NUTRITION GUIDE

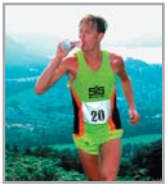
About

Science in Sport grew out of the desire to provide the best nutritional products and advice to athletes. The Company mixes qualified sport scientists, food technologists, and a physician with keen athletes and sports people who have competed from local level to the world stage. As a result of all this experience they have an unprecedented knowledge of the nutritional needs of athletes. Science in Sport also collaborate with leading Universities on research projects, as well as getting involved at the sharp end of sports performance.

Tim Lawson - SiS director, photo : Steve Walton

Initially Science in Sport grew in cycling thanks in part to the use and endorsement of the products by Chris Boardman, (The Olympic cycling champion, multi world record holder and yellow jersey wearer in the Tour de France) he liked the Company ethos, and helped to inspire the creation of REGO, total recovery sports fuel. It wasn't long before the word began to spread and Science in Sport's products became more popular at the top level of many other sports. To date Science in Sport have helped to win Olympic Gold's, World Championships, Premiership Titles scale Everest, explore the poles, sail around the world and set numerous World Records. Science in Sport designs, develops and manufacturers its own products to ensure they are of the highest quality and purity- they have to be, we don't know when an Olympic medal or World Cup may depend on it!

Science in Sport is continually striving to innovate and improve products to assist all athletes to reach their goals and maintain its position as leaders in sports nutrition.



Nutrition for Performance

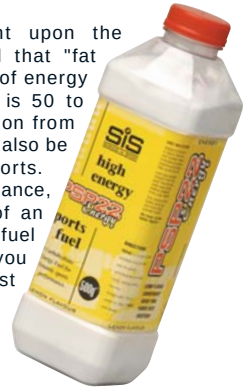
"The critical nutritional factors determining sports performance are hydration and energy supply"

A Nutritional strategy to optimise your energy supply and hydration is the most effective way of improving your next sports performance. Energy supply and hydration have a huge and immediate effect on sports performance.
As little as 2% loss in body weight through dehydration can decrease performance by up to 20%, and once carbohydrate energy is used up performance decreases by about 50%.

Something to think about?

The Right Fuel

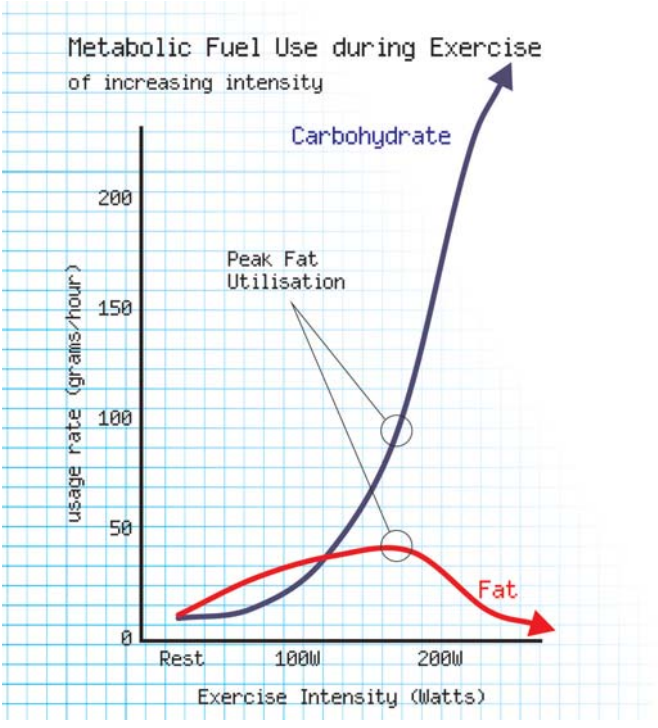
The body provides energy by burning fats, carbohydrates and some proteins. Carbohydrate has a much lower oxygen cost than fat, so more energy can be produced with a given amount of oxygen using carbohydrate as a fuel rather than fat, i.e. you can go faster and further per breath!
The efficient use of fat is also dependent upon the availability of carbohydrate. It is often said that "fat burns in the flame of carbohydrate". The rate of energy production from aerobic use of carbohydrate is 50 to 100% greater than the rate of energy production from the aerobic use of fat alone. Carbohydrate can also be used to provide anaerobic energy for sprint efforts.
Fat is a very efficient store of energy, for instance, scientists have deduced that the fat stores of an average man could provide enough energy to fuel about 3.5 days running at marathon pace, so you are unlikely to run out of fat even in the longest race.



