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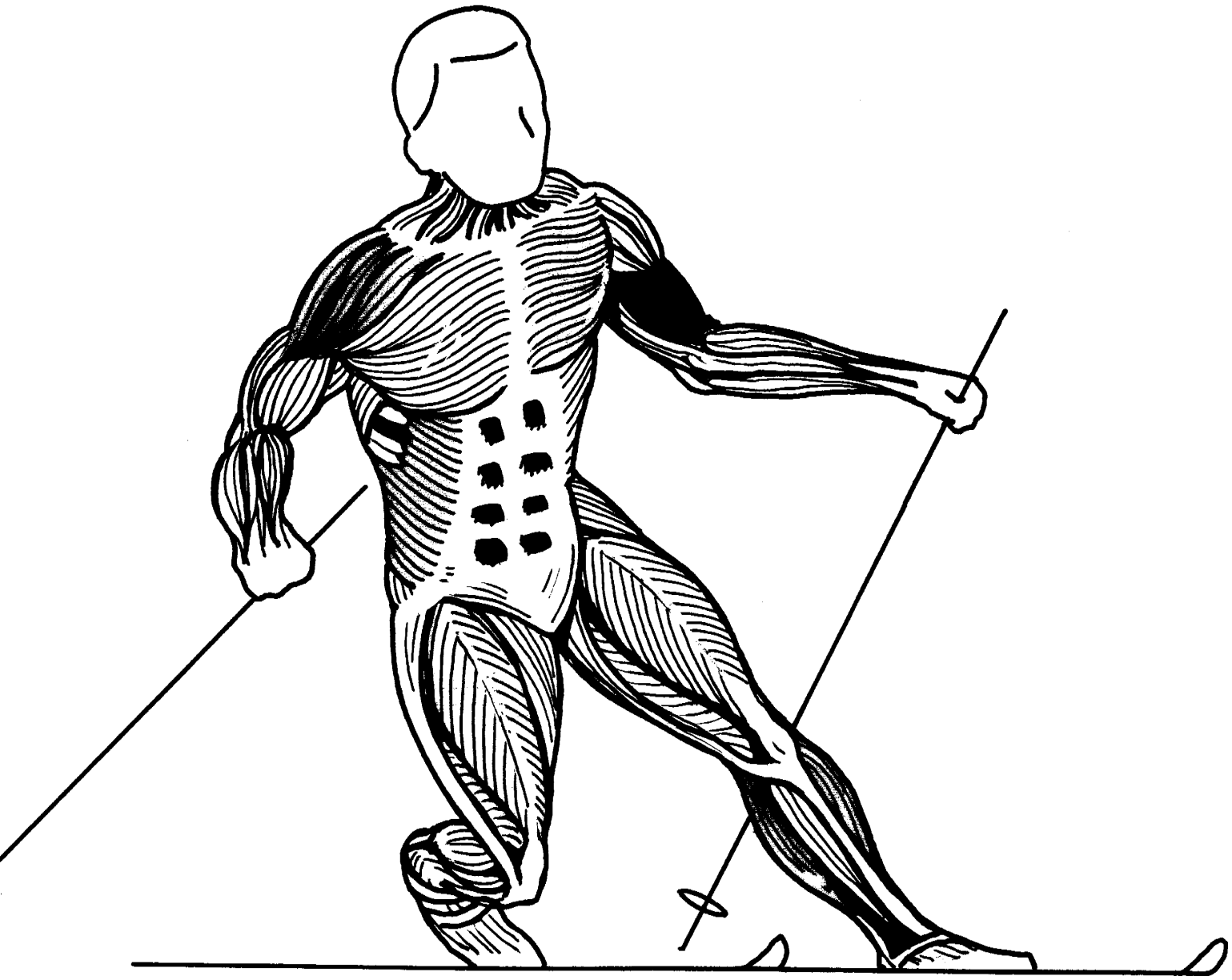
Through Total Conditioning



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PLEASE NOTE: Reference credentials abbreviated C.S.C.S identify Certified Strength and Conditioning Specialists.

