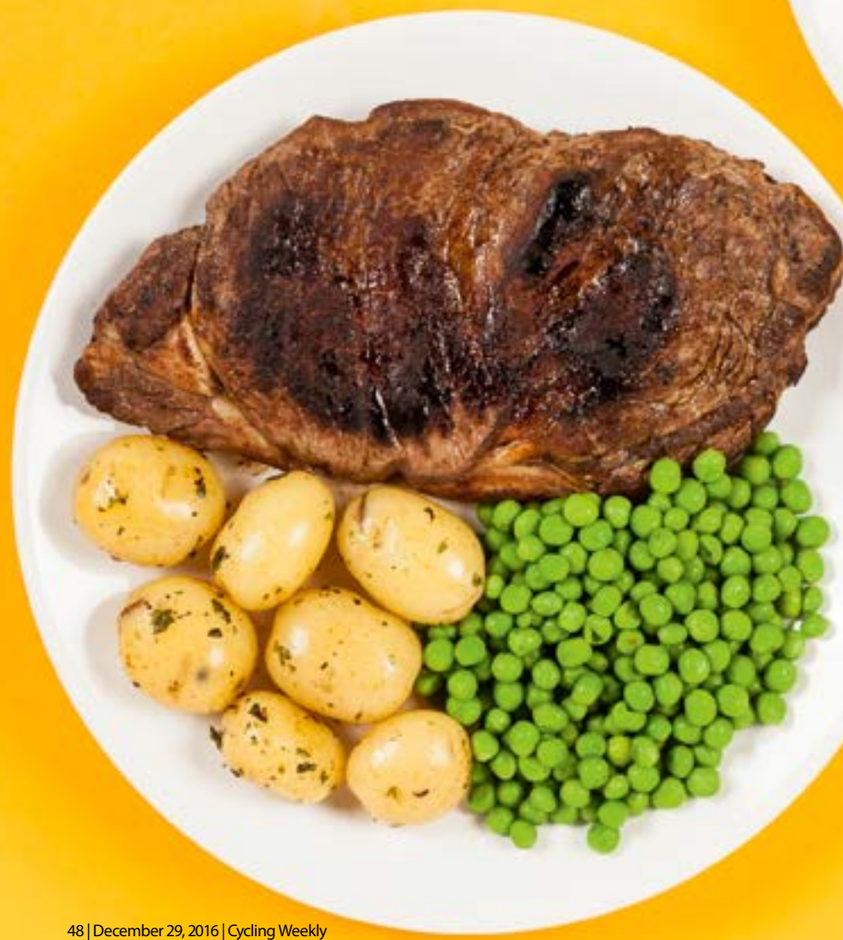
Are all calories equal?

Is losing weight a simple matter of cutting calories, or do you need to be choosier about the type of calories you eat? *Anita Bean* investigates



"Mark Haub ate only sugary junk for 10 weeks, yet shed 29lb, 8% of his body fat"

Proportion of kcals lost as heat?
Protein: 25-30%
Carbs: 12%
Fat: 3%

You know the rules: eat fewer calories than you burn and you'll lose weight; eat more and you'll gain weight, right? Well, it may not be that simple. According to new research, the source of calories you eat may be more important than simply *how many* you eat.

In 2010, Mark Haub, professor of nutrition at Kansas State University shed 29 pounds in 10 weeks, eating Twinkies, Doritos, Oreos and other treats instead of normal meals. He didn't do the experiment to endorse a junk food weight loss programme but to prove a point: calories are all that matter in weight loss. Haub's body fat dropped from 33.4 to 24.9 per cent. This posed the question: what matters more for weight loss, the quantity or quality of calories? As cyclists eager to keep our weight under control, the answer clearly matters a great deal.

The question as to whether all calories are equal has been hotly debated by scientists for many years, and has proved to be a controversial topic. Some believe that a calorie is a calorie no matter where it comes from: to lose weight people simply need to eat less and move more. Others believe that no calories are alike and that provided you choose the source of your calories carefully, then you can lose weight without counting calories.

"There's no doubt that energy (calorie) balance — represented as calories in versus calories out — matters when it comes to weight loss," explains Dr James Betts, associate professor in nutrition and metabolism at the University of Bath. "Long-term changes in mass are generally proportionate over time to the net balance between energy in and out."

Indeed, studies using rigorous standards have consistently shown that when people create a calorie deficit, they lose weight. Conversely, when people eat more calories than they need, they gain weight.

"To lose weight, you need to be in a state of negative energy balance," clarifies exercise physiologist and nutritionist Dr Scott Robinson (guruperformance.com).

Is it true you need a calorie deficit of 3,500kcal to lose 1lb?

