

# BOOST YOUR ENDURANCE

Seven simple plans  
for running  
farther and faster

BY AMBY BURFOOT

**A**s runners, we all want to increase our endurance, but we're often referring to two different things. The beginning runner wants to go farther—from 2 miles to 4 miles, then to 6. More experienced runners don't see much point in running farther. (Isn't 26.2 miles far enough?) These runners want to improve their speed-endurance—the pace at which they can cover substantial distances.

Fortunately, you can have it both ways. You can follow training plans that build the length of your long runs, and others that improve your speed-endurance.

Using such workouts, thousands of runners have dramatically improved their endurance. Craig Beesley, a beginning runner, extended his longest run from 30 seconds to nearly 3 hours. Doug Underwood, a successful marathoner, wanted to lower his best from 3:50 to 3:30 to qualify for the Boston Marathon. And Deena Drossin, the American 10-K and cross-country star, wanted nothing less than to run the marathon faster than a legend, Joan Samuelson.

All three runners achieved their goals. Each used a different method. Which raises the point that exercise physiologist Kris Berg explains in his recent article, "Endurance Training and Performance

in Runners," in the journal *Sports Medicine*. "After decades of studying ways to improve endurance," says Berg. "I'm leaning more than ever toward the great gestalt of mind-body wisdom, and encouraging runners to do what feels right."

In other words, different strokes for different folks. We're not all the same. Genetic researchers refer to "high responders" and "low responders." Sometimes we need to take different paths to reach our goals.

On the following pages, you'll find seven endurance-boosting strategies that have worked for a range of runners. Not all will work for you. But one or more will, and that should be enough to significantly increase your endurance, which means you'll run stronger and easier than ever before.

## PLAN 1 TAKE ONE STEP AT A TIME

**BASIC ENDURANCE** If there is one overarching principle of endurance-building, this is it. Call it gradual adaptation. That is, be consistent, be patient, and build up slowly. This principle applies to all circumstances and all runners—the beginner who's trying to make it around the block four times, as well as the 36-minute 10-K runner who's training for a first marathon with long runs that stretch to 12 miles, then 16, then 20.

TIM DEFRESCO PHOTOGRAPHY

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**NO SHORT CUTS:**  
The surest path to  
greater endurance?  
Increase your  
mileage gradually  
each week.

The gradual-adaptation principle is deeply rooted in human physiology, and has worked for about a billion runners since Paleolithic man started stalking wild animals in East Africa 150,000 years ago. It still works today. Witness Craig Beesley of Moose Jaw, Saskatchewan, Canada.

When Beesley began running 2 years ago, he could only manage 30 seconds at a time, followed by 4½ minutes of walking. But he didn't let his lack of fitness discourage him. He simply repeated the cycle eight times (for a total of 40 minutes), and made sure he did three workouts a week.

Thirteen weeks later, Beesley was running 30 minutes at a time, and by last fall he had completed his first half-marathon in 2:12. Pretty impressive. But Beesley didn't stop there. He kept running outdoors through the winter months, despite temperatures that dropped to -25° F, and last spring added speedwork to his routine. By May, he was running long runs of 2 hours, 40 minutes, and doing six 400-meter repeats in 1:45. In his near future: a first marathon.

A program can't get any simpler than Beesley's, or any more successful. "I've increased my endurance and my speed, and I've done both without any injuries," he says. "My family members describe me as a very patient man. Patience combined with persistence is a great combination for success in running."

**What you should do:** Whatever your present endurance conditioning, build it slow but steady. We like a program that adds 1 mile a week to your weekend long run, for example: 5 miles, 6 miles, 7 miles. Every 4th week, reduce mileage by skipping the long run. Rest and recover. The next week, start building again, 1 mile at a time: 8 miles, 9 miles, etc.

## PLAN 2 RUN YASSO 800s

**SPEED ENDURANCE** We learned about this amazingly useful workout in a casual conversation with RUNNER'S WORLD race and event promotions manager Bart Yasso, and first wrote about it nearly a decade ago. Since then, literally thousands of runners have told us at marathon expos or in e-mails that the program has worked for them. With the Yasso system, you run 800-meter repeats on a track in the same minutes/seconds as your hours/minutes goal time for a marathon. (So if you're looking to run 4:30, do your 800s in 4 minutes and 30 seconds.)