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Preseason preparation for the collegiate shot putter

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Shot putters must acquire great strength, power, agility, flexibility and skill to be successful. While throwing the shot is the simplest of all throwing techniques, mastering this maneuver takes years of preparation. An optimal performance in the shot put is the result of a carefully planned program integrating several components of training, including aspects of Olympic lifting, power lifting and bodybuilding, as well as running, jumping and throwing. Improvement often comes from careful attention to detail. This article outlines the approach to preseason preparation used by Indiana State University (ISU) throwers, including 17.34-meter collegiate shot putter Christy Barrett, who competed at the 1991 World University Games.

Track and field is unique when compared to other sports because the season is geared toward peaking for three or four important contests or meets. This makes periodization of the training program essential. A shot putters calendar year is broken into the following training phases: the preseason conditioning program from September through November; the strength-power phase, October and December; and January and February are a peaking and maintenance phase, with the indoor season climaxing at the end of February and the beginning of March. The strength-power phase is repeated in mid-March and April and peaking and maintenance are done again in May and June to prepare for outdoor conference and national championships. The months of July and August are considered the active rest or transition phase in preparation for fall.

Fall Preparation Phase

The primary objective of the fall preparation program is to ensure peak performance in key competitions. ISU throwers are trained as complete athletes and this is reflected in their practice regimen. To understand the preseason program at ISU, different training phases must be understood. Our preseason conditioning program assumes that the athletes will return with fitness levels ranging from sedentary to fairly active. At Indiana State, the year begins with low intensity and high volume to prepare the athletes for more specific, higher intensity work.

Each training session is designed to fit into a one week microcycle. A group of three to four microcycles forms a mesocycle. Each mesocycle is designed to build on the previous one and three to four mesocycles fit in the macrocycle. At ISU, two macrocycles form the annual plan. The first macrocycle extends through the indoor season and the second extends through the outdoor nationals. The preseason program is similar to the other field events, but has less emphasis on aerobic activity and more emphasis on strength and technique development. The physical components periodized for the year include strength training, medicine ball throws, running, plyometrics, circuits and shot put throws.

Strength-Power Phase

The strength-power phase begins in November and is very demanding. In this phase, quantity is reduced and quality is increased. For many of the throwing drills, the regulation shot is replaced by an overweight imple-

vegetables, breads, cereals, lean meat, fish, poultry and low-fat dairy products. To avoid excess fat in their food, athletes should limit the amount of fried foods, high-fat chips and crackers, salad dressing, butter, margarine, oils and high-fat desserts.

Protein

Protein is the least desirable energy source for volleyball athletes. If 10 percent of total calories consumed is protein, that is enough to provide adequate amino acids to repair, maintain and build muscle tissue. High-protein diets do not increase the capacity to build muscle tissue, but can provide excess calories that will increase body fat. The same is true for protein and amino acid supplements. If an athlete requests protein supplementation, consult a trainer, registered dietitian or health-care professional for advice. High-protein diets can be harmful and a waste of money.

Hydration

Long matches and practice sessions in a warm, humid gym can easily result in dehydration. It is important for athletes and coaches to prevent dehydration, rather than simply treat the symptoms. Athletes should be encouraged to drink at least 8 cups of water daily and 2 to 3 cups prior to practice or competition. Fifteen minutes before an event, another cup should be consumed. During a relatively intense physical activity, drinking about one half cup every fifteen minutes is recommended. Upon completion of the session, athletes should drink at least 2 cups of fluid for every pound lost during the event (2). The post-game snack can include carbohydrate drinks, which provide needed fluid, carbohydrates, and electrolytes. Electrolytes (sodium, potassium and chloride) are minerals essential to maintaining fluid balance throughout the body. Electrolyte replacement may be necessary after intense exercise or in case of dehydration.

Vitamins and Minerals

A balanced diet will provide most vitamins and minerals required by volleyball athletes. They must understand that consuming extra vitamins and minerals will not increase their energy level or enhance performance. Female athletes need to be particularly aware of their calcium and iron intake. Supplementation might be necessary if calcium and iron levels are consistently low.

