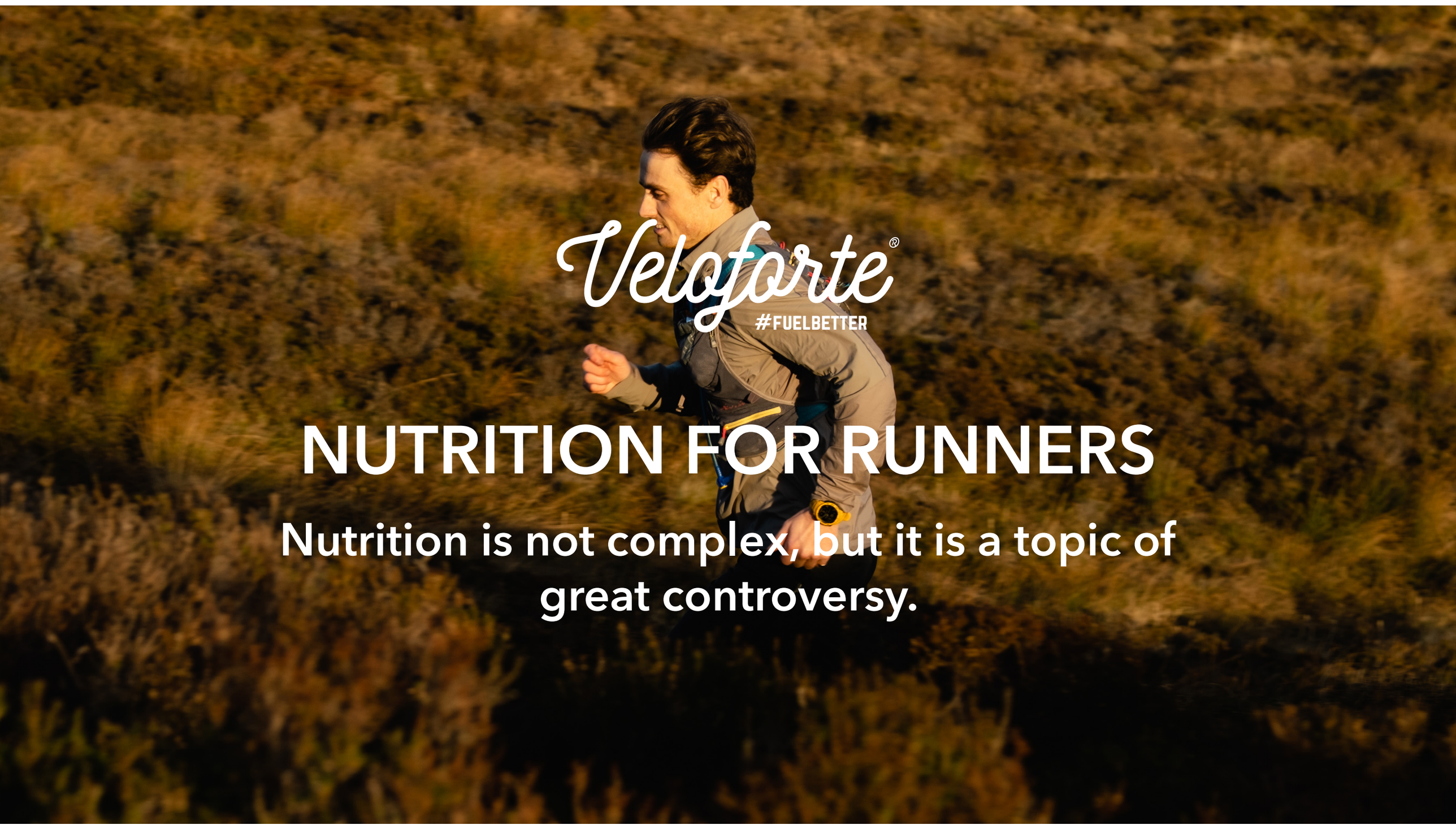


NUTRITION FOR RUNNERS

Nutrition is not complex, but it is a topic of great controversy.

When it comes to nutrition specifically for performance, it feels like everyone has an opinion but often this information is based on n=1, or the science, when it is available, is simplified to fuelling and recovery.

In reality, human bodies are not machines; while we definitely need fuel to survive, it is not as simple as we can cover a certain number of miles when we fill our tank with a specific number of litres of petrol, as in the cases of cars.

