

### 11.1.6. Shooting warm-up

This is the final warm-up phase and is often implemented using a blank buttress.

During this phase review what was taught during the previous practice session. After this review, the coach will either choose to either teach a new skill or to reinforce the previous one.

If the decision is made to continue working on a previously learned skill, it is a good idea to incorporate the circuit of cut-out target faces from the Standard Teaching Process in the shooting warm-up.

## 11.2. CARDIO-VASCULAR DEVELOPMENT

Although archery is known as anaerobic a-lactic activity (i.e. one that does not produce lactic acid), good cardiovascular efficiency provides an excellent foundation to the archer.

During competitions and training sessions (except in the case of very specific training situations) the heart rate should never reach particularly high values. If the heart rate does rise significantly, it is most likely due to emotional factors and not the required metabolic effort.

An efficient cardiovascular system allows a faster and more effective recovery through the faster elimination of the residues of energy production generated by continuous and repetitive efforts; therefore it delays fatigue. In addition, good circulation enables faster heart rate stabilisation, creating a more consistent and optimal shooting state for the archer.

Aerobic activity is anything that elevates the heart rate in a free-breathing environment as for instance running, cycling, fast walking, rowing and sport games such as basketball, football, handball, etc. Furthermore, such an activity is only considered aerobic when the heart rate is between 50 and 80 percent of the participant's maximum heart rate.

Through a simple formula (called the Karvonen formula) it is possible to determine, simply and precisely, the proper heart rate required to attain a specific degree of aerobic benefit.

$$\mathbf{((HR\ max - HR\ at\ rest) \times\ percent\ intensity) + HR\ at\ rest}$$

In the above formula, "HR max" is the participant's maximal Heart Rate, and "hr at rest" is their heart rate at rest.

For example, for a healthy novice who has a maximum heart rate of 180 bpm (beats per minute) and a resting rate of 70 bpm, if he has to work at 60% of his maximal cardiac efficiency the formula becomes:

$$((180-70) \times 0.60) + 70 = 136\ \text{bpm}$$

In this example, the heart rate derived from the Karvonen formula should allow the novice to easily and with minimal risk proceed with the selected physical activity at a consistent and bearable rhythm for a long enough period of time to provide positive effects and increase his aerobic fitness.

Exercising with too high a heart rate risks injury, delayed recovery and wastes too much energy for the individual's objectives. Conversely, working in a range that is at too low a level does not produce any kind of cardiovascular adaptation.

Ideally the activity selected for the aerobic training portion will be varied regularly, i.e. alternating running sessions with cycling sessions and with other sports. This is especially true if young novices are involved as the variety will help them improve their level of motor coordination.

Aerobic training can be done before or after a shooting session. For instance 15 to 20 minutes of running at a pace defined by the Karvonen formula would not cause any trouble to the novices at the beginning of a training session. Better still, a prolonged warm-up benefits all levels of performance by improving flexibility and increasing the body temperature (making muscular contraction easier as well as other positive impacts) in concert with improving cardiac fitness. Alternatively, a physical training session performed at the end of a shooting session yields many advantages with respect to organic and muscular recovery.

If the novice already has a good level of physical efficiency, it is possible to start with 10 minutes of running and then increasing the duration to 30-40 minutes over a few sessions. If the novice is not receptive to this increase, or the novice is not trained in the exercise, it is better to start with a fast walking session and progress from there.

The novice should not consciously increase their speed; any increase will occur automatically as the cardiovascular system becomes more efficient. As the novice's fitness improves, their heart rate for the same level of physical exertion and the engagement will drop. Consequently to maintain the pulse at the preselected rate,

the novice will automatically increase their pace.

The objective is to maintain a constant heart rate at the preselected target during the physical training session.

Periodically, have the beginners take their pulse during the exercise session to gauge their intensity level. Typically, the easiest location for taking a pulse is the carotid artery on the side of the neck. Take care not to press too hard on the carotid artery to avoid an inaccurate reading. Count the number of beats for 6 seconds and multiply that number by 10, or count for 10 seconds and multiply by the number of beats by 6 to get the number of times the heart is beating per minute. If the pulses of the beginners are within their target heart rate zone, they are right on track. If not, adjust the exercise workload until they get into their selected range.