Do not underestimate the importance of carbohydrate

Often people exercising to lose weight are put off using energy drinks because they think that they are high in calories, but it is important to remember that quality exercise depends upon carbohydrate energy. When carbohydrate energy supply is compromised exercise intensity has to be reduced. This means that less calories are burned for each hour of exercise.

The graph below illustrates the importance of carbohydrate even for fat burning exercise, notice that the maximum fat burn per hour requires over 100g of carbohydrate energy. Exercising with low carbohydrate supply also increases muscle protein breakdown and risk of infection.



Metabolic fuel use during exercise
Bradley. Data on File.

Endurance Performance

There have been many studies which have shown that endurance performance correlates with carbohydrate stores (muscle glycogen), and that fatigue occurs when these stores are used up.

Most cyclists are aware of glycogen depletion and describe it as "hunger knock" or "bonk". Since it is impossible to burn fat anaerobically, workouts of high intensity deplete the body of carbohydrate rapidly. It is possible to deplete carbohydrate stores with as little as 20 minutes of interval training.

Stuart Dangerfield

So carbohydrate is important for power as well as endurance athletes. This is why it is important to have a diet that is high in complex carbohydrate and why many athletes have adopted the strategy of carbohydrate loading.

Recent work has shown that it is possible for trained athletes to achieve an increased carbohydrate store by tapering training and eating carbohydrate in the days preceding competition. The only major problem with this is physically eating the required quantity of carbohydrate, which is usually more than that with which the athlete feels comfortable, 600g per 24 hours e.g. 3 kg of potatoes! PSP22 has been recommended as a more palatable way of ingesting the required amount of calories without eating too much fat or protein.

Depletion loading regimes, where by athletes deprive themselves of carbohydrate and continue to train in order to fully deplete there carbohydrate stores, before “super-compensating” with a high carbohydrate diet are no longer recommended. Latest research has shown that it is much more important for performance to keep blood sugar levels high during exercise with a regular supply of carbohydrate energy drinks and gels.

Pre Event Feeding

The conventional advice for the athlete is that the pre event meal should be taken 3 hours before competing. It should be relatively light but high in carbohydrate and low in fat. PSP22 Energy and GO-Gels can be useful in this pre event meal to increase the carbohydrate content without increasing the bulkiness of the meal. Eating anything within an hour before an event has, in the past, been considered detrimental to performance due to the possible insulin response.

There is also evidence, however, that it may be beneficial to take a small amount of strong (25 to 30%) solution 5 to 10 minutes before competition.

This is certainly recommended once into warm-up, especially if consuming carbohydrate during the event is not possible. PSP22 Energy and GO-Gels are particularly useful for taking in high concentrations of energy since they are easily tolerated due to the unique carbohydrate structure.

People vary in their response to pre-event feeding and, as with any nutritional strategy, it is worth experimenting with different combinations during training, to work out which strategy best suits the individual. Many sportspeople prefer, and what we tend to recommend, is to continue sipping PSP22 Energy from the pre event meal right through the warm up and into the event.

