

Weight loss: Why to go!

If weight loss or weight management is a high priority as you build up for the new season, maybe it's time to start using a muscle building and recovery supplement. **Andrew Hamilton** explains...

AT A GLANCE

This article:

- Explains why power-to-weight ratio matters for endurance performance and the role of weight management in improving power-to-weight
- Looks at evidence that diets rich in calcium – particularly from dairy foods containing whey – can help lower body fat
- Provides practical advice for athletes trying to reduce or maintain body fat levels

Unless you're a cross-channel swimmer or sumo wrestler, it's almost certainly the case that whatever your sport or activity, you'll perform it better if you don't carry too much excess body fat. That's because surplus body fat acts as dead weight, increasing the load on your muscular system and demands on your oxygen transport system, negatively affecting your power-to-weight ratio (see box 1).

So it's hardly surprising that one of the holiest grails of sports nutrition has been the search for an effective fat loss supplement. However, despite the abundance of 'fat loss' potions and lotions on the market, very few (if any) stand up to the rigours of scientific scrutiny. But perhaps the answer could be right under our noses as new research suggests that one of the most familiar nutrients in our everyday diet may hold the key to sustainable weight loss...

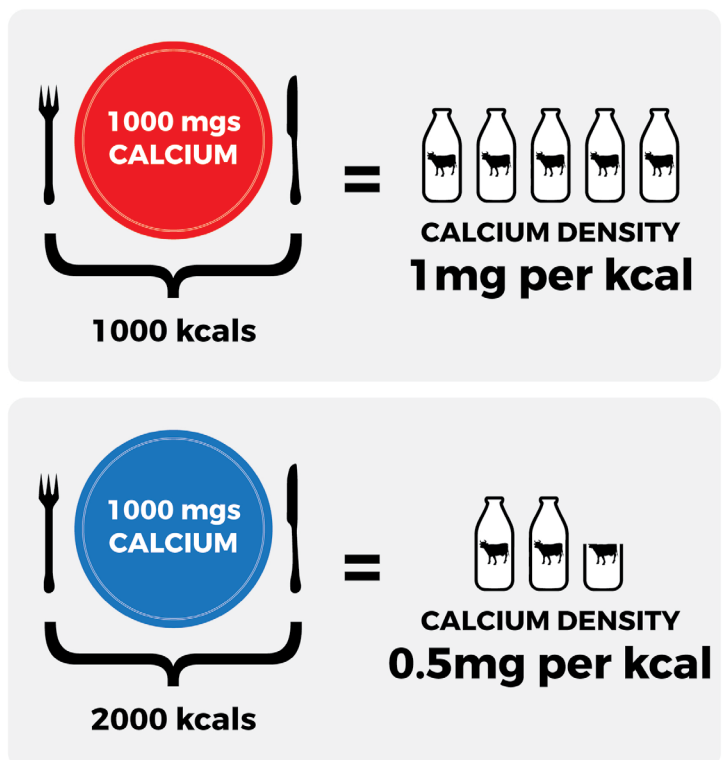
Calcium

The story starts at the turn of the century when scientists began investigating the link between dietary calcium intake and bone density using a highly accurate bone-scanning technique known as DXA^(1,2). Having collated the bone density data, they also decided to take advantage of the fact that DXA scans are also very good at determining body composition and body fat. So they then looked to see whether there was a link between dietary calcium intake and body fat levels. What they observed was very intriguing; there was a very clear and obvious relationship between the 'calcium density' of the diet (see figure 1) and body fat. The calcium density of the diet was inversely linked to changes in body

UNDERSTANDING NUTRIENT DENSITY

The term nutrient density simply expresses how much nutrient content (in this case calcium) is ingested per calorie consumed. In the study above, it refers to how 'calcium-rich' the diet is. For example, a diet containing 1000mgs of calcium per day and 1000kcal per day has a calcium density of 1mg per kcal. A diet containing 1000mgs of calcium and 2000kcal per day may have the same calcium content but only contains 0.5mg of calcium per kcal consumed – ie has only half the calcium density (see figure 1).

FIGURE 1: CONCEPT OF CALCIUM DENSITY ⬇



weight and body fat – ie a high-calcium density predicted weight loss and body fat reductions, while a low-calcium density predicted weight and body fat gain.

