Fuel economy

Will manipulating your metabolism make you a better rider? *Cyclist* investigates

Words **SAM CHALLIS** Photography **GEOFF WAUGH**

A consultation with Laurent Bannock, and expert in metabolic efficiency, can help riders go further, faster

In the land of cycling nutrition, carbohydrate is king. It provides the quick hit of energy required to get riders through the interval sessions that we're told we need to build power and speed. The result is that we have become loyal subjects to the mighty carbs, and our bodies have become reliant on them for fuelling our rides. But it could be that we are serving the wrong master.

Broadly speaking, the average cyclist carries enough glycogen (carbohydrate stored in the muscles) to fuel about 90 minutes of activity – barely enough to get most riders to their first cafe stop. Further, carbohydrate oxidation (ie burning energy) has a strong correlation with lactate production, which limits performance. So to improve, we need to become more metabolically efficient, which is why *Cyclist* has come to Guru Performance in Mayfair, London, to see Laurent Bannock, a scientist at the forefront of metabolic efficiency training.

All hail fat

'Metabolic efficiency is the ability of an individual to utilise their most significant on-board fuel supply – body fat – for as much of the exercise duration as possible,' Bannock says. 'Fat is the most sustainable energy source for an athlete, and delays the accumulation of lactic acid by sparing glycogen stores. However the situation is complicated by the fact that an athlete must also be metabolically flexible – able to switch rapidly and proficiently between the body's fuel sources to match the fluctuating intensities of competitive events. Don't worry, we'll revisit this later,' he tells me with a grin, as if sensing my growing incomprehension.

He then asks me to remove my right sock and lie back on his examination table. Bannock explains that a host of anthropometric details are needed before we get to the crux of the testing. 'This is a fluid balance test to determine intra and extracellular hydration,' he says as he attaches electrodes to various points on the right side of my body. 'It's critical to understand the context in which metabolic results are achieved. Think of metabolic efficiency as a GPS signal – each auxiliary test is a satellite, and more satellites create a more accurate signal.'

Dehydration, as well as having other detrimental effects, increases the rate of muscle glycogen usage, therefore reducing metabolic efficiency. By testing for adequate hydration, this factor can be removed to ensure we get a true measure of my metabolic efficiency. This same logic is applied to the rest of my assessments, which include body composition analysis via a skinfold test. 'Despite being the source of energy we're trying to tap into, most body fat is unnecessary and is non-functional weight that serves as a primary limiting factor of performance,' Bannock says.

Saliva, blood and urine samples are taken, determining among other things my immune function. Poor immune function helps point towards high stress levels: another hindrance to metabolic efficiency. 'Stress causes the adrenal glands to secrete adrenaline, which tells the body to burn more carbohydrates – it's the fight or flight response, but is detrimental to endurance performance,' says Bannock. Despite having a busy job, my stress levels appear reasonable. With a

complete set of accurate results, I can move onto the main tests.

Now for the hard bit

The expected sweat and pain is postponed by 10 minutes as I am required to sit still while a Bane-style mask collects details of how much fat and carbohydrate I burn and what ratio of oxygen and carbon dioxide I inspire and expire at rest – ultimately determining my resting metabolic rate.

According to the test, I naturally burn 2,724kcals a day, which is some 500kcals higher than the estimated daily requirement of 2,192 for a person of my height and weight. 'Knowing this is incredibly important,' says Bannock. 'It highlights the individual variability that exists in metabolic testing. You're a long way off average so working off a wrong value can have a profound impact on adaptation to metabolic training. To go back to the GPS analogy, this is another integral satellite.'

The time has finally come to hop on the static bike. I'm following a hybrid protocol developed by Bannock that's adapted from standard 'fat max' and metabolic efficiency tests, but also includes metabolic flexibility parameters. It's a stepped protocol starting at 100 watts, increasing by 40 watts every five minutes until I reach a 'substrate crossover' – where the intensity is such that my body has no choice but to switch from burning mostly fats to mainly carbs.

Pre-assessments include hydration analysis (right), body composition (below) and how many carbs *Cyclist* burns at rest (bottom). The results combine to give an overall picture of metabolic efficiency

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Master your metabolism

Five ways to improve your metabolic efficiency

Periodise your diet

Eat less carbohydrate on rest days and more on training days. Carbs are used to fuel high-intensity exercise – on rest days you don't need as many carbs because you don't expend as much energy. This decreases your body's reliance on them.

