

The Coaches Training Tips

The Art of Sprinting

By Ian Bowman & Ron Brown

One of the most common comments that you hear from cyclists is 'I am not a sprinter'. What they usually mean is 'I am not a *great* sprinter'. Everyone can sprint and with the proper training can be a good sprinter in the right situation.

Sprinting is a function of three factors:

- **Neuromuscular skill** – The ability to activate and coordinate or muscle fibres available at the right time to ensure that maximal forces are transmitted to the rear wheel. This is developed through efforts that closely replicate the exact movement and speed of the event
- **The volume and quality of muscle mass relative to the size of the cyclist** (i.e. the size of the muscles and the percentage and size of fast-twitch fibres within them.) – This is developed through strength conditioning and repeated efforts at maximum power.
- **The ability to resist the fatiguing efforts of intensive anaerobic energy production** – developed through intensive interval training at E4 (92%+ Maximum Heart Rate)¹.

The energy source that the body uses for sprinting is different to that used for the endurance sections of a race where oxygen is used to release energy from glycogen and fats stored in muscles. Sprinting involves the both the Alactate system, which is responsible for short burst activities lasting up to 10 seconds, and the lactate system which supplies the energy required for activity lasting 10 seconds to two minutes. To become a better sprinter, both of these systems must be developed through specific training. This will enable you to generate more speed and explosiveness and will help the body adapt cardiovascularly to tolerate and buffer high levels of lactic acid, making you a more efficient performer².

To better understand the training required to improve sprint performance we need to examine the phases of a sprint:

- The jump or initial acceleration
- The acceleration
- The finish³

The Jump

This is the most technically difficult part of sprinting. An explosive jump can gain 300mm over an opponent who is starting their sprint slightly slower – it may not seem significant, but is often more than enough to win. The jump can be either standing or seated. However, both begin with a good position in the bunch or breakaway. The right position depends on a number of factors:

- Uphill or downhill – big strong riders often do better downhill where their weight is not a disadvantage.
- Upwind or downwind – small riders often jump early when going downwind where their lower power/surface area ratio is not a disadvantage.
- Long straight line finish or short straight after a corner – small riders have a lower centre of gravity and usually corner faster than a big rider.
- Leading or following a wheel – small riders tend to sit on as long as possible.

Like most areas of racing, being in the right place at the right time is a large part of success.

Standing jump – this is the most common and is used to start a spring from both low and high speeds. Getting out of the saddle and driving forward with one leg while driving back with the other with your strength and weight provide a large amount of power that is unmatched in other position.

A standing jump is executed in a gear that is slightly higher than you can roll along in comfortably with the hands firmly on the drops. As one foot (it doesn't matter which one) passes the 12 o'clock position, come out of the saddle while pulling strongly with the arm that is on the same side as the leg that pushing down. Keep both arms fairly rigid so that the bike stays reasonably upright. Don't thrash the bike back and forth. I may feel like you are going fast but it is wasting effort. Conversely, don't try to be ultra stiff as this will also waste energy – standing sprints on a stationary trainer are very difficult as the bike does not move at all. Try to achieve a smooth fluid motion.

Seated jump – when the speed is extremely high, such as a downhill finish, you may be going too fast to come out of the saddle and jump into a higher gear. In this case you focus on increasing your cadence rather than riding harder to raise your speed.

The Acceleration

After the first 10 or so pedal strokes, you move to the acceleration phase. This is where you concentrate on going faster until to reach the highest speed you can achieve standing. At this point you settle into the saddle and continue to increase or maintain your speed.

Common mistakes during acceleration are:

- Standing for too long while progressively shifting to bigger and bigger gears. This can result in you speed dropping off. It may also result in you sitting down in a gear that is too big. If this happens, you will need to shift down or may have to stand up again.
- Sitting down too early, robbing you of speed.
- Sitting down abruptly disrupting the power and cadence of your pedal stroke.

The Finish

When you are around 150 metres from the line, focus on riding the straightest path to the line. Don't look at other riders, just keep your eyes on the line and go as fast as you can. Be careful that you maintain a straight line and don't drift over the path of another rider.

