



By Triathlon Vibe April 1, 2020

Sports scientist Stephan Nuesser on how to adapt to a low-carb, high-fat diet to fuel for longer, reduce stomach issues and increase triathlon performance.

Low-carb, high-fat diets have become much more widespread with triathletes over recent years – especially Ironman competitors seeking to better utilize the body’s ample energy stores of fat while racing. But making the switch can be tough – it needs careful planning, patience and discipline while going it alone without expert guidance can lead you into a quagmire of guesswork, uncertainty and even health issues.

To unravel the mysteries a low-carb, high-fat diet for triathletes, we spoke to sports scientist Stephan Nuesser of SNDC who specializes in advanced performance testing and – in recent years – helping athletes unlock their athletic potential through low-carb, high-fat adaptation.

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Speaking from his performance lab in Burscheid near Cologne, Germany, Stephan gives you the low down on what to think about before making dietary changes, what to expect as your body adapts and how your triathlon racing will benefit as a result.

Why consider low-carb, high-fat?

“What I see from the nutrition point of view is that 99% of athletes still rely on carbohydrates as the main fuel source. And perhaps that’s industry-controlled or industry directed – what we learned is you need the pasta, you need the carbohydrates to be strong and perform. But it’s just not true.

“For long-distance running or triathlon, the amount of fat you can store in your body is not the limiting factor – you can store 70 or 80,000 calories of fat. Compared to that, you can only store 2,000 calories of carbohydrates.

“I use the analogy of a truck – you have a small tank of fuel in the front – that’s the carbohydrates – and a huge one on the back – the fatty acids. As athletes, we’re always trying to keep the small tank full, going to lots of gas stations, which is a lot of stress and a lot of hassle, not ever thinking, ‘Why don’t we use the big tank in the back?’, which is right there.”

Unlocking that bigger fuel tank can mean gaining access to a serious amount of calories you would otherwise have to try and replenish through carbohydrates: “The idea is that if you shift your fatty acid metabolism you can cover 70 to 80 percent of your required energy, meaning only 20 or 30 percent needs to come from carbohydrates.”



Avocados are a great source of healthy fats and an ideal choice in a LCHF diet. (Photo: Geraldine Dukes, Pixabay)

“It’s also a myth that fat increases cholesterol and that cholesterol is the reason for chronic heart diseases. It’s been proven wrong. I would say that the high amount of glucose and fructose [sugary carbs] in the diet are the reason for all diseases which are connected to the metabolic syndrome such as type two diabetes, high blood pressure and obesity. Fat doesn’t make fat – processed foods and carbohydrates make us fat.

“But saying all that, it doesn’t necessarily need to work for everyone. If an athlete runs on carbs and is OK with having 20 gels and two liters of Coke during the race, hasn’t had any problems, feels strong and feels healthy, then continue that route. But in my experience, most athletes don’t have this experience with carbs.”

When to make the switch to low-carb, high-fat

Deciding to change to a low-carb, high-fat diet is a big undertaking. It takes discipline, time and regular testing to successfully adapt to this more efficient fat-burning state – it's also essential to have the support of an expert to guide you.

“You need to consider that it will take at least eight weeks of adaptation. In this time, you're going to go through phases where you don't feel you're as strong as you were, but then it will come back and you'll feel much better. For this reason, I usually recommend starting in November or December so that you have the winter preparation phase for getting fat-adapted.”

Once you're ready to start, a program of carefully managed carbohydrate reduction, logging and testing begins.

“My athletes track everything they eat for at least seven days using the MyFitnessPal app, which I then combine with their Training Peaks data. From this, I can see the training profile of fat, carbs and protein the athlete is currently using.”

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With this baseline, it's time to cut down on carbs, switch to mainly low-intensity training and start regular ketone measurements – an indicator of how the metabolism is adapting.

“There's not really a strict definition of what 'low carb' is. It can be 50g, 100g, even 200g and you need to adapt the amount of carbs so that the athlete still feels OK and can perform and train – it's about finding an individual edge. One of the biggest mistakes I see with athletes trying it on their own is that they actually cut out the carbs too much.

“In general, I start with 100g and see how the athlete reacts. If they're good with that, we can even go a bit lower, which we call a cold keto phase where we really push the body to go on the fats. Usually, after about two weeks, we can go up again and they can feel strong and can perform on their normal level, at which point we're usually at 100 to 200g of carbs.”

Training during LCHF adaptation

“During this keto phase – usually two to eight weeks – you need to be careful that you're activating the right muscle fibres by staying in your low fat-burning intensity most of the time. You can still do one or two sessions a week where you go for 15, 20, 30 seconds intensity, this keeps the glycolysis still functioning without high lactate accumulation. It's not for stimulating the fat-burning, more to keep the system used to higher intensity but avoid long high-intensity intervals as that means you go into your aerobic carbohydrate metabolism.”

Athletes should also be prepared to feel weaker as they adapt but push through until the adaptation is complete.



Persevering through the tough low-carb, high-fat adaptation phase could unlock your fuelling potential. (Photo: Skeeze, Pixabay)

“During adaptation, the body is not as strong as before because it’s going through a physiological change. But after that’s finished then the same strength, the same performance comes back as before – just without the need for a high-carb diet.