Runners are drawn to Yasso 800s by Bart's unforgettable name, the simplicity of the workout, and word-of-mouth success stories.

Doug Underwood is one of those Yasso fans. A runner for just 3 years, Underwood completed his first two marathons in 3:55 and 3:53, and then was bitten by what he calls the "Boston bug." He wanted to qualify for the Boston Marathon, and was willing to train harder to get there.

The core of his program: Yasso 800s. Since Underwood needed to run a 3:30 to reach Boston, he ran his Yasso 800s in 3:30, building up to 10 of them in a single workout, taking a 3:30 recovery jog between the fast 800s.

Underwood finished his goal race, the Baton Rouge Beach Marathon, in 3:30:54, good enough for a race entry to Boston. (Boston Marathon organizers offer runners a 59-second grace period beyond the strict qualifying standards.) "I credit the Yasso 800s with getting me there," says Underwood, who also made sure to log plenty of long runs. "They are tough workouts, but they do the job. If you can run 10 of them at your goal pace, you have a great chance of achieving your marathon goal time."



**SPEED WORKS:** To improve your focus, sense of pace, and speed-endurance, try Yasso 800s.

**What you should do:** Run Yasso 800s once a week. Start with just four or five of them at your appropriate pace, then add one a week until you reach 10. The first several weeks should feel quite easy. The last several will be hard, but hang in there. This workout builds focus and concentration, as well as speed-endurance.

## PLAN 3 RUN LONG AND SLOW

**BASIC ENDURANCE** Meghan Arbogast was already a successful marathoner 5 years ago, with a 2:58 to her credit. Only one problem: "I was overtraining and killing myself," she says.

No longer. Since 1998, Arbogast has been training slower and racing faster under a program designed by Warren Finke, a well-known coach in Portland, Oregon, near Arbogast's home. Finke believes marathoners should focus on consistent, easy-paced training runs that help them build endurance without getting hurt every couple of months. "A lot of runners train too hard, get injured, and never reach their potential," he notes.

The Finke program emphasizes "effort-based training," and he believes in keeping the effort modest (at 80 percent of the speed you could race the same distance) most of the time. "Most runners are probably training at about 90 percent of their race pace," says Finke. "Running 80 percent is pretty easy, but it helps keep you injury-free."

The program has certainly turned things around for Arbogast. Two years after beginning Finke's effort-based training, she improved her marathon personal record to 2:45. And last June, she won the Christchurch Marathon in New Zealand with another 2:45. "I think I can keep improving," says Arbogast. "The key is to stay healthy and keep gaining endurance."



**What you should do:** Do most of your runs at 80 percent of the speed you could race the same distance. So, if you can race 10 miles at 7:30 pace, you should do your 10-mile training runs at 9:23. To convert a race pace to an 80-percent training pace, multiply the race pace by 1.25; for more details, visit Finke's Web site: [teamoregon.com](http://teamoregon.com). To find a wide range of your equivalent race times, go to [runnersworld.com](http://runnersworld.com), and click on "race time calculator" under the calculators section.

## PLAN 4 MAKE EVERY WORKOUT COUNT

**SPEED ENDURANCE** When you've been running marathons for 25 years and have an advanced degree in exercise physiology, you should eventually learn a thing or two about training. Exercise physiologist Bill Pierce, chair of the Health and Exercise Science department at Furman University, thinks he has. At the very least, he's found a program that works wonders for him. Pierce, 53, still runs marathons in about 3:10, not much slower than when he first stepped to the starting line more than 2 decades ago.

His secret? The 3-day training week. Pierce follows the usual advice to alternate hard days with easy days, but he takes it to the extreme. He runs only hard days—3 of them a week. On the other 4 days, he doesn't run at all, though he lifts weights several times a week, and also enjoys a fast game of tennis.

In stripping his training program to its essence, Pierce runs each of his three workouts at a specific target pace and distance. One is a long run, one is a tempo run, and one is a speed workout. "I run at a higher intensity than some others recommend, but I have found that this program has worked well for me for many years,"

## Of Bees, Birds, and Brains

What nature has taught me about endurance

BY BERND HEINRICH, PH.D.