Pre-game, Post-game and On-the-road Meals

Pre-game meals can prevent hunger during the event. The best choice for this meal is a high-carbohydrate, low-fat meal three to four hours before the event. The meal should consist of foods that are quickly digested, such as carbohydrate-rich foods (1). Nutritious food is available for traveling in most restaurants, including fast food operations. Pancakes, muffins, low-fat chicken sandwiches, thick crust pizza, bean burritos, baked potatoes and spaghetti are possible choices. Snacks such as fruit, juices, bagels, crackers, popcorn, muffins, low-fat meat and cheese are also convenient and healthy. Some athletes may prefer a small snack prior to warm-up or between games. It is important to replenish glycogen stores by eating a small, high-carbohydrate snack within one hour after competition.

Education

An abundance of information has been written in the last decade on sports nutrition. Unfortunately, research has shown that nutrition information is not reaching the athletes. Coaches and trainers occupy key roles in educating athletes on dietary choices. The inclusion of nutrition information in volleyball training programs can help accomplish many goals. The most obvious goal is to increase the potential for peak performance and secondarily, to influence healthy lifestyle changes among athletes. ●

The NSCA wishes to thank Gatorade for providing its support and resources in the development of the Sports Nutrition section of the NSCA Journal. We value Gatorade's constant endeavor to provide quality information to our readers.

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Strength-Power Phase

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Table 1. Preseason Conditioning Exercises

Warm-up
Jog 800 meters, partner-up and prepare to do the flexibility routine with a partner.

Flexibility
All stretching performed with a partner.

The stretches should be held 10-15 seconds and performed slowly and statically. Recommended stretches include:

1. Loosen upper body — rotate arms, rotate neck, rotate trunk and perform 5 reps each way.
2. Partner tricep stretch — you hold arm behind head, partner pulls down on wrist.
3. Standing pec. stretch — hold arms extended behind back and partner will pull them together.
4. Shoulder and pec. stretch — clasp hands behind head and have partner pull back on your elbows.
5. Hip stretch — sit down on the ground with one leg extended and the other crossed over it, looking over the opposite shoulder.
6. Lower back stretch — lay on your back with legs extended, then cross one extended leg over the other at a 90-degree angle.
   Have a partner help you hold.
7. Hamstring stretch — lay on back with legs extended, have partner pull leg back toward your head. Repeat each leg 3 times
   trying for improvement.
8. Standing quad stretch — stand balancing against a fence on one leg and grasp the other leg by the ankle.
9. Calf stretch — stand leaning against a fence with both hands, one leg extended behind and other one bent providing pressure.

General Strength Circuit

1. Crunches	x 30
2. Clap push ups	x 10
3. Leg toss	x 20
4. Push ups	x 15
5. V-ups	x 20
6. Leg scissors	x 20 in and out x 20

Medicine Ball (10 repetitions of each)
Catch and throw
Partner pass
Overhead throw on knees
Twists
Situps
Shot flips on knees
Shot drops
Overhead explosions

Plyometrics
5 x 5 boxes (double leg hop)
3 x 5 rotational boxes (sides, 180° 360°)
5 x depth jumps
5 x hurdle hops
5 x broad jumps

Jump Rope Exercises
1. 30 sec. warm up: regular jump
2. Jump rope circuit 15 sec. each: regular jump, side to side, front to back, double jump, skipping
3. 30 sec. cool down: regular jump

Sprints
An example of a microcycle for sprints during preseason preparation:

Monday	long sprints
Tuesday	short sprints
Wednesday	off
Thursday	short sprints
Friday	long sprints
Saturday	rest
Sunday	10-15 minute easy run

Short sprints (choose one)
1. 5 x 30 meters
2. 5 x 60 meters

Medium sprints (choose one)
1. 4 x 80 meters
2. 4 x 100 meters

Long sprints (choose one)
1. 3 x 150 meters
2. 3 x 200 meters

ment to build strength. The intensity of the medicine ball and plyometric exercises are increased, repetitions are lowered and the number of exercises is decreased. The emphasis is on all-out strength and power development.

