

TOP TIPS

Fluids and Football Performance:

Five Take Home Messages

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The game of football is designed so that the margin between victory and defeat is usually small: one-sided games are seldom entertaining. A few goals over the course of a season can mean qualification for Europe or a mid-table placing. Equally, a few goals may be all that separates the comfort of a mid-table place from the battle to avoid relegation. When small margins can be gained by attention to nutrition, it seems foolish to ignore these potential advantages. A good diet will not make a poor player into a star, but poor food choices will certainly result in poor performances. The importance of diet and hydration is often overlooked

in football, but the picture is changing as clubs begin to realise the benefits that can follow from an intervention that costs little or nothing in financial terms.

Message 1 - Dehydration is bad news for performance



During exercise, the muscles produce heat; the harder the work, the greater the rate of heat production. To limit the rise in body temperature that results, we need to sweat, even in cold weather. This effectively limits the rise in body temperature, but results in the loss of water and salts from the body.

Dehydration has several negative effects on both physical and mental performance, and these become noticeable when sweat losses reach about 1-3% of body weight; this translates to something between 800 ml and 2.4 litres of fluid for an 80 kg player. Paradoxically, sweat losses will be greater in hot weather, but smaller levels of dehydration are tolerable without an adverse effect on performance than in cold weather.

Outfield players typically lose about 1-3 litres of sweat during an average training session or game. Most will lose about 1.5-2 litres, but a few individuals will lose less, and a few may lose more. For some players in some environments, this is enough to reduce running capacity, impair performance of

football-specific skills, and may also be enough to increase the risk of injury through loss of judgement and co-ordination. Generally speaking, most goals are scored and most injuries occur late in the game; fatigue and dehydration are responsible at least in part for these events. The risk of serious adverse effects may be small but it does not make sense to take any risk at all when the solution is so simple. Indeed, it does not seem worth putting effort into improving stamina by fitness training and then ignoring the returns that come from a sensible hydration policy.

Message 2 - Drink as much as you need but not too much



Some players seem to have the idea that, if it is good to drink during training or match play, then the more you can drink the better. This is very definitely not true. As outlined in the previous section, it is important not to let the body water deficit become too great. That means taking drinks in situations where significant sweat losses occur. Some people sweat much more than others, however, so we cannot simply recommend a fixed amount of fluids.

Fortunately, there is an easy way for players to identify how much fluid they need. A simple measurement of body weight before and after a training session or game will reveal how much dehydration has taken place. A small amount of fuel will have been used to provide energy – mostly carbohydrate and a little bit of fat – but most of the weight loss is in the form of water. A 1 kg weight loss translates into a loss of 1 litre of body water, and this is equivalent to a dehydration level of 1.25% of body weight for an 80 kg player. This change in weight takes account of both sweat loss and any drinks consumed – if fluid intake equals sweat loss, body weight will stay the same. The aim should be to drink enough so that body weight stays within about 1-2% of the initial body weight. Routine weighting before and after training will tell players if they are drinking enough. If players can weigh drinks bottles before and after training, they can then also calculate how much sweat was lost.

By making these measurements on players in training and in matches, we have seen some players who do not drink enough and others who drink too much. There are two obvious situations that challenge a player's ability to stay well hydrated. In the heat, sweat losses are greatly increased,

so there is a need for extra fluids in hot weather, not only in training and match play, but also throughout the day. In pre-season training, the weather is often warmer, and there is limited opportunity for recovery between morning and afternoon sessions. In this situation, players may need extra drinks breaks during training and should also be encouraged to ensure that they drink plenty at lunch.

We have seen some players who drink so much that they actually gain weight in training. This seems to be more common in female players. This may mean that the player has arrived at the ground already dehydrated, but it may also be that players are drinking too much because of a mistaken belief that more is better. The extra weight gain that results from over-drinking is certainly not helpful.

Only by making measurements on each individual player can we give appropriate advice on an individual basis.

Message 3 - Don't turn up for training or games already dehydrated

We had good evidence from measurements made on the best players at many of the top clubs in the UK and across Europe that many players arriving for training are already dehydrated. This may be because they have not recovered from the

previous day's sweat loss, or it may be simply because they did not bother with breakfast. Whatever the reason, this is bad news. Training in a dehydrated state makes the session feel harder: there is no point in making it any harder than it needs to be. Dehydrated players will not perform as well in drills and skills tests, and, as pointed out above, may be more liable to minor injuries.

