Beating the dog (days)

Here's how to bounce back from the summer doldrums

BY CHARLES HOWE

Daylight in the northern hemisphere reaches a peak on June 21, as does average temperature exactly one month later. Unfortunately, as summer starts to wane, form often does the same for many competitive cyclists. Heat stress and fatigue from accumulated training load can play a role in this, but here I will address the decrement in performance that takes place apart from such factors, as a result of competition.

Roots of the problem

Aerobic energy production is the overwhelming determinant of performance in any endurance (>5 minutes) activity, and is assessed by two parameters – maximal oxygen uptake, or VO_2max, which sets the upper limit of 'steady state' energy production, and lactate threshold (LT), which indicates the fraction of VO_2max that can be utilized for an extended period of time. Continuous excursions of more than ~30 seconds above LT rapidly consume limited energy reserves (i.e., muscle glycogen) and result in acidosis, a build-up of hydrogen ions that inhibits muscular contraction. Therefore, time spent above LT must be balanced by an equal or greater period below it, and the higher LT is, the less anaerobic capacity is taxed at a given rate of energy output. The key to raising LT is to maintain a fairly steady aerobic effort, 5-20% under threshold intensity, for 30 minutes to 3 hours continuously. This provides the optimal stimulus for the two adaptations at the muscular level that determine LT: 1) capillary formation, which allows increased delivery of oxygen to, and clearance of waste products from the working muscles; and 2) mitochondrial formation, which allows increased aerobic energy production.

Variations in energy output are greater in bicycling than any other endurance sport, and this is especially so in that staple of state and national racing calendars in the U.S.: criteriums (Figure 1). Typically held on a ½ to 1-mile course in the town center, these spectator-friendly events are the most energetically dynamic of all forms of road racing, requiring frequent sprinting out of corners and for primes (prizes for intermediate sprints, or "races within the race"). Furthermore, since they are usually held on flat courses, criteriums are less selective than hilly road races, so the pack of riders tends to stay together to a greater degree, making for frequent attacks.

Thus, anaerobic capacity can make a significant contribution to energy output in mass-start bicycle races, but as the season wears on, the foundation upon which rests – lactate threshold – is eroded; paradoxically, it becomes more difficult to respond when the pace picks up rapidly, even though your anaerobic capacity is as high as ever. All too often, riders erroneously conclude they need to concentrate their training on short, high-intensity efforts.

Restoring the base

Instead, the solution is to step back from racing for several weeks and go on a program of steady-state 'tempo' training, i.e., rides 1½-4 hours in length where energy production is primarily aerobic in nature (Figure 2). To ensure the latter, terrain should be flat-to-rolling, for the most part; particularly in the first week or so, the number of hills should be limited and they should not be too steep. When there is climbing, a steady tempo should be maintained, rather than hammering away and accelerating over the top. Generally, this means remaining seated and using a smaller gear that lets you to stay at a high enough cadence to "spin" your way up.

Each ride should start with ~10 minutes at an easy pace, then gradually increase to an intensity that is brisk but comfortably sustainable, such that something is always held in reserve, and energy output in the second half of the ride is greater than the first, leaving you 'pleasantly tired' afterwards and looking forward to the next time out. To quote an old and fundamentally useful maxim, "Train, don't strain," or, put another way, "Work, don't suffer."

For those who train with a power-measuring system such as the PowerTap, SRM, or Ergomo, this means an intensity of 75-90% of functional threshold power (FTP), defined as average power for a flat ~50 minute time trial, which serves as a proxy for determining power at lactate threshold. If done correctly, cumulative average power should rise gradually throughout each ride, as should final average power of each ride throughout the period, but always as a natural consequence of improving fitness as you regain aerobic 'strength' and your body starts to 'come back to you,' not as a result of deliberately pushing the pace.

Do you *need* a powermeter to gauge intensity? Power is the "bottom-line" measure of performance, the only way to know how much work you are truly accomplishing, but it should be continuously correlated with how hard the effort feels, as assessed by the standardized 10-point scale of perceived exertion (PE), which integrates feedback from several systems into an overall, 'undifferentiated' rating of the body's response to a given level of intensity.

Table 1. 10-point perceived exertion scale.