In fact, when you stop and consider human biology, the body is a series of intricate processes that all interact and work in conjunction with each other to keep us alive. This is why fuelling is never as simple as just energy in versus energy out; it is about the composition of your diet, the timing of your nutrients and quantities it takes not just to meet the demands of your training load, but also how to continue to drive biological processes alongside.

While there are always trends and beliefs within sport around what makes you a better runner, the key scientific findings demonstrate that it is actually consistency in your training that will improve your outcome. While following a diet trend or taking a supplement or fixating on your weight may feel like the path towards optimal performance, many of these are not sustainable, or based on any credible evidence, and often result in a break in your training.

Thus, ensuring that you make appropriate choices around your training and lifestyle, will help you to maintain your training effort day after day, resulting in progression; whilst also helping to maintain motivation and encourage adaptation from your training. Studies have also shown that timing of nutrition has an integral role to play in hormonal balance, bone health and maintaining your immune system.

> **“Problems occur when runners aim to do hard sessions fasted or in a carbohydrate depleted state: similarly, they can also find that they are not hungry immediately after a session and prolong recovery. Both these situations have negative effects on hormonal regulation within the body.”**

Let’s Talk about Carbs....

Carbohydrate is the **key fuel source** for exercise as it is broken down into glucose, the body’s preferred currency, and utilized by the body to provide energy.

Carbohydrate is stored as glycogen throughout the body, but specifically within the liver and muscles.

It is this source within the muscle that is the most readily available energy for working muscles, releasing energy more quickly than other sources. However, this storage facility is limited. If the muscles are inadequately fuelled, it will lead to fatigue, poor performance and potentially putting you at greater risk of injury.

To give you some context...

It takes around 500g of carbohydrate to have completely full muscle glycogen stores, with an additional 80g in liver glycogen, mainly used to maintain energy to the brain. When muscle glycogen is at full capacity, at most this will last you around 90-120 minutes running at around 65-75% of your maximal heart rate. The quicker you go, the faster your stores will deplete. Thus, for those of you training most days, your glycogen stores are always slightly depleted.

This helps to explain how important planning your carbohydrate intake around and during training sessions is; the amount you require will be dependent on the frequency, duration, and intensity of your training. However, regardless of what you may have read, exercise and running uses a lot of energy. To help you meet your needs, it is important to understand the difference in the available types of carbohydrate. Over the years, carbohydrates have been classified in many ways; the most common types are simple and complex.

Complex Carbohydrates

Complex carbohydrates are those including pasta, rice oats, couscous, potatoes, bread, and cereals.

Simple Carbohydrates

Simple carbohydrates include dairy, fruit and sugar, honey, and molasses.

Runners need a mix of **both**. Ideally complex carbohydrates at mealtimes and then more simple options immediately before, during and after, depending on the training session.

Whether you are training for a 5k, 10k, marathon, ultra-distance, road or trail, chances are your training week will consist of a mix of training sessions. A high percentage of your runs will probably be done in a steady state with one or two runs a week including some intensity, and a longer run which will vary in distance depending on your specific goal.

Types of Runs:

Carbohydrate is the **key fuel source** for exercise as it is broken down into glucose, the body's preferred currency, and utilized by the body to provide energy.

Carbohydrate is stored as glycogen throughout the body, but specifically within the liver and muscles.

It is this source within the muscle that is the most readily available energy for working muscles, releasing energy more quickly than other sources. However, this storage facility is limited. If the muscles are inadequately fuelled, it will lead to fatigue, poor performance and potentially putting you at greater risk of injury.

High Intensity Training:

Includes intervals, tempo or hills up to 60 minutes.

Ensuring sufficient fuelling in the 24-36 hours prior to these sessions is going to ensure that you have full glycogen stores. However, as we have mentioned earlier, when we are working at these very high work rates, our body can deplete our stores within 45 mins.

Aim to take on energy around 20-30 minutes into the session. With gels always make sure that you take them on over a period of 5 minutes to allow for better absorption and ensure that you are hydrated.

With the Sports drinks, you would benefit from sipping on these throughout the session, maybe after each interval or hill or in the minutes before and immediately after the tempo effort.

High Intensity Training:

Includes intervals, tempo or hills up to 60 minutes.

Ensuring sufficient fuelling in the 24-36 hours prior to these sessions is going to ensure that you have full glycogen stores. However, as we have mentioned earlier, when we are working at these very high work rates, our body can deplete our stores within 45 mins.

Aim to take on energy around 20-30 minutes into the session. With gels always make sure that you take them on over a period of 5 minutes to allow for better absorption and ensure that you are hydrated.

