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REVIEW ARTICLE

The Norwegian double-threshold method in distance running: Systematic literature review

Bence Kelemen . *School of Doctoral Studies. Hungarian University of Sport Science. Budapest, Hungary.*
Otto Benczenleitner. *Department of Athletics. Hungarian University of Sport Science. Budapest, Hungary.*
Laszlo Toth. *Department of Psychology and Sport Psychology. Hungarian University of Sport Science. Budapest, Hungary. Teacher Training Institute. Hungarian University of Sport Science. Budapest, Hungary.*

ABSTRACT

This study aimed to give a systematic literature review about the training of elite Norwegian long-distance runners (1500-10.000 meters). After a search in databases, we found 7 articles, that have systematically registered the training volume and intensity distribution of 13 elite runners over longer periods (n = 13). The results were the following: the best long-distance runners run 120 to 180 kilometers per week on average. The waist majority of this training (75-80 %) is done at low intensity (62-82% HRmax). Two to four sessions are done at the anaerobic threshold pace (82-20% HRmax), either in continuous or interval format during the base period, often done twice on the same day. One to two times weekly higher intensity sessions (>97% HRmax) are done, in form of short intervals (>800m) or short sprints. Longer intervals, above the anaerobic threshold (92-97 % HRmax) are rarely used during the base period. The training is closely monitored by a lactate meter or heart rate monitor. Before the racing season, in the pre-competition period, the athletes do fewer workouts at an anaerobic threshold pace and increase the number of sessions at a specific race pace.

Keywords: Performance analysis, Periodization, Anaerobic threshold, Long-distance running, Elite level.

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Corresponding author. *School of Doctoral Studies. Hungarian University of Sport Science. Budapest, Hungary.*
E-mail: bencekelemen95@gmail.com
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INTRODUCTION

Despite its relatively small population, Norway has produced several world-class long-distance runners. The Ingebrigtsen family has attracted attention in recent years, with three brothers winning the European outdoor 1500 m championships. They also have several continental records and an Olympic gold medal to their name. In the 1980s, women's athletes Grete Waitz and Ingrid Kristiansen achieved world records and international medals in both track races and marathon running. In the early 2000s, Marius Bakken set a new national record of 13:06.39 in the 5000 m and qualified twice for the World Championships finals, while Sondre Moen set a continental record in the marathon in 2017. Most recently Narve Nordas medalled at the world championships in the 1500 metres. What could be the secret of this small Northern European country? In the literature, the training of these runners, as well as several of Norway's elite distance runners, is well documented and published, and shows a relatively well-differentiated coherent pattern. To such an extent that in recent years Swedish runners have taken over the training system of Norwegian runners and are breaking national records (Kalle Berlgrund 3:33.70 in 1500 m in the final of the Doha World Championships and Andreas Almgren 7:34.31 in 3000 m, and 13:01.7 in 5000 m).

Races between 1500 m and 1000 m are dominated by aerobic energy production (Gastin, 2001), with 75-80% of the shorter 1500 m distance coming from aerobic energy, and 95% of the 10 km distance. These races are distinct in energy distribution and pacing from the shortest, 800 m middle distance. The latter is characterized by a steadily decelerating pace following a fast start (Kelemen et al., 2020; Filipas et al., 2018), while the longer distances all have a more even pace, with a steady middle section between a fast start and finish, where runners achieve the fastest splits (Tucker et al., 2006). A meta-study analysing the world's elite runners found that the training for the 800 m differed from that of the 1500 m race, with the latter distance specialists training in a similar way to the longer 5 and 10 km races (Haugen et al., 2021). Several factors have been identified that are related to and determine endurance performance. These are maximum oxygen uptake (VO_{2max}), running economy (RE), and speed associated with maximum oxygen uptake (Noakes et al., 1990; Noakes, 2001; Conley and Krahenbuhl; 1980). In addition to these factors, the anaerobic threshold and associated running speed (vAt) are the most predictive of distance running performance (Tjelta et al., 2012). A consensus has emerged among coaches and researchers that interaction between three main factors plays a role in the development of these parameters: training volume (number of kilometres over a time period), training density, and training intensity (Midgeley et al., 2007; Brandon, 1995). However, this combination may vary from one event to another and from one athlete to another (Seiler & Tonnessen, 2009). There may also be differences in the training tools that coaches use to achieve a given physiological adaptation.

