

Training women for the Heptathlon – A brief outline

By Jitka Vindusková

The status of women's combined events within the athletics programme has affected the performance demands and the training required for success. When the Pentathlon was included in the Olympic programme in 1964, evidence of systematic combined event training could be noted for the first time. The trend became more pronounced with the introduction of the Heptathlon in 1981. This article has been adapted from a presentation given by the author at High Level Coaching Seminar 'Combined Events' (Prague, 27.-30. September 2002). It starts with a discussion of the increased competitive opportunities for the combined events and performance development in the Heptathlon. It then gives the performance demands and an overview of the training and development for the event. It concludes with an extensive list of methods available for various aspects of the training process together with loading information.

ABSTRACT

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Introduction

The number of competitive opportunities for the combined events has increased dramatically in recent years. Men's and women's competitions are now a feature of the programmes of all international games and championships for senior athletes and in all 'junior' (17, 19, 23) category championships. A European Cup in combined events has been held since 1973, initially on a biennial basis then changing in 1993 to an annual fixture with three divisions of national teams competing. The number of traditional combined events meetings has grown to the point where there are enough competitions on the international calendar to support a combined events grand prix – the IAAF Combined Events Challenge. On the national level, the number of championships across all age categories seems to be increasing. This growth in opportunity has increased the attractiveness of the combined events for both the public and the athletes.

The relatively short history of the women's combined events has been punctuated with numerous changes to the scoring system and in the number, choice, and order of disciplines. The Pentathlon was first included in the European Championships programme at Brussels in 1950 and in the Olympic Games at Tokyo in 1964. The Heptathlon was introduced in 1981 and has featured in the programme of all major athletics competitions since.

Performance development in the Heptathlon

Since the introduction of the Heptathlon, only three names have figured in the list of world record holders (Table 1). The current record, set by the fantastic Jackie Joyner-Kersey (USA) in 1988, is likely to remain in the record books for a long time to come.

Performance development in women's combined events has been conditioned by many factors, of which the most fundamental are:

- Social conditions (changes in the status of women in society, the conversion to professional and commercial sport, etc.)
- Material and technical conditions (artificial surfaces for tracks and run-up areas, vaulting poles, landing areas, clothing, footwear, etc.)
- Expansion in the athletics programme at national and international level
- Changes in the scoring system
- Developments in training

It is interesting to look a little deeper at the results and study the differences in the performances and careers between the world's best adult and junior heptathletes. Table 2 shows that the all-time best heptathletes (n=14) achieved their best performances (\bar{x} =6864.4) at about the age of 24, five years after their best junior performances (5922.6) and improved by an average of 941.9 points. Their athletic careers spanned 9.8 years on average.

The all-time best juniors achieved their best senior results (\bar{x} =6398.8) after 2.3 years of training. They improved by 198.8 points;

| | | | | |
|-----------------------|--|------------|---------------------|----------------------|
| 6716 (6788) | Ramona Neubert | GDR | Kiev | 27-28.06.1981 |
| | 13.70 - 15.41 - 1.86 - 23.58 - 6.82 - 40.62 - 2 :06.72 | | | |
| 6773 (6845) | Ramona Neubert | GDR | Halle | 19-20.06.1982 |
| | 13.58 - 15.10 - 1.83 - 23.14 - 6.84 - 42.54 - 2:06.16 | | | |
| 6836 (6935) | Ramona Neubert | GDR | Moscow | 18-19.06.1983 |
| | 13.42 - 15.25 - 1.82 - 23.49 - 6.79 - 49.94 - 2:07.51 | | | |
| 6867 (6946) | Sabine Paetz | GDR | Potsdam | 05-06.05.1984 |
| | 12.64 - 15.37 - 1.80 - 23.37 - 6.86 - 44.62 - 2:08.93 | | | |
| 7148 | Jackie Joyner-Kersey | USA | Moscow | 06-07.07.1986 |
| | 12.85 - 14.76 - 1.88 - 23.00 - 7.01 - 49.86 - 2:10.02 | | | |
| 7158 | Jackie Joyner-Kersey | USA | Houston | 01-02.08.1986 |
| | 13.18 - 15.19 - 1.88 - 22.85 - 7.03 - 50.12 - 2:09.69 | | | |
| 7215 | Jackie Joyner-Kersey | USA | Indianapolis | 15-16.07.1988 |
| | 12.71 - 15.65 - 1.93 - 22.30 - 7.00 - 50.08 - 2:20.70 | | | |
| 7291 | Jackie Joyner-Kersey | USA | Seoul | 23-24.09.1988 |
| | 12.69 - 15.80 - 1.86 - 22.56 - 7.27 - 45.66 - 2:08.51 | | | |

