

THE LONG RUN
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Aerobic Development and Muscular Endurance are the most important factors in training an endurance runner. In any event that takes over a minute; a person's aerobic capacity and muscular endurance are the limiting factors and have a greater effect on their performance than any other aspect. In training an athlete's aerobic capacity, it is preferable to run at a faster aerobic pace. Typically, this is accomplished in two or even three runs a day with the focus of each running being quality, not quantity. Though any run done below an athlete's anaerobic threshold will be beneficial, it takes considerably longer for an athlete to develop a strong aerobic capacity when they run at a slow pace. Therefore, it is not wise to stray too far from the quality aspect of training. However, running several shorter runs a day typically does not do much for an athlete's muscular endurance. An athlete's knee lift while running has a direct correlation on an athlete's running velocity. At the end of races, when fatigue is setting in, the athlete with the greater muscular endurance will have the better knee lift, and subsequently, the great velocity. This is the reason why muscular endurance is extremely important and athletes who typically run two shorter runs a day at faster aerobic speeds often overlook this. This is the reason why "Long Runs" have become the bread and butter of many great distance runners. It is a great way to develop an athlete's aerobic capacity and muscular endurance at the same time.

The Long Run, by definition, is a run that is considerably longer than any other run during a training week, hence the name – Long Run. In the training of my distance runners, the Long Run will always be done on Sunday's, about 44 to 46 weeks of the year, with the only exception being the week leading up to a major race or during weeks of no running at all. A full long run should be 18-24% of an athlete's weekly mileage with a maximum time of two and a half hours of continuous running, though marathoners might run up to 3 hours. For example, an athlete who is targeting 90 miles that week will do a 16 to 21 mile Long Run once a week.

Several physiological adaptations are achieved during weekly long runs. These include the ability of the body to use fat as a fuel source, capillarization of the muscle fibers, the number of mitochondria in the cells, the enzyme activity within the mitochondria, myoglobin in the muscle cells, and the muscle's ability to store glycogen. The net effect of all this is that more fuel is available to the body and the fuel that is available will be used more effectively. The long run also strengthens all the ligaments, tendons, muscles and bones of the body. This reduces the likely occurrence of muscular and skeletal injury during the harder periods of training.

A big problem with training inexperienced distance runners is that they associate a Long Run with "Long, Slow Distance," or LSD for short. I advise all of my athletes to keep Long, Slow Distance to a minimum, especially during their Long Run. Instead, I want them to focus on "Long, STEADY Distance." The reason for this is that when an athlete runs at a slower aerobic pace, it takes longer to achieve the same aerobic benefits as it does if they were running at a faster aerobic pace. Arthur Lydiard was once asked what he thought about the use of LSD in training; he responded with, "LSD has its place.

Long, Slow Distance of three, four or five hours certainly will enhance your capillary development well because you are engaging the exercise for a very, very long period of time.” All of Lydiard’s athletes, whether they were a half-miler or marathoner, would run his famous 22-mile loop through the hilly Waitarua Mountains in New Zealand in about 2 hours. This is an average mile pace of under 6-minutes, which is definitely not a slow pace. The point is it takes longer to obtain the same result than if an athlete were to do their aerobic training at higher aerobic speed. I advise all of my athletes during aerobic runs to run at a pace that is 60 to 90 seconds slower per mile than their 10,000-meter race pace. For example, an athlete who is in shape to run 40:00 for 10,000-meters should run between 7:25 and 7:55 for an aerobic run, keeping in mind that the faster they run the better benefits they are receiving. If an athlete does not want to think about time during a Long Run, then I advise them to run at a pace that will make them ‘Pleasantly Tired’ at the completion of their run. Both of these methods will typically yield a pace that is about 65-75% of their VO₂ Max or 70-80% of their maximum heart rate, which is about the pace they need to run to get the most return for their time-spent running.

Another reason why I see Long Runs as the most important run of any distance runner, whether they are a half-miler or ultra-marathoner is the increased capillarization within the muscles. In the 1980s, Dr. Uhlenbrock of the West German Sports School did a study of ultra-marathoners who ran 50, 60, and 100 miles a day, day after day. Dr. Uhlenbrock concluded that if an athlete uses muscle groups continuously for long periods, even at low intensities, they would very quickly develop dormant capillary beds as well as establish new ones. He said that this was unquestionably the secret of muscular endurance. This long, steady type of training is not just beneficial for typical endurance athletes. It can be used for anyone who is looking to increase his or her muscular endurance. Arthur Lydiard worked with the trainers of former professional boxer and heavyweight champion of the world, Michael Spinks. Lydiard figured that if a boxer punches a bag steadily for two hours, without stopping he would build the muscular endurance that will enable him to throw punches hard and fast for the length of a 15-round bout. When Spinks went into the ring, he was still throwing effective punches when his opponents were tiring to the point where they not only could not match his punching ability, they could not get out of the way of his blows.

This is the reason why Long Runs will help all types of distance runners, especially half-milers who typically lack in aerobic development and muscular endurance. When an athlete runs at a moderate pace, their slow twitch muscle fibers are the first ones recruited. However, if they run far enough, they slowly become glycogen depleted and more and more fast-twitch fibers must be recruited to help maintain the effort. As these fast-twitch fibers partake in aerobic running, they begin to develop more mitochondria within each cell. When there is an abundance of mitochondria in the cell, aerobic metabolism will be enhanced and an athlete will be able to run further and faster before lactic acid begins to accumulate within the cell. While fast-twitch fibers will never have the same number of mitochondria that slow-twitch fibers have, the increase will better help them function at high speeds for a prolonged period of time. Consequently, at the end of races, when others are tiring, an athlete with a solid aerobic background will still be able to run at close to full speed.

As stated earlier, Long Runs should be performed almost year round, whether it is during an athlete’s base-building (aerobic development) phase, their anaerobic

conditioning phase, or their sharpening/coordination phase. The only exceptions should be during rest weeks and the week before a major race. During our base-building phase of training, I prescribe three longer runs a week, with the longest run being about 22% of my athletes' weekly mileage on Sunday. The other two come on Tuesday's and Thursday's, with Tuesday's run being about 15% of their weekly mileage and Thursday's being about 17% of their weekly mileage. This equates to about 54% of their weekly mileage in three runs. I always preach that the bulk of their daily mileage should come during one run. I would much rather see them do a 12-mile run in the morning and 2 mile jog in the evening instead of two 7-mile runs. During our anaerobic conditioning phase of training Long Runs will be cut to once or twice a week, with Sunday still being a run of about 22% of their weekly mileage. If a second Long Run is done during the week, it is about 15% of their weekly mileage. During our sharpening/coordination phase, Long Runs are cut to just Sundays; however, it remains at 22% of their weekly mileage.

An athlete's aerobic capacity as well as their muscular endurance has proven to be the limiting factors in almost every endurance race. The athlete with the best aerobic capacity will typically run the best times. However, since the goal is to win races, not just run fast, it is just as important for athletes to have good muscular endurance. This endurance will allow them to run close to full speed at the end of races, giving them a distinct advantage over the other runners who are tiring and just hoping to finish. The Long Run is a great way to develop both of these aspects at the same time and thus, it is a workout that will give athletes 'the most bang for their buck.'