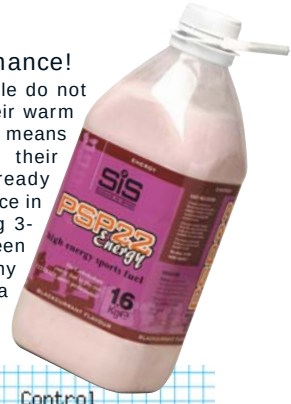
Neil Hodgson

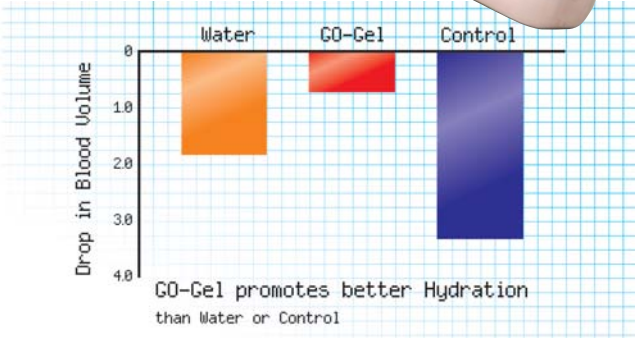
World Super Bike Champion 2003

“When racing at 200mph hydration and nutrition have a key role to play”

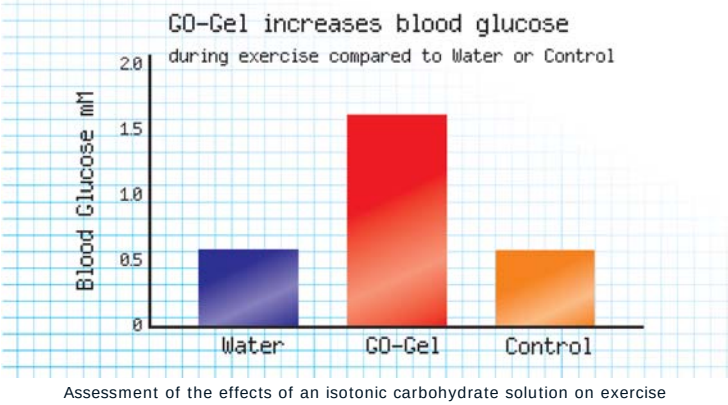
Improve your next sports performance!

Some studies have shown that many people do not drink anything from the time they start their warm up until the time they start to race. This means that when they are on the start line their hydration and energy supply is already compromised. Improving sports performance in these situations maybe as simple as taking 3-400ml of PSP22 at 10-15% solution between then warm up and start of competition. Many people have also found that Go-Gels are a great pre race energy boost.



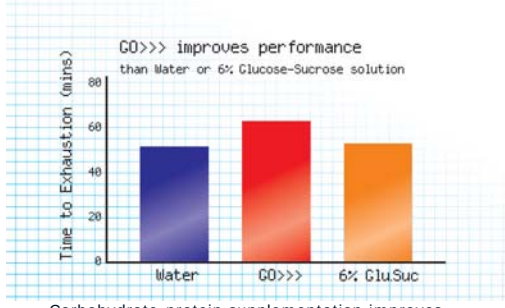


Assesment of the effects of an isotonic carbohydrate solution on exercise performance. Brooke et al, 2002. Medicine and Science in Sport and Exercise



Assessment of the effects of an isotonic carbohydrate solution on exercise performance. Brooks et al., 2002. Medicine and Science in Sport and Exercise

Energy Drinks



Carbohydrate-protein supplementation improves performance in time to exhaustion after recovery from a prolonged exercise bout.
Hammond. E., (Data on File)

The problem with ordinary glucose drinks is that glucose is highly osmotically active. This means that a glucose solution greater than 5% (5g in 100 ml.) will empty only very slowly from the stomach. In some cases it may even draw fluid into the stomach from the body and so contribute to dehydration. To avoid this, an energy drink must be less osmotically active than blood, i.e. at or below the isotonic level. The preferred alternative to an ordinary glucose drink is a glucose polymer solution that is less osmotically active than glucose, and can therefore be taken in much higher concentrations without affecting how quickly it empties from the stomach. A solution such as this can provide fluid and also provide a significant energy source during exercise.