**B**ugs, birds, distance running, and the secrets of endurance performance have always intrigued me. As a child growing up in Germany, I chased carabid tiger beetles down the gravel roads of the nearby Hahnheide Forest, where our refugee family lived for 6 years in a shack. At a home for homeless kids in rural Maine, the other members of my first cross-country team called me "Nature Boy."

In graduate school in California, I continued running noncompetitively and published articles explaining how hawk moths can fly almost continuously (they're geniuses at body-cooling). A few years later, I began corresponding with Edward O. Wilson, the eminent Harvard biologist, and was pleased to learn that he shared my interest in distance running. Looking over some of my workouts, Wilson declared, "You could run a sub-2:30 marathon." Curious to see if he was right, I entered my first marathon, and qualified for Boston. The following April I ran 2:25:25 to win the masters division in the 1980 Boston Marathon.

Next I tried the ultradistances. Impressed with the way bumblebees can fly for hours on nectar, I drank a quart of honey before a long run. It was a disaster. I spent more time ducking behind bushes than running.

One failed experiment, but many more to try. I turned my attention to birds, since they can fly far longer than bees by relying on fat metabolism. One of my favorites, the blackpoll warbler, congregates in the fir and spruce forests of the Northeast each July for a quick but impressive feeding frenzy. In 10 days, it doubles its bodyweight, gorging on ripe berries and

small insects. Then it sets off for Venezuela, flying nonstop for 2,200 miles, which takes nearly 100 hours. So I drank a quart of olive oil before a run. Same bad result as the honey.

Still, I knew I could improve my fat metabolism with super-long runs that depleted my blood glucose and muscle glycogen, and forced my body to burn fat. I did many 30-milers, sometimes running as much as 200 miles a week. While I never achieved the endurance of the blackpoll warbler, my results eventually exceeded my expectations, and there is a lesson in that.

We humans are not bees, birds, or cheetahs, but we are capable of astonishing



**ENDURANCE EXPERT:** Thanks to its energy-storing powers, the blackpoll warbler can fly nonstop for 2,200 miles.

endurance feats primarily because we have developed one astonishing organ beyond all others: the brain—the instrument of thought, of dreams.

As early humans, we could never catch our prey by out-sprinting it. We needed a slow-but-sure plan, which only a highly developed brain could imagine. We are psychologically evolved to pursue long-range goals, because through millions of years that is what we had to do in order to survive. In the first weeks of a training program, the end goal can seem very, very distant indeed. But as long as you can hold it in your thoughts, it is within your grasp—be it 2 miles, a marathon, or more.

## Foods to Go . . . and Go

The farther you run, the more you have to eat, primarily carbohydrates. Carbs before a workout or race. Carbs during. Carbs after. You can't beat sports drinks, gels, and bars as top sources of carbohydrates (see "Get Your Carbs Here," page 30, for the lowdown on these foods), but it's no wonder endurance athletes sometimes crave something else.

We recently polled a group of ultramarathoners and Ironman triathletes to find out what they like to eat during their 8- to 24-hour races. Then we asked sports nutritionist and ultramarathon researcher Beth Glace, of the Nicholas Institute of Sports Medicine and Athletic Trauma in New York City, to rate these foods on a 1 to 10 scale, with 10 being the top score.—A.B.

| Food                                 | Rating | Beth Glace's Take  |
|--------------------------------------|--------|--|
| Potatoes, baked or boiled, with salt | 10     | A nearly perfect endurance food: lots of carbs and water, more potassium than a banana, and added sodium.                              |
| Chicken noodle soup                  | 9      | Mom was right—a very nutritious pick. Good source of water, carbs, and salts. And a nice alternative to pasty, sweet-tasting things.   |
| Rice cakes                           | 9      | High in carbs, fairly high in potassium, low in fat and protein. Be sure to choose the salted varieties.                               |
| Watermelon                           | 8      | Almost pure H <sub>2</sub> O, just as the name implies. Plus, a good source of potassium and sugar.                                    |
| Bananas                              | 8      | Rich in potassium and sugar, though not as much water as watermelon. But, as with most fruits, low in sodium.                          |
| Gummy bears                          | 6      | Easy to carry, no melting, and a tasty way to get some sugar. But no electrolytes.   |
| Fig bars                             | 5      | High in carbs and moderate in fat. But be careful on race day: Figs are high in fiber, and can be a mild laxative.                     |
| Beef jerky                           | 5      | A good endurance food, especially since in ultra-races, athletes often crave something savory and high in protein. Also, it's low-fat. |
| Oatmeal cookies                      | 4      | Provide a jolt of carbs and salt, and a bit of potassium. Would rate higher except for the 30-percent fat factor.                      |
| Peanut butter-and-jelly sandwiches   | 3      | A quintessential American comfort food, but too high in fat. You don't want anything to "stick to your ribs" in an endurance event.    |
| M&Ms                                 | 1      | Well, they do melt in your mouth, not in your hands. But, really, can't you wait until after the race for your chocolate fix?          |