This literature review aims to examine and analyse the literature documenting the training of Norwegian middle and long-distance elite runners over the last two decades. In particular, we searched for research that analyses the training of a particular athlete over a longer period. Our literature review seeks to answer the question of the volume, intensity, and training methods that characterize the training of Norwegian elite athletes.

Material and method

The literature search was conducted on 25 September 2023. After searching the Scopus, PubMed, Web of Science, ResearchGate, and Google Scholar online databases, 7 studies systematically recorded and processed the training volume and intensity of the best distance runners over an extended period. The following search terms were used using logical variables (AND, OR): 'Norwegian', 'distance running', 'elite level', training volume', training intensity, and 'training distribution'. A total of 13 runners' training was

documented (n = 13). In addition to these studies, a conference presentation by a coach was also used, as well as a longer account of one of the runners analysed (www.mariusbakken.com).

RESULTS

Training volume

On average, the runners ran between 120 and 180 kilometres, and they completed between 10 and 14 training sessions per week.

Grete Waitz averaged 123 kilometres in 10-11 training sessions weekly during the 1979 season when she set a national record of 8:31.75 for 3000 meters and a personal best of 4:00.58 for 1500 meters (Tjelta at al., 2014).

Ingrid Kristiansen recorded a weekly average of 155 kilometres over 49 weeks between November 1985 and October 1986, during which season she achieved a world record of 14:37.33 in the 5000 meters and a world record of 30:13.76 in the 10,000 meters (Enoksen et al., 2011; Tjelta & Enoksen, 2001).

In the 2012 season, Henrik Ingebrigtsen won the European outdoor championship in the 1500m and finished 5th in the same distance in the London Olympics. During the preparation season, he covered an average of 150 kilometres per week between November and May (Tjelta, 2013).

Henrik, Filip, and Jakon Ingebritsen averaged between 150 and 160 kilometres during 13-14 weeks of training between November 2018 and March 2019 [(Tjelta & Enoksen, 2010).

Members of the Norwegian team that finished 2nd in the junior category (17-19 years) at the 2008 European Championships in Cross Country Running averaged between 115 and 145 kilometres per week during different stages of training (Tjelta & Enoksen, 2010). This was higher compared to Spanish runners of junior age (23±2 years) who averaged 70 kilometres per week. The difference in volume was due to the low-intensity distances covered. Despite their younger age, the Norwegian runners ran closer to the world records at 1500 and 5000 meters, and the researchers found that the runners who were most successful over time were those who had done more training volume. Three seasons later, the two runners with the highest weekly volume won the 5000m and 10,000m at the European junior championships. The third runner placed 18th at the 2012 European Cross-County Championships, and the fourth runner, Henrik Ingebrigtsen, came first in the same event. The researcher concluded that a relatively high amount of aerobic training at this age may be a determinant of long-term success (Tjelta, 2016).

In a review study, three internationally successful Norwegian runners (Marius Bakken with 5000 m in 13:06.37, Bjornar Kristensen with 3000 m steeplechase in 8:16.75, Susanne Wigine with 10,000 m in 30:32.36) ran an average of 161 km during 13 training sessions per week during their training. This was reduced to 148 km per week during the competition period (Enoksen et al., 2011).

In Kalle Berglund's 2019 season (1500 m 3:33.70, 9th place at the World Championships in Doha), he ran an average of 135 km per week, while the maximum weekly volume was 158 km (Bengtsson, 2022).

Distribution of training intensity

The literature uses different intensity zone-based schemes to classify the training performed by endurance athletes (Seiler & Tonessen, 2009). In most cases, aerobic work is classified into three categories: Zone 1:

low intensity, with blood lactate below 2 mmol/L; Zone 2: intensity between the aerobic and anaerobic threshold, with blood lactate between 2 and 4 mmol/L. Zone 3 is where the intensity is above the anaerobic threshold when the blood lactate levels are above 4 mmol/L (Seiler & Kjerland, 2006). These three aerobic categories, complemented by two anaerobic zones, were used to create a 5-zone scale in the articles we analysed (Enoksen et al., 2011; Tjelta & Enoksen, 2010; Tjelta; 2016), which is presented in Table 2. Zone 4: anaerobic endurance training (at 3000 and 800 m race speeds where blood lactate levels are above 8 mmol/L) and Zone 5 includes alactic sprint training. The intensity of the training sessions was monitored using lactate measurement (Lactate Pro LT) and heart rate (HR).