Table 1: World Records in the Heptathlon 1981 to present

| | All Time Best Senior Heptathletes (n=14) 1984 – 2000 | | | All Time Best Junior Heptathletes (n=20) 1983 - 1997 | | | Difference of \bar{X} |
|----------|--|--------|-----------------|--|-------|-----------------|-------------------------|
| | X | S | r _{vd} | X | S | r _{vd} | |
| AGE | 24.6 | 2.0 | | 20.9 | 2.8 | | -3.7 |
| HEP SEN | 6864.4 | 161.4 | | 6398.8 | 261.3 | | -465.6 |
| 100mH | 13.26 | 0.33 | -0.581 | 13.73 | 0.38 | -0.665 | 0.48 |
| HJ | 1.86 | 0.05 | 0.254 | 1.81 | 0.08 | 0.366 | -0.05 |
| SP | 14.74 | 0.97 | 0.457 | 14.00 | 1.13 | 0.604 | -0.74 |
| 200m | 23.54 | 0.41 | -0.445 | 24.34 | 0.65 | -0.389 | 0.80 |
| LJ | 6.71 | 0.26 | 0.672 | 6.34 | 0.26 | 0.699 | -0.38 |
| JT | 46.96 | 3.95 | 0.189 | 45.01 | 5.72 | 0.455 | -1.95 |
| 800m | 130.47 | 3.85 | 0.053 | 132.85 | 3.18 | 0.006 | 2.38 |
| | X | S | r _{vd} | X | S | r _{vd} | |
| AGE | 19.4 | 1.6 | | 18.5 | 0.8 | | -0.9 |
| HEP JUN | 5922.6 | 5934.6 | | 6200.1 | 130.1 | | 277.5 |
| 100mH | 14.22 | 0.62 | -0.68 | 13.90 | 0.31 | -0.45 | -0.32 |
| HJ | 1.75 | 0.08 | 0.73 | 1.79 | 0.07 | 0.04 | 0.04 |
| SP | 12.67 | 1.15 | 0.69 | 13.37 | 1.05 | 0.46 | 0.71 |
| 200m | 24.84 | 0.65 | -0.81 | 24.43 | 0.58 | -0.60 | -0.41 |
| LJ | 6.21 | 0.28 | 0.51 | 6.21 | 0.22 | 0.39 | 0.01 |
| JT | 40.16 | 5.53 | 0.45 | 43.93 | 5.52 | -0.06 | 3.77 |
| 800m | 136.25 | 6.20 | -0.560 | 135.21 | 4.26 | -0.332 | -136.25 |
| AGE | 28.5 | 4.1 | | 23.6 | 5.7 | | -5.0 |
| HEP LAST | 6431.2 | 286.6 | | 6215.0 | 189.8 | | -216.3 |
| IMPROV. | 941.9 | 404.4 | | 198.8 | 221.8 | | -743.1 |
| TO TOP | 5.1 | 2.1 | | 2.3 | 2.5 | | -2.8 |
| ALL | 9.8 | 4.0 | | 5.0 | 5.5 | | -4.8 |

Table 2: Performances by the Best Senior and Junior Heptathletes

their junior performances were 277.5 points better than the junior performances of the all-time best heptathletes. The all-time best juniors ended their athletic career after an average of five years.

