

Training Considerations for the Long Hurdles

Nathan Wiens – Iowa State University – Sprints/Hurdles

We will cover five basic objectives in the long hurdle race. 1) Identifying a Potential Long Hurdler, 2) Developing a Balanced Approach to Training the Biomotor Abilities 3) Development of Power and Speed, 4) Development of Aerobic Ability and Anaerobic Tolerance, 5) Identifying Performance Considerations and 5) Creating a Training Design. These five topics should move a coach from the beginning stages of identifying potential long hurdler through designing a training program to meet their needs.

Objective #1: Identifying a Potential Long Hurdler

Primary concern for high school athletes is identification of an athlete with the biomotor abilities to sprint the 400m effectively (or willingness to train to do so) with the mental toughness to engage 10 barriers along the way.

The 400m hurdles are one of the most exclusive events when identifying potential athletes. Athletes must possess, 1) The desire and heart to train like a 400-600m runner, 2) Strength; A balanced high level of core strength, maximal strength and strength endurance, 3) The mental focus, concentration and attitude to be aggressive on negotiating 10 barriers over 400m, 4) The flexibility and coordination of a short hurdler, 5) the steering ability of a pole vaulter/horizontal jumper, 5) And last but not least, sprinting ability as speed is the primary limiting characteristic throughout all the sprint events.

Objective #2: Develop a Balanced Approach to Training the Biomotor Abilities

There are five primary biomotor abilities. Speed, Strength, Endurance, Coordination and Flexibility. A balanced approach to training these attributes is needed because they are interdependent on one another. Great improvement of one ability is impossible without parallel improvement of the others. Every microcycle or week long plan should include training that incorporates all five abilities. Each week should have an individual focus (speed, strength, endurance etc.) but not lack attention to the others.

Objective #3: Development of Power and Speed

Although all biomotor abilities must be trained in connection with each other, speed must be addressed at the beginning stages of training. Done well, proper training of the speed component will ensure that correct sprint mechanics will be established and carried throughout the year. A technically efficient hurdler will make larger gains in improving stride length and stride frequency (the two factors that determine the speed of an athlete) throughout the course of training and will have a higher adaptation rate to the other biomotor abilities. However, if proper technique is not enforced early on, then training sessions can result in improper muscle memory and damage to soft tissue as the season progresses.

Phases of training power and speed are designed to progressively increase:

Speed => Short Speed Endurance => Speed Endurance => Special Endurance 1 => Special Endurance 2 (See Chart).

Exercises utilized in speed and power sessions include acceleration runs, fly's, sprint/flow/sprint or alternating speed runs at maximal levels, resisted and assisted runs, multi-jumps, multi-throws, Olympic lifts, and functional core development work.

Objective #4: Development of Aerobic Ability and Anaerobic Tolerance

This objective is to increase energy system functioning. Energy systems are responsible for providing an energy rich compound called ATP to fuel muscle work and recovery. The first energy system is the anaerobic (ATP-PC) Energy System which gives us 5-8 seconds of ATP Production. The second is the Anaerobic Lactate (Glycolytic) System where the breakdown of glucose or glycogen in anaerobic conditions results in the production of lactate and hydrogen ions. The accumulation of hydrogen ions is the limiting factor in runs of 300-800m at above 85-90% effort. The Aerobic Energy System utilizes proteins, fats and carbohydrates (glycogen) for resynthesizing ATP.

In increasing energy system functioning, we hope to increase the athlete's lactate threshold to minimize the effects of hydrogen ion interference with motor unit operation. To help the long hurdler achieve higher energy system functioning, extensive and intensive tempo runs are used. Distances of 100-600 meters are used and times are calculated off a percentage of 200m and 400m personal bests or goal paces.

As speed is a precursor to speed endurance, extensive tempo runs are a precursor to intensive tempo. Extensive tempo runs greatly assist the athlete in their ability to handle greater work loads and volumes and prepares the athlete for quicker recovery between sets/reps for workouts later in the year. Intensive tempo work is more intense and mixes the aerobic and anaerobic energy systems and begins to prepare the body to undergo training associated with lactate buffering.