PSP22 Energy is isotonic at over 50% solution so it can provide over 10 times the energy of glucose. This can be explained in a simple way by saying that the stomach will only allow so many molecules through in a given period of time, so if you drink a glucose polymer solution that has say twenty glucose units in one molecule, then your stomach will be able to process more glucose units than it would if you drank a simple glucose solution.

A useful starting point for working out the amount of PSP22 Energy that should be used is to use 1g per kilogram body weight for each hour of exercise, though some researchers say 60g per hour regardless of size. This is roughly equivalent to drinking a 10% solution of PSP22 Energy in a standard sized (or 2 pint) cycling bottle each hour. Solutions used in this way have been shown to improve performance significantly. Go-Gels, the world's first isotonic energy gel, provide 25g of carbohydrate in a 70ml isotonic solution o tend to be good for 20-30 mins of exercise.

Percentage solution explained

In simple terms this is just a measure of the strength of the drink. Making up a solution of PSP22 energy drink is a process of dissolving the powder into water. The percentage solution can be found by dividing the number of grams of powder by the volume of the finished drink. For instance 100g of glucose polymer powder dissolved in a litre bottle gives 100/1000 = 10% solution It would be correctly designated a 10% solution weight by volume sometimes abbreviated 10%w/v.

ENERGY & HYDRATION

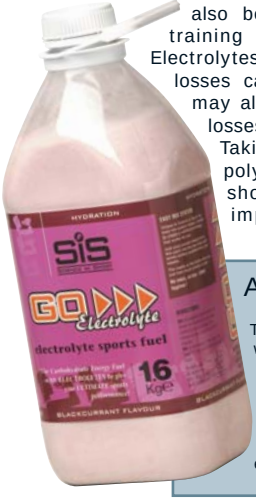
The basic formula for most sports is to aim to take 60-70g of carbohydrate per hour with sufficient fluid to keep hydrated. Taking less than 60g per hour increases the chances of poor performance due to low energy supply, taking more than 70g per hour is more likely to result in gastrointestinal distress than improve performance. Remember to add up all your sources of carbohydrate including, energy bars, gels, drinks and other foods. Sometimes the logistics of a sporting challenge mean that hydration is often compromised, but still try to get 60g of carbohydrate for each hour.

Sir Ranulph Fiennes

The Worlds Greatest Explorer

"I use SiS GO-GEL'S for 500Km Adventure Race Team events lasting up to eight days/nights and for shorter competitions like the LAMM, KIMM, Ace Races and High Peaks Marathon. Over the years I have tried many different energy and sports nutrition products and find SiS GO-GEL'S by far the best in terms of ease of use on the move and immediate results."

Dehydration



When dehydration is a problem, electrolyte loss may also be significant. This can often occur when training indoors or in high heat and humidity. Electrolytes are the minerals lost in sweat, and high losses can decrease performance. Electrolyte loss may also be a factor in ultra endurance events, as losses can be significant after 4 hours of exercise. Taking on board electrolytes with a glucose polymer drink such as GO Electrolyte, has been shown to counteract this loss as well as improving water absorption.

Are you drinking enough?

Try weighing yourself before and after training. Any weight loss will mostly be due to not drinking enough. If you do this a few times and have notes on how much you drank and the weather, a quick look outside will give you a few clues about how much drink you should take out. You will need to drink 1.5 times the mass of any loss in fluid after exercise to fully re-hydrate.

Bradley Wiggins

World Pursuit Champion 2003
Credit Agricole
Professional

“ I first used Science in Sport products back in 1993 at the age of 13 after attending a nutrition seminar conducted by Science in Sport. There is no doubt that Science in Sport’s products have helped me to train and race harder and recover faster, something that is very important when competing in major championships and stage races. I certainly believe that Science in Sports products have helped me to reach the top in cycling and will continue to help me win more medals and titles”

Use the table below to optimise your carbohydrate intake. Aim for 60-80g per hour of exercise (blue zone). First figure out how much you are going to drink per hour - 500ml to 1000ml is usually best - but you may be restricted due to carrying capacity. Look up the table to get into the blue zone and across to read the concentration (percentage solution) required. At higher concentrations use PSP22 Energy and at lower concentrations use GO Electrolyte. If you're still below the 60-80g target use GO-Gels or GO-Bars to give you that extra boost.