With the Sports drinks, you would benefit from sipping on these throughout the session, maybe after each interval or hill or in the minutes before and immediately after the tempo effort.

Long Moderate Intensity Training:

Such as running on road up to 3 hours.

In this scenario you want to be starting to think about your fuelling 20 minutes in and this may be in an easily digestible form.

The key thing here is forward planning and considering what fuelling you want to take on for race day. While meeting your requirements, ensuring you can maintain pace and supporting recovery are key reasons for intra-run fuelling, another important feature is training the gut for race day so that you can go into the event confident with your nutrition strategy. You want to be aiming for 60-90g of carbs per hour in these runs and fluid requirements will range anything from 100-250ml of fluid every 20 minutes depending on the climate conditions and the individual's losses. This would also be a good opportunity to try caffeine – in general gum released caffeine into the body a lot faster.

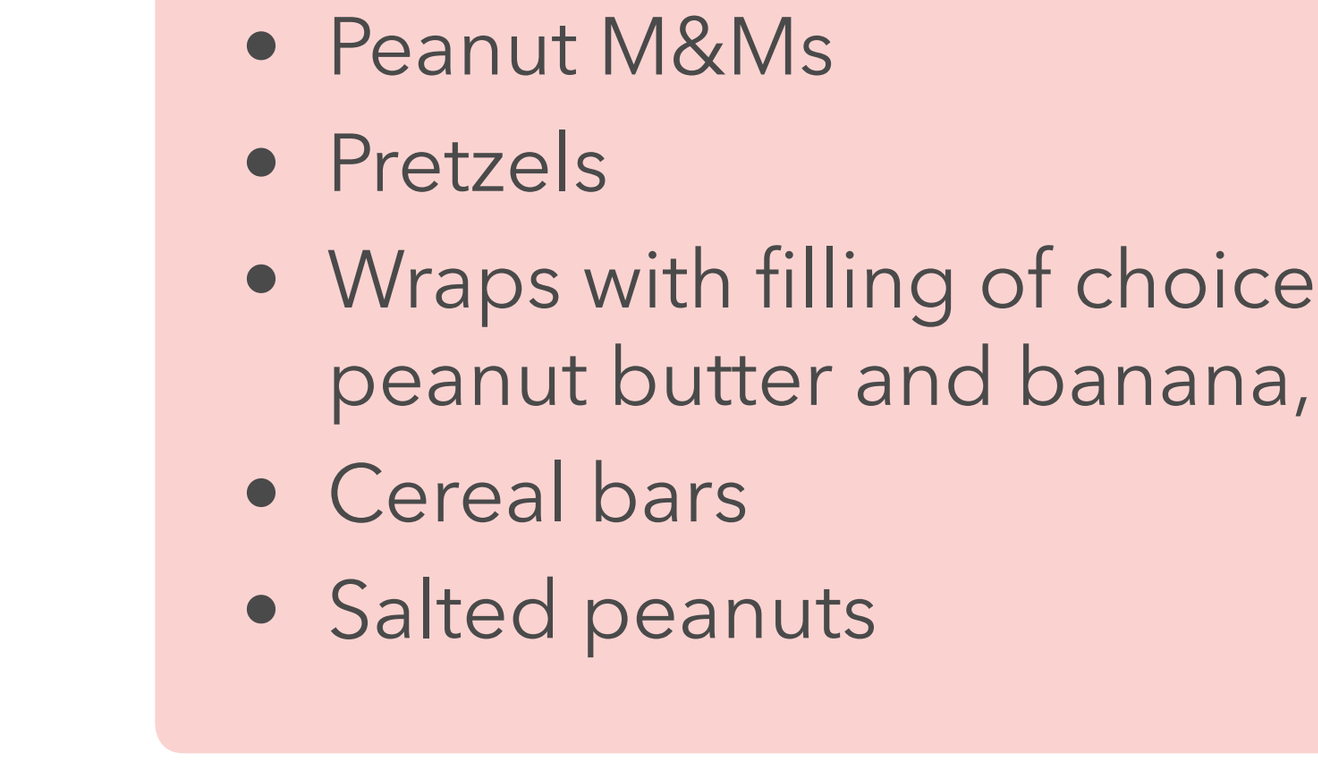
Longer Trail Runs

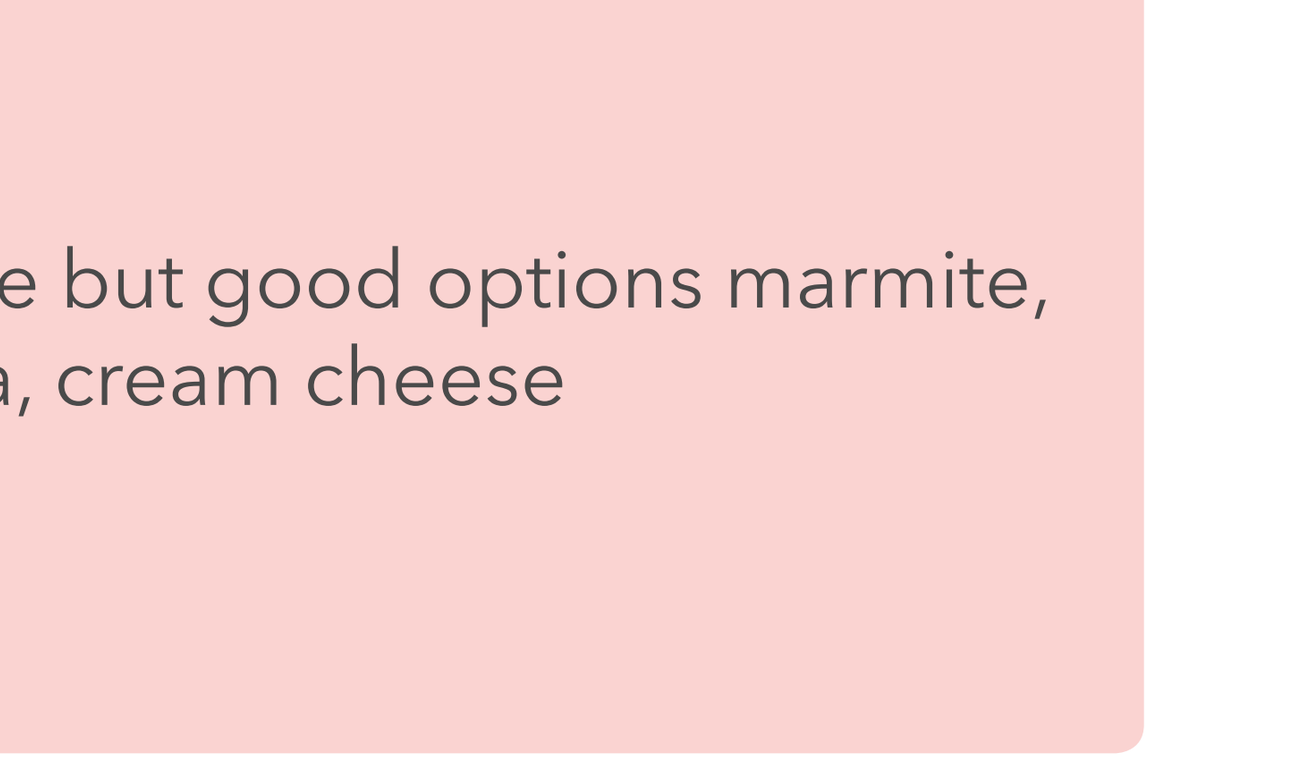
Over 3 hours

Once again starting to fuel early is key but in this situation, especially when we think about the types of races and terrains this may cover, there is more room for real food options. A lot of the athletes I work with who run these longer distances, often find that they need to split their fuelling up, where they may focus on solid fuel for the first part of the run, then maybe move more towards gels and jellies, finishing up with liquid and caffeine. However, I cannot stress enough, it is finding the practice and options that work for you. I know some elites who can stomach gels even in 16 hours plus races, while others who can tuck into boiled salted potatoes throughout 100 miles. In these very long races staying on top of hydration and sodium losses is highly critical; aiming for a minimum of 90g of carbs, with the aim to try and see if you can consume more without negative consequences is always going to result in a more consistent performance.

Some good ideas for real fuel include:

- Cold salted potatoes
- Noodle soup
- Scotch pancakes
- Peanut M&Ms
- Pretzels
- Wraps with filling of choice but good options marmite, peanut butter and banana, cream cheese
- Cereal bars
- Salted peanuts





Top Tips!