LEVEL	SENSATION
0	Nothing at all
½	Extremely weak (just noticeable)
1	Very weak
2	Weak (light)
3	Moderate
4	Somewhat strong
5	Strong (heavy)
6	
7	Very strong
8	
9	
10	Extremely strong
**	Maximal

Thus, these two indices can be used together to guide the rate of energy output and optimize work performed within a given period of time (a primary goal of training); power provides an objective standard by which PE can be 'calibrated,' while PE provides feedback that modulates intensity, thereby allowing relatively even pacing of the overall effort. Power is particularly important for keeping intensity under control in the early stages of each ride, before PE has a chance to 'catch up' to the effort.

Two more factors must be addressed during each ride – heat stress and hydration/carbohydrate replenishment. Do what you can to minimize the effects of the former by starting out as early in the morning as possible; by planning a route that passes through, for instance, shaded valleys instead of sun-drenched plains; and by stopping to douse yourself with cold water a time or two, or perhaps taking a plunge in a swimming pool or lake at the end of the ride, as possible.

A sports drink such as Gatorade®, when properly mixed, is the most efficient means of staying adequately hydrated and fueled during each ride, since it provides water, carbohydrate, and electrolytes (sodium, potassium, and calcium) in the correct proportions, all at once. Be sure to ingest ~750 ml (24 oz) each hour, beginning approximately 40 minutes into the ride and continuing every 15 minutes thereafter (clear bottles can help monitor the rate of consumption); two bottles should thus be enough for rides up to ~2½ hours.

No matter how well you execute each ride during this period, however, the fitness level you regain will be limited by something you can't control, namely, how 'wide' of a base you laid down to begin with, in the dark winter months and the early spring. Discussion of that, however, must wait for a future article.