Carbohydrate consumption per hour

at different concentrations and volumes

Percentage Solution	250ml	500ml	750ml	1000ml
16% (use PSP22)	40g	80g	120g	160g
14%	35g	70g	105g	140g
12%	30g	60g	90g	120g
10%	25g	50g	75g	100g
8% (use GO>>>)	20g	40g	60g	80g
6% (Use extra GO-Gels+22g or GO*BARs+44g)	15g	30g	45g	60g

Chance of GI distress

rate mls drunk per hour

Carbohydrate replacement

for optimum performance try to replace at least 60g of carbohydrate per hour of exercise using PSP22, Go Electrolyte and Go-Gels. Go bars also contain about 46g of carbohydrate per bar.

Choosing an energy drink

When choosing an energy drink it is important to remember that not all glucose polymers or maltodextrins are the same. They may differ markedly in their properties according to the size and structure of the polymer, and the consistency of the product - additives including flavours can also affect the performance enhancing properties of the drink.

Drinks containing small amounts of fructose may be beneficial as it is absorbed in a different way. However, it is probably best to avoid energy drinks with high concentrations of fructose as fluid absorption is compromised, and osmotic diarrhoea and gastro intestinal distress common.

Always look for a product with a high percentage of higher saccharides that is hypotonic at the strength of solution you wish to use.

It is also important to remember that you will have to drink the solution during competition and training, so its taste is important. Find out in training if the drink is to your liking, **Science in Sport** offer a range of flavours. Anything added to a polymer solution will increase the osmotic potential of the drink, and so compromise the properties of it. Therefore, it is probably better to avoid drinks with hundreds of 'magical' ingredients. Find a product that works for you, but always experiment during training with any new product before using it in competition.

Hypotonic - Isotonic Hypertonic

These terms describe the relative concentration of the drink. The best way to compare the concentration of drinks is to look at the number of dissolved molecules

HYPOTONIC solutions

Contains less molecules in solution than body fluids. Science in Sport products are designed to be used at hypotonic concentrations

ISOTONIC solutions

Contains approximately the same number of molecules in solution as body fluids. The relative concentration of body fluids varies between individuals and according to their hydration status. Isotonic solutions are unlikely to be in exact balance with each individual.

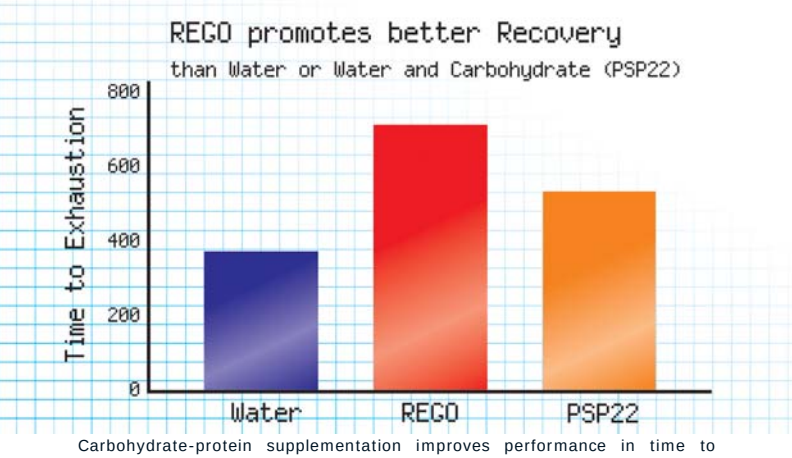
HYPERTONIC solutions

Contain more molecules in solution than body fluids. Hypertonic solutions tend to be heavy on the stomach and empty very slowly. Simple sugar solutions are hypertonic over 6% solution and most pops and sodas are 15-18% simple sugar solutions. Some hypotonic solutions can breakdown to hypertonic solutions when ingested.