As soon as clear improvements appear, the novice should increase their intensity level, for example from 60% to 65%. Continue increasing the challenge as appropriate until the novice reaches 80% of their maximum heart rate.

Keep in mind that aerobic activities can be performed in "circuits" in alternation with more specific shooting exercises. This kind of training is normally utilized to increase the novice's overall fitness. An example of a circuit would be 6-arrow ends alternated with 2 or 3 minutes of running for a number of repetitions to challenge the level of the novice. Aerobic activities can be also utilized, again as a circuit, in alternation with strength exercises, and strength training circuits can also be intermixed with shooting.

## 11.3. BODY BALANCE

The ability of a novice to maintain a controlled, stable equilibrium for a long time on the shooting line is often a condition that can make the difference, either positive or negative, in the final result. This is especially true in situations that involve rain, wind, unstable ground surface, etc.

Even without any wind, if the novice's body sways, the visual alignments used for aiming are disturbed. The novice usually reacts to this by moving the bow arm in order to bring the sight (or arrow point depending on the aiming system) back to the centre of the target. In the meantime, the body sways back, making the visual alignment wrong again. So the novice moves to regain their alignment and so on, creating a vicious circle in which more and more tension builds in the novice's body. By the end of this scenario, even if the novice releases properly, the arrow impact in the target will be away from the centre because the arrow has been propelled from a different "launch pad".

Also, an unstable body generates only a few, very brief, coordination opportunities between the visual references and the novice's feelings (see Chapter 1). This generally results in a conscious and deliberate release by the novice instead of the smooth, serene release brought about by a perfect follow-through.

In archery, a strong body balance is required in order to keep the aiming eye in a stable special position during the shooting sequence, particularly during the force production period at full draw.

In this section, two aspects of body balance are covered:

- General Body Balance
- Shooting Body Balance

### 11.3.1. General Body Balance:

#### 11.3.1.1. Body balance exercises on feet without any device:

The following generic exercises have to be implemented at least 3 times per week for a minimum of 4 weeks to be effective. The sessions will typically progress as follows: 30 seconds per exercise in the 1<sup>st</sup> session - 35 seconds in the 2<sup>nd</sup> session - 40 seconds in the 3<sup>rd</sup> session - 45 seconds in the 4<sup>th</sup> session - 50 seconds in the 5<sup>th</sup> session - 55 seconds in the 6<sup>th</sup> session - 1 minute for the following sessions.

#### Standing on level ground with feet in a line heel-to-toe:



Static posture, feet in line, eyes closed

Start with one foot forward, then repeat the exercise with the other foot forward. Closing the eyes makes the exercise more challenging.

#### Standing on level ground on one foot:



Static posture on one foot, eyes closed

Perform the exercise once for each foot. Closing the eyes increases the challenge of the exercise.

### "The Plane"



The plane, eyes closed

Balanced on one foot, lean forward at the waist with arms stretched out to the sides and the second leg straight out behind. Repeat the exercise, switching which leg is on the ground. Closing the eyes increases the challenge of the exercise.

### "Reverse Plane"



Reverse plane, eyes closed

Balanced on one foot, lean backwards with arms stretched out to the sides and the second leg straight out in front. Repeat the exercise, switching which leg is on the ground. Closing the eyes increases the challenge of the exercise.

### Static lunge



Static lunge, eyes closed

Take a large step forward, keeping the feet no more than shoulder width apart in the left-to-right direction, and push the trailing knee towards the ground. Repeat with the other foot forward. Closing the eyes increases the challenge of the exercise.

### Static equilibrium on the edge of a step

The following set of exercises can be implemented on the edge of a pavement or step. If on a stair, for safety purposes, chose the lowest step. All of these exercises are static; hence the beginners should not walk. The equilibrium on one or two heels exercises could be done with the eyes closed.

a)



Same exercise in both directions with the right foot front, eyes closed





Same exercise in both directions on each foot, eyes closed



On two heels, eyes closed or open



And one heel (do both)



On two points of feet or the point of one foot (do both), eyes closed

### Slow continuous walk



Slow and continuous walk

Walk continuously for one minute, travelling only 2 meters.

