15 Simple Ways To Improve Your Athletic Performance Right Now

Fueling Guidelines That Are Easy to Follow and Incorporate

By: Steve Born

Proper fueling of the body prior to, during, and after exercise requires personal experimentation to find the ideal fit for you, the individual athlete. There is no “one size fits all” approach; we are all “experiments of one" when it comes to fueling during exercise. You need to determine, through trial and error in your training, what works best for you. However, there are some basic guidelines that will enable you to eliminate much of the guesswork, so you can more rapidly learn how to properly fuel your body, allowing you to enjoy higher quality workouts and better race performances.

Some of these recommendations may seem pretty foreign to you, especially in regards to fluid, calorie, and electrolyte replenishment during exercise, where some “experts” tell you that you need to eat and drink at or near depletion rates. Before you subscribe to and follow those suggestions, consider the words of Bill Misner, Ph.D.:

> The human body has so many survival safeguards by which it regulates living one more minute, that when we try too hard to fulfill all its needs we interfere, doing more harm than good. If I replace all the fuels I lose at the rate of 700-900 calories per hour, I bloat, vomit, present diarrhea, and finish the event walking or at an aid station. If I replace all the fluids lost all at once, I end up in the emergency tent with an IV for dilutional hyponatremia. If I replace all the sodium my body loses at the rate of 2 g/hour, I end up with swollen hands, eyes, ankles, feet, and noticeably labored exercise, or hypernatremia-induced bonking.
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> At an easy aerobic pace, the rate of metabolism increases from a sedentary state to a range of 1200-2000%. As a result, the body goes into “survival mode” where blood volume is routed to working muscles, fluids are used for evaporative cooling mechanisms, and oxygen is routed to the brain, heart, and other internal organisms. Interestingly, it NOT focused on calorie, fluid, and electrolyte replacement, as some of the “experts” advise.

Pretty bold words (and warnings), indeed. The truth is that you don't need to suffer the undesirable maladies Dr. Misner describes; they're not a mandatory part of being an athlete. If you follow our suggestions, we believe you will not only avoid performance-ruining and potentially health-threatening consequences, you will also have much more enjoyable experiences and achieve better performances in your workouts and races. These suggestions have their roots in science and have been proven time and time again (and again and again) over the course of several years in working with endurance athletes. You have nothing to lose, and a whole lot to gain, by testing them in your training. I'm betting that the more of the following recommendations you adopt and practice in your training and racing, the fewer problems you'll run into fueling-wise and the better your performance will be.

1. Keep fluid intake during exercise between 16-28 ounces per hour.

There's probably more misinformation on the subject of hydration than any other aspect of fueling, which is really bad because over hydration also presents the most serious physiological consequences of any fueling issue. Acute over hydration can cause hyponatremic (low sodium) induced coma and death.

In general, most athletes, under most conditions, will satisfy hydration needs with a fluid intake in the range of 20-25-ounces/hour—roughly the equivalent of the standard size of a small or large water bottle. Lighter athletes and/or athletes exercising in cool weather conditions may only require an intake of 16-18 ounces/hour. Larger athletes and/or athletes exercising under very hot and humid conditions are the ones that can consider fluid intakes at the high end of that range (28 ounces/hour), perhaps even upwards of up

to 30 ounces/hour on occasion. Sure, you can sweat more than that, but you cannot physiologically replace it ounce-for-ounce.

Regular fluid intake over 30-34 ounces hourly really increases the potential for serious performance and health problems, so keep that in mind before you indiscriminately gulp down excessive amounts of fluid. If you override your internal mechanisms, you'll find out the hard way how your body deals with excess water intake during intense exercise. Unless you enjoy nausea, bloating, and DNFs, forget advice like “drink to replace” or “drink even when you're not thirsty”—it's just plain wrong.

2. Restrict caloric intake to 300 cal/hr during exercise.

If you want to watch your race go down the drain fast, follow the “calories out, calories in” protocol that some “experts” recommend. ***Fact: your body can't process caloric intake anywhere near your expenditure rate.*** Athletes who attempt to replace all the fuels they lose—which can be upwards of 700-900 calories per hour—will most likely end up with bloating, nausea, vomiting, and/or diarrhea. Sound like a good strategy to you? We didn't think so.

If you want to achieve your best performance, replenish calories in “body cooperative” amounts, allowing your fat stores to make up the difference, which they will easily do. For most athletes, 240-300 cal/hr will do the job. For lighter athletes, 180-200 cal/hr may be just the ticket, while larger athletes can consider hourly intakes of slightly over 300 cal/hr.