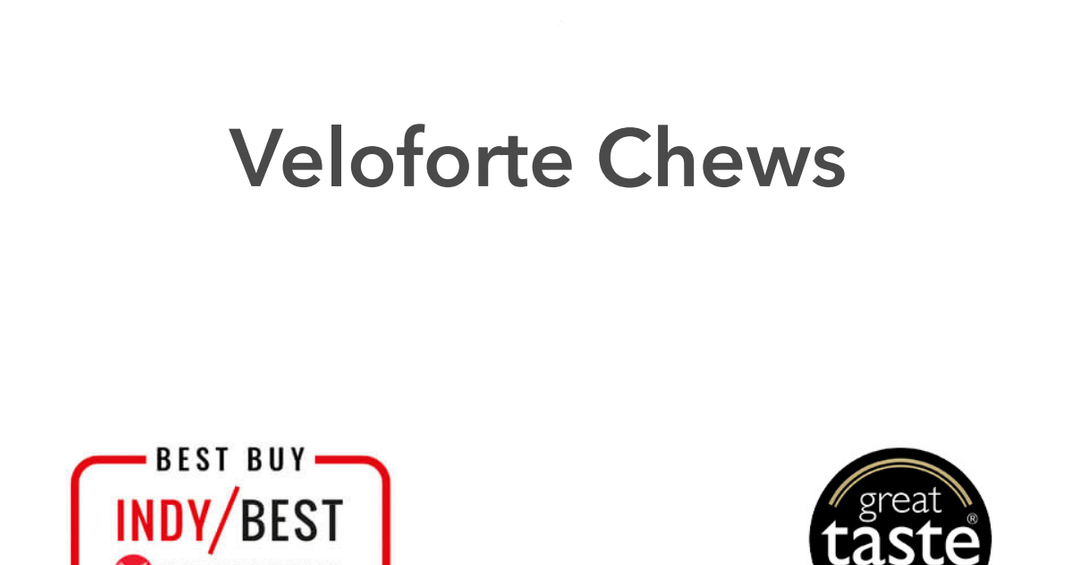
A key fact is the body can absorb around 60g of glucose per hour and 30g of fructose. There are some new studies emerging that suggest that this upper limit of 90g in total could be increased to 120g in some athletes who train their gut but presently the sample sizes used have been small and only done in men running at altitude.

A great way to hit these easily digestible requirements are using a mix of Veloforte gels (22g carbohydrate per gel) or chews (42g of carbohydrate per pack). Both provide glucose and fructose in the correct composition, preventing gastro-intestinal distress, while delivering energy to the working muscles allowing you to maintain your pace and stay consistent.

Veloforte Gels

Veloforte Chews

In those longer trail runs where you want to take more solid food, veloforte energy bars are a great option and with so many varieties available, you won't suffer from taste fatigue.



Veloforte Bars

Recovery Goals

After each run, training or race, runners need to be mindful about their recovery, ensuring that they take this on within 30 minutes of finishing. The recommendations are 1.2g of carbohydrate per Kg/BW and up to 0.4g/Kg BW protein. If this is not a timed meal, then a recovery snack needs to be consumed which could be something like:

- Veloforte shake made with cows milk
- Veloforte energy bar and banana
- Greek yoghurt and granola

1.2G
carbs per kg/BW

and up to

0.4G
protein per kg/BW

These ensure a good intake of carbohydrate and protein, to start the replenishment process. This should then be followed up with a balanced meal within 2 hours. This would also be the case if a runner is doing a double day of training, including if one session was strength training and the second, a run.

Problems occur when runners aim to do hard sessions fasted or in a carbohydrate depleted state: similarly, they can also find that they are not hungry immediately after a session and prolong recovery. Both these situations have negative effects on hormonal regulation within the body. If this down regulation continues, then this can have longer term consequences on your health and performance, such as a depressed immune system, a decrease in bone density and a much slower digestive system.

Ghrelin is our hunger hormone – levels rise after exercise or several hours after a meal, signifying that we need to refuel. When Ghrelin is high, leptin levels are low. Both these hormones will return to normal levels when energy demands are met. However, if a runner continually does not fuel adequately after a training session, intentionally or unintentionally, leptin levels stay low. Chronic low leptin levels send a signal to the body to encourage energy preservation.

So, while the runner may think they are going to lose weight and improve body composition, indeed the reverse can happen. It's important to highlight here that this is a simplified version to help explain why some runners, even when they restrict intake, or increase training still don't achieve the body composition and weight goals they would expect.

Is it ever appropriate to train fasted or in a carbohydrate depleted state?

The topic of training fasted is one that generates a lot of discussion. There are a number of reasons why runners may choose to run in a fasted state. Firstly, it is often ease, especially for those early morning runs where there just isn't time to take on fuel before we don our trainers and head out of the door.