These and other findings prompted researchers to investigate further. In a highly regarded piece of research called the ‘Quebec Study’, 235 men and 235 women were categorised into three groups according to their average daily calcium intake⁽³⁾:

- Low - less than 600mgs per day
- Medium - 600-1000mgs per day
- High - over 1000mgs per day

The researchers found that the women in the ‘low-calcium’ intake category had significantly higher body weight, percentage body fat, total fat mass, BMI, waist circumference and total abdominal adipose tissue compared to the medium and high-calcium groups. The same overall trend was observed for men, but the differences were less significant.

Calcium or dairy?

Following this early research, some scientists wondered if calcium supplements might help reduce body fat, but subsequent studies produced rather unconvincing results. Simply giving a calcium pill didn’t seem to result in weight/fat loss. Further research showed that maybe the calcium in calcium-rich diets wasn’t primarily responsible for producing favourable changes in body composition. For example, in one study, 32 subjects were placed on a calorie-controlled diet individually designed to promote weight loss⁽⁴⁾. The subjects were assigned to one of three groups:

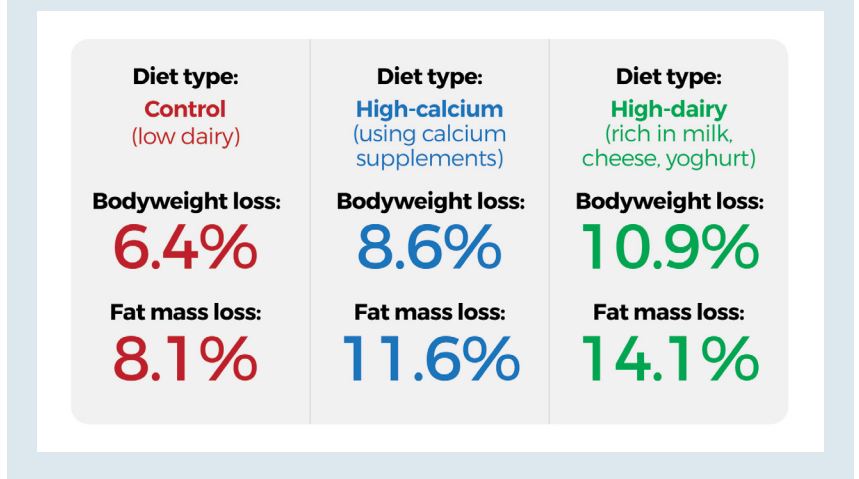
- Group 1 (control group) – consuming 0 to 1 servings of dairy products per day while taking a 400–500 mg calcium supplement and a placebo pill.
- Group 2 - the placebo pill was replaced by 800mgs calcium carbonate (high-calcium group).
- Group 3 – as group 1 and with the same total calorie intake - ie maintaining a 500kcal per day deficit) but consuming 3 servings of dairy products per day as part of their diet (high-dairy group).

After 24 weeks, subjects in the high-dairy group lost significantly more bodyweight and body fat than the other two groups (see figure 3). Intriguingly, fat loss from the abdominal region represented 19% of the total fat loss in subjects in the low-dairy group but 66.2% for those in the high-dairy group! Fat carried on the

FIGURE 2: CALCIUM-RICH FOODS IN THE DIET



FIGURE 3: WEIGHT LOSS AND CALCIUM/DAIRY INTAKE



abdominal region is associated with a higher risk of diseases such as coronary heart disease, so a greater fat loss from this region is significant.

What this study indicated is that while calcium initially seemed to be linked to weight loss benefits, the calcium was actually a sideshow, and the mysterious factor linked with weight loss was more likely to be associated with the dairy product itself. More recent studies on calcium supplementation seem to confirm that calcium does not produce significant weight loss⁽⁵⁾.

BOX 1: WHY POWER-TO-WEIGHT RATIO IS VITAL FOR PERFORMANCE

One of the biggest factors determining endurance performance is your aerobic power. All other things being equal, the faster you can absorb and use oxygen, the harder your muscles can work without fatiguing and the faster the pace you can sustain. However, while improving your aerobic fitness (with hard training) can increase the amount of power your muscles can produce, basic human physiology and genetics means there's a limit to the gains that can be achieved this way.