Table 1. List of literature sources reviewed and results of athletes analysed (n = 13).

Study	Athlete	Period analysed	Performance (time)
A Longitudinal Case Study of the Training of the 2012 European 1500 m Track Champion (*Tjelta*, 2013)	Henrik Ingebrigtsen	2011-2012	1500 m- 3:35.43
Three Norwegian brothers all European 1500m champions: What is the secret? (*Tjelta*, 2019)	Henrik Ingebrigtsen Filip Ingebrigtsen Jakob Ingebrigtsen	2018-2019	3000 m- 7:36.85 1500 m- 3:30.82 1500 m- 3:30.16
Training and Philosophy that lead to Swedish record (*Bengtsson*, 2019)	Kalle Berglund	2018-2019	1500 m- 3:33.70
Distribution of Training Volume and Intensity of Elite Male and Female Track and Marathon Runners (*Enoksen et al*, 2011)	Marius Bakken Bjornar Kristensen Susanne Wigene	2004 2006 2009	5000 m- 13:06.39 3000 m st.- 8:16,37 10.000 m 30:32.26
A Case Study of the Training of Nine Times New York Marathon Winner Grete Waitz (*Tjelta et al*, 2014)	Grete Waitz	1979	1500 m-4:00.58 3000 m-8:31.75
The training of international level distance runners (*Tjelta*, 2016) Training volume and intensity (*Tjelta and Enoksen*, 2011)	Ingrid Kristiansen	1985- 1986	5000 m- 14:37.33 10.000 m-30:13.76
Training Characteristics of Male Junior Cross Country and Track Runners on European Top Level *(Tjelta and Enoksen*, 2010)	Sonde Moen Sindre Buraas Lars Erik Maide Henrik Ingebrigtsen	2008	15. European Cross-country Championship junior team race 2. place

Table 2. Five-zone intensity scale (source: Tjelta, 2016).

Intensity Zone	Type of training	Lactate (mmol/L)	% HRmax	Physiological adaptation
1	Easy and moderate continuous running	0.7-2.0	62-82	Recovery and improved running economy
2	Threshold training	2.0-4.0	82-92	Increase v AT and VO_{2max}
3	Intense aerobic intervals	4.0-8.0	92-97	Increase VO_{2max}
4	Anaerobic training, mainly at 800 m and 1500 m pace	>8.0	>97	Increase anaerobic capacity
5	Sprint			Increase speed

For the Ingebrigtsen brothers, the amount of training around and above the anaerobic threshold in the preparation period was 23-25% of the weekly mileage during the 2018-19 season, with limited work in the anaerobic zones. Zone 2 training was done 4 times a week. They completed two anaerobic threshold interval sessions on the same training day ("*double-threshold day*") twice a week. In the morning, 2-3 km intervals

were run with short rest (5x6 min), and in the afternoon, intervals between 400 m and 1000 m were run at 5 and 10 km race pace (12x1000 m with one-minute rest, or 25x 400 m with 0.5-minute rest). The volume of anaerobic threshold training sessions (Zone 2) was 8-12 km. This was supplemented with one Zone 4 workout per week (e.g. 20x200 m hill run), plus short sprints at 60 and 100-m distances. Between 75 and 80 percent of the total training, volume was done at low intensity in Zone 1 (Tjelta, 2019). These intensity distributions are typical of Henrik Ingebrigtsen's training in 2012 (see Figure 1) (Tjelta, 2013) and Kalle Berglund's training in 2019 (Bengtsson, 2019).