It is also interesting to note that tall, slender athletes tend to do best in junior Heptathlon competitions. The participants at the IAAF World Junior World Championships in

Athletics Heptathlon were, on average, 1.75 metres tall and weighed 59.6 kilograms.

Performance demands

The Heptathlon is a technical discipline of a speed and strength nature. The key performance skills are maximum speed, explosive power and speed endurance.

The status of women's combined events within the athletics programme has affected the performance demands and the training required for success. Initially, athletes who could produce sound performances in two or three disciplines did the best. When the Pentathlon was included in the Olympic programme, the need to perform well across the spectrum of events increased and evidence of systematic combined event training could be noted for the first time. This trend became more pronounced when the Heptathlon replaced the Pentathlon.

The athlete's movement potential is obviously a key consideration. General and special motor tests that can be used for assessing this potential are shown in Table 3.

A second consideration is co-ordination. Good co-ordination enables athletes to manage their movements purposefully, to adopt the right movements quickly, and adapt them by refinement to internal and external conditions.

In addition to the technical skills in the individual disciplines, heptathletes must be able to cope with special technical and tactical demands. Like all combined event athletes, they must be able to achieve maximum performance:

- In the sprints and hurdles without the benefit of qualifying runs
- In the long jump and throws with a limited number of attempts
- In a fixed sequence of events
- Even as they become fatigued

Developed intellectual and social skills will help heptathletes cope with difficult situations in their preparation and during competition. Athletes who can be sufficiently aggressive and self-confident during a competition and balanced and reliable in training tend to be successful in combined events.

Through training and competitions, heptathletes must learn about physical and mental hygiene, rational nutrition, and how to work with scoring tables. They should

| Test or Discipline | Score Level | | |
|-----------------------|-------------|---------|---------|
| | 4800 | 5500 | 6200 |
| 60m | 8.20 | 7.80 | 7.50 |
| 100m | 12.90 | 12.30 | 11.80 |
| 150m US | 20.20 | 19.20 | 18.20 |
| 600m | 1:49.0 | 1:43.0 | 1:37.0 |
| 5-jump | 13.00 | 14.00 | 15.00 |
| Overhead shot 4kg | 11.80 | 12.90 | 15.20 |
| Bench | 45 | 55 | 70 |
| Standing shot put 4kg | 9.30 | 10.40 | 12.70 |
| Shot put 3kg | 11.50 | 12.70 | 15.00 |
| 100m hurdles | 15.60 | 14.50 | 13.80 |
| High jump | 1.60 | 1.70 | 1.80 |
| Shot put | 10.50 | 11.70 | 14.00 |
| 200m | 26.80 | 25.50 | 24.50 |
| Long jump | 5.30 | 5.75 | 6.20 |
| Javelin | 35.00 | 40.00 | 45.00 |
| 800m | 2:30.00 | 2:24.00 | 2:15.00 |

Table 3: Demand profile for selected performance levels in the Heptathlon

also have a good knowledge of their competitors and their performances in order to estimate possibilities and requirements in competition.

The level of tactical preparation for the Heptathlon is manifested in overall conduct during the event, examples include:

- Optimal warm-up prior to a discipline and between disciplines (in order to achieve good performances at the first attempt),
- Correct choice of starting height in the high jump
- Correct choice of tempo in the 800 metres

Heptathletes must also be well equipped for competitions (food, drink, clothing, spikes, etc).

Training overview

The aim of Heptathlon training is for the athlete to achieve the best possible performance during her period of maximum performance possibility, as determined by the individual's overall development and the available competition. The basic task is to adapt the techniques and tactics required for the individual disciplines to the combined events context. It is also necessary to develop the athlete's condition and personality to meet the requirements for competitive success.