Fortunately however, the absolute amount of aerobic power at your disposal is not the only factor for determining performance. The amount of mass you have to move around – *ie* your bodyweight – is vitally important too. This is because accelerating mass or moving mass uphill against gravity requires power. It follows therefore that less mass to lug around means less power required to move it. This gives rise to the concept of power-to-weight ratio, which is determined by the simple formula: *maximum sustainable power (watts) ÷ body mass (kg)*.

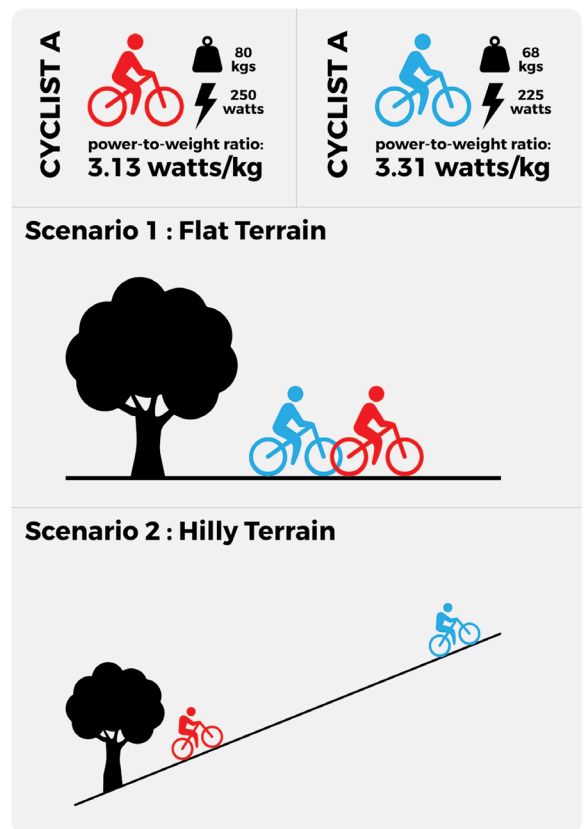
To work out your power-to weight ratio figure, simply divide your maximum sustainable power output (in watts) by your body mass in kilograms (kg). For example, an 80kg cyclist with a maximum sustainable power output of 280 watts has a power-to-weight ratio of 3.5 watts per kilo (commonly abbreviated as 3.5W/kg or 3.5W.kg⁻¹).

A good power-to-weight ratio is vital for running performance; even on completely flat terrain, every single stride requires lifting the body up against gravity. On hilly terrain, power-to-weight ratio is even more important. Power-to-weight ratio is also an important determinant of cycling performance. While it's true that on a perfectly flat road or track, no energy is expended working against gravity, the fact is that 99% of cyclists don't ride on perfectly flat and smooth roads. Head into the hills and a cyclist with a higher power-to-weight ratio will trump a cyclist with more power overall but a lower power-to-weight ratio.

For example, take two cyclists; cyclist A who weighs 80kgs can sustain a maximum power output of 250 watts while cyclist B who weighs 68kgs can only manage 225 watts. On a perfectly flat, smooth indoor track (where gravity is not an issue) we can confidently predict that A will be faster than B. On a hilly road however, power-to-weight begins to matter more. Despite more absolute power, cyclist A's power-to-weight ratio is 3.13 watts/kg while B's is 3.31 watt/kg. On a flat road, there might not be much in it but head into the hills and it is cyclist B that will be pulling away (see figure 4).

Since power-to-weight ratio is determined by power (watts) divided by mass (kg), hopefully even the most non-mathematical readers can appreciate that even if your power output (aerobic fitness) stays constant, a drop in body mass (ideally by shedding excess body fat) will increase your power-to-weight ratio.

FIGURE 4: POWER-TO-WEIGHT RATIO AND PERFORMANCE



Land of milk and whey

Over the past five years or so, researchers have become increasingly confident that it's the milk proteins in dairy produce (milk, yoghurt, cheese etc) that are responsible for potential weight loss and other beneficial effects. In particular, studies indicate that dairy protein achieves this because it enhances satiety (reduces hunger), even when overall calorie intakes are modest⁽⁶⁾. The two main proteins in milk and other dairy products are casein and whey, and of these, it's whey protein that has generated the most interest.