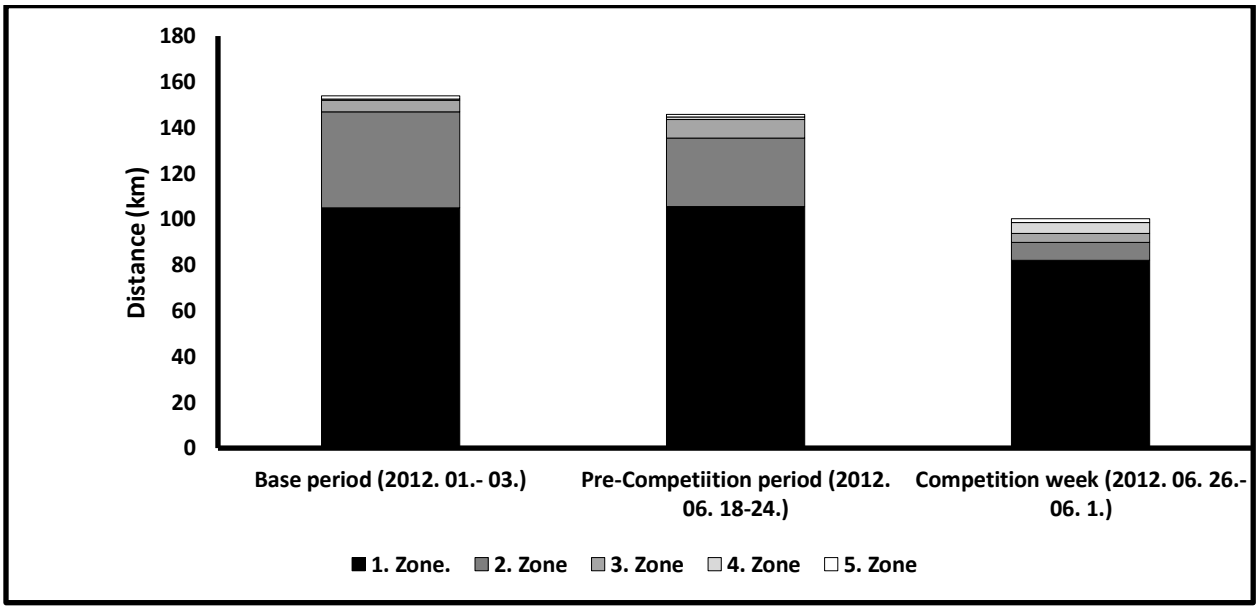

Figure 1. Henrik Ingebrigtsen's weekly kilometres and intensity distribution at different stages of his preparation in 2012 (Source: Tjelta, 2013).

During the pre-competition preparation period, the number of Zone 3 training sessions was reduced and the number of Zone 4 (3000- 800 m race pace) race-specific training sessions was increased. During the race period, in the race-free weeks, the ratio of low-intensity to high-intensity (Zone 2-5) mileage was 75:25, while in the race weeks the ratio was 80:20 (Tjelta, 2013).

A similar distribution was observed for Wigene, Bakken, and Kristensen (Enoksen et al., 2011). In the base period, the proportion of Zone 1 distances was 76% (average 123± 11 km per week), which increased to 79-80% during the preparation and competition periods. The number of kilometres completed in Zone 2 (anaerobic threshold) was 31.6 for the three runners (19.6%) weekly during the base period, decreasing to 14.5% and 13% in subsequent periods. The proportion of anaerobic endurance training (3000m and 800 m race pace) was 2.7; 3.6 and 4.9% respectively. Short sprints and strides accounted for 1.3-1.8% of the total training load.

Grete Waitz completed 52% of her training at a low intensity between November 1978 and October 1979, 43% of her training with sustained running in Zone 2. 2.5% of her training was in Zone 3, but this was mainly made up of 3000 m and 10,000 m races. He ran 2% in Zone 4 and 0.5% in Zone 5 (Tjelta et al., 2014).

Ingrid Kristiansen completed 91.31% of her average weekly 155 kilometres between November 1985 and October 1986 at low intensity (Zone 1), with 4.7% of her anaerobic threshold intensity (3:10 and 3:40 min/km

for her) during this period, in the form of sustained running at distances between 3 and 23 kilometres. The number of anaerobic endurance training sessions during the period was 10, which is only 0.37%, these were done at distances of 200 and 300 meters at 1500 meter race pace. Sprint training sessions accounted for 0.12% of the annual total, at 60 to 100-meter distances. The number of aerobic capacity workouts was 45/ 3.5% (Zone 3). This included races between 3 and 10 kilometres and intervals between 400 and 1000 meters with the same speeds (Tjelta, 2019).

