrate foods were needed for me to be able to replenish muscle glycogen s tores between training sessions. At around 75 kg, my daily intake of 400 -700g of carbohydrate each day is required. (McArdle et al 1996)

Although I enjoyed eating high carbohydrate foods such as bread, cereal, fruit, potato, rice and pasta, I struggle to consume sufficient quantities each day of these bulky foods i.e. only 2 big meals a day.

I started eating carbohydrate -rich foods and drinks immediately after each training session so that muscle glycogen storage was activated as quickly as possible.

Analysis from the table

As you can see from the table I expend more than I was in taking. I think this was to do with me being ill, because I wasn't in taking enough food I was getting enough energy and that's why I was feel weak compared to other weeks.

From the tables you can see that I eat between 60 -73% carbohydrates each day. As it states in McArdle an athlete should be in taking around 60%+ so I'm reaching the right amount of carbohydrates. My tables show that I take in about 5-20% fat of my diet ea ch day. With this and the carbohydrates it means that 80% of the food I take in is off high -energy foods. This is what helps me to train and compete to the best of my ability.

The protein that is in my diet about 10 -20% helps me to recovery fast for swimming and especially after weight training. The protein in my diet helps to re-pair muscle damage.
Even thought I was ill during this week my % didn't change just the amount that I took in.

Benefits & Drawbacks of Commonly Used Pre Competition, During Competition and Post Competition Nutritional Strategies.

Carbohydrate loading is done to maximize energy for competition involving endurance, as in my case swimming.
This starts six days before competition; it involves eating a higher protein diet with lower carbohydrate, along with short interval training and rest, for three days followed by a high carbohydrate with much lower protein intake for the remaining three days before competition. For maximum benefit, "Carbo Loading" should only be done twice per ye ar. (Triathlete magazine February 2001 page 43)

Eating a high carbohydrate diet for several days prior to the event will maximize your internal glucose (glycogen) stores, and will prolong the duration of activity until fatigue occurs . (But it will not increase the muscle's maximum energy output during that time.)

Pre-Event Nutrition

Properly nourishing yourself before exercise should:

* Prevent low blood sugar during exercise
* Provide fuel by topping off your muscle glycogen stores
* Settle your stomach, absorb gastric juices and prevent hunger
* Install confidence in your abilities

Allow adequate time for digestion and normalization of blood glucose:

* 4 hours for a large meal (this might mean getting up a lot earlier if you have an early heat swim)
* 2 - 3 hours for a smaller meal
* 1 hour for a blended meal, a high carbohydrate beverage (10 -30%), or a small snack

During competition

During competition it's important that you keep your body well hydrated and the keep your body well fuel for the competition that you're about to compete in. Its important to keep your body well hydrated because if its not you cant perform to the best of you're ability.

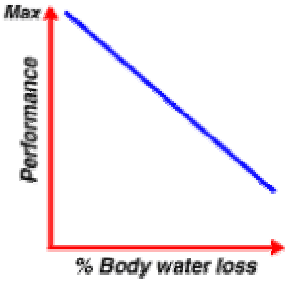


Fig1: Effect of body water loss on performance

You can see from this graph the importance of keep you're self hydrated because you can see that the % of water lost affects you're performance a great deal. The more % of water lost the more your performance is affected for the worst.

Its important to take in carbohydrates during the event as it provides you with an additional source of glucose "fuel" that will extend the length of time before fatigue occurs. This becomes important in swimming events that last over 2 days.

Post competition

Properly nourishing you after exercise is just as important as nourishing yourself afterwards. The faster you take in food the fast the body will absorb it and the faster you will recover from one race to the next. This is very important if you have heats in the morning and then semi-final or finals at night. After competing it best to take in sugary foods as they absorb quickly by your muscles.