Recovery

It can take about 48 hours to replace muscle glycogen stores when relying on a normal carbohydrate diet. Since most serious athletes train more than once in 48 hours, they run the risk of chronic exhaustion associated with muscle glycogen depletion. This can be overcome by taking on board carbohydrate immediately after exercise in order to optimise recovery.

Research, measuring muscle enzyme activity, has shown that it is probably most beneficial to take carbohydrate within 20 minutes of completing the workout. Taking on board a carbohydrate/protein complex such as Rego Recovery improves recovery rates still further. Rego Recovery goes further by not only replacing carbohydrate stores, but also helping to rehydrate, maintain glutamine status, enhance protein synthesis, protect against free radical damage and replace the co-factors depleted during exercise. Food or drink taken after exercise should have a fair amount of sodium and potassium in order to help the body to rehydrate. It is probably best if this kind of product is fortified with vitamins and minerals in balance with the energy content of the drink. Just



Carbohydrate-protein supplementation improves performance in time to exhaustion after recovery from a prolonged exercise bout.
Hammond. E., (Data on File)

taking neat carbohydrate and protein will undoubtedly speed up recovery fast but it is best not to take too many "empty" calories. Post exercise must also be a great time for replacing all those vitamins and minerals which are co-factors in the body's enzyme complexes involved in the production of energy. Remember a major goal of training is to increase these enzyme capacities. Rego contains a unique blend of vitamins, minerals and co-factors in the

body's enzyme complexes involved in the production of energy. Remember a major goal of training is to increase these enzyme capacities. Rego contains a unique blend of vitamins, minerals and co-factors specifically formulated for this purpose. Rego also includes anti-oxidant vitamins to protect against free radical damage.

Glutamine can be depleted by hard training leading to overtraining and depressed immune function.
Rego Recovery contains protein high in glutamine to help maintain glutamine levels after hard training. Glutamine has many other useful properties including maintaining muscle cell volume .

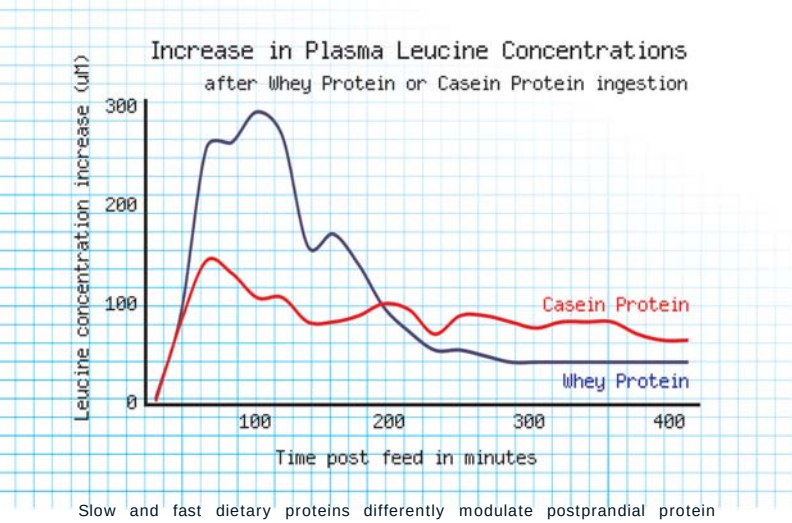
James Hickman
4 x World Butterfly Champion
and Record holder

“ after a tough training session
I love a cool cold pint of
Rego”

MAXIMISING RECOVERY AND ADAPTATION

Over many years there has been anecdotal evidence relating protein supplementation to muscle development and increased performance scientific research is now catching up and quantifying these findings. Modern techniques have enabled researchers to look at the protein requirements of athletes in greater depth. From this research it has become apparent that the protein requirement for athletes is greater than was previously thought. It is now believed that an athlete should consume between 1.5g & 2.5g of protein/Kg of body weight/day, and increasingly researchers are questioning whether the 0.8g/Kg/day traditionally recommended for general populations is adequate. There is now a strong theoretical basis for expecting a beneficial effect from protein supplementation in active people and protein consumption of the order of 4g of protein/kg of body weight/day is not uncommon in strength athletes.

