

My experience of altitude training with 100 and 200m runners

NSA © by IAAF
9:2; 59-63, 1994

by Nikola Antonov

“This contribution is one of the lectures given at the Workshop of the European Athletics Coaches Association in Belmeken/Bulgaria (cf. Report pp. 103).

The author discusses the reasons why altitude training should benefit sprinters. He gives his views on why such training may have proved ineffective in the past and offers a detailed account of the means and methods he would recommend, before, during and after altitude training. In his view, such training, properly conducted, is essential for complete success in the short sprints.”

Associate professor Dr Nikola Antonov is a professional coach and lecturer in the National Sport Academy in Sofia, Bulgaria. He is chief coach of the Bulgarian National sprint and hurdles squad. He was the personal coach of Peter Petrov, bronze medalist in the 100m at the Moscow Olympics of 1980 and he has contributed to the achievements of Olympic athletes Yordanka Donkova, Ginka Zagorcheva and Anelia Nuneva. Dr Antonov is the author of more than 70 publications related to the theory and practice of track and field athletics.

The advantage of competing at medium altitude (approximately 2000m) in the sprint events is well known. The results of the Olympic Games in Mexico 1968 speak for themselves. The world record of 19.72 sec. for the men's 200m, achieved in 1979 by Pietro Mennea in Mexico, stands to this day. Excellent performances in the sprint events are possible because of the lower resistance of the air at medium altitude. Sprinting is not influenced directly by the muscle oxidation process but rather by anaerobic mechanisms.

However, there is still much controversy about the effectiveness of altitude training for the sprint events, especially for the short sprints. Altitude training is still carried out, worldwide, from an intuitive rather than scientific base. The problems are resolved through trial and error and results are often contradictory. In our opinion, preparation for the sprint events without the use of altitude training is not so effective. High performances are sometimes achieved without altitude training, but we think these are casual or obtained as a result of using non-training methods. Our practice is to carry out altitude training three times a year, with a total duration of 60 - 70 days. This training is effective only if it is applied properly, according to sound, rational training principles. Unfortunately, in our many years' experience, we have observed many cases of incorrect use of the altitude environment for training. The most typical and frequent errors are:

1. Inappropriate choice of the period in which to organize a training camp. It is incorrect to start the training year with an

altitude training camp; it is even worse, if the transition period has been one of only long, quiet recreation.

2. Using medium altitude only for rehabilitation or recreation, and not for hard training.
3. Reducing the duration of the training camp due to various, often subjective reasons.
4. Interrupting the training for 1 - 2 days.
5. Insufficient training of optimum intensity, sometimes with only 1 - 2 hard training sessions per week. Too much time allowed for recreation.
6. Incorrect distribution of the weekly training units.

In a double periodization programme, with a view to participation in the European or World Indoor Championships, our three altitude training camps, each of 20 to 22 days duration, are allocated as follows:

- The first camp starts in the middle of October or November, depending on when the training year begins.
- The second camp takes place in March or at the beginning of April, depending on the dates of the most important competitions, in this case the European or World Indoor Championships. Immediately after these, we have a week's transition period and then we resume altitude training in Belmeken.
- The third camp starts at the end of June or July, or at the beginning of August, depending on the dates of the most important competitions of the year.

Prior to the first altitude training camp, we introduce a mesocycle of 15 to 20 days general preparation. In the case of Peter Petrov, this preliminary preparation lasted a full month, because of his inherent low aerobic capacity. Our many years' experience, together with the analysis of all available sci-

entific and methodical literature, leads us to conclude that the best effect of these three weeks of altitude training is obtained with the following methodical structure of organization in each microcycle:

1. The aim, in the first week, is to gain a fast adaptation to a larger volume of training of the optimum intensity, according to the pertinent training mesocycle. Here, a wide variety of training means will be used.
2. During the second week, the condition of the athlete must be watched carefully, because physiological changes now occur, due to the effect of acclimatization and the large training loads. During and after this week, 15 training sessions can be undertaken, varying the type of training load and, occasionally, including three or four training units in one day.

Generally, 3 to 5 of these 15 training units are loaded heavily and they have a significant effect, structurally and functionally, on the athlete's organism. 4 to 6 training units are given a medium loading and 4 to 6 a low loading, which activates the rehabilitation process and prepares the athlete for further heavy loads.

The structure and contents of the second weekly cycle of 18 training units, during the October training camp in Belmeken, for Peter Petrov, are as follows:

Monday

First training unit - from 10 a.m. to 12 noon.

- 1) Warm-up with slow running plus flexibility exercises with medicine balls.
- 2) Maximum and dynamic weight training - 6 tons.
- 3) Game - 30min.
- 4) Flexibility exercises - 30min.