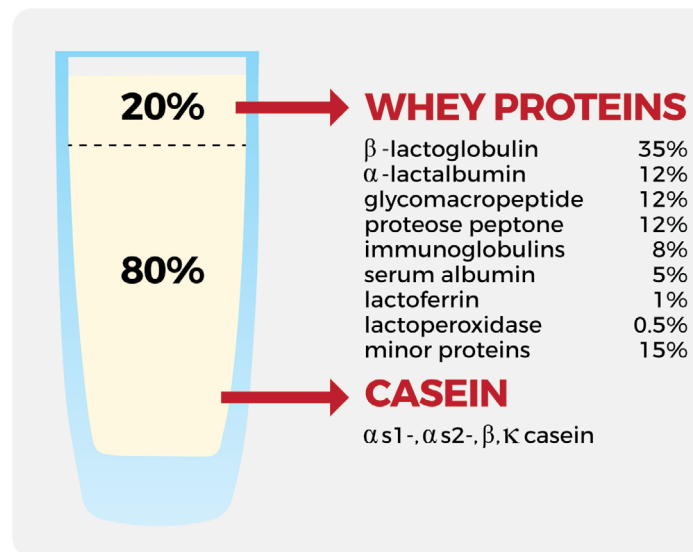
Most athletes are familiar with whey protein as part of a post-exercise recovery drink. The importance of post-exercise recovery cannot be overstated. If you can recover faster, you can train harder again sooner. And over time, this means getting bigger fitness gains, and with less chance of illness or injury. It turns out that because it can be rapidly digested and assimilated, and because it's rich in a muscle building amino acid called leucine, whey protein is king for recovery.

Having said that, whey protein is still too often regarded as something that's only relevant for strength and power athletes. Many recreational and endurance athletes are reluctant to consider whey on the basis that they don't require power and strength. But ignoring the fact that faster recovery combined with improved power and strength is only going to help you whatever your sport, there's now another good reason to consider whey protein because it seems it really can help you maintain optimum body composition.

Whey and body composition

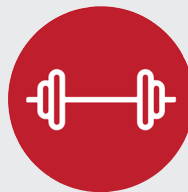
The benefits of using whey protein during recovery are indisputable (see practical guidelines for tips on using whey). But in recent years, evidence has been steadily accumulating that the consumption of whey protein can help with body fat reduction or weight maintenance - *while at the same time enabling athletes to conserve or increase muscle mass*. This is important; anyone can crash diet and lose body fat but this invariably produces a loss of lean muscle mass, which can worsen performance and increase the risk of injury - not what you want! Whey supplementation on the other might allow you to have your cake and eat it. In the last couple years, a number of studies have confirmed the fat loss, muscle maintenance/gain benefits of whey supplementation (see box 2 opposite).

FIGURE 5: MILK PROTEIN, CASEIN AND WHEY



Around 80% of the protein in milk is in the form of casein with the remaining 20% as whey. When milk is left to coagulate (as in cheese making), the whey proteins remain in the liquid section while the casein settles to the bottom. There are a wide range of different whey proteins; some of these are thought to interact with gut chemistry, resulting in the release of gut hormones that make us feel fuller.

BOX 2: RECENT STUDIES ON WHEY AND FAT LOSS INCLUDE:



A study showing that whey protein consumption after **resistance training** reduces subsequent energy intake by decreasing appetite, while still allowing muscle growth to occur⁽⁷⁾.

A study that found whey protein after **resistance training** increased abdominal fat loss and improved body composition (the proportion of lean muscle mass)⁽⁸⁾.



A study on **endurance and strength athletes**, which found that whey protein supplementation after exercise significantly reduced feelings of hunger⁽⁹⁾.



A study on **female athletes**, which showed eight weeks of post-exercise whey supplementation improved body composition (lowered body fat and increased muscle mass) and selected measures of performance⁽¹⁰⁾.



A review study (a study that pools the finding from a number of previous studies), which found that unlike other proteins, whey protein - either alone or as a part of a multi-ingredient formulation - appears to maximize lean body mass and fat-free mass gain, as well as upper and lower body strength improvement⁽¹¹⁾.