It's important for swimmers to eat something within 30-45 minutes after training or a race because your body can take in and absorb food faster in that time than any other time during the day. The faster food can be absorbed into the body after training the faster the body can recover

Nutritional 'Check List' Highlighting the Most Beneficial Strategy for Optimum Performance and Recovery from My Event- 100 and 200 metres freestyle.

OPTIMAL SWIMMING DIET:

- Strenuous daily training requires a high-energy, high-carbohydrate diet. Swimmers who fail to consume enough carbohydrate will fail to recover adequately between training sessions resulting in fatigue, loss of body weight and poor performance.

- There is a lot of evidence in books such as McArdle, plus other nutritional books and on the Internet that adequate dietary carbohydrates are needed for maximum performance. At least 10 grams per kilogram of body weight per day. What is unclear is whether more carbohydrate (beyond 600 to 700 grams per day) will provide large additional benefits.
- Fat: If you are an endurance event athlete, there may be some advantage to several weeks of a moderate fat intake equivalent to 30% of total Calories. But there is no evidence this helps in single day, high performance (%VO2max greater than 60%) activities and there may be long-term health consequences. As total Caloric needs increase, the only reason to consider a high fat (more than 15 to 20% of total Caloric needs) diet would be maintenance of a positive Caloric balance IF carbohydrates alone were not meeting the challenge. (Swimming Times magazine June 2002)
- It's important for swimmers to eat something within 30-45 minutes after training or a race because your body can take in and absorb food faster in that time than any other time during the day. The faster food can be absorbed into the body after training the faster the body can recover

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The Process of Dehydration and Its Physiological Effects.

Process & Definition:

Water is an essential nutrient making up 50 -55% of your weight (www.usaswimming.org 2003). Water cools your body. As you exercise your body temperature increases and you sweat. As the sweat evaporates from your skin, you cool down. Dehydration will occur if the body water you lose is not replaced. You can become dehydrated even when you lose 0.3kg of water as sweat. Dehydration can be dangerous resulting in chills, clammy skin, throbbing heartbeat, nausea and decreased performance as explained later. (Information from www.usaswimming.org Jan 2003)

High-intensity exercise in the steamy environment of a heated indoor pool, or outdoors in the sun, can lead to moderate sweat losses, which are not obvious when the swimmer is already wet. Most all -competitive swimmers bring drink bottles onto the poolside and drink du ring rest periods or between sets. Sports drinks provide an additional fuel supply for long training sessions.

"In a fluid balance study undertaken on the Australian swimming team in Atlanta in 1995, we measured average sweat losses of ~125 ml per kilomet re swum in training or about 600 ml per workout. These swimmers were provided with both water and sports drink at the session and managed an average intake that perfectly matched their losses (125 ml per km). Of course, some swimmers were better at matchin g losses than others. And during anaerobic threshold sets, sweat losses increased to 170 ml/km."(www.aisswimming.aus Feb 2003 Website)

*Fluids should be readily available and are needed during training.

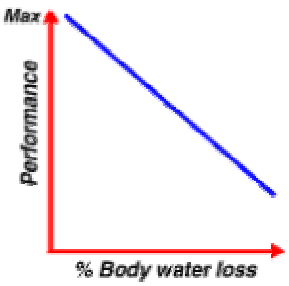

Fig1: Effect of body water loss on performance

The diagram gives a general idea of how increased body water loss reduces performance capacity. (Hydration in swimming – www.usaswimming.org 2002)

The lack of adequate body fluids for the body to carry on normal functions at an optimal level (by loss, inadequate intake, or a combination of both) Dehydration is loss of water and important blood salts like potassi um (K+) and sodium (Na+). Vital organs like the kidneys, brain, and heart can't function without a certain minimum of water and salt.