Chill out

Being stressed raises adrenaline levels, forcing your body to burn more carbohydrates at rest. Get a massage, take a nap... do something that relaxes you. This will decrease your adrenaline and allow your body to burn fat more easily.

Train fasted occasionally

Before breakfast your muscles have less glycogen in them. A couple of hour-long spins a week, early in the morning, will force your body to use its fat stores for energy. Take it easy though – you want to burn fat, not break down muscle.

Watch the sport drinks

Avoid using sports nutrition products when training at low intensity. Carbs are the body's preferred energy source – consuming gels and energy drinks will cause your body to stop burning fat and become dependent on carbs for ride fuel.

Mix it up

Intersperse low-intensity, high-volume rides with interval sessions. This will keep your body guessing and help prevent a progress plateau, familiarising your body with burning fat for fuel but also training your top-end speed and lactate threshold to keep you competitive in sprints.

The test starts innocuously enough: I see on the screen to my right that the five-minute blocks are slipping by with little change in my physiological parameters. However, at 260 watts I really start to notice the work rate and the graph displaying my substrate utilisation shows that fat oxidation is starting to fall, with carbohydrate rising to take its place.

Until now the finger prick blood samples to test lactate have been tricky to collect, but now my thudding heart forces blood out of my finger with relative ease as the target power rises to 300 watts. Midway through this block the substrate graph shows my fuel utilisation has clearly switched, so with relief I hear the call that no further increments are necessary.

From my data Bannock has a clear idea of my metabolic efficiency: 'It's good but there's room for improvement.' It can be seen that keeping a power output of around 220 watts, or a heart rate of 150bpm, would allow the bulk of my energy to come from fat, drastically increasing time to fatigue. This gives me a clear target to aim for during training, but it seems I might need to rethink my behaviour off the bike.

'Ideally there should be a clear switch on the substrate chart, which there isn't particularly, and you should be burning less carbohydrate at rest than you do, suggesting you eat too much of it,' says Bannock. 'But as a non-competitive cyclist, your metabolic efficiency is most important – your metabolic flexibility only becomes a pressing issue in races where the need to switch between fuel sources helps you respond to changes in pace most effectively.'

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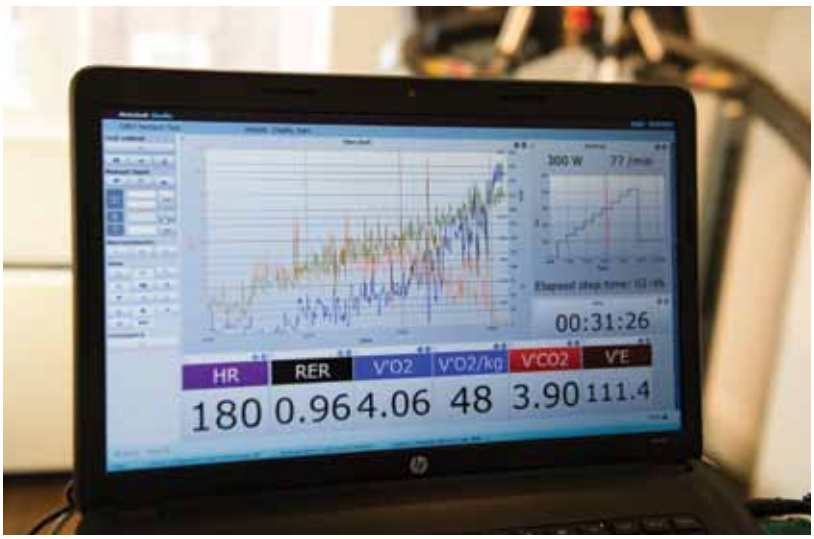

As *Cyclist* works harder and harder on the bike, the data on screen pinpoints the switch from fat to glycogen as the main source of fuel

So where do I go from here? 'Periodic carb loading in response to training demands – ie more carbohydrate on training days, but less on rest days – would see both your efficiency and flexibility improve,' Bannock says. This makes complete sense; I habitually eat the same thing regardless of my activity level. 'I would also recommend training fasted occasionally too – your body responds best to variety and training with low muscle glycogen would force your body into oxidising its fat stores more readily. Changes would be tangible within six weeks – adaptations to metabolism occur as a result of consistency and frequency.'

No cake for me at my next cafe stop, then.

For more on cycling efficiency see p80