Best whey for fat loss?

Go into any sports shop and you'll see many different types of whey on sale such as whey isolate, whey concentrate, micro-filtered whey, hydrolysed whey etc (see box). This begs the question: what kind of whey is best for recovery? In a very recent study, researchers looked at the effects of different types of whey protein on body composition and strength performance⁽¹²⁾. In particular, they wanted to find out if hydrolysed whey (whey protein that has been broken down into smaller building blocks to make digestion faster/easier) was more effective at promoting recovery and growth than other types.

Fifty six trained men were split into four different groups. All of the subjects underwent an 8-week strength training programme but each group used one of three different types of whey:

- 80% whey protein concentrate
- High-lactoferrin-containing whey protein concentrate
- Extensively hydrolysed whey protein concentrate

Unsurprisingly, all of the subjects gained muscle mass following the strength-training programme but the type of whey consumed didn't seem to make a difference to the amount of muscle mass gained. However, the subjects who took the hydrolysed whey reduced their body fat mass by around 6% - a significantly greater reduction than using the other whey proteins (or no whey).

CONCENTRATE, ISOLATE OR HYDROSYLATE?

There are several types of whey protein available on the market but which one is right for you? To help understand this, let's look at how whey is produced. Whey is simply the watery by-product of the milk manufacturing process (see figure 1). Following pasteurisation, the whey coagulates (clumps) and is extracted in one of two forms depending on the filtration technique (microfiltration or ultra/diafiltration).

Whey protein concentrate typically comprises around 80% protein, whereas whey protein isolate comprises around 85 - 95% protein.

- Whey protein concentrate contains naturally-occurring carbohydrates and fats, which make it the most calorie-dense form of the supplement.
- By contrast, whey protein isolate has undergone

additional purification to minimise all these other macronutrients, thus enhancing the protein content. The downside however is that this processing also removes important micronutrients and sub-fractions that may help boost immune function - for example lactoferrins, beta-lactoglobulins and immunoglobulins).

- Whey is also commonly sold as whey protein hydrolysate, which is a concentrate or isolate in which some of the chemical bonds in the whey have been broken following exposure to heat, acids or enzymes. Such 'pre-digestion' makes hydrolysed proteins more rapidly absorbed in the gut than either whey concentrates or isolates and, as such, may be preferred by people with sensitive digestion. On the minus side, this process also makes whey hydrolysates less palatable and more costly.

APPLYING THE KNOWLEDGE

Although its primary role is to help muscles grow and repair after exercise, it seems that whey protein might also help lower body fat and improve body composition - useful for endurance athletes trying to improve their power-to-weight ratio. Here are some practical tips to bear in mind when applying these findings in practice:

- While foods such as milk and yoghurt are decent sources of whey protein, most athletes looking for power-to-weight improvements will find it easier to consume a whey protein containing drink immediately

after exercise. By doing this, you'll also get the recovery benefits that whey can give.

- There are several types of whey protein drinks on the market (see box). Some evidence suggests that hydrolysed whey might be the most effective whey for weight loss/maintenance but it tends to be dearer than other types of whey and has a less pleasant taste. You pay your money and take your choice!
- It doesn't matter if other proteins are present so long as each post-exercise drink/snack provides around 20g of whey.
- If you're doing higher volumes

of training, use a whey/recovery product that provides around 20g of whey protein along with around 40-60g of carbohydrate per serving as well. This will help recovery by replenishing muscle glycogen.

- Consume a meal or snack containing a blend of protein and carbohydrate within 90 minutes of your whey/recovery drink. If this is not possible, consume another recovery drink as above.
- If 'leaning up' rather than recovery is your number one priority, choose a hydrolysed whey protein, which may be more effective. Go for one

that provides smaller amounts of carbohydrate. A ratio of around 1:1 (ie around 20g of whey plus 20g carbohydrate per serving) is ideal.

- All the above assumes that your day-to-day nutrition is already excellent. If you regularly consume sweets, biscuits, cakes, and other foods high in sugar or refined carbohydrate, or if you eat a lot of processed, fatty food, cutting these out and replacing with unrefined carbohydrates and high-quality proteins will be a more effective way to shed surplus pounds!

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