Far too many athletes think they need to match calories *out* with equal amounts of calories *in*. They're usually the ones on the side of the road or off the back, waiting for their stomach to stop rebelling. If you follow a more sensible caloric intake, you'll be blowing by them, not joining them.

3. Avoid simple sugars in your fuels; use complex carbohydrates only.

You've heard the phrase “garbage in, garbage out,” right? Guess what—simple sugars (glucose, sucrose, fructose, and dextrose) are garbage. They're inefficient fuels for exercise, and they're health hazards when consumed regularly in typical dietary quantities. They have no place in your body.

This leads to the question, “Why do companies include these types of sugars in their products?” Most likely because simple sugars are cheap, they sweeten the product, and they allow the label to read, “Packed with XX carbs per serving.” But just look at the side panel to find out what you're really getting.

Simple sugars give you energy peaks and crashes, and they also have a severe limitation on absorption. They need to be mixed in weak concentrations for efficient digestion, which means you can only intake about 100 cal/hr. You can consume more, but you can't absorb more. You'll only get sick trying. Complex carbohydrates, however, absorb at about three times the rate as simple sugars. That covers the 300 cal/hr we just mentioned. Plus you get smooth, steady, reliable energy-no peaks and valleys. Yes, complex carbohydrates do contain, as part of their naturally occurring structure, a small percentage of 1- or 2-chain sugars. There's a big difference, however, regarding how your body responds to these sugars when they are “part of the whole” rather than when they're isolated and added to a product as a separate ingredient… big difference.

As far as the fairly recent “multiple carbohydrates” studies are concerned—the research that found that a blend of carbohydrates increased oxidation rates, indicating higher energy production—take a closer look at the studies before you jump on the bandwagon. What you’ll notice is that most of the studies’ subjects (cyclists) exercised at low intensity, only 50-55% maximum power output, which I think we’d all agree is very much a recovery pace, if that. To be blunt, at a leisurely 50% VO2 Max pace, athletes can digest cheeseburgers and pizza with no gastric issues. So the issue isn’t whether the results of these published studies are disputable, but rather if they apply to faster paced, longer duration bouts of exercise. We do not believe this to be the case, which is why we do not recommend the use of multiple carbohydrate sources during exercise.

Look, we're not going into a long physiology lesson now; we just want to save your body, your health, and your performance. If you take the “garbage in, garbage out” concept with any seriousness you'll avoid the glucose/sucrose/fructose/dextrose products and stick with complex carbohydrate fuels.

4. Exercise over two hours requires protein, too.

Carbs alone won't satisfy all of your energy requirements once you exceed two hours or so. Protein will have to satisfy roughly 10% of your energy requirements. You have two choices:

1.) Use a fuel such as Sustained Energy or Perpetuem that contains both complex carbohydrates and soy protein.
2.) Allow your body to literally feed upon itself (that is, digest your own muscle tissue) to make fuel.

Did you pick #1? Good call!

5. Use soy, not whey, during exercise.

Whey protein is a superb protein when it's used at the right time: after exercise. Do not use it before or during because the added glutamine quickly degrades to produce ammonia. Ammonia build-up is a primary culprit in muscle fatigue, and you're already producing ammonia when you exercise. Don't make it worse.

Now, there is some confusion regarding glutamine and ammonia that we'll clear up. Yes, glutamine does eventually scavenge ammonia. The key word, however, is "eventually." When glutamine metabolizes it increases ammonia initially, but then scavenges more than originally induced systemically, *taking approximately three hours or so for it to accomplish this*. Again, since you're already producing ammonia during endurance exercise and since ammonia is a primary culprit in fatigue, it seems logical that you'd not want to increase ammonia levels. However, that's exactly what you'll do when you consume glutamine supplements or glutamine-enhanced whey protein during exercise.

Soy or rice gives you the protein you need with minimal extra ammonia production. After exercise, when ammonia production is not an issue, glutamine-enhanced whey protein is great for immune system boosting, muscle tissue rebuilding, and enhanced glycogen synthesis.

6. Use liquid fuels as your main energy source, even during prolonged training and races.

There's nothing wrong with consuming a little solid food on occasion during prolonged exercise as a pleasant diversion from the monotony of liquid fuel consumption, but you must:

- Make wise choices. Choose foods that have little or no refined sugar and saturated fats. Don't think, “I'm a calorie burning machine so I can eat anything that I want.” What you put in your body greatly determines what you get out of it. Remember: garbage in, garbage out!

- Make solid food consumption the exception, not the rule.