Lastly, as speed moves towards speed endurance and intensive tempo moves the athlete towards the ability to handle special endurance workouts, we find ourselves nearing or in the midst of the early competition season. Special Endurance 2 runs are a means of increasing the body's tolerance of hydrogen ions or creating a lactate buffer. When performing special endurance 2 workouts, athletes will be flooded with lactate. Since hydrogen ion accumulation slows the contractile activity and the rate of glycolysis within the muscle and limits force production, these runs are prescribed during the pre-competition to competition phases to aid in lactate tolerance.

The physical and mental toll of these workouts can be very demanding. Focus through these microcycles should be given to these workouts and subsequent recovery periods and modalities need to also accompany these days.

Objective #5: Identifying Performance Considerations

This objective concerns the integration of hurdle technique and specific training into the mainframe of the training design. The below considerations are listed in order of importance and need to be integrated into the training design. Progression through the third and into the fourth point should occur before the first outdoor race.

- 1) Ability to apply force at takeoff to move through the hurdle and minimize deceleration.
- 2) Ability to perform effective and efficient hurdling skills with both legs.
- 3) Ability to maintain a consistent rhythm for 8-10 hurdles.
- 4) Ability to manage race distribution efficiently.

Stages in Technical Learning

- 1) Develop General Fitness
 - a. Permits the athlete to learn and repeat correct movements without having to compromise for weaknesses.
- 2) Develop Basic Technique
 - a. Basic technique must be learned correctly so that it can be built upon at faster speeds. The earlier the athlete learns the earlier he/she will ensure correct muscle memory. (Look for 85-90% mastery of the technique.)
- 3) Develop Specific Fitness
 - a. Raises the potential for more total expression through technique
- 4) Develop Advanced Technique
 - a. Advanced technique implies the optimal speed, strength, endurance, etc. can be expressed at the highest level of performance.

Objective #6: Creating a Training Design

When developing a training design for the long hurdler, coaches should start with their athlete's final week of competition in mind and move backward throughout the season. This way, the athlete will peak at the correct time without disturbances in training due to trying to force-in or string-out objectives throughout the phases.

Training for Long Hurlers - Weekly Training Cycles

Fall Training - General Prep

Monday: Sprint Development/Acceleration/Hurdle Skill/Plyo's/Weights
 Tuesday: Tempo Running/Weights
 Wednesday: Recovery/Core Training/Circuit Training/Swimming/Flexibility
 Thursday: Technical Runs/Transition Drills/Weights
 Friday: Hill Running/Strength Endurance/General Strength
 Saturday: Aerobic Development/Extended Warm-up/Fartlek Runs/Core Training/Flexibility
 Sunday: Rest

Specific Prep/Pre-Competition Phase

Monday: Sprint Development/Power Development/Hurdle Skill/Plyo's/Weights
 Tuesday: Hill Running or Extensive-Intensive Tempo/Strength Endurance/Weights
 Wednesday: Recovery/Core Training/Circuit Training/Swimming/Flexibility
 Thursday: Hurdle Skill/Technical Runs/Weights
 Friday: Specific Endurance/Lactacid Capacity/General Strength/Flexibility
 Saturday: Extended Warm-up/Tempo/Core Training
 Sunday: Rest

Indoor-Competition Phase

Monday: Speed-Power Development/Plyo's/Weights
 Tuesday: Hurdle Skill/Weights/Multi-jumps
 Wednesday: Lactacid Power/Strength Endurance
 Thursday: Recovery/Swimming/Weights/Core Training
 Friday: Pre-meet Routine/Acceleration
 Saturday: Competition
 Sunday: Rest

Competition Phase

Monday: Hurdle Skill/Plyo's/Weights
 Tuesday: Lactacid Power/400m Hurdle Distribution/Weights/Core Training
 Wednesday: Recovery/Core Training/Swimming or Tempo Running
 Thursday: 400m Hurdle Starts/Weights
 Friday: Pre-meet Routine/Easy Acceleration
 Saturday: Competition
 Sunday: Rest