The core of combined events training lies in preparing an athlete's condition and technique. During training, we start by forming general skills and then go on to refining special skills. When selecting training exercises, we start with preparatory exercises and then move on to development exercises, switching in both cases from general to specialised exercises. When selecting training methods, we proceed from extensive to intensive methods.

The systematic improvement of technical skills, linked to the changing level of condition preparation, enables heptathletes to achieve better performances in the technical disciplines. A perfect sprint technique is manifest-

ed as relaxation and relative consistency of the stride, rhythmical running over hurdles while holding the torso in an upright position, low swing and stretch legs. In the jumping disciplines, we pay attention to a smooth connection between the run-up and the jump and the correct position of the torso when the jump is made. In the throwing disciplines, we attempt the gradual integration of the legs, torso, and arms with the graded final effort.

Within the long-term preparation, a primary all-round approach to exercises and improvement of techniques in a wide variety of individual disciplines is a feature of the general and specialised preparation stages. Focus on the Heptathlon begins in the second part of the specialised preparation stage. In this stage, we pay close attention to the development of special performance skills, the adoption of special combined events skills and on the regulation of the degree of an athlete's aspiration, to be consistent with her ability to perform in top-level competition. Volume oriented methods form the bulk of training in all preparation stages.

During the specialisation stage, extensive methods continue to dominate while the focus of technique training is on the disciplines of the Heptathlon. The periodic nature of preparation is emphasised and the nature of training changes considerably in the individual training periods. The number of Heptathlon competitions per year is increased to 2-5 events and the overall competition programme increases as well. Young combined events athletes also take part in the sprint, hurdles, and long jump.

At the end of this stage, a decision is made on the athlete's prospects in relation to the Heptathlon. We take on athletes for top-level Heptathlon training only on the provision that there are no factors preventing high-level performance, i.e. a low maximum speed, considerable weaknesses in one or more of the disciplines (javelin, 800 metres), frequent injuries and health problems, lack of systematic training to date, collapsing during competitions, low willingness to adapt their lifestyle to top-level training, training acceleration, etc.

At present, the dominant features of professional training for heptathletes are:

- Absolute individualisation of the training load
- Use of specialist consultants for refining techniques in individual disciplines
- Use of a wide range of medical products to prevent health problems
- Long-term training stays in places with good weather (Canary Islands, South Africa, etc.)

Examples of training content

Physical preparation

1) Development of speed and power

- General sprinting exercises
- General jumping preparation exercises
- General throwing exercises
- Individual and multiple vertical and horizontal jumps (repeated up to ten times)
- Exercises with a 50% load in series, 4-6 repetitions in one series
- Plantar inflexions with a 60-80% load, 10-20 repetitions in one series

All attempts in the jumping and throwing disciplines develop speed and power. The following number of repetitions is recommended in a single training session: up to 80 vertical jumps, up to 100 horizontal jumps, 30-50 throws at submaximal intensity.

2) Development of speed

- Positional and awareness starts
- Half-standing starts
- Crouch starts
- Graded runs 60 – 100m
- Short sprints 15 – 50m with start of 10 – 30m
- Run-up for distance
- Running over 3 – 5 hurdles

In one training session, the total volume should not exceed 0.3-0.35km. The maximum number of repetitions is 6-8. Rest intervals: 2-3 minutes.

3) Development of power

- General strength and firming exercises for direct holding of the body
- Exercises on power machines
- Gymnastic and acrobatic exercises
- Exercising and improving technique in special muscle development exercises with a loose dumbbell
- Throwing and jumping exercises, 10 – 20 repetitions
- Exercises with a 50-70% load, 4-8 repetitions in one series
- Exercises with an 80 – 90% load, 1 – 3 repetitions

In addition to increasing the speed and power element, we develop work on general power endurance and we begin developing maximum strength. Overall volume in one training session: 150 vertical jumps, 120 horizontal jumps, 150-200 throws.