Don't stop sprinting until you have crossed the line. Too often riders stop just before the line. Even professional riders have lost races this way. When you are just before the line, put everything into one last push on the pedals. As you do so, thrust the bike forward until your arms are straight. While you are throwing your bike forward, keep looking straight ahead – turning your head loses speed.

Gearing

There is no magic formula for selecting the best gear. It depends on the condition and the rider. Choose too big a gear and you will quickly be bogged down; too small and you will be spinning and getting nowhere.

Generally, you will start your sprint in the big chainring as sprinting in the small ring risks running out of gears. Most successful sprints will be in a gear that is only one or two bigger than you were riding before the sprint. A common mistake that big strong riders make is to try to make up for a slow sprint by selecting a big gear. Heavier riders have more inertia and usually need a smaller gear than a lighter rider. Being able to pedal at a high cadence is advantageous in a sprint.

Sprint Training

Sprint training is best done after you have mastered the technique of sprinting. Intervals to improve your sprint are extremely intense and should only be done when you are fresh. A training partner who rides beside or slightly ahead of you and encourages drives you to go faster can be valuable.

Good places to do sprint training are Lakeside, Nundah criterium circuit or somewhere where you don't have to worry about cars backing out in front of you etc when you are going flat out. Training on a slight downhill will help you develop speed, but forget that you also have to be able to sprint uphill.

Some intervals that I recommend are⁴:

Big Gear Starts – Roll at a very low speed in a big gear. Jump out of the saddle and push as hard as possible on the pedals for 12 pedal revolutions. HR: not applicable. Rest: at least 5 minutes.

Cadence – Perform in a low gear on the flat, or slightly down hill. Cadence 130 RPM (or the highest cadence you can sustain). HR: E2. Rest: 5 minutes.

Sprint Accelerations – Ride on a flat road with a tailwind (or an indoor trainer). Perform as a set of sprints in progressively higher gears. While rolling along at a speed below 25kph, jump up out of the saddle. Use your arms to leverage the handlebar. Focus on pulling up on the pedals with your hamstrings. If you spin the gear out, don't shift – return to the saddle and focus on maintaining high pedal speed. Your upper body and hips should be smooth and steady. Keep your head up as you drive to the end of the sprint. HR: Not applicable. Cadence: Not applicable. Rest 3 minutes between sprints, 8 minutes between sets.

Set – Each 15 sec.

- Sprint #1: Very light or easy gear (39x16 or 15 i.e. 66-70 inches)
- Sprint #2: Large or hard gear (53x18 or 17 i.e. 80-84 inches)
- Sprint #3: Three or Four gears up from the hard setting (53x16 or 15 i.e. 89-95 inches)

Sprints – Specified distance sprints, 100% effort all the way. Rest: 3 minutes on a flat course.

Graduated Sprints – Start the effort at 90% until half distance, increase to 95% to ¾ distance, 100% effort for the final ¼ distance. Treat this as if you are trying to hold off an attack. Rest: 3 minutes.

Stomps – Use a slightly downhill course or a tailwind. Starting from 25-30kph, stomp on the pedals as hard as you can while seated in a large gear. Focus on pulling through the bottom of the stroke and pushing on the down stroke. HR: Not applicable. Cadence: Not applicable. Rest: 5 minutes.

Codes

REC (Recovery) - 50%-60% HR Max

E1 - 65%-75% HR Max

E2 - 75%-85% HR Max

E3 - 85%-92% HR Max

E4 - 92%-100% HR Max

Wrapping up

Sprinting involves extremely intense all out efforts that often mean the difference between winning and losing. While physiology has some influence on your sprinting ability, tactics and training can produce winning results. In addition, sprinting and sprint training can be fun.

If anyone has any suggestions for this column or wants to discuss their training just send me an email or give me a call on 0402 446 947.

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¹R. Davidson et al. 'Endurance, sprint and strength conditioning', in Training, ed. A. Simpkin, Coachwise, Armley, 2000.

²J. Stewart, Sprinting: an Essential Cycling Skill, viewed at http://www.active.com/story.cfm?story_id=10434, July 2005.

³K. Wenzel & R. Wenzel, Bike Racing 101: Essentials for Cycling Competition, Human Kinetics, Campaign, 2003.

⁴Many of these intervals are based on the work of other coaches, particularly Tony Melcer.