


005

LIQUID ASSETS





When we exercise, our muscles only use about a quarter of the energy for work and the remainder is released as heat. We sweat to cool down. Heat is lost by evaporation: sweating.

In this chapter you will find out:

- How drinking strategies are essential to performance and should not be neglected
- How to calculate your fluid losses from training and adjust your fluid intake to maintain performance
- The importance of sports drinks to replace both carbohydrates and fluid
- The importance of avoiding over hydration (hyponatraemia)

005

LIQUID ASSETS

Sweat comes from water in the body, which needs to be replaced to prevent dehydration. Exercising whilst dehydrated can cause your temperature to rise quickly and cause heatstroke, which is potentially fatal.

Replacing fluid lost during training or competition is crucial and becomes even more important in hot and humid conditions. If the fluid shortfall is too great then it is likely that this will have a detrimental effect on performance. In order to restore fluids after exercise, it is necessary to drink more than the amount lost through sweat as well as ensuring you replace the salts, particularly sodium, that are also lost in sweat.

Another factor to consider is when there is only a short time between training sessions, particularly if your training requires 2/3 sessions a day. In essence your post-exercise recovery is also your pre-exercise preparation. Having already discussed the importance of recovering sufficiently so that you're ready to train again through replacing your carbohydrates, it is as essential to tailor your fluid requirements to suit the specific challenges of your specific event, paying particular attention to the environmental conditions and the nature of your competition.

FLUID REQUIREMENTS

Generally we need about 2-3 litres of fluid a day to be properly hydrated – about half of this normally comes from food and half from drinks. However, as an athlete, it is likely that your fluid needs will be higher due to the level of training you are doing.

The more you sweat, the more you need to drink to replace the lost fluid. Even small sweat losses can cause fatigue, especially in hot weather. Plus, the fitter you are, the more effective you are at keeping your body cool through sweating! Training harder, longer, in hot and humid surroundings will also make you sweat more.

It seems obvious to recommend that you aim to replace what you lose through training and competition – but that is easier said than done. Most people will only replace about half of what they've lost unless they make a concerted effort to measure their fluid losses and assess their rehydration in that manner. To estimate how much fluid you lose, weigh yourself before and after at least one hour of exercise under conditions similar to competition or

hard training. It's preferable to weigh yourself without clothes, or at least in minimal clothing, so as not to include the sweat absorbed within your clothing. It is important to remember the following points:

- wear the minimum of clothes
- remove excess sweat from the body with a towel
- remove trainers and socks
- make sure you've passed urine prior to weighing before exercise
- weigh yourself as soon as is practical after exercise (within 10 minutes) and before passing urine
- record the amount of fluid you drink during the training session
- remember, the aim is to limit fluid losses – not to lose too much or to gain weight

As a guideline, each kg of weight loss is equivalent to one

litre of fluid loss, but the amount of fluid needed is estimated to be 1.2-1.5 times the fluid lost – so that's 1.2-1.5 litres of fluid for every kg of weight lost during your session or competition.

The table below shows examples of calculating fluid loss, and how much is required to replace those losses for recovery.

To work out sweat rate per hr

- Weigh yourself before and after an hour of normal training during which you don't take on fluids (if you do this, ensure that the environment is temperate and you do not make yourself ill)
- The body weight lost = your sweat loss per hour, e.g. a 1kg body weight loss is 1000ml per hour or 500ml in half an hour

Table 9 - Examples of calculating fluid loss

Initial weight:	a	70kg	72kg
Final weight:	b	69kg	72.5kg
Weight difference:	$c = a - b$	1kg lost (1000ml lost)	0.5kg gain (500ml gained)
Fluid drunk during session:	d	500ml	1500ml
Total fluid loss:	$Y = c + d$	1000+500 = 1500ml	1500-500 = 1000ml
Total fluid needed:	$Z = Y \times (1.2 \text{ or } 1.5)$	1800 to 2250ml	1200 to 1500ml
Extra fluid needed during recovery	$Z - d$	1300 to 1750ml	None

005

LIQUID ASSETS

If it's not possible to weigh yourself before and after exercise, look at the colour of your urine. If it's pale and plentiful, you're well hydrated, but if it's dark and sparse, you probably need more fluid.

If weight loss is unavoidable then try to limit dehydration levels to no more than about 2% loss of body weight. This is when it is thought it can start to be detrimental to performance. That's equivalent to 1kg for a person weighing 50kg, 1.5kg for a 75kg person and 2kg for someone who weighs 100kg. Beware, tolerable losses are smaller in hot and humid conditions and during endurance events. Conversely, it's also important to avoid overcompensating for sweat losses by drinking so much that you actually gain weight during exercise as this can also cause problems.

Unless your fluid loss and replacement is controlled, long training sessions in hot environments will lead to you becoming increasingly dehydrated. The result is not only a negative effect on performance, but a rise in body temperature, dizziness,

nausea, fatigue and eventually heatstroke.

Prevention is better than cure – start off well hydrated and stay that way!

DRINKING SCHEDULE

In terms of fluid and rehydrating, how much and what is essential – but you should also consider “when” as an important factor. Not only must you get the amounts right, but you also have to make sure your body is used to the strategy you adopt to counter dehydration, so it can adapt to the necessary fluid intakes required for your level of training and competition. Knowing how fast you can drink something is as important, and like a new pair of spikes, you should never attempt to try it out during an important competition. Work out your likely fluid needs in training and never in competition.

Don't leave things to chance. Take your beverage choice with you, and keep it with you while you work out or compete, and stick to your plan of when, what and how much.