4) Development of endurance

General endurance:

- Constant tempo run of 5 – 8km
- Running with varying speed for 15 – 30 min
- Momentum running 100 – 200m, 10 – 16 repetitions (low tempo), total of 1.2 – 2.0km
- Swimming 100 – 400m, 1 – 5 repetitions
- Cross-country skiing 5 – 25km
- Jumping exercises, more than 20 repetitions (low intensity), total of 150 – 200 jumps.

Tempo endurance:

- Sections of 100 – 200m with repetition, tempo 60 – 80 % (heart rate at end of section 160 – 180 bpm)
- Total volume 1.0 – 1.2km per training session

Speed endurance:

- Sections of 70 – 100m with repetition, tempo 80 – 90%
- Total volume 0.6 – 0.8km per training session

5) Development of mobility

- Gymnastic strengthening, stretching, and relaxing exercises focusing on individual joints and muscle groups.

Total number of exercises in special-focus training sessions: torso 45 – 60, hip joint 30 – 35, ankle joint and knee joint 30 – 40, shoulders 25 – 35. Number of repetitions in series: 3 – 5, number of series: 6 – 8. Stretching exercises are carried out after a warm-up. Stretching muscles after previous contraction is highly effective. We carry out stretching gently, without sudden, jerky, or violent movements. Stretching exercises take place at the beginning and end of each training session.

Technical preparation

1) Development of co-ordination

- Running over hurdles of different heights and distances
- Alternate jumping over hurdles of various heights
- Throws with varying degrees of force
- Running against and with the wind
- Jumps from boxes of various heights
- Mirror exercises
- Co-ordinated movement of the arms and legs
- Jumps with varying arm work
- Running at different frequencies and strides
- Alternating different styles
- Alternate right and left jumping leg and right and left throwing arm
- Alternating general movement and details
- Exercising when very tired
- Exercises with the eyes closed
- Exercising after rotation

For the development of co-ordination, we use frequent alternation of a wide range of exercises with a small number of repetitions, we change the internal and external conditions in the way movement is carried out.

2) Hurdles

- Running over small hurdles with short intervals (rhythm exercise)
- Hurdling with only stretch or swing leg
- Walking over hurdles focusing on the scope of movements and maintaining balance
- Run-up to the first hurdle

- Hurdling with a one-stride, three-stride, and five-stride rhythm
- Running over 4 - 8 hurdles

3) High Jump

- Gymnastics on the landing pad
- Scissor jumps from a short run-up
- Scissor jumps after curved run-up
- Curved run-up with indication of jump point
- Jumps from a short run-up to the landing pit, with no crossbar
- Jumps from a short run-up
- Jumps from a short run-up from a higher jump point
- Jumps with a full run-up

4) Shot put

- Standing vertical throw
- Throws from the front position, on the spot or with a jump
- Seated throws
- Repeated pushes, with or without a shot
- Individual pushes with adjustment of the throwing stance
- Standing throw from a sideways position
- Throw with push, focusing on fluency and explosiveness of movement

5) Long jump

- Run-up to jump
- Jumps from a short and gradually extended run-up with landing on swing leg
- Jumps from a short and gradually extended run-up, exercising pre-jump rhythm
- Jumps from a short and gradually extended run-up, exercising flight and landing stages of jump
- Jumps from a run-up, focusing on acceleration to the jump
- Jumps with full run-up

6) Javelin

- Light throws from front position
- Throws from position with step forward
- Standing throws with sideways position

- Throws from impulse jump
- Throws from short run-up
- Throws with full run-up

Tactical and theoretical preparation

- Rudiments of physiological training
- Rudiments of biomechanics
- Tactical behaviour during combined events

Psychological preparation

- Diversity of trainers' didactic skills
- Stress situation modelling
- Supplementary activities during training
- Exercising how to control current mental states
- Contribution to the planning of further training and competition activities
- Optimisation of social background (work, study, etc.)

Regeneration

- Massage
- Self-massage
- Sauna
- Underwater massage
- Alternating baths
- Swimming
- Baths
- Sleep

Literature

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