During the training of the junior team, silver medallists at the 2008 European Championships in Cross Country Running, 78.3% of the distances covered were low intensity, 19.5% were at anaerobic threshold intensity (82-92% HRmax), typically in the form of intervals two to four times a week, with longer, sustained runs being less frequent. An anaerobic threshold training session was between 8 and 14 km (26-47 min) in volume. Aerobic capacity (92-97% HRmax) accounted for only 1.3% of the weekly volume, with athletes spending 0.5% of the workout at the highest speeds (Zone 5). During the competition period, the proportion of training sessions belonging to Zone 2 decreased to 11.7%, while that of training sessions developing aerobic capacity increased to 4.8% (Tjelta & Enoksen, 2010).

DISCUSSION

The most competitive Norwegian distance runners have high weekly mileage, averaging 160 km per week per year, which can be as high as 180 km in the winter preseason and 120 km in the summer racing season. Both the literature (Kariosk, 1984) and empirical observations by coaches are consistent with the finding that the training of the best elite distance runners is characterized by a similar volume of work. Of this volume, 75-80% of all but 1 of 13 runners (Grete Waitz) is low intensity (>2 mmol/L lactate) sustained running primarily for recovery and general aerobic endurance development. Stephen Seiler has published several studies concluding that most endurance athletes train at a ratio of 80:20 for low-intensity to above-anaerobic threshold training (Seiler, 2010). All athletes except Ingrid Kristiansen spend 15-20% of their weekly training on anaerobic threshold training, 30-40 km of work per week in Zone 2. What makes the Norwegian system special is the structure of these workouts. To be able to do this amount of work at this intensity has been solved since the 2000's mostly with "*double-threshold days*", where anaerobic threshold training is done in the morning and afternoon, mainly in the form of intervals (Casado et al., 2023). These workouts are closely monitored during rest periods using lactate measurement and heart rate monitoring. These are the tools and the appropriate coordination of intensity that allow this high volume of relatively fast, aerobic endurance training to be performed effectively and prevent over-exertion. Morning exercise on these days is in the form of longer interval distances (2-3 kilometres or 6-10 minutes) and lactate levels are kept below 2.5 mmol/L, an intensity equivalent to a marathon race pace. In many cases, a treadmill is used to optimize conditions in bad weather and reduce mechanical stress. The second training session of the day takes place 5-6 hours later, where shorter intervals with short rest periods are completed (10-12 x 1000 meters with 1-minute rest; 25 x 400 meters with 30 seconds rest, or 45-second intense stretches with 15 seconds rest). The short intense stretches allow them to work at higher intensities without lactate build-up, so they run at a 5-10 kilometre race pace while keeping lactate levels below 3.5 mmol/L for most of the training. On such a day, they complete 2 x 10-12 km in Zone 2 (Table 3). In the case of Marius Bakken, this was 2 minutes 53 seconds per kilometre before his personal best of 5000 meters in 2006, at 3 mmol/L over the 1000-meter repetition distance. Lactate threshold training is performed 2-4 times per week (Bakken, 2021). Another difference from the traditional approach is that no intense, longer (<800m) aerobic capacity interval training is performed in Zone 3 (92-97% HRmax) during the base period. This is consistent with recent research that the best distance runners preparation in other nations is characterized by tempo runs (Zone 2) and short intense intervals (Zone 4) (Casado et al., 2021). Except for short 60-100 m speed development sprints above the anaerobic threshold,

the best Norwegian distance runners train once a week at anaerobic intensities. During this training, anaerobic endurance and race speed economy are developed is done in the form of short intervals, which in several cases are hill runs (20 x 200 m hill runs, 70 seconds jogging back recovery). By combining these elements during the long training period, runners develop aerobic endurance to a very high level which is reflected in high VO_{2max} values (Tjelta & Enoksen, 2010). Henrik Ingrebrigtsen's 2010 VO_{2max} was 84.4 ml/kg/min (Tjelta, 2013), while Marius Bakken's was 87.4.

This high aerobic endurance in the weeks leading up to races enables them to perform intense race-specific high lactate training (>8 mmol/L). Anaerobic threshold training is also performed during the summer but at a lower frequency. The weekly training schedule during this period is more varied than during the preparation period and varies from week to week depending on the competitions. During the summer period, in the weeks without competition, the volume of work is done at the usual level (140- 160km/week).

Table 3. Kalle Berglund's one-week training during the 2018-2019 season's preseason (source: Bengtsson, 2019).