"Losses of only a few percent in an adult and up to 5% in infants are considered mild dehydration." (AIS Swimming Website)

"The process of dehydration is usually followed by a discrete hesitation of the body to replenish its losses. This is usually compounded by the inability to consume a large enough volume of fluid to adequately replace the lost volume. This can be a ser ious situation, especially for athletes who train in hot environments and who have high training volumes. The term for this process is "involuntary dehydration," becomes even more interesting when we realize that one of the signals to trigger the body's th irst mechanisms is a rise in blood osmolality from a normal level of 285 mosmol/kg to 300 mosmol/kg. Unfortunately, this does not happen until late in the exercise session, making it even more vital to always drink, whether you're thirsty or not." (Triathlete Magazine February 2003)

Causes & Symptoms:

Dehydration can be caused by excessive loss of water from the body as in:
Sweating.
Diarrhoea
Excessive loss of fluid through vomiting or excessive, urine, stools or sweating
Excessive urine output (usually down to alcohol consumption)
Poor intake of fluids.

Signs of Dehydration

Mild	Moderate	Severe
Thirst	Very dry mouth membranes	All signs of moderate dehydration
Dry lips	Sunken eyes	Rapid, weak pulse (more than 100 at rest).
Slightly dry mouth membranes	Skin doesn't bounce back quickly when lightly pinched and released.	Cold hands and feet
		Rapid breathing
		Blue lips
		Confusion, lethargy, difficult to arouse

Fluid losses up to 5% are considered mild; up to 10% are considered moderate; and up to 15% are considered severe. Severe dehydration can result in cardiovascular collapse and death if not treated quickly (triathlete magazine February 2003 page 54)

Strategies To Avoid/Delay Dehydration.

Before exercise: Hyper-hydrate
Drink before exercise! 1-2 hours before exercise drink about 1 pint of water. 15-30 minutes before exercise drink another 1 pint of water. It best to drink isotonic drinks but if you can get hold or don't have any then water is the next best thing.

During exercise: Hydrate
Drink ¼ of your drinks bottle (187ml) every 15-20 minutes during a workout

After exercise: Rehydrate
for an accurate fluid loss calculation weigh yourself before and after a workout. For each pound of body weight lost drink 2 cups (16 oz.) of water. If you don't have access to a scale, drink until your urine is clear. Clear urine is a good indication of adequate hydration.

Rehydration - an important element of training and preparation towards competitions. Athletes need to drink during competitions and training sessions.
Cold water (10^{o}) is absorbed more rapidly than hot one. Dissolved gases slow down absorbtion (Cola, carbonated drinks are not useful), as well as any added suger or protein for instance.

Thirst is not a good indicator of fluid loss - Drink before you're thirsty!

- Avoid caffeine and alcohol, they increase fluid losses
- Drink fluids at a cool temperature.
- Unless you are an ultra-endurance athlete participating in events lasting over 8 hours, electrolyte (sodium, potassium, and chl oride) losses from exercise are easily overcome by typical intakes from the regular diet. Therefore, salt tablets and other electrolyte replacements are not recommended.

Sports drinks that content 7-10% of sugar are the best drinks to drink after training or competitions, as they are absorbed faster.

Appropriate Dehydration and Recovery Strategies.

Treatment:
Oral rehydration may be sufficient for mild dehydration. Mild dehydration is safe to self-treat for all ages, as long as it doesn't worsen.
Ways to do this is to drink, slightly sparkling water. This will help you recover from dehydration quicker than drinking water.

If you're severely dehydrated, you must get to a hospital right away.

Intravenous fluids and hospitalization may be necessary for moderate to severe dehydration. The health care provider must also determine and treat the cause of the dehydration. To treat dehydration, you must first address the cause: Fever, Vomiting, Diarrhoea, and Heat Exhaustion are the most common reasons for extreme dehydration. (Triathlete Magazine June 2001)

Bibliography:

Anthony Bush lecture notes 2002/2003

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AIS Swimming Website - www.aisswimming.aus

Hydration in swimming diagram – www.usaswimming.org

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McArdle. W.M, Snatch .F, Snatch 1996. pages 147 -178

Appendix

1-14 Daily food intake and daily energy expenditure.