Popular dogma says that you need to create a calorie deficit of 3,500kcal to lose a pound. But this doesn't account for the slowing of your metabolism as you lose weight ('adaptive thermogenesis'). As a result, it overestimates how quickly people lose weight. A better option is the online body weight planner (supertracker.usda.gov/bwp/index.html) created by scientists at the National Institutes of Health (NIH), US. Based on a mathematical model created by analysing all the latest research on weight loss, it accurately predicts how long it will take to reach your goal weight and how many calories you need to consume. It takes into account not only the drop in metabolic rate as you lose weight but also your age, current weight, how much exercise you do and other variables.

Can eating 'good' calories instead of 'bad' calories help you lose weight? Some people claim that you can lose weight without a calorie deficit. Further, they claim you can lose more weight on the same calorie deficit by avoiding carbohydrate, i.e. calories from carbs are 'bad' as they can be turned into body fat more readily than 'good' calories from protein or fat.

"When people eat more protein, they feel fuller and eat fewer calories without realising it"

Their argument comes from studies that show greater weight losses from low-carb diets compared to high-carb diets despite the participants claiming to eat the same calories. However, when you look more closely, these studies were conducted under 'free-living conditions' which means participants were free to choose what and how much they ate. By excluding carbs, the low-carbohydrate dieters ended up eating more protein. When people eat more protein, they feel fuller and eat fewer calories without realising it. So, the participants' greater weight loss can be explained by their lower calorie intake (not directly the type of calories).

In studies where calories were more rigorously controlled, there is little or no difference in weight loss between high- and low-carbohydrate diets. Also, in longer-term studies lasting longer than six months, adherence falls and people on high-carb or low-carb diets lose about the same amount of weight. The bottom line is that calories do count: you cannot lose weight eating 'good' calories if you don't create a calorie deficit.

A calorie's a calorie... isn't it?

"Too much of anything isn't good. I would advise steering away from extremes," says Robinson. "In the real world, it is very difficult to stick to a restrictive diet, whether it's restricting carbs or fats. I see people who have tried these. The most important thing is adherence. Usually restrictive diets are very difficult to stick to in the long term."

Does the body respond differently to calories from different nutrients? "By definition, a calorie is a calorie in terms of the energy it delivers," says Robinson. "However, there is a difference in the way calories from different macronutrients (proteins, carbohydrate and fat) are absorbed and metabolised by the body."

Betts concurs: "The body responds differently to calories from different nutrients."

Some of the calories you consume are used up digesting and processing the food and turning it into accessible fuel. This is called the thermic effect of food (TEF). Protein has a much higher TEF than the other macronutrients, equating to 25–30 per cent of total calories. Thus, if you eat 100 calories of protein, 25-30 of these calories will be lost as heat, only about 70–75 will be absorbed. In contrast, eight to 12 per cent of the calories consumed in the form of carbs and two to three per cent of the calories in fat are used up in digesting it.

"The precise magnitude varies depending on various factors, some known, some unknown," says Betts.

"You also need to consider the effects the different macronutrients have on satiety, or how full up they make you feel," explains Robinson. "Protein has a higher satiating effect than carbohydrate or fat, so it can help you maintain a negative energy balance." In other words, consuming foods high in protein (such as eggs, fish or milk) will help keep you feeling full longer, whereas snacking on, say, a packet of crisps will stave off hunger far less effectively.

This also explains why high-protein, low-carbohydrate diets may produce greater weight loss (at least in the short term) compared to other diets: protein makes you feel less hungry so you spontaneously eat less.

So, let's get this straight, if you overeat 300kcal in carbs, will you put on the same amount of weight as you would have had you over-eaten 300kcals of protein? Anything that tips you into positive energy balance will result in weight gain. However, when you overeat carbohydrate or protein, some of the calories are used for heat production (DIT). Overfeeding studies at the University of Colorado Health Sciences Centre, US, have shown that when people overeat carbohydrate they burn more carbohydrate (converting it to heat), and only about 75-85 per cent of the excess calories are stored as fat. On the other hand, when they overeat fat, they don't burn more fat; 90-95 per cent of the extra calories get stored as fat.

"This happens because we have a limitless capacity to store fat, whereas our capacity for carbohydrate storage is small and limited," clarifies Betts.

For cyclists who regularly deplete their glycogen stores, it's even harder to accumulate fat mass from excess carbs. When you eat carbohydrate, it is burned in preference to other fuels and stored as glycogen before it's converted into fat.

A landmark study at the University of Lausanne in 1988 found that carbs are converted to fat ('de novo lipogenesis') only when your glycogen stores are full and when you are in positive energy balance. In this experiment, participants ate 5,000kcal and 1,000g carbs a day for five days. They didn't gain as much body fat as predicted; instead, much of the excess carbohydrate was used to fuel normal metabolism (they stopped burning all other fuels). The more carbs they ate, the greater their energy expenditure. In essence, your body has a degree of metabolic flexibility and is able to use more of the fuel most readily available to it.