More alarming were the results of measurements we made recently on 22 players and 10 substitutes involved in a highly competitive game involving two Premier League reserve teams. Based on measurements made on urine samples provided by the players on arrival at the ground, eleven of the 32 players were dehydrated when they arrived about 90-minutes before kick off.

We have some evidence that the players who drink most in training are likely not to be those who actually lose most sweat, but rather those who arrive at the training ground already dehydrated. In other words, the players who have not drunk enough before training are playing catch up during training. This makes no sense. It is surely much better – and certainly much easier – to ensure that you take enough fluids in the hour or two before arriving at the ground. This is especially true on match day.

You can tell if you are dehydrated – your body tries to conserve water by reducing the amount of urine produced. You pass urine less often, the volume is small and the colour is dark. Players should ensure that their urine colour is pale – colour charts posted in toilets can serve as a reminder: dark urine is a sign of not drinking enough.



Message 4 - What you drink is important

Drinking plain water is better than drinking nothing at all, but there are many situations where players will benefit from drinking a properly formulated sports drink. Sports drinks contain sugar and salt, and these ingredients have several advantages. Ingested drinks first sit in the stomach for a while before being emptied into the intestine where they are absorbed at varying speeds. Where rehydration is needed rapidly – and that is always the case in training or football – it is important that the stomach empties quickly and water, sugar and salts reach the bloodstream quickly.

Water and salts, especially sodium, are important for maintaining hydration, and sugar provides essential fuel for the brain and for the working muscles. Water provides no sugar and no salt. Many studies have shown that players can keep going for longer in simulated football activities when they drink a sugar-containing sports drink than when they drink only water. Other studies have shown that these drinks can help conserve skills late in a simulated match situation.

The addition of a little sugar and salt will speed up the absorption of water in the intestine; this is the basis of the formulation of oral rehydration drinks used in the treatment of diarrhoea in children. Rapid rehydration is needed during match play and sports drinks are formulated on the same principles.

Just as some players sweat more than others, so some lose more salt in their sweat. These salty sweaters seem to be more susceptible to muscle cramps in training and competition, although there are clearly also other causes of cramp. In some of these players, taking a drink with a higher salt content has been found to reduce the frequency and severity of muscle cramps. This may be of particular importance at the present time when the British Government, through the Food Standards Agency, is running a major national

media campaign to encourage reductions in salt intake. Some players lose only small amounts of salt in sweat during training or games, but a few players may lose 8-10 grams of salt in the course of a single session. This needs to be replaced, and sports drinks will make some contribution to salt replacement. Most of the body's needs for salt, though, will be met by normal food intake.

Message 5 - Every player is different - individuals need individual strategies

It is possible to give general advice that will apply to varying degrees to most people: you need to drink more in hot weather; sports drinks are better than water; aim to drink enough in training and match play so that you do not lose more than about 1-2% of body weight. The serious player, however, will want to ensure that he or she uses strategies that are best suited to their individual needs. Just as one size of boots does not fit every player, there is no a single drinking strategy that fits all players.

Most clubs have a limited choice of drinks available, usually water and whatever sports drink their sponsor provides. Sometimes the sports drink is available in a choice of flavours, sometimes not. It is important, though, that players experiment with different drinks to see what

suits them best. Sports drinks are generally better than water, but in short sessions or where sweat losses are small, water is perfectly OK. Other players may benefit from extra sugar, and some may need drinks with higher levels of salt.



In the elite game, players deserve to have the support they need to allow an individual drinking strategy to be worked out. The ideal drink will have the right amount of sugar and salt, will taste good and will be made available at the player's preferred temperature (drinks left sitting on the touchline for 90 minutes are too cold on cold days and too warm on hot days).

Support staff can only help so much, though. Players need to take some responsibility for looking after themselves. Sometimes

it is amateur players who take the most professional approach to the game. It is hard for the club to control what players do outside the ground: players have to want to succeed and to want to do what is needed to be successful. Clubs can help by making sure that they do know what is needed and helping them to achieve this.

Conclusions

The available evidence suggests that many players, including experienced players at international level in successful clubs pay little attention to the need to maintain an adequate hydration status. Where the losing is small, attention to detail becomes crucial, and maintaining good hydration practices is a vital part of successful performance.

Further Reading

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Biography

Ron Maughan is Professor of Sport and Exercise Nutrition at Loughborough

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