says Pierce. "It reduces the risk of injuries, improves long-term adherence, and still lets me enjoy the gratification that comes with intense efforts."

**What you should do:** Pierce does interval training on Tuesdays, tempo training on Thursdays, and a long run on Sundays. For interval repeats, he runs 12 x 400 meters or 6 x 800 meters at slightly faster than his 5-K race pace. On tempo days, he runs 4 miles at a pace that's 10 to 20 seconds per mile slower than 10-K race pace. On Sundays, he runs 15 miles at a pace that's 30 seconds per mile slower than his marathon race pace. You can easily adapt these workouts to your own 5-K, 10-K, and marathon race paces.

## PLAN 5 DO PLYOMETRICS

**SPEED ENDURANCE** Deena Drossin had already joined the ranks of America's all-time best female distance runners, including Joan Samuelson, Mary Slaney, and Lynn Jennings, when she first paid a visit to Zach Weatherford nearly 2 years ago. She asked Weatherford, the strength and conditioning coach at the U.S. Olympic Committee's training facility in Chula Vista, California, if he could devise a program that would give her more leg endurance and quickness.

Weatherford said he wasn't sure, acknowledging to Drossin that he had never worked with a distance runner before. "But let me think about it, and do some research," he said.

Weatherford returned with several ideas worth testing, and the two have been working together ever since. "We started with core strength, and progressed to explosive leg plyometrics, always focusing on the basics, and doing quality sessions, not quantity. Runners already do enough quantity," he says. "In her first plyometrics workouts, Deena hit the ground like this big, flat-footed person, but we

**BOUND FOR GLORY:** Do plyometric exercises to boost your endurance and leg power, says U.S. distance star Deena Drossin.



# The Next Cool Thing

Every endurance athlete knows that heat is public-enemy No. 1 (edging out carbohydrate depletion for the dubious distinction), so it should come as no great surprise that cooling down with ice vests *before* a run could become the next big endurance-boosting phenomenon.

Concerned that their Olympians would fizzle in the heat and humidity of the 1996 Atlanta Games, Australian researchers did some of the first "pre-cooling" studies nearly a decade ago. Now, with the sweltering Athens Olympics just around the corner, the field is



First Choice Racing's Ice Vest

heating up (or cooling down) again.

A number of the early Aussie studies showed that pre-event body cooling improves endurance performance, particularly in hot weather, by reducing sweat rate, heart rate, and body temperature. More recent work by the Danish investigator Lars Nybo has focused on the brain's reaction to the heat stress of an endurance event.

It turns out that your brain temperature is already 0.5 degrees Fahrenheit higher than your so-called core temperature, and that it

rises higher as your body temperature increases with exercise.

At a certain point, the brain sends a stern message to the leg muscles. Something like, "Yo, down there, you're killing me. Knock it off." Since the brain is in charge, the leg muscles obey, and you slow down.

So to run longer and faster, keep a cool head. Literally. We haven't seen any marathoners wearing ice vests before their races, but we've heard some reports, and we wouldn't be surprised to see a few shivering runners on the marathon start line in Athens. (You can check out cooling and ice vests at [icevest.com](http://icevest.com), [stacoolvest.com](http://stacoolvest.com), and [coolsport.net](http://coolsport.net).)—A.B.

kept emphasizing, "Get your feet up fast. Get your feet up fast."