Second unit - 4 to 6 p.m.

- 1) Fartlek on track - 3 x 2km.
- 2) General physical preparation - 20min.
- 3) Stretching - 15min.

Tuesday

First training unit – 7 to 8 a.m.

- 1) Slow steady run – 2km.
- 2) Stretching – 10min.
- 3) Vertical bounds – 120.

Second unit – 9.30 a.m. to 12 noon.

- 1) Warm-up for speed work – 1 hour.
- 2) Standing and crouch starts, with and without towing a car wheel: 20m at 85 – 95% effort, with 3 to 4 sets of 18 repetitions.
- 3) Standing start repetitions. 2 sets of (3 x 50m).

Third unit – 4 to 6 p.m.

- 1) Warm-up – 45min.
- 2) Acceleration runs – 4 x 50m.
- 3) Fast reaction exercises.
- 4) Multi jumps – 250.
- 5) Throws with a 4kg shot – 20.
- 6) Tempo endurance – 10 x 200m at 80% effort.

Fourth unit – 8.30 to 9.15 p.m.

Swimming – slow and steady for the development of aerobic capacity.

Wednesday

First unit – 7 to 8 a.m.

Gymnastics, stretching and bounding.

Second unit – 10 a.m. to 12 noon.

Speed endurance – 2 x 250m at 85% effort; 2 x 200m at 85% and 4 x 150m at 90% effort.

Third unit – 4 to 6 p.m.

- 1) Basketball – 30min.
- 2) Flexibility, stretching – 20min.
- 3) Strength endurance uphill repetitions – 800m.

Fourth unit – 8.30 to 9.15 p.m.

Swimming.

Thursday

First unit – 7 to 8 a.m.

- 1) Compensatory – slow steady run – 30min.
- 2) Flexibility, stretching, relaxation – 30min.

Second unit – 10 a.m. to 12 noon.

- 1) Maximum and dynamic weight training – 6 tons.
- 2) General physical preparation – 30min.
- 3) Tempo endurance – 3 sets of (4 x 100m).

Friday

Three training units as for Tuesday, with modifications to the intensity of effort.

Saturday

Three training units as for Wednesday, with modifications to the intensity and length of the repetitions.

Sunday

One compensatory training unit – slow steady run – 30min plus flexibility and stretching – 30min.

It must be said that, during the second week of the altitude training camp, the athletes are predisposed to injury. For this reason it may be necessary to modify the volume or intensity of some elements of the training programme. Moreover, it is normal to decrease the intensity of the training slightly at the end of the second week. Also, stabilizing and compensatory training must be included. Training units of a compensatory character should always follow hard, intensive units, mostly of the speed endurance type, with over 15mmol/l lactic acid in the athlete's blood.

We apply this type of training in the afternoon, if the morning's training has been aimed at speed endurance, or else on the morning of the following day, if speed endurance work has been carried out in the evening. These sessions consist of a slow, steady run with a pulse of 130 - 150 per min, of no less than 30 minutes duration plus stretching and flexibility exercises. Although there is accumulated psychological fatigue in the third week, the athlete's system is already adapted to the specific requirements of the high altitude and the heavy training loads. Therefore, the heaviest training loads can be

applied in this week. We may, as it were, apply an overload, regardless of the feelings and emotions of the athlete.

It is up to the coach to determine how far into the third week these heavy loads may continue. It will be good if the athlete can cope with these heavy training loads till the end of the third week but not all athletes can do this. In our view, the coach should not be influenced too much by the risk of injury. In fact, injuries can be avoided, in spite of the heavy training loads, if the training programme includes the following:

- complete facilities for physical and medical rehabilitation;
- coaches with the knowledge and intuition necessary to conduct a proper rehabilitation programme;
- discipline and toughness on the part of the athletes. If the athlete cannot withstand three weeks with an increasing load, one should not try to plan two weeks with an increasing load and then an "unloading" week. It is better to plan for days rather than for weeks.

The 21 days training camp is planned as follows: 8 loading days, then 3 - 4 unloading days, and again 8 - 9 loading days.

We begin altitude training in Belmeken one week after the close of the winter competition season. The athlete's general state of fitness is now higher than it was in Autumn. At first glance, the weekly training cycle in March seems to be identical with that of the autumn training camp in Belmeken. Some items are, indeed, repeated but, in fact, there are some differences. The main differences lie in the increased volume of running for endurance at a higher intensity and in the more intensive character of the speed and speed-strength training.

Changing from indoor track work to altitude training, together with work of a harder but essentially different type, brings about a great training effect and stabilizes the

psychological and physical status of the athlete.