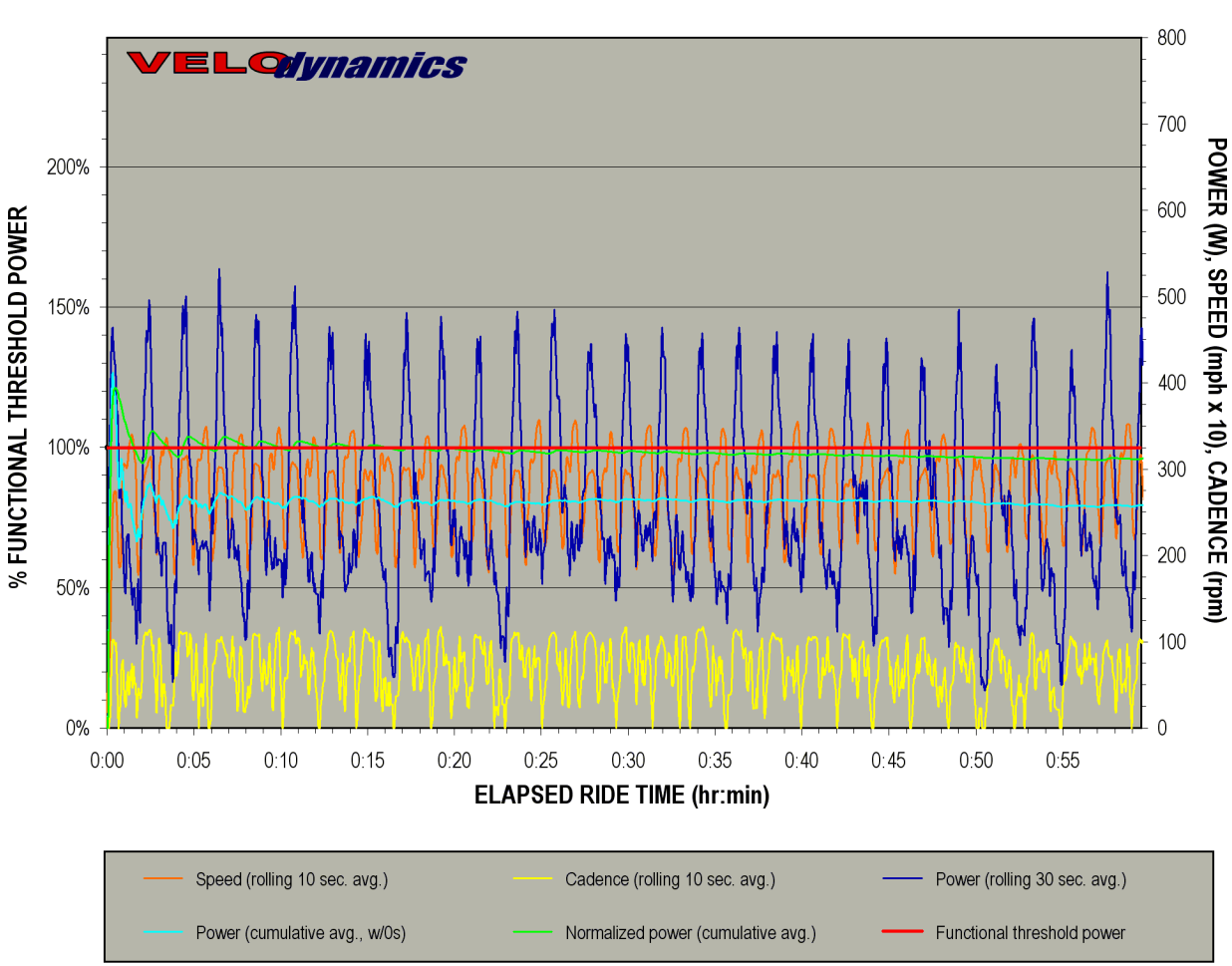
Finishing touches

After 2-3 weeks of tempo training, your endurance base will be restored as far as is possible without a more extensive build period. **Then** comes the time to work on anaerobic capacity with some spirited group rides and/or training races (or races used as training), perhaps over more hilly terrain. To enhance their effectiveness, such rides/races should be ridden as aggressively as possible, instead of 'wisely' or conservatively, since the goal is to incur large neuromuscular loads and accumulate large oxygen deficits. Training races, where you are allowed to sit out a lap or two, are ideally suited to this purpose. Here is a sample plan for a recreational competitor with up to 12 hours available per week:

Table 2. 4-week period to restore aerobic fitness.

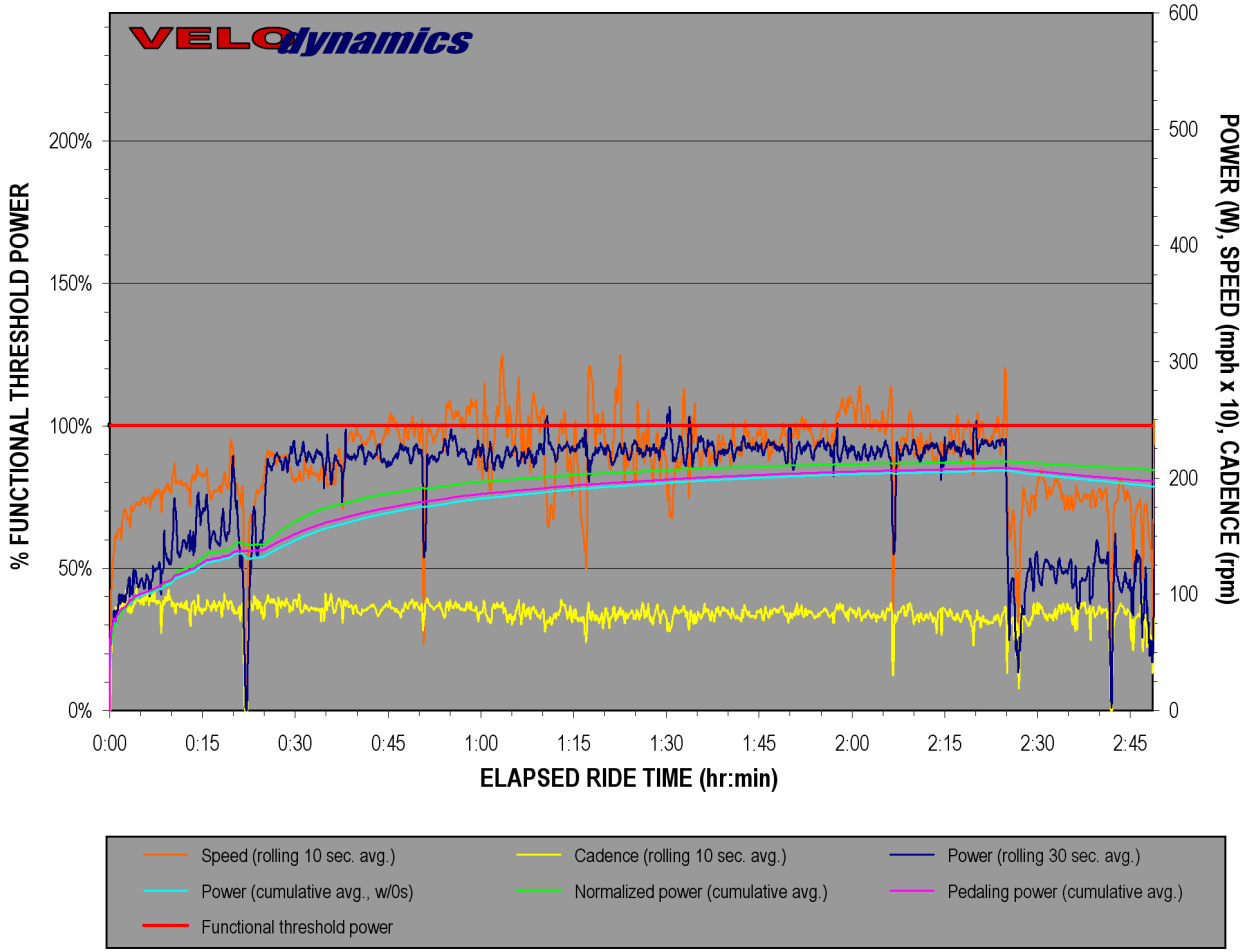
WEEK	HOURS	KEY WORKOUTS				
		Weekday			*Weekend*	
1	9:45	1:00 – F	1:30 – F	1:30 – R	2:00 – F	3:00 – R
2	11:00	1:30 – R	1:30 – F	1:30 – R	2:15 – H	3:30 – R/V
3	12:15	1:30 – R	2:00 – F	1:30 – R	2:30 – H	4:00 – R/V
4	8:00	1:00 – F	**1:00 – F/V**	2:00 – R	2:00 – H	**2:00 – R/V**