Solid food is harder to digest than liquid, and it requires more time, water, and electrolytes. Relying too heavily on solid foods can leave you feeling lethargic, bloated, and nauseated. Liquid fuels digest and absorb readily, so you avoid those unwanted maladies. Most of all, avoid all junk foods, which contain lots of saturated fats and refined sugars, at all times. Believe me, when the latter stages of the race are upon you, you'll be thanking yourself that you took a pass on that sugar & fat laden pastry earlier in the race.

7. Remember to replenish electrolytes during exercise.

You can get your energy fuels (“gasoline”) dialed in right, but if you neglect the electrolytes (“oil”), the dash light comes on-except your body doesn't have a dash light. Instead, you get cramps, spasms, muscle revolt, irregular and rapid heartbeat, and major bonk. Don't wait for the light to come on; those are the final symptoms of increasing impairment. If you don't respond well before your body's oil light comes on, you can pretty much kiss optimal performance, and probably the whole race, goodbye.

8. Don't rely on salt tablets to fulfill electrolyte requirements.

- “Electrolyte replenishment” does not mean “sodium or salt replenishment.” Sodium chloride (a.k.a. “salt”) is indeed an important component of electrolyte replenishment but it does not fulfill the entire requirements. Calcium, magnesium, and potassium should be replenished as well as all these minerals play key roles in the maintenance of many important body functions.

- Most of us obtain more than enough salt from our daily diet and most athletes have a reservoir of upwards of 8,000 – 10,000 mg stored in body tissues. In other words, when you start your race you’ll most likely be doing so with a huge reserve of sodium chloride “on board.”

- Keep in mind that “too much” can have as many performance inhibiting-to-ruining consequences as “not enough.” Over the years we have observed that far too many athletes “over salt” their bodies during exercise, with a variety of maladies such as bloating, water retention (edema-like symptoms), and stomach distress being the usual and undesirable outcome.

When it comes to sodium/salt replenishment the key is to provide an appropriate dose to support the maintenance of normal body functions without overwhelming the body with too much, which will override and neutralize those mechanisms.

How much salt is enough? Electrolyte depletion is widely variable—you can't rely on a “one-size fits all” bottled drink or drink mix. You need to experiment and find your own range for any given weather condition and duration of exercise. That being said, 200-400 mg of sodium chloride (salt) per hour, as part of a full spectrum electrolyte replenishment product, is a good starting point for most athletes under most conditions. That’s the amount you’ll receive in 2-4 capsules of Endurolytes. Certainly there will be occasions when 100-200 mg of salt (1-2 Endurolytes) will be completely adequate; on hot-weather workouts or races, it may be necessary to consume 500-600 mg/hour (5-6 Endurolytes).

9. Don't use any new supplement or fuel, or supplement/fueling protocol, in a race without having first tested it in training.

This is a cardinal rule for all athletes, yet you'd be amazed how many break it. Unless you're absolutely desperate and willing to accept the consequences, do not try anything new in competition, be it equipment, fuel, or tactics. These all must be tested and refined in training.

Because all Hammer Nutrition fuels are specific and formulated to easily combine with one another, you have all the flexibility you need to ensure that you can tailor a fueling program for any length of race, regardless of conditions. You'll never have to guess or try something off the table in hopes of trying to keep going another hour.

10. Be flexible with your fuel consumption during a race, keeping in mind that what may have worked in training may not be appropriate under race conditions.

Caloric intakes that worked during training may not be appropriate during a race; you may need to consume slightly less in a race than you did during training. Why? Increased anxiety, increased pace, and increased

potential for dehydration all contribute to the possibility of a less-than-optimally functioning digestive system. In addition, at the increased pace during a race, more blood is diverted from digestion and directed toward maintaining muscle performance.

When you get to the race it's great to have a caloric “game plan” in place, but don't be a slave to it. You may need to alter that game plan (which may mean a slightly lower hourly intake of calories) to accommodate the possibility of a less-than-optimal digestive system.

11. Replenish your body with carbohydrates and protein as soon as possible after each exercise session.

Here's a statement to remember: “When you're done training, you're not done training, at least not until you've put some fuel back into the body.” Equally important as your workout (muscle exhaustion and nutrient depletion) is what you do immediately following your workout (muscle repair and nutrient replenishment). If you neglect to refill the tank, you'll never get the full value out of all the work you just put in… and what a waste that would be.

Increased fitness simply won't happen, at least not efficiently or effectively, if you ignore your body's cries for fuel replenishment. Give your body what it needs immediately after exercise, when it's most receptive to replenishment, and it will respond wonderfully—recovering faster, efficiently adapting to physical stress, and “learning” how to store more and more readily available fuel in the muscles.

An ideal and easy-to-use post-workout fuel is Recoverite, with its 3:1 ratio of complex carbohydrates and protein. Mix a couple of scoops with water, drink, you're done… simple. You've just put the best “finishing touches” on your workout that you possibly could, and you've given your body a great head start on tomorrow's workout.