The preparation for the second stage of the summer competition period, the main competition period, begins with a so called microtransition stage. It is precisely in this stage that we conduct the third training camp in Belmeken, in June, July, or at the beginning of August. We now carry out the immediate preparation for the most important competition of the year. This microstage is characterized by an extra increase in the training volume and some decrease in its intensity. There then follows a gradual decrease in the volume and increase in the intensity. To this end, the training goes along the following lines, with the aim of amplifying the athlete's total working capacity:

- During the first 10 days, the repetitions of endurance work are carried out at an intensity of 70 to 80%. After this, the intensity rises abruptly and the training intensity increases to 86 - 100% effort.
- At the same time training for speed and speed-strength is carried out also at a high intensity.

Below is the structure and contents of the *third week* of the training camp, held in July in Belmeken, applied to the Olympic medallist Peter Petrov:

Monday

First training unit - 10 a.m. to 12 noon.

- 1) Warm-up for power training - 30min.
- 2) Dynamic weight training - 3.5 tons.
- 3) General physical preparation - 20min.

Second training unit - 4 p.m. to 6 p.m.

- 1) Game - 30min.
- 2) Fartlek on track - 2 x 2km.
- 3) Flexibility, stretching, relaxation - 30min.

Tuesday

First training unit - 9.30 a.m. to 12 noon.

- 1) Warm-up for speed work - 1 hour.
- 2) Crouch starts in groups with a signal:

- 4 x 20m: (Peter Petrov's best time, manual electronic - 2.82s),
- 4 x 30m, best time - 3.73s,
- 2 x 40m, best time - 4.68s.

- 3) Standing start repetitions at varied effort, 3 x 60m, times: 6.51, 6.42, 6.38s.

Second training unit - 4 to 6.30 p.m.

- 1) Warm-up for speed-strength training - 45min.
- 2) Exercises for fast reaction on mattress - 3 x 8.
- 3) Jumps, bounds and multi-jumps - 60.
- 4) Accelerations - 3 x 60m.
- 5) Speed endurance, standing start repetitions - 4 x 100m at 90 - 95% effort, each with 5 - 6 minutes recovery. Times: 10.65, 10.42, 10.51, 10.36s.
- 6) Flexibility, relaxation, stretching exercises - 15min.

Third training unit - 8.30 to 9.15 p.m.

Swimming.

Wednesday

First training unit - 9.30 a.m. to 12 noon.

- 1) Warm-up for speed work - 1 hour.
- 2) Standing starts - 2 x 20m at 98% effort.
- 3) Flying start repetitions for the development of maximum speed - 4 x 20m with 4 minutes recovery. Times: 1.82, 1.72, 1.76, 1.68s.
- 4) Jumps, bounds and multi-jumps - 50.

Second training unit - 4 to 6 p.m.

- 1) Warm-up for speed endurance - 1 hour.
- 2) Standing start repetitions - 4 x 150m at 90 - 95% effort, recovery 6 - 8 minutes. Times: 16.32, 15.96, 15.78, 15.87s.
- 3) Flexibility and stretching exercises - 15min.
- 4) Slow steady run - 1.5km.

Third training unit - 8.30 to 9.15 p.m.

Swimming.

Thursday

First training unit - 7 to 8 a.m.

- 1) Compensatory microtraining - slow, steady run with a pulse of 130 - 150 bpm

- 35min.

- 2) Flexibility - 15min.
- 3) Repetitions - 120m.

Second training unit - 10 a.m. to 12 noon.

- 1) Warm-up for power training - 30min.
- 2) Dynamic weight training - 3 tons.
- 3) General physical preparation - 20min.
- 4) Gymnastics, stretching and relaxation - 20min.
- 5) Slow, steady run with walking and breathing exercises - 1.5km.

Friday

Two training units are carried out: from 10 a.m. to 12 noon and from 4 p.m. to 6 p.m. The same as for Tuesday but without the speed endurance sections.

Saturday

First training unit - 10 a.m. to 12 noon.

- 1) Warm-up for speed endurance - 1 hour.
- 2) Standing start repetitions, two sets : 2 x 250m at 90% effort with 10 minutes recovery. Times: 29.32 and 29.14s: 2 x 200m at 95% effort with 12 minutes recovery. Times: 21.34 and 21.42s.

Second training unit - 4 p.m. to 6 p.m.

- 1) Game - 30min.
- 2) Flexibility, stretching - 20min.
- 3) Strength endurance repetitions uphill - 0.8km.

The third training camp in Belmeken produces the best effect when we return from altitude 20 days or one month before the main competition. All the factors of athletic fitness are then in harmony and performances reach a high and stable level. In our experience, the best performances, during the main competition period, are achieved between 3 - 5 weeks after getting back from Belmeken.

In conclusion we can say that we are convinced of the great importance of properly conducted altitude training for the achievement of top performances in the 100 and 200m sprints.