One of the most exciting research developments is that it is not just the quality of protein that matters but more importantly the speed of absorption (kinetics) of the protein. These factors have led SiS to develop a new range of protein supplements



Slow and fast dietary proteins differently modulate postprandial protein accretion, Boirie et al., Proc. Natl. Acad. Sci. USA Vol. 94, 1997

The Science in Sport Protein Kinetics System

Protein Kinetics is the study of the relationship between the speed of absorption of dietary proteins and the effect on protein turnover and retention. The SiS Protein Kinetics System links the varying protein requirements of the body throughout the training day with the absorption characteristics of different proteins.

The amino acid leucine appears to be the main key to switching on protein synthesis. Some proteins like whey protein are rapidly absorbed and can easily double plasma leucine levels. When leucine levels are doubled it is a powerful stimulus for protein synthesis. Consuming rapidly absorbed proteins immediately after exercise can thus switch the body from a catabolic (muscle breakdown) state into an anabolic (muscle build up) state.

photo : Phil O'Connor

Craig MacLean

World km Champion 2002

"The PKS protein range has powered me to the top in track cycling"

Although leucine is the switch for protein synthesis it is important to look further than the amount of this amino acid in a serving in different protein formulas. The main protein in milk is Casein protein, casein tends to clot when it reaches an acid environment such as the stomach and is absorbed very slowly. Although milk protein contains higher concentrations of leucine than soya, a good soya protein isolate will result in much higher leucine levels than milk or other casein containing proteins because it is absorbed more quickly.
It is for this reason that the most effective recovery drinks are free from casein and are best made up with water.

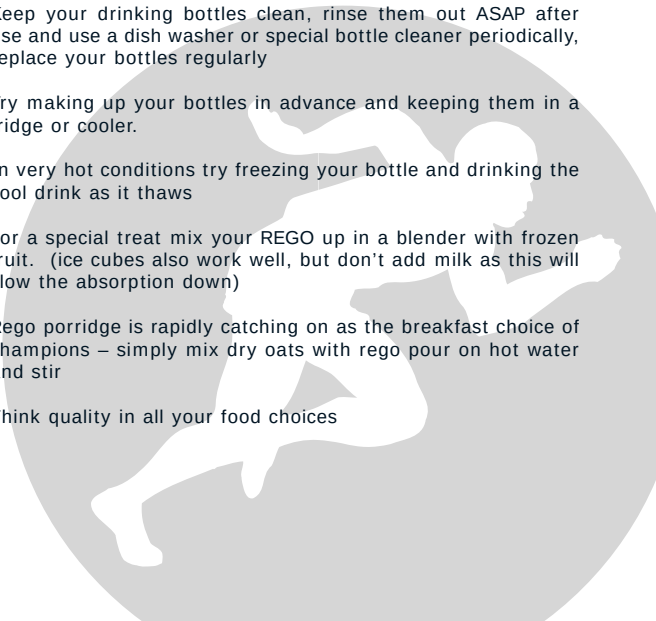
Casein products are probably best saved for meal replacement products, when it will be 3 hours or more before the next protein containing meal. Casein products are thus ideal for night time formulations.
Sleep should be a time for rest and recovery. However, hard training and insufficient or incorrect protein intake can lead to a catabolic effect during sleep i.e. muscle break down rather than muscle build. Breakdown of other proteins such as regulatory proteins and rate limiting enzymes is likely to have major detrimental effects in endurance athletes.