Day	Base period
Monday	AM 10 km easy PM 10 km easy, speed development
Tuesday	AM Anaerobic threshold workout: 5 x 6 minutes (1 min rest), 2.5 mmol/L PM Anaerobic threshold workout: 10 x1000 m (1 min rest), 3.5 mmol/L
Wednesday	10 km easy, strength and core
Thursday	AM Anaerobic threshold workout: 5 x 2 km (1 min rest), 2.5 mmol/L PM Anaerobic threshold workout: 25 x 400 m (30-sec rest), 3.5 mmol/L
Friday	10 km easy
Saturday	AM Hill training: 20 x 219-meter hills (70-sec jog back), 8,0 mmol/L PM 10 km easy
Sunday	AM 20 km long run PM Strength and core

CONCLUSION

The training of the most competitive Norwegian distance runners is characterized by high weekly volumes (120-180 km/week), most of which (70-80%) is done at low intensity (62-82% HRmax; 07-2.0 mmol lactate). High-intensity training is mostly done around the anaerobic threshold (82-92% HRmax; 2-4 mmol/L lactate). These workouts are typically performed in interval form 2-4 times per week, often twice on a training day ("*double threshold day*"). To achieve the right intensity and prevent overload, lactate measurement and heart rate monitoring are used during the workouts. The remainder of high-intensity workouts (>97% HRmax; >8.0 mmol/L lactate) are faster, short intervals (>800 m), and short sprints 1-2 times per week. The use of intense, longer-duration aerobic capacity intervals (92-97% HRmax; 4.0-8.0 mmol/L lactate) is not typical during the base period. Race-specific longer interval training at race speeds and the development of anaerobic capacity are started 6-10 weeks before the race, with a parallel reduction in the number of training sessions close to the anaerobic threshold.

AUTHOR CONTRIBUTIONS

Bence Kelemen developed the theoretical formalism, conducted a systematic review of the research and summarised the data. Authors Bence Kelemen and Ottó Benczenleitner contributed to the final version of the manuscript. The project was supervised by László Tóth.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

REFERENCES

Bakken M. (2021). The Norwegian model. Retrieved from: http://www.mariusbakken.com/the-norwegian-model.html (2021, acessed 25 January 2022)

Bengtsson J. (2019). Kalle Berlgrund training program. Retrieved from: https://pajulahti.com/wp-content/uploads/2020/01/Jan-Bengtsson-Pajulahti.pdf (2019, accessed 25 January 2022)

Brandon L. J. (1995). Physiological factors associated with middle distance running performance. Sports medicine (Auckland, N.Z.), 19(4), 268-277. https://doi.org/10.2165/00007256-199519040-00004

Casado, A., Foster, C., Bakken, M., & Tjelta, L. I. (2023). Does Lactate-Guided Threshold Interval Training within a High-Volume Low-Intensity Approach Represent the "Next Step" in the Evolution of Distance Running Training? International Journal of Environmental Research and Public Health, 20(5), 3782. https://doi.org/10.3390/ijerph20053782

Casado, A., Hanley, B., Santos-Concejero, J., & Ruiz-Pérez, L. M. (2021). World-Class Long-Distance Running Performances Are Best Predicted by Volume of Easy Runs and Deliberate Practice of Short-Interval and Tempo Runs. Journal of strength and conditioning research, 35(9), 2525-2531. https://doi.org/10.1519/JSC.0000000000003176

Conley, D. L., & Krahenbuhl, G. S. (1980). Running economy and distance running performance of highly trained athletes. Medicine and science in sports and exercise, 12(5), 357-360. https://doi.org/10.1249/00005768-198025000-00010

Filipas, L., Ballati, E. N., Bonato, M., La Torre, A., & Piacentini, M. F. (2018). Elite male and female 800-m runners' display of different pacing strategies during Season-Best performances. International Journal of Sports Physiology and Performance, 13(10), 1344-1348. https://doi.org/10.1123/ijspp.2018-0137

Gastin, P. B. (2001). Energy system interaction and relative contribution during maximal exercise. Sports Medicine, 31(10), 725-741. https://doi.org/10.2165/00007256-200131100-00003

Haugen, T., Sandbakk, Ø., Enoksen, E., Seiler, S., & Tønnessen, E. (2021). Crossing the Golden Training divide: the science and practice of training World-Class 800- and 1500-m runners. Sports Medicine, 51(9), 1835-1854. https://doi.org/10.1007/s40279-021-01481-2

Karikosk O. (1984) Training Volume in Distance Running, Modern Athlete and Coach, 1984, 22(2), 18-20.