Peaking and Maintenance Phase

An in-season peaking phase is the same for the indoor and outdoor seasons. There is a mini-peak at the end of each week with the major peak at the end of the phase. A typical week consists of heavy throwing and weight lifting early in the week, with low repetitions (3-5), basic exercises (bench, squat, clean) at high intensity (80-90 percent of 1 RM).

During the early indoor and outdoor seasons emphasis is on strength development. The middle of the week consists of light lifting, used for nerve stimulation, and light throwing. The end of the week is used for rest.

Close to the important competitions the work load is decreased. Two weeks prior to an important competition, heavy squats are discontinued and the lifting and throwing is light and fast.

Mini-transition Phase

Between the indoor and outdoor seasons, a three- to four-week strength-power stage is used to rebuild the base. This is also referred to as a mini-transition phase that is used to facilitate physiological and psychological restoration. The lifting and training volumes are increased

and intensity is decreased. Medicine ball exercises, plyometrics and a general strength circuit are done bi-weekly. The athlete is then ready to enter the in-season peaking phase for the outdoor season.

The Preseason Program

In the fall, the development of strength and endurance specific to throwing is emphasized. Preseason weight lifting is considered a hypertrophy or bodybuilding stage. The emphasis is on building an endurance base in the weightroom for future heavy lifting. Repetitions should be high (8-10), but the athletes should be encouraged to increase repetition maximums. Workouts will be based on a percentage of repetition maximum. Eight sets per body part are performed with two to three minutes rest between sets. Lifting is suggested four to six days per week with each body part worked bi-weekly.

Throwers also need to perform general conditioning activities that improve strength and coordination through body weight activities. General conditioning for throwers improves overall fitness and should remain fairly specific to anaerobic activities. Aerobic conditioning will not be emphasized but will include an 800-meter warm-up run, a general strength circuit done bi-weekly, a jump rope circuit, and an 800-meter cool down. Each workout should include a partner flexibility routine, form-running drills and abdominal exercises to enhance postural strength. A general strength circuit consisting of five body weight exercises performed twice a week, plus medicine ball exercises and plyometrics, are performed on days opposite the general strength circuit. Long sprints (150-200 meters) are done twice a week and short sprints (30-100 meters) are done on opposite days.

Preseason throwing includes repetitive activity designed to establish patterns and pathways to work from. Drills are employed in each of the throwing events, stressing proper body positions. Each throw can be broken down into parts and each part drilled either empty-handed or with an implement. This is an excellent time of year to teach the proper model to athletes so they can work on proper technique and change bad habits. The following is an example of a one-week microcycle:

Monday. Warm-up, flexibility, form drills, plyometrics, technique, long sprints, weights, cool down.

Tuesday. Warm-up, flexibility, strength circuit, technique, medicine ball, short sprints, weights, cool-down.

Wednesday. Warm-up, flexibility, jump rope circuit, individual technique work, weights, cool-down.

Thursday. Warm-up, flexibility, strength circuit, technique, medicine ball, short sprints, weights, cool-down.

Friday. Warm-up, flexibility, form drills, plyometrics, technique, long sprints, weights, cool-down.

Saturday. Warm-up, flexibility, weights.

Sunday. 10 to 15-minute easy run.

Each component of the preseason program is explained in detail in the following section, followed by an example of how each aspect can be integrated into the program.

Warm-up

Steady running for five to 10 minutes, followed by flexibility, form running and acceleration runs should be an integral part of the preseason preparation phase. At ISU, 3-5 sets of abdominals are performed daily as part of the warm-up. The 800-meter warm-up and cool-down run, strength circuit and high-repetition weight lifting will help build preseason endurance. Endurance specific to throwers is needed to prevent muscular fatigue, which can inhibit motor learning during lengthy training sessions. As more intense preparation and competition phases follow, some elements of the warm-up can be reduced to two days per week. The warm-up and cool-down runs should continue throughout the season.