12. Don't over-consume food the night before the race in the hopes of “carbo loading.”

It would be nice if you could maximize muscle glycogen stores the night before the race, but human physiology doesn't work that way. Increasing and maximizing muscle glycogen stores takes many weeks of consistent training and post-workout fuel replenishment. Excess consumed carbohydrates are only going to be eliminated or stored as body fats (dead weight), so don't go overboard during those pre-race pasta feeds. Eat until you're satisfied, but not more.

13. For races over 60 minutes in length, finish a pre-race meal three hours prior to the start of the race.

Let's assume you've been really good—you've been training hard (yet wisely) and remembering to replenish your body with adequate amounts of high quality calories as soon as possible after each and every one of your workouts. Great! You've now built up a nice 60-90 minute reservoir of premium muscle glycogen, the first fuel your body will use when your long race begins. Don't blow it now by eating something an hour or two prior to the start of the race!

Do you know what happens when you eat within three hours of exercise? Your muscle glycogen stores get burned much more rapidly… in long-duration events that’s definitely not performance enhancing! For workouts and races lasting longer than 60 minutes (perhaps up to 90 minutes at the most), refraining from calorie consumption for the three-hour period prior to the start is crucial because you want to preserve your glycogen stores, not accelerate their depletion.

During shorter distance races, however, accelerated rates of glycogen depletion/utilization are not problematic so following the “three hour rule” isn’t a necessity. You don’t need the calories for energy

(muscle glycogen stores will take care of the majority of that), but the presence of carbohydrates will elevate glycogen utilization. That's what you want for a short race. If you eat something 1-2 hours prior to the start of a short-duration race, thus causing the insulin "flood gates" to open, yes, you will be depleting your glycogen stores at maximum rates. However, at this distance it's a beneficial effect, as glycogen depletion is not an issue when the race is over within, at most, 90 minutes.

Bottom line: Fast three hours prior to the start of a longer-duration event (60-90+ minutes). For shorter events, consuming a small amount of fuel an hour to two prior to the start may enhance performance.

14. Don't sacrifice sleep to eat a pre-race meal.

OK, you're convinced that it's a good idea to eat at least three hours prior to the start of your race. "But wait," you say. "My race starts at 7 a.m. Are you telling me I have to get up at 3 a.m. or so just to eat?" Well, you could get up to eat if you're so inclined, but you don't have to. The fuel you've got stored in the muscles? It's going to be there, full strength, even after a night-long fast (really). In the morning your brain may be saying, "I'm hungry," but your muscles are saying, "Hey, we're good to go."

Bottom line: do not sacrifice sleep just to eat. If you've got an early morning race start, the best strategy is:

- Eat a high quality meal the night before (topping off liver glycogen stores)
- Get an adequate amount of sleep
- Have 100-200 calories of easily digested fuel (Hammer Gel is ideal) 5-10 minutes prior to the start of the race

That's right, 5-10 minutes prior, not one or two hours prior. The key, in terms of muscle glycogen depletion rates, is in the timing. If you must eat before the start of your race, you need to complete consumption three hours prior. If that's not logistically feasible, have a little something 5-10 minutes prior. Do that and you won't expend your hard-earned glycogen too rapidly.

15. Consume appropriate amounts of high quality food for your pre-race meal.

The goal of the pre-race meal is to top off your liver glycogen, which has been depleted during your sleep. Believe it or not, to accomplish this you don't need to eat 600, 800, or 1000 calories or more, as some would have you believe. A pre-race meal of 200-400 calories—comprised of complex carbohydrates, perhaps a small amount of soy or rice protein, and little or no fiber or fat, and consumed three hours prior to the start of the race—is quite sufficient. You can't add anything to muscle glycogen stores at this time (you'll just be topping off liver glycogen stores), so stuffing yourself is counterproductive, especially if you've got an early morning race start.

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More detailed information about proper fueling and all the Hammer Nutrition products can be found in *The Endurance Athlete's Guide To Success*. You can download a free copy at http://www.hammernutrition.com/guide

Steve Born is a technical advisor for Hammer Nutrition with over a decade of involvement in the health food industry. He has worked with hundreds of athletes - ranging from the recreational athlete to world-class professionals regarding their supplement/fueling program. Steve is a three-time RAAM finisher, the 1994 Furnace Creek 508 Champion, 1999 runner-up, the only cyclist in history to complete a *double* Furnace Creek 508, and is the holder of two Ultra Marathon Cycling records. In February 2004 Steve was inducted into the Ultra Marathon Cycling Hall of Fame.