“Last year a triathlete I now work with tried it on his own and stopped it after four weeks because it didn’t feel right. The performance went down. He didn’t trust it anymore. So he stopped it and went back to carbs and the same problems came back – energy issues during the run, feeling empty, being unable to keep his pace. So this year we did it together and he also had some problems at the beginning, but we adjusted it as we went and now, after eight weeks, he feels super happy that he did it and he’s still maintaining that path.”

Measuring metabolic changes

“If your body uses fatty acids as an energy source, it breaks down the fatty acids into ketone bodies. Every athlete changing to low-carb, high-fat needs to measure their ketone bodies.

“You can measure using a ketone meter and a small capillary blood test. You prick your finger, you take one little drop of blood and then in eight seconds you have a result.”



A ketone meter such as the Nipro 4 Sure is essential to test the blood levels for ketones and take a healthy and scientific approach to low-carb, high-fat living. (Photo: [Nipro](#))

This regular measurement is where plenty of athletes trying low-carb, high-fat come unstuck. Without the hard data from the blood, there's no real way of knowing how adaptation is progressing and what the best level of carb intake is.

“Everyone reacts differently but if the athlete is measuring the ketones, then we have feedback on how the fatty acid metabolism is adapting. Therefore, we can either reduce carb intake, maintain the current level or increase the carbs.

“So it's actually quite an individually flexible approach, which I think is needed to have a solid result and it's always helpful to have someone who can advise what to adjust to make it work the best possible way.”

How to manage your low-carb, high-fat diet

Athletes often concentrate on cutting out the carbs with less thought towards covering daily energy expenditure.

“The biggest mistake I see is to stick on a very low carbohydrate diet and don’t match your daily calorie demand – you don’t eat carbs, but then you also don’t eat fat either. So let’s say you need 2,500 calories, which is not so much if you train.

“50g of carbs is around 200 calories so you have 2,300 which need to come somewhere else. So you have some protein, say that gives 600 calories. That means 1,700 needs to come from fat. So you need to have a plan and a strategy of how to match your calorie consumption and what energy you need from fats. Otherwise, after a few days, it starts to shut down your metabolism, which is no good.



Fats and protein from meat form a key element to most low-carb, high-fat diets, making it more challenging for vegetarians and vegans. (Photo: Bruno/Germany, Pixabay)

“Another issue is not eating enough protein – I advise around 2g of protein per kg of body weight. So let’s say an average athlete who weighs 80 kg – he then needs 160g of protein per day.”

It’s not just the macronutrients though, there are other factors that athletes attempting adaptation without expert support often neglect.

“You also need to look after your electrolytes intake because during that adaptation phase you have a higher sodium secretion from your kidneys and need more sodium and magnesium to compensate. Some people trying these keto diets get the keto flu – where that you feel a bit shaky and a bit dizzy. That’s because sodium is an important controller of blood pressure and if you don’t have enough it gets lower giving these negative effects.”

Where do carbs come in?

When on a low-carb, high-fat diet, carbohydrates can still play an important role in fueling training – albeit usually reserved for high-intensity sessions.

“It depends on what training you do. So let’s say you do an easy fat burning session. During this, you mostly activate type-one muscle fibres [also called slow twitch]. These contain a lot of mitochondria and this is actually the place where fatty acid is metabolized in the muscles.

“If you do a tough gym session or intervals or hill sprints you activate more type two muscle fibres [also called fast twitch], which are used for high intensities like sprinting, but they don’t have the capacity to burn so much fat – they rely more on the glycolysis, which is the carbohydrate metabolism.”

Racing with a low-carb, high-fat diet

“The longer the distance, the more benefit you have from a low carb diet, but 70.3 or full Ironman athletes both benefit in the same way. It’s much easier to race without that carb demand.

“What carbohydrate dependent athletes have tried is to have 60 to 80g of carbs per hour so that they can actually refuel and even expand their carbohydrate ‘tank’. But these high sugar loads also create a high chance of gastrointestinal stress – so many have stomach problems or diarrhea.

“If you compare that to a fat-adapted athlete, you can run with 40 or 50g of carbs to match your energy demands but have less gastrointestinal stress and more stomach space.

“An average athlete has a fatty acid metabolism capacity of around 0.6g per minute. Top fat-adapted triathletes are on 1.2g of fat per minute. So, let’s say you get your metabolism up to 1g per minute, that means 540 calories per hour could come from your fat metabolism.”

All this means that if you can successfully increase your fatty acid metabolism to 1g per minute, you’ll be getting an extra 216 calories per hour. That’s around two-and-a-half gels per hour that you don’t have to force down – music to the ears of any long-course athlete.

The longer the distance, the more benefit you have from a low carb diet. Therefore, by going down the fat-adapted route you can avoid overloading the digestive system as well as reducing the bloating, discomfort or more severe gastrointestinal issues that come with this. But even more crucially for the performance-minded athlete, because it's a stable, reliable energy source, it'll be with you throughout your whole event – including the latter stages when many athletes struggle to eat enough.

So, what's the bottom line for long-course triathletes? "In my experience, fat-adapted athletes feel they have much more energy left towards the end of races when others dependent on carbs are struggling. So, they can finish the race strong and that leads to an increase in overall performance," and who would say no to that?