Flexibility

Stretching must be incorporated into the training as part of the warm-up and should follow light jogging. This aspect of training is essential for athletes, as it allows full freedom of movement about all joints and enhances muscle elasticity. Flexibility should be done with a partner. Gradual "stretch and hold" methods should be used to elongate the elastic elements. Stretching should also be done after each training session to take advantage of muscle spindle fatigue, prevent soreness and enhance muscle-tendon elasticity.

General Strength Circuit

The general strength circuit consists of body weight exercises grouped to form a circuit to stress the aerobic system, build strength and enhance coordination and body awareness.

Athletes must be able to move their body weight efficiently. Often, athletes have trouble manipulating their body weight because they limit their training to free weights. The general strength circuit causes neuromuscular adaptations that improve coordination and body awareness.

The exercises in the strength circuit include push-ups, clap push-ups, crunches, leg tosses, leg scissors, chin-ups, back hyperextensions and dips. An example of a suggested preseason circuit is in **Table 1**. The repetitions for each exercise should start at 20-25 for

Table 2. Weight lifting-September Hypertrophy Phase

Monday
Legs

Abdominals (3 sets)
Squats (see percentage)
St. leg deadlift 3 x 8
Leg ext. 3 x 10
Leg curl
Calf raise 3 x 15

Tuesday
Chest and Triceps

Abdominals
Bench (see percentage)
Incline 3 x 10
Pullover 3 x 10
Close grips 3 x 10
Push downs 3 x 10

Wednesday
Back, Shoulders and Biceps

Abdominals
Cleans (see percentage)
Dumbbell military 3 x 8
Chins 3 x 5 (men)
Lat pulls 3 x 10
Dumbbell row 3 x 8
Preacher curl 3 x 8
Dumbbell curl 3 x 8

Thursday
Legs

Abdominals (3 sets)
Squat (see percentage)
Lunges 2 x 10
Leg ext. 3 x 10
Leg curl 3 x 10
Calf ext. 3 x 15

Friday
Chest and Triceps

Abdominals (3 sets)
Bench (see percentage)
Dumbell incline 2 x 10
Flys 3 x 10
French curls 3 x 10
Dips 3 x 10

Saturday
Back, Shoulders and Biceps

Abdominals. (3 sets)
Cleans (see percentage)
BNP 10, 8, 6
Lat raise 3 x 8
Chins 3 x 5 (men)
Lat pulls 4 x 8
Cable row 3 x 8
Preacher curls 3 x 12
Dumbbell curls 3 x 10

Percentage for bench and squat (estimate 10 rep. max.)

		Workout 1	Workout 2
Week	1	5 x 10 75%	4 x 10 85%
	2	4 x 10 80%	3 x 10 90%
	3	4 x 10 85%	2 x 10 95%
	4	4 x 10 80%	1 x 10 100% (try for 10 rep. max.)
	5	*Start sets of 5	

Percentage for Cleans (estimate 5 reps. max.)

		Workout 1	Workout 2
Week	1	5 x 5 75%	4 x 5 85%
	2	4 x 5 80%	3 x 5 90%
	3	4 x 5 85%	2 x 5 95%
	4	4 x 5 80%	1 x 5 100%

abdominal exercises and 15-20 for upper-body exercises. These should be adjusted to fit the athlete, and as fitness improves, the athlete can perform more repetitions or repeat the circuit.

Medicine Ball

This training consists of a group of exercises with a 2-kilogram ball that strengthens the abdominals and torso. These exercises help improve flexibility, strength and coordination, and can be valuable in adding an increased load to all muscle groups. These drills are particularly useful for developing ballistic strength in the trunk, back and shoulder girdle. Athletes should pair up and follow the exercises listed in **Table 1**. Ten repetitions should be performed in each exercise and as the athletes progress, the number of repetitions should be increased or a heavier ball used.