Drossin did jump roping, skipping drills, box jumps, and even high-knee sprints through the "rope ladder" that you often see at football training camps. And then she ran the London Marathon last April in 2:21:16, a personal record by more than 5 minutes and a new American record. "I really felt a difference in London," says Drossin. "I've noticed a considerable change in my running mechanics. My feet are spending less time on the ground, and I've increased my stride frequency. At London, my legs did not fatigue at all during or after the marathon."

**What you should do:** You could always train with your local high school football team while they work out with the rope ladder. But if that's too intimidating, here's a simple alternative: Instead of running strides at the end of several easy runs a week, do a "fast-feet" drill. Run just 15 to 20 yards with the shortest, quickest stride you can manage. You don't have to lift your knees high; just lift them fast, and move forward a few inches with each stride. Pump your arms vigorously as well. Rest, then repeat six to eight times. Once or twice a week, you can also do 5 minutes of single-leg hops, two-legged bounding, and high-knee skipping, all on a soft surface such as grass or packed dirt.

## PLAN 6 RUN LONGER TEMPO RUNS

**BASIC ENDURANCE** We admire runners who refuse to give up on their goals and who keep trying various methods to reach them. By this standard, Patrick Noble, a career Army man who's now retired and living in South Korea, deserves a lifetime achievement award. In 1986 Noble finished his first marathon in 3:17, feeling both proud and ambitious. "Let's go for a sub-3," he told himself.

Thus began the journey. Noble increased his training, and before long he had run 3:04, 3:01, 3:05, and 3:02. You can quickly see what's missing from this list. A less-determined runner might have given up. Not Noble.

He kept running marathons—dozens of them. In the last 2 years, he ran his 49th marathon. No luck. His 50th. Ditto. His 51st. Nope, sorry. But last May, in his 52nd marathon, Noble broke through the 3-hour barrier with a 2:58:23 at the Camp Casey U.S. Army base in South Korea. And it was a new approach to tempo runs, Noble believes, that helped him dip below 3:00.

The conservative view on tempo runs suggests that you cover 20 to 40 minutes at a pace that's 10 to 20 seconds per mile slower than

your 10-K pace. Noble pushed his tempo runs up to 60 minutes. "I think the long tempo runs gave me the extra strength I needed," says Noble. "I also made sure to run very easy the day after the tempo runs, and watched my diet and even gave up beer for 6 to 8 weeks before the marathon." (Joe Vigil, coach of American marathon record holder Deena Drossin and 2003 U.S. marathon champ Ryan Shay, also believes in long tempo runs to build endurance.)

**What you should do:** Do a tempo run once a week for 8 weeks. Start with a 20-minute tempo run at 10 to 20 seconds per mile slower than 10-K race pace, and add 5 minutes to your tempo run every week. Be sure to take 1 or 2 easy days before and after tempo days.

## PLAN 7 RUN LONG AND FAST

**SPEED ENDURANCE** Okay, we know. This is the opposite of Plan 3. You caught us. But it works for some runners, just as the long-and-slow approach works for others. A perfect example of the "high-responders" versus "low-responders" principle.

A recent convert to long-fast training: Scott Strand of Birmingham, Alabama. Last February, Strand improved his marathon personal record by more than 4 minutes with a 2:16:52 in the National Championship Marathon right there in downtown Birmingham. And it was his longer, faster long runs that got him the PR, Strand believes.

"I covered 18 to 23 miles in my long training runs," says Strand, "and I did the last 9 to 14 miles at marathon pace or faster. That was much faster than my previous long-run efforts of 17 to 22 miles at whatever pace I felt like running."

This kind of endurance program, based on long, hard runs has been popularized the last several years by marathon world record holder Khalid Khannouchi. Khannouchi does ferocious long runs—so fast and sustained that he gets nervous for several days before them. Old school: The only thing that mattered was spending 2 to 3 hours on your feet. New school: If you want to finish strong and improve your times in the marathon, you have to run hard and fast at the end of your long runs.

**What you should do:** On your long runs, pick up the pace for the last 25 percent of the distance. Gradually accelerate to your marathon goal pace, or even your tempo-run pace. You don't have to attack your long run the way Khannouchi does, and you shouldn't collapse when you finish. But you should run hard enough at the end to accustom your body to the late-race fatigue of the marathon. **R**