### Slow and continuous rotations



Continuous slow rotation on 1 foot, eyes closed

Standing on one foot, twist at the torso, first to the right, then the left and finishing centred, in one minute. Repeat for the second foot. Closing the eyes increases the challenge of the exercise.

### Slow tiptoe squats



Slow and continuous squats on toes, eyes closed

Standing with feet together, rise to a tiptoe position (up on the toes). From this position slowly squat down as low as possible then slowly rise to a standing position again. Closing the eyes increases the challenge of the exercise.

### One leg squats



Slow squats on one foot, eyes closed

Standing on one foot, slowly squat as low as possible and then slowly return to the standing position. Repeat the exercise with the second leg. Closing the eyes increases the challenge of the exercise.

### Two foot twist-walk



Twist on two feet

Standing on two feet, “walk” laterally by twisting the feet. Only the ankle moves, the hips must be kept in line directly below the shoulders. Move 4 meters back and forth.

### One foot twist-walk



Twist on one foot

Standing on one foot, “walk” laterally by twisting the foot. Only the ankle moves, the hips must be kept in line directly below the shoulders. Move 4 meters back and forth. Repeat the exercise with the second foot.

### 11.3.1.2. Proprioceptive or wobbling boards:

Improve body balance and control by maintaining balance while standing on differently configured wobble boards. A suggested progression is:

- Start with 40 seconds minimum
- Increase progressively to 1 minute
- Have the novice simulate 3 shots without equipment
- Have the novice simulate 3 shots with an elastic band

- Forward-backward
- Left-right



- or, 360°



All of these exercises can be executed with one foot or two feet on a single board, or using two boards.

Also mixed boards can be used, for example one foot on a forward-backward wobble board and the other foot on a left-right wobble board.



The 360° exercise can also be done with a board laid down over an inner tube that is not fully inflated.





### 11.3.1.3. Body balance exercises with light overloads:

In the standing position the human being is constantly re-centring the body from any direction of swing. To refine this re-centring process, here are some exercises in which the novices tilt in various directions to reach the limit of their balance and hold that position. Make sure that the novices keep the bodyline straight at all times, taking special care not to break at the waist.

Start by doing the exercise with body weight only, then add a light weight held over the head to increase the challenge. The amount of weight held overhead varies according to the ability of the novice. A general target is about 5-8 kg for experienced novices.



### 11.3.2. Shooting Body Balance

The concept here is to create some instability while the novice is shooting in order to improve their balance and stability on solid ground. This can be accomplished simply by having the novice shoot from an unstable platform.



#### 11.3.2.1. Wobbling in one direction

- a. From the left to the right foot  
Demonstrated in the picture above by the athlete on the right. Below is a view of the underside of the board.



- Board size = 40 x 70 cm;
- Fix two partial wooden disks of 83 cm (33") diameter 25 cm apart from each other on the underside;
- Use a non-slip board;



b. From heels to toes  
Shown in the image below.



- Board size = 40 x 70 cm;
- Fix two partial wooden disks of a 52cm (21") diameter 50 cm apart from each other on the underside;
- Use a non-slip board;

Some suggestions:

- Keep the partial disks quite short (maximum 12 centimetres high) to reduce the risk of injury in case the novice slips off the board;
- fix the partial wooden disks with screws;
- Prepare partial wooden disks in various sizes (diameters) in order to suit the balance skill of the novices and to create a progression in the level of instability;
- When shooting from natural ground, put a flat board on the ground first as a solid surface for the wobble board to sit on.

### 11.3.2.2. Wobbling in all directions

This can be achieved by lying a board on an inner tube that is partially inflated.



500-10, or more challenging 480/400-8", are popular sizes of tubes for novices

Some suggestions:

- The inner pressure has to be modified depending on:
  - The balance skill of the novice;
  - The body weight of the novice.
- Choose a large enough tube to avoid the board touching the floor;
- Ideally use a round board, so the corners will not hit the floor;
- Prepare tubes from various diameters (e.g. some 8" and a few 12") in order to fit the balance skill of the novices and to create a progression in the level of instability.