Plyometrics

One of the objectives in training for power is to involve as many motor units (muscle fibers) as possible in a quick, explosive contraction. Plyometrics involves simultaneous voluntary and involuntary muscle contractions. Therefore, more motor units are called upon during a single contraction of this type than would be used in either contraction alone. Plyometrics is an eccentric contraction followed immediately by a concentric contraction that helps train the fast-twitch fibers specific to throwing. Plyometrics, including box jumps, depth jumps, hurdle hops and

Table 2. Weight lifting-September Hypertrophy Phase *(continued)*

October Strength/Power Phase

Monday
Chest, Shoulders and Triceps

Abdominals (3 sets)
Squats (see percentage)

Front squats 3 x 5

Leg press 10, 8, 6
Calf raise 3 x 15

Tuesday

Back and Biceps

Abdominals (3 sets)
Bench (see percentage)

Incline 3 x 5

Close grips 3 x 5
BNP 3 x 5
Push downs 3 x 6

Wednesday

Legs

Abdominals (3 sets)
Cleans (see percentage)
Chins 3 x 5
Lat pulls 5 x 6
Dumbbell rows 3 x 6
Standing curl 3 x 6

Dumbbell curl 3 x 6

Thursday
Legs

Abdominals (3 sets)
Squats (see percentage)
Lunges 2 x 8
Leg ext. 3 x 6
Leg curl 3 x 6
Calf raise 3 x 12

Friday
Chest, Shoulders and Triceps
Abdominals (3 sets)
Bench (see percentage)
Incline 3 x 5
Close grips 3 x 5
Weighted dips 3 x 5
French curls 3 x 8

Saturday
Back and Biceps

Abdominals (3 sets)
Cleans (see percentage)
Snatches
Chins 3 x 5
Lat pulls 4 x 8
Bent row 3 x 8
Preacher curl 4 x 8
Dumbbell curl 3 x 8

Percentage for bench and squat (estimate 5 RM)

		Workout 1		Workout 2	
Week	1	4 x 5	85%	5 x 5	75%
	2	4 x 5	90%	5 x 5	80%
	3	3 x 5	95%	5 x 5	85%
	4	1 x 5	100%	4 x 5	70%

Percentage for cleans

		Workout 1		Workout 2	
Week	1	4 x 4	85%	5 x 4	75%
	2	4 x 4	90%	5 x 4	80%
	3	3 x 4	95%	5 x 4	85%
	4	1 x 4	100%	4 x 4	70%

many types of bounding drills, should be performed in moderation only twice a week in the preseason and once a week during the season. Plyometrics should not be performed by athletes with orthopedic injuries.

Strength Training

Strength is the basis for all other aspects of training. A stronger athlete can perform better technically and achieve higher levels of performance. Strength training must be a major element in the training of a successful thrower and must be carried out with a planned program throughout the year.

The preparation begins with the hypertrophy phase in September **(Table 2)**. This should encompass a wide variety of exercises and involve all muscle groups. These exercises should include the classic power lifts and Olympic lifts, but must also include supplementary or support exercises more specific to throwing events. Alternate light and heavy workouts and work each body part bi-weekly. Base each workout on a percentage of a repetition maximum for the particular mesocycle. In September, perform sets of 10 repetitions. In October drop to sets of 5 repetitions and in November move to sets of 8. The jump from 10 to 5 repetitions has proven to be very effective as a means of gaining strength because the sudden decrease in volume and rise in intensity shocks the system. This will help promote faster gains in the training intensity of the throwing. Sets of 5 also prepare the athlete to handle heavier loads for sets of 8 in November. Lifting should be per-

Table 3. Training the Shot Put (Preseason)

Order of Drills		Collegiate Women		Collegiate Men		High School Boys		High School Girls	
Drill		**Wt.**	**#**	**Wt.**	**#**	**Wt.**	**#**	**Wt.**	**#**
Wrist Flips		12 lb	(3)	20 lb	(3)	16 lb	(3)	12 lb	(3)
Front Push		12 lb	(3)	20 lb	(3)	16 lb	(3)	12 lb	(3)
Standing Throws	#1	12 lb	(5)	20 lb	(5)	16 lb	(5)	12 lb	(5)
	#2	12 lb	(8)	20 lb	(8)	16 lb	(8)	12 lb	(3)
Glides		12 lb	(5)	20 lb	(5)	16 lb	(5)	12 lb	(5)
		10 lb	(6)	18 lb	(6)	14 lb	(6)	10 lb	(6)
		4 kg	(5)	16 lb	(5)	12 lb	(5)	4 kg	(5)
Glides (with reverse)		4 kg	(15)	16 lb	(15)	12 lb	(15)	4 kg	(15)