However, more often this way of training has been associated with improved endurance performance. The theory is based on the fact that our body only has enough glycogen stores to fuel around 90 minutes of moderate training. After this point if we do not provide the body with an extrinsic carbohydrate source, the body will go in search of another fuel source in order to maintain delivery to the muscles. We have a large amount of energy stored within our body as adipose tissue (fat) and so it makes sense that this would be the next source of fuel for the moving body. However, the release of energy from fat is a much slower process and has a detrimental effect on running performance, particularly when we are working at an effort of 7/10 or more. Thus, it has been suggested that if we can improve our ability to use fat for fuel, then we can maintain a higher pace for longer.

All sounds straight forward right?

Not really. There are a number of concerns and issues that need to be taken into consideration. Indeed when you look at the supporting literature for fasting or low carbohydrate diets on fat adaptation and performance, the most recent review of the literature in the journal of Sports Medicine, 2020, concluded that, “there is little or no evidence to support the notion of endurance training and fasted mediated increases in fat oxidation, and we recommend that endurance athletes should avoid high intensity training while fasted.”

> **“For optimal performance and recovery, fuelling before, during (on long runs) and after is best practice and actually helps with satiety and appetite.”**

Similarly, Louise Burke demonstrated in her most recent study (2017), that low carbohydrate high fat diets, impair exercise economy and negates the performance benefit from intensified training. Thus, the overriding evidence would suggest that there is little to gain from training fasted or in a carbohydrate depleted state, apart from the convenience with regards to early morning starts.

What do you do if you are an early riser and can't face food before you head out for your run?

Ideally you want to aim for around 0.5-1g of carbohydrate per Kg/BW, with this being titrated according to duration and intensity of training. One practical suggestion is to make up your own sports drink. Take 300ml of any fruit juice and dilute with 300ml of water; if you tend to have heavy sweat losses, add ¼ tsp salt. Similarly, you could use a veloforte energy drink. Drink some of this prior to leaving for your training session and then continue to sip on during. Other good options include veloforte chews, gels, hot cross buns, banana and fruit yoghurt or scotch pancakes. If this is a long run, it is important to ensure that you maintain your fuelling by taking on regular carbohydrate every 30-40 minutes.

BEST BUY
INDY/BEST
INDEPENDENT

Veloforte Energy Drinks

What is the deal with food and running?

One of the most common issues reported with taking fuel when running is gastric distress. This outcome causes many runners to avoid fuelling during long or intense training. However, we have already heard the evidence for the importance of carbohydrate availability. The real issue is that many individuals do not practise fuelling during training but then go ahead and fuel during a race to ensure optimal performance.

When I ask runners why this is the case, it is usually related to the fact that they want to “save” their energy for after training, so they have something to look forward to. This is definitely one myth that needs to be rectified. In fact, for optimal performance and recovery, fuelling before, during (on long runs) and after is best practice and actually helps with satiety and appetite.

Everyone will have their own personal preference when it comes to race day nutrition. It will also depend on the type of race - supported, unsupported; at altitude or in the desert; hot or cold; road or trails; single day or multi day and how long each day will be.

Don’t make these common mistakes!

- Leaving it too long before they start fuelling; ideally you want to start taking on nutrition within the first 30 minutes and continue every 30-40 minutes.
- Taking sports gels too quickly; aim to take one gel over 4-5 minutes rather than all in one go. This helps with absorption and also tolerance.
- Becoming dehydrated and not taking on replacing fluids and electrolytes, specifically sodium.
- Trying new products on race day.

Hydration & Electrolytes

Hydration, this is one a lot of people neglect when in reality it is crucial to your running and race success. It is well documented in scientific literature that fluid intake and adequate hydration during exercise are essential and, more importantly, critical during prolonged training sessions and competition events.

The key role of fluid intake during endurance running is that it maintains:

- Hydration
- Thermoregulation (body temperature)
- Adequate plasma (blood) volume
- Avoids dehydration

Ensuring that plasma volume and thermoregulation stay within an optimal range has a direct impact on performance. When core body temperature rises, due to dehydration, plasma volume decreases, resulting in an increased heart rate, which accelerates fatigue. Just a 1% reduction in body weight through fluid losses can contribute to these negative physiological effects. In addition, dehydration has a marked effect on cognitive function, resulting in your inability to make decisions.

What about salts?