	Fall	Specific/Pre-Comp	Indoor-Comp	Outdoor Comp
Monday	Acceleration Complexes, Resisted Runs, Multi-Jumps, Multi-Throws, Plyo's	3X4X30 Rest: 3'/7' 3X3X40 Rest: 3'/7' 2X5X50m Rest: 3'/7'	Stabilization of sprinting ability & power development.	Hurdle skill and speed drills over hurdles.
Tuesday	Circuits w/100-200m runs 2-3X8X100m 12-20X200m 2-3X3X300m	2X250, 200, 150m Hills 6X60sec hills 8-12X200m	Hurdle skill and refinement of hurdle ability with both legs	Hurdle Distribution 450, 400, 350, 300 350, 200, 100, 300 2X320
Wednesday	Recovery/Core Training	Recovery/Core Training	2X500, 3X200 2X450, 3X200 3-4X350	Recovery/Core/Swimming or Tempo Running
Thursday	Marching & Skipping Over Hurdles - Sprint Drills, Technical Runs, Hip Placement, Foot Strike, Shin Angles	Hurdle Skill - Maximize effective hurdling with both legs	Recovery, Swimming to maintain endurance and strength levels, Core Work and Weights	Hurdle Skill - Starts to the first hurdles/Rhythm
Friday	10X100 Hills 8-10X150m Hills 6-8X200m Hills	2X2X500m 600,400,200,400,600 2X600, 3X300	Pre-Meet Acceleration Hurdle Starts	Pre-Meet Acceleration/Handoffs Rest/Recovery
Saturday	Extended Warm-up Fartlek/1' on 2' off for 30' Cross Country Runs	Extended warm-up complex/sprint drills & jogs + tempo strides	Competition	Competition
Sunday	Rest	Rest	Rest	Rest

Categorization of Methods and Means (Examples of how energy system components can be categorized for planning)						Volume Range Per Session		
Common Terminology	Length Of Run	Component and Description of Objective	Energy System	Percent of Best Mark	Rest Interval Between Reps/Sets	Based on Best Race Distance		
						100m min-max	200/100 mH min-max	400/400 mh min-max
Extensive tempo	>200	Aerobic capacity (AC)	Aerobic	<69%	<45sec/<2min	1400-3000	1800-3000	2400-4000
	>100m	Aerobic Power (AP)	Aerobic	70-79%	30-90/2-3min	1400-1800	1800-2400	1800-3000
Intensive tempo	>80m	Lactacid capacity (LCAP) Aneerobic capacity	Ana/aerobic mix	80-89%	30sec-5min	800-1800	800-2000	1000-2800
Speed	20-80m	Speed (S)						
		Aneerobic power	Anaerobic	90-95	3-5min/6-8min	300-800	300-800	300-900
		Alactaid strength	Alactic	95-100	3-5min/6-8min	300-500	300-600	300-600
Speed Endurance	30-80m	Alactic Short Speed (ASSE)						
		Aneerobic Power	Anerobic	90-95	1-2min/5-7min	300-800	300-800	600-1200
		Aneerobic Capacity	Alactic	95-100	2-3min/7-10min	300-800	300-800	600-1200
	<80m	Glycolytic Short Speed Endurance (GSSE)						
		Aneerobic capacity	Anaerobic	90-95	1min/3-4min	300-800	300-800	600-1200
		Aneerobic power Lactacid capacity	Glycolytic	95-100	1min/4min	300-800	300-800	600-1200
90-150m	Speed endurance (SE)							
	Aneerobic power	Anerobic	90-95	5-6min	300-900	600-1200	400-1000	
	Lactacid strength	Glycolytic	95-100%	6-10min	300-600	300-600	400-800	
Special endurance 1	150-300m	Long speed endurance (LSE)						
		Aneerobic power	Anaerobic	90-95	10-12min	600-900	600-1200	600-1200
			Glycolytic	95-100	12-15min	300-900	300-1000	300-1000
Special Endurance 2	300-600m	Lactacid power (LAP)						
		Lactic acid tolerance	Lactic acid	90-95	15-20min	600-900	600-1200	600-1200
			Tolerance	95-100	full	300-600	300-600	300-900