Weigh up your food choices

The power of protein

Similarly, overeating protein results in less fat gain than overeating fat. Research at Nova South-eastern University, Florida published in 2014, found that resistance-trained athletes who consumed 800 extra calories of protein a day (mostly from protein powder, averaging 4.4g/kg/day which is more than five times the recommended daily intake) for eight weeks didn't gain fat weight, as would be expected. Theoretically, they should have put on somewhere in the region of five to six kilos.

It seems, then, that surplus calories from carbohydrate or protein are less readily converted to body fat than fat calories. "The take-home message seems to be that if you intend to overeat, it's better the extra calories come from protein — or carbohydrate — than fat," says Robinson.

Is it worth counting calories?

"I don't ask my clients to count calories — I give them portion guidelines and tailor that according to their activity. Your overall goal should be to consume balanced meals," says Robinson.

Tracking your calories using apps can be useful to make you more aware of what you're eating but it isn't as accurate as we are led to believe.

"That's because the numbers you see on food labels and databases are averages and don't consider the energy required to digest those foods (TEF), which in a mixed diet accounts for around 10 per cent of the calories you consume, or the way food is prepared," explains registered dietitian Lynne Garton (alimenta.co.uk).

"Chopping, blending or mashing makes more calories available for absorption"

What's more, how you prepare food changes its calorie content. Cooking your food makes more of the calories available for absorption, as does chopping, blending, mashing, even chewing. Generally, more calories are absorbed from processed foods than unprocessed food.

Some calories pass through undigested. "In certain foods, such as nuts and seeds, some of the calories (macronutrients) are 'locked up' in the food matrix and cannot be digested by gut enzymes," adds Garton. Recently, US researchers have found that we absorb fewer calories from nuts and seeds than previously thought. For example, almonds have been shown to contain 129kcal per 28g serving, 20 per cent fewer calories than previously estimated.

Even the bacteria in our gut can increase or decrease the calories we absorb. People with a higher proportion of firmicutes bacteria absorb an average of 150 calories more per day than those with a higher proportion of bacteroidetes.

Should you track your calorie output?

Wearable devices for measuring calorie expenditure have become extremely popular with cyclists. But research suggests we shouldn't put too much faith in their readings.

"Calorie expenditure figures used on online calculators and fitness trackers are based on predictive equations so aren't very accurate," warns elite cycling coach Roland Kemp. "I may advise my cyclists to use them to increase motivation or to help them understand how many calories they burn versus how many they should be eating. Sometimes people think that doing an hour's cycling means you can eat three times your body weight in food, which means you undo all the calorie-burning benefits of your exercise."

A 2016 study of 12 popular wearable devices by Japanese researchers found there was considerable variation between the devices when compared with energy expenditure measured in a metabolic chamber (the gold standard of measurement). Some (e.g. Garmin and Jawbone) underestimated calorie expenditure by a couple of hundred calories over a 24-hour period while others (e.g. Fitbit and Omron) overestimated by a similar magnitude. The researchers concluded that "most wearable devices do not produce a valid measure of total energy expenditure."

Down to the individual

There are numerous factors that affect how many calories you burn during exercise and at rest: your weight, body composition (muscle burns calories, fat doesn't), your genes, how much brown fat (fat tissue containing more mitochondria) you possess, sleep and hormones; all affect metabolic rate.

"There is a huge difference between individuals in how many calories they expend," notes Betts. "Physical activity is the factor that has the greatest impact, as you can expend large amounts of energy by moving around doing exercise and/or simply living an active lifestyle — or alternatively you can spend very few calories by staying still and living a sedentary life."

So, are all calories equal? Yes and no. A calorie is a calorie from a thermodynamic point of view because the human body cannot create or destroy energy, only convert from one form to another. But in terms of different macronutrients and the effects they have on the body, all calories are not equal. Different foods have different effects on the body. If you want to lose weight, you need to focus not solely on the number of calories you're eating but also the source of those calories, your activity level, body composition and all the other factors discussed above.

Calories and weight loss: the essential points

- To lose weight, you need to create a calorie deficit.
- The notion that some calories are 'good' while others are 'bad' is misleading.
- It's easier to achieve a calorie deficit if you consume adequate protein (which reduces hunger) and minimise highly processed calorie-dense foods (which increase hunger).
- The amount of energy you get from food depends where those calories come from — it takes more energy to digest and process protein than carbohydrate, which requires more energy than fat.
- Protein has a higher satiating effect than carbohydrate or fat.
- You are less likely to gain fat eating extra protein or carbohydrate compared with fat. However, this isn't a licence to eat as much as you want.
- Calorie counting is not an exact science — don't attach too much precision to values on food labels.
- Don't put too much faith in calorie tracking — accuracy of most popular fitness trackers vary +/- 20 per cent over 24 hours and among different individuals.
- For most cyclists trying to lose weight, cutting calories by a conservative 15-20 per cent will help increase fat loss and minimise protein loss.