Most runners will sweat between 400-2400 ml per hour of exercise, with the average value being around 1200 ml per hour; although this will vary with age, sex, weight, the intensity of training and also the environmental temperature. These sweat losses are predominantly water but the main electrolyte lost is sodium. The sodium content of sweat varies substantially from 115 to greater than 2000 mg per 1000 ml of sweat; a runner who is a “salty sweater” (i.e., has a high amount of sodium in their sweat) may lose well in excess of the recommended intakes.

Most electrolyte tablets, salt capsules or sports drink will only provide around 250-300mg of sodium. If you are diluting your electrolytes into 750ml, this will mean having to consume in the region of 2250ml of fluid per hour during longer races to meet your sodium requirements, which is practically very difficult both from a consumption and transportation point of view.

Is it any wonder then why so many runners complain of the common symptoms associated with low sodium intakes and dehydration?

These include:

- Gastro-intestinal distress
- Nausea
- Bloating
- Fatigue
- Impaired concentration
- Dizziness
- Heat stress

Indeed, the biggest cause for stomach issues during runs is related to sodium imbalance and not the sports nutrition gel or bar that most runners allude to. If your body is dehydrated, and you are consuming glucose, this will become highly concentrated within the gut. As blood flow is being directed away from the stomach to the working muscles, it cannot absorb this quick enough, resulting in stomach upsets.

As a rule of thumb, I generally suggest runners need to take around 700-900mg of sodium an hour during longer training and competition. This can be a mix of salt tablets, electrolytes, energy drinks and even food.

Some good food suggestions include:

- Salted peanuts
- Mash potato with cheese or marmite
- Cheese straws
- Cured meat

Sodium balance and staying hydrated is not just confined to during running; it is equally important to think about it leading into an event. I regularly recommend that individuals start drinking electrolytes in the 24 hours prior to race day to help prevent any of the above issues.

Back to the Macros...

Proteins are often called the building blocks of the body. Protein consists of combinations of structures called amino acids. There are 20 amino acids and these combine in various sequences to make muscles, bones, tendons, skin, hair and other tissues. They serve other functions as well, including transporting nutrients and producing enzymes.

Eight of these amino acids are essential and must come from your diet. They are found as a complete source in animal protein food such as dairy, meat, fish and eggs. They are found in an incomplete source in plant-based proteins; that is, they will be lacking in one or more of the essential amino acids. Examples include vegetables, grains, nuts and legumes. If, however, these are combined in the correct way you can make a whole source of protein.

Some good combinations include baked beans on toast; rice and dhal; and wholegrain bagel with peanut butter.

We hear a lot about protein within the sports and fitness industry with many of us believing it is the most important macro-nutrient for active individuals. In reality, runners need protein primarily as a response to exercise rather than as a fuel source.

Protein has been a huge area of research for many years, with the most recent findings demonstrating how important protein is in the recovery phase. During all exercise, including endurance sports such as running and cycling; team or power sports such as netball, football, tennis or resistance training (using weights); an increase in the breakdown of protein in the muscle has been shown. That said, while there is a preference to include a large amount of protein in the immediate recovery phase, the recommendations for protein foods are that they should be distributed throughout the day, to help counteract a negative protein balance. The suggested amount is 0.4g/Kg BW protein 4-6 times a day depending on training load.

For a 65Kg runner this will be 26g protein at each serving which looks like:

- 4 medium eggs
- 100g chicken
- 100g red meat
- 300g tofu
- 250g Greek yoghurt
- 150g chickpeas

Fat

Contrary to popular belief, not all fat is bad for you! In fact, it is vital that everyone eats some fat to help absorb fat-soluble vitamins A, D, E and K and to provide essential fatty acids that the body cannot make. These nutrients have important roles to play within the body, particularly with regards to recovery, immune health, inflammation and prevention of fatigue.

However, like protein, fat is best reserved for inclusion as an integral part of your daily diet but should be avoided as an immediate fuel source. In fact it is worth being aware that a high fat option pre-run slows digestion and so can actually sit heavy on the stomach.

Eating too much of a particular kind of fat – saturated fat – can raise your cholesterol, which increases the risk of heart disease. Saturated fat is the kind of fat found in butter and lard, pies, cakes and biscuits/cookies, fatty cuts of meat, sausages and bacon, cheese and cream. It also encompasses trans fat, which is often found in processed foods. It's important to cut down on this type of fat and choose foods that contain unsaturated fat in preference.