Factsheet 5 provides a summary of how to approach hydration before, during and after exercise. It's important to bear in mind that these are simply recommendations from what the science has discovered. Tailoring them to suit your individual needs and preferences is down to you.

In summary:

- after exercise, you also need to replace salt losses
- one of the main factors influencing fluid needs during and after exercise is the volume of fluid lost
- the length and type of exercise and likely sweat rates will determine volume of fluid needed
- although most athletes don't drink enough after a session, be aware you should not drink so much that you gain weight
- drinking too much plain water could cause a problem. If you're sweating very heavily for a prolonged period of time and could result in hyponatraemia – low blood sodium levels

HYPONATRAEMIA

Excessive drinking can cause hyponatraemia. In milder forms, it can cause bloating and nausea – in serious cases it can lead to headaches, confusion, difficulty in breathing, loss of coordination, unusual fatigue and even death.

It is caused by drinking extreme amounts, firstly because urine production is decreased during exercise, limiting the body's ability to excrete excess fluids. Secondly, sodium is also lost in sweat, making it easier for the body's sodium levels to become diluted.

Women doing marathon running or long cycle rides can be at particular risk, as they are drinking and working out for a

prolonged period. As women are in general smaller than men, their body fluids get diluted quicker, and they sweat less and so don't need to drink as much in the first place.

Whilst dehydration should be the main concern for you as an athlete, hyponatraemia is a possible threat to athletes who go too far with their drinking practices. Therefore, during long periods of training or in competitions, e.g. in marathons, a sports drink containing sodium can be useful in helping replace the salts lost in sweat.

BEVERAGE CHOICE

The type of drink you opt for is also important. The choices can be determined by the event you compete in, the length of effort and the type of conditions you are training or competing in.

Yet, ultimately, it's important to ensure something as simple as

it being a flavour or consistency you like – as this will encourage you to drink more. Conversely, a drink with all the correct composition will not do you much good if the taste of it dissuades you from drinking it. If training at a low-to-moderate intensity for less than an hour, then water will suffice – if necessary add juice or squash, which will also provide you with some carbohydrates to help restock glycogen (carbohydrate) stores.

Factsheet 6 provides a summary of the different types of drinks available for different situations.

Beverage choice during exercise

During a session or competition that lasts for longer than an hour and causes fatigue, the recommendation is to ingest 30-60g per hour of rapidly absorbed carbohydrate,

because it generally improves performance. In this instance, a sports drink would be useful.

Sports drinks provide both carbohydrate and fluid simultaneously to help prevent fatigue. Most commercial sports drinks are 4-8% carbohydrate (i.e. they have 4-8g of carbohydrate per 100ml of fluid), making them 'isotonic' – a similar concentration to blood – and, therefore, are quickly absorbed. The carbohydrate can come from sugars (glucose, sucrose, and syrups which contain no more than about 50% fructose), maltodextrins or other rapidly absorbed carbohydrates.

Sports drinks also contain sodium to stimulate sugar and water absorption, and replace the sodium lost in sweat. This is useful for those who train for longer than 2 hours or for athletes that experience heavy sodium losses – i.e. more than 3-4 g of sodium.

Caffeine contained in commonly available beverages can enhance power output during the later stages of endurance performance. This benefit can be obtained with relatively small doses of caffeine – about 1.5mg per kg body weight or approximately 50-100mg – from commonly consumed drinks such as coffee and cola beverages.



005

LIQUID ASSETS

A question of salt?

It is difficult to estimate how much sodium you are losing. But as a general rule, if you:

- have opaque sweat
- if your sweat tastes salty
- if it leaves white marks on your clothes

...then you should probably consider having some extra salt.

Sodium has the benefit of encouraging you to drink more. In fact, the drive to drink is present for several hours after training or competing. Beware – when your mouth is moistened with fluid, your body automatically signals your brain to stop drinking. This often happens before your body's fluid levels have been completely restored – hence the reason why thirst is not a good indicator of whether or not you are hydrated.

Beverage choice after exercise

As highlighted earlier, restoring hydration levels can only be achieved through drinking 1.2-1.5 times greater than the

amount lost through sweat. And as acknowledged – it's important that you like the taste otherwise you won't drink enough! However, it is also important that the sodium lost in sweat is also replaced.

Therefore the success of a rehydration drink depends, amongst other factors, on palatability and sodium concentration.

Although daily sweat and sodium losses vary widely among individual athletes and depends on many factors – such as diet, physical condition, environment and heat acclimatisation – it is assumed that where sweat losses are high, sodium losses will generally also be high.

Therefore, a moderate excess intake of salt would appear to be beneficial for rehydration and without any detrimental effect on health, providing that fluid intakes are also in excess and kidney function is not impaired.

Therefore if only liquids are available following exercise, it is best to opt for sports drinks that contain sodium. Plain water can be drunk if a source of sodium is available at the same time from (or added to) food. Although other salts are lost in sweat – potassium and magnesium in particular – including these as part of the recovery strategy seems to have no particular benefit over and above sodium.





Cheers

Although alcohol in moderation is fine, it's certainly not a good idea to drink it just before or immediately after exercise. You need to ensure you have rehydrated properly before drinking alcohol following a competition no matter how much you want to celebrate or commiserate.

Alcohol before exercise not only has a detrimental effect on co-ordination skills and exercise performance, but also increases the risk of injury. Furthermore, alcohol can cause dehydration and slow down recovery from injury. See chapter one - Down to Basics for more information on alcohol.