

# What is the Best Cadence?

This topic has been debated for years and probably will continue to be for the foreseeable future. What constitutes optimal cadence? Though the data are often conflicting and continually being challenged by new research, the choice boils down to a simple tradeoff: Harder gearing tires the leg muscles but is mechanically more efficient; easy gearing wastes more energy but spares the muscles.

When riding at a constant set speed, pedaling at 50 rpm tires the legs faster than pedaling at 90 rpm. Doubling your cadence reduces the average amount of force production required by half. For example, a rider producing 400 watts at 60 rpm must average just over 80 pounds of pedal force, while increasing the cadence to 120 rpm reduces this number to just over 40 pounds of force. This example represents the average pedal force produced throughout an entire pedal stroke; peak forces would be higher at various points in a complete pedal rotation.

Well-trained cyclists are capable of combining both high cadence and low cadence work to optimize performance. With the use of power meters being common in the professional ranks, it's interesting to apply data collected over many races and correlate it with race circuit profiles to see what relationships result. Several patterns begin to emerge: it's clear that climbing steep hills requires significant force production, even with very easy gears cadences often drop below 45 rpm particularly on grades of 12% to 18%. Flat sections on the other hand, were contested largely between 75 rpm to 115 rpm. Most riders seem to favor a higher cadence on flat sections, to spare their muscles for sections requiring high power outputs such as steep climbs. Long steady climbs usually fall between these extremes with most cyclists adopting a cadence of 60- 85 rpm providing a good compromise between mechanical efficiency and muscular fatigue.

In a race situation, most cyclists select an appropriate cadence without being conscience of it. Training rides provide an opportunity to manipulate levels of fatigue by experimenting with gearing as you ride. Cyclists with a high level of muscular endurance, the ability to produce higher levels of pedal force for longer periods have either trained for many years and /or devote a great deal of focused training time for development, tend to choose slightly lower cadences to lower their relative heart rates.

Training your system for improved low cadence efforts could include hill repeats during a training ride or over-gearing on a climb, choosing more difficult gearing than you would normally. Both of these exercises when practiced regularly will improve your climbing tolerance and force production. Training your system for higher cadence work primarily requires two adaptations: developing the neuromuscular pathways to enable a smooth pedal stroke, and a greater emphasis on cardiovascular fitness development. Interval training at high intensities, high cadence training rides and time trial intervals all will provide the needed stimulus for maintaining a higher cadence for a longer period. One last thought: If you improved both your pedal force production, [power output], and your high-speed cadence, [cardiovascular fitness], do you think your overall speed

would increase? Also remember that not everyone races most effectively at high cadence. Even though Lance races with a high cadence...do you think his force production high...you best believe it is!

Be a Complete Cyclist.

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