These include:

- Oily fish, such as salmon, sardines and mackerel, which are an exceptionally good source of omega-3 fatty acids
- Nuts and seeds, including their oils and butters
- Sunflower, rapeseed and olive oils
- Avocados

When I work with runners, I like to encourage them to use these good fats as much as possible in their diets over saturated varieties. However, it is important to point out that these good fats still have a high-energy value and should be eaten with that in mind. One exception to the rule is the saturated fat in dairy which has actually been shown to have protective properties for the cardiovascular system.

What about the small stuff....

Do runners have higher requirements of minerals and vitamins? Do they warrant supplementation? The jury is out on this one. Some studies show that there are enhanced requirements in runners due to an increase in damage to muscles by components known as free radicals. However, there have been no absolute links to actual improved sporting performance with a diet high in antioxidants.

So back to the original question of whether runners have higher requirements? Technically, no, as if you are a very physically active person, you will actually be taking in more food in the form of fuel. As long as this fuel is balanced and nutrient-rich and not made up from empty calories, then you will meet your increased requirements.

Remember that all forms of fruit, vegetables, herbs and spices count. I always use frozen berries, for example, and although I prefer fresh herbs, I also have a drawer full of the dried variety.

Key macronutrients to focus on:

- Vitamins – A, B, C, D, E and K
- Minerals – calcium, iron and phosphorus
- Electrolytes – sodium and potassium
- Trace elements – iodine, zinc and magnesium

Micronutrients are essential for many metabolic processes within the body, but you can’t make them yourself; you need to get them from your diet. Most function as co-enzymes or co-factors within the body – that is, they aid enzymes and proteins in their function. For example, the B vitamins are very important for carbohydrate and fat metabolism, while vitamin C, along with zinc, is important for a healthy immune system, and magnesium and calcium are needed formuscle contraction. So you can see each and every one has a huge role to play.

Caffeine

Some people can’t even think about stringing a sentence together before they have had their first shot of caffeine, while others will be reduced to a nervous wreck simply from inhaling coffee fumes. So, what is the deal with caffeine?

For years we were told to be wary of how many caffeinated drinks we consumed daily as they had diuretic properties resulting in dehydration. As science evolves, messages change and the truth is that moderate consumption (1-3 strong cups of coffee a day, 3–6 cups of tea or a can of Coke) will have no negative effect on your health.

One hour before training

1–3

mg/kg per BW

For longer events consume

40–60

minutes from the finish

When it comes to sports nutrition, caffeine has its own part to play. It has been used by many elite athletes as a performance-enhancing substance, but as with everything, what works for one person doesn’t necessarily work for another. Individuals are either caffeine responders or non-responders. If you are someone who can drink a cup of coffee late at night and still sleep like a baby, you are a non-responder. In other words, caffeine doesn’t affect you at all. If, however, the opposite is true and you will be up all night, tossing and turning, you are a responder. Caffeine works best as a performance enhancer in those who are responders, and the suggested dose is 1-3mg/kg BW about an hour before training/competing. Similarly in longer events, you may want to consider a fuelling aid with caffeine 40-60 minutes from the finish as this has been shown to help with reducing perceived exertion.

Final Word

We can see that Fuelling for training is critical if you want to get optimal adaptation and progression. Understanding what you need to consume before, during and after is fundamental to performance. Intra-run fuelling is going to be necessary in certain training situations. We also need to consider the terrain, distance, and time on feet as these all have implications to energy requirements.

Everyone will have their own personal preference when it comes to nutrition, and specifically, race day nutrition. This will also depend on the type of race - supported, unsupported; at altitude or in the desert; road or trails; single day or multi day and how long each day will be.

For example, those running on trails or mixed terrain often prefer using real food during training and races. This works as there will be fluctuations in pace which means that food maybe better tolerated in comparison to someone doing a flat-out road run, where all blood flow has been directed away from the stomach and into the working muscles, making it more difficult to digest solid food.

In all situations, it is important to practice with your race day choices through training to allow the gut to adapt. On that note, remember that fruit and dried fruit has a high fructose content so just be mindful of how much you consume as this can potentially cause digestive issues during your race or training.

Finally make it individual – take on board the fundamental practices and then work out what you like. There is nothing worse than trying to consume something you can't stand the taste of just because it has been written somewhere that it is good for you, or your training buddy swears by it. If you don't like the taste of something, you are unlikely to consume it, especially under race day conditions when pressure can be high. The key objective is to work out what is practical and easy to source, and you know you can tolerate.