F – flat R – rolling H – hilly V – variably-paced (e.g., group ride or race). **Bold** type indicates training race.



RIDE SUMMARY	7/5/04	
Rider:	AWG	
Event:	Fitchsburg SR (CT)	
Level - conditions:	4 F/V	
Body mass:	73	kg
Functional threshold power (FTP):	325	W
(= 60 min TT power)	4.45	W/kg
	18.34	$W/kg^{0.67}$
Recording interval:	2.52	sec
Ride time:	0:59:31	h:m:s
Pedaling time:	0:46:40	h:m:s
Pedaling %:	78%	
Distance:	27.5	mi
Avg. speed:	27.7	mph
Avg. cadence:	68	rpm
Avg. power (w/coasting):	258	W
Avg. pedaling power:	330	W
Avg. normalized power (NP):	312	W
Max. 1 min. avg. power:	389	W
Max. 5 min.avg. power:	329	W
Max. 30 min. avg. NP:	327	W
Aerobic continuity:	83%	
Second-half output:	49.4%	
Intensity factor:	0.96	
% of threshold	79%	
Training stress score:	91	
NOTES:		

Figure 1. Power, speed, and cadence information from a 1-hour criterium.



RIDE SUMMARY	7/10/04	
Rider:	FG	
Event:	Solo tempo ride	
Level - conditions:	3 F	
Body mass:	51	kg
Functional threshold power (FTP):	245	W
(= 60 min TT power)	4.80	W/kg
	17.58	$W/kg^{0.67}$
Recording interval:	2.52	sec
Ride time:	2:48:40	h:m:s
Pedaling time:	2:44:46	h:m:s
Pedaling %:	98%	
Distance:	60.6	mi
Avg. speed:	21.5	mph
Avg. cadence:	84	rpm
Avg. power (w/coasting):	193	W
Avg. pedaling power:	197	W
Avg. normalized power (NP):	207	W
Max. 1 min. avg. power:	249	W
Max. 5 min.avg. power:	235	W
Max. 30 min. avg. NP:	227	W
Aerobic continuity:	93%	
Second-half output:	50.2%	
Intensity factor:	0.84	
% of threshold	79%	
Training stress score:	201	
NOTES:		
1:59:50/1:59:22 @ 222 W		

Figure 2. Power, speed, and cadence information from a tempo ride.