*All drills are performed without the reverse unless indicated

Training the Shot Put (Inseason)

Order of Drills		Collegiate Women		Collegiate Men		High School Boys		High School Girls	
Drill		**Wt.**	**#**	**Wt.**	**#**	**Wt.**	**#**	**Wt.**	**#**
Standing Throws	#1	12 lb	(5)	20 lb	(5)	16 lb	(5)	12 lb	(5)
	#2	12 lb	(6)	20 lb	(6)	16 lb	(6)	12 lb	(6)
Glides		12 lb	(3)	20 lb	(3)	16 lb	(3)	12 lb	(3)
		10 lb	(3)	18 lb	(3)	14 lb	(3)	10 lb	(3)
		4 kg	(3)	15 lb	(3)	12 lb	(3)	4 kg	(3)
Glides (with reverse)		4 kg	(10)	16 lb	(10)	12 lb	(10)	4 kg	(10)
(with reverse)		8 lb	(8)	14 lb	(8)	10 lb	(8)	8 lb	(8)

Table 4. Explanation of Throwing Sequence Drills

Throwing Drill Progression (Glide)

Wrist Flip: Stand at the front of the ring with both feet at the toe board, the shot off the neck and at the shoulder. Flip the shot with the elbow up and the thumb down. Work on keeping elbow up and flipping off the fingers (this drill warms up wrist).

Front Push: Stand at the front of the ring with both feet at the toe board, the shot off the neck and at the shoulder. Step back with the drive leg and turn the upper body slightly toward the back of the ring. Flip the shot with the elbow up and the thumb down. The front push is done like a wrist flip, but with right leg back and emphasis on right side speed.

Standing Throw #1: Rotate hips and throw the shot with a tilted axis at a 45+ degree angle. Emphasis is on hip rotation with no forward thrust. Work for position only and do not reverse. Work on rotating hips while keeping upper body back.

Standing Throw #2: Start from an upright (stickman) position with the hips over the leg. Bend a little more on each throw during warm up. Drive the upper and lower body all the way through. Emphasis is on a one-two action: 1. (hip rotation), and 2. (shoulder rotation). Again, work for position only and do not reverse.

Glide (no reverse): The first 15 or 20 glides are done without the reverse. The majority of the practice is done without the reverse to ensure proper hip drive and the block.

Glide (full technique): These are done at the end of a workout when the nerves are ready and positions are set up by the no reverse workout. Reverse and work on the rhythm of the full technique.

formed six days per week during the summer, September and October; four days per week November-January; and, three days per week during the competitive season.

Throwing Overweight Implements

In the preseason preparation phase, the athlete should work with heavy shots to build throwing strength. This serves as the final ingredient in our fall preparation phase and is the key to success with the dynamic glide. A ladder-type system is used, starting heavy and moving to a lighter implement as the athlete tires and technique deteriorates. This workout helps improve power and makes up for deficiencies in the weightroom.

Six weeks of this will bring immediate results. As the season progresses the ladder can be adjusted downward for more speed work. **Table 3** includes a typical throwing workout for a collegiate or prep thrower. The different throwing drills are explained in **Table 4**.

Using heavy shots can help build specific throwing strength, as well as improve core strength and technique. Often, athletes can muscle the lighter shots and get away with bad habits. But when using the heavy shots, athletes must concentrate on proper technique to manipulate the overweight implement.

Conclusion

Success in throwing events is no accident. An optimal peak performance in the shot put is the result of a carefully planned program integrating several components of training. Training for the shot put includes aspects of Olympic lifting, power lifting, and bodybuilding, as well as running, jumping and throwing. The coach must formulate the proper mix according to the needs of each athlete. For optimal performance, no detail should be left to chance. The incorporation of periodization into the training program of a shot putter is essential. However, consistency is the key to success in any training program. ●