Slow release proteins can be used to drip feed amino acids during sleep to provide an anti catabolic effect. This could be a scientific explanation of the recommendation of milky drinks last thing at night to help with sleep. However, when a specific night time formulation for sports performance is developed there are other factors that should be taken into consideration. Research shows that hard training can reduce the bodies zinc and magnesium stores which in turn can lead to lower testosterone and insulin growth factor levels. Supplementation with zinc and magnesium has been shown to help maintain higher levels of zinc and magnesium, and thus support higher levels of testosterone and insulin growth factor.

Rego Nocté contains slow release protein, zinc and magesium, and fructo-oligisaccharides that have been shown to improve mineral absorption. Fructo-oligisaccharides also promote the growth of beneficial bacteria in the gut that results in improved gastrointestinal health.

TOP TIPS

- Plan a nutritional strategy well before your event
- Use the carbohydrate consumption chart to ensure that you are getting sufficient carbohydrate and drink enough to prevent dehydration.
- Good preparation starts with good recovery from your last session, invest in a good recovery formulation.
- It's always worth having an extra energy gel with you just in case.
- Add a night time protein recovery drink to your nutrition for periods of heavy training.
- Keep your drinking bottles clean, rinse them out ASAP after use and use a dish washer or special bottle cleaner periodically, replace your bottles regularly
- Try making up your bottles in advance and keeping them in a fridge or cooler.
- In very hot conditions try freezing your bottle and drinking the cool drink as it thaws
- For a special treat mix your REGO up in a blender with frozen fruit. (ice cubes also work well, but don't add milk as this will slow the absorption down)
- Rego porridge is rapidly catching on as the breakfast choice of champions – simply mix dry oats with rego pour on hot water and stir
- Think quality in all your food choices



Easy Mix System

Simply pour the powder straight into your drinks bottle - no scoops required. The marks on the bottle show you just how much powder to add.

no mess
no fuss
improved hygiene

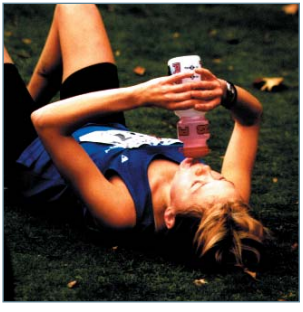


photo Dave Wearn

SiS
Science in Sport

Clean Fast Convenient

REMEMBER Science in Sport products are available in a varierty of different size for economy and convenience

Your Energy System

Fuel — Hydration — Recovery — Power Snack

PSP22 energy

HIGH ENERGY

The choice to give you extra energy during exercise. Ideal for long work outs, carbo loading or when you need that extra boost. PSP22 is very versatile and can be used at high concentrations to give you the ultimate energy drink. PSP22 should be your choice for a fast and sustained energy boost. Ideal before, during or after exercise.

orange | blackcurrant | lemon | original

GO electrolyte

HYPOTONIC ENERGY

Ideal for indoor work outs, exercise in the heat and any time when you are sweating heavily or dehydrating. Go provides fast rehydration, sustained energy and is ideal during or after exercise. Go puts back what you sweat out.

lemon&lime | blackcurrant | watermelon | tropical

REGO recovery

TOTAL RECOVERY

A carbohydrate and protein mix that helps speed up recovery from intense exercise and enables you to get the most out of each days training. Ideal for those who have training sessions close together.

strawberry | chocolate | banana

GO-GEL

ENERGYBOOST

Go-Gel provides 25g of isotonic energy in a convenient fast-flow gel. Essential emergency rations on long rides.

orange | blackcurrant | tropical

GO-BAR

POWERSNACK

THE power snack that's high in carbohydrates, rich in micro-nutrients and low in fat.

banana | chocolate&orange | cherry&vanilla | apple&blackcurrant | tropical

www.scienceinsport.com

SiS

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