Kelemen B., Béres S., Szalma L., Gyimes Zs.(2020). A tactical comparison of men's middle distance running. Magyar Sporttudományi Szemle 2020; 21/ 85, 2020/3, 58-59.

Midgley, A. W., McNaughton, L. R., & Jones, A. M. (2007). Training to enhance the physiological determinants of long-distance running performance: can valid recommendations be given to runners and coaches based on current scientific knowledge?. Sports medicine (Auckland, N.Z.), 37(10), 857-880. https://doi.org/10.2165/00007256-200737100-00003

Noakes, T. (2001). Physiological capacity of the elite runner. Running & Science-in an interdisciplinary perspective. Copenhagen: Institute of Exercise and Sports Sciences, University of Copenhagen, Munksgaard, 19-47.

Noakes, T. D., Myburgh, K. H., & Schall, R. (1990). Peak treadmill running velocity during theVO2max test predicts running performance. Journal of Sports Sciences, 8(1), 35-45. https://doi.org/10.1080/02640419008732129

Seiler S. (2010). What is best practice for training intensity and duration distribution in endurance athletes?. International journal of sports physiology and performance, 5(3), 276-291. https://doi.org/10.1123/ijspp.5.3.276

Seiler, K. S., & Kjerland, G. Ø. (2004). Quantifying training intensity distribution in elite endurance athletes: is there evidence for an "optimal" distribution? Scandinavian Journal of Medicine & Science in Sports, 16(1), 49-56. https://doi.org/10.1111/j.1600-0838.2004.00418.x

Seiler, S., & Tønnessen, E. (2009). Intervals, Thresholds, and Long Slow Distance: the Role of Intensity and Duration in Endurance Training.

Tjelta LI, Rønning TA, Dyrstad S. (2012) Relationship between Velocity at Anaerobic Threshold and Factors Affacting Velocity at Anaerobic Threshold in Elite Distance Runners. International Journal of Applied Sports Sciences. 2012; 24. 8-17. https://doi.org/10.24985/ijass.2012.24.1.8

Tjelta, A.R., & Tjelta, L.I. (2011). Distribution of Training Volume and Intensity of Elite Male and Female Track and Marathon Runners. International Journal of Sports Science & Coaching, 6, 273 - 293. https://doi.org/10.1260/1747-9541.6.2.273

Tjelta, L. I. (2016). The training of international level distance runners. International Journal of Sports Science & Coaching, 11(1), 122-134. https://doi.org/10.1177/1747954115624813

Tjelta, L. I. (2019). Three Norwegian brothers all European 1500 m champions: What is the secret? International Journal of Sports Science & Coaching, 14(5), 694-700. https://doi.org/10.1177/1747954119872321

Tjelta, L. I., & Enoksen, E. (2010). Training Characteristics of Male Junior Cross Country and Track Runners on European Top Level. International Journal of Sports Science & Coaching, 5(2), 193-203. https://doi.org/10.1260/1747-9541.5.2.193

Tjelta, L. I., Tønnessen, E., & Enoksen, E. (2014). A case study of the training of Nine Times New York Marathon winner Grete Waitz. International Journal of Sports Science & Coaching, 9(1), 139-158. https://doi.org/10.1260/1747-9541.9.1.139

Tjelta, L.I. (2013). A Longitudinal Case Study of the Training of the 2012 European 1500m Track Champion. International Journal of Applied Sports Sciences, 25, 11-18. https://doi.org/10.24985/ijass.2013.25.1.11

Tjelta, L.I.; Enoksen, E. Training volume and intensity (2001). In Running & Science-An InterdisiciplinaryPerspective; Bangsbo, J., Larsen, H.B., Eds.; Institute of Exercise and Sport Sciences, University ofCopenhagen: Copenhagen, Denmark 2001; pp. 149-177.

Tucker, R., Lambert, M., & Noakes, T. D. (2006). An analysis of pacing strategies during men's World-Record performances in track athletics. International Journal of Sports Physiology and Performance, 1(3), 233-245. https://doi.